Univerza *v Ljubljani*
Fakulteta *za farmacijo*

60 let Fakultete za farmacijo Univerze v Ljubljani

JUBILEJNO POROČILO O DOSEŽKIH

JUBILEE PROGRESS REPORT

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UVODNI POZDRAV

Spoštovani bralci jubilejnega Poročila o dosežkih,

štejem si v čast, da vas smem nagovoriti v jubilejnem študijskem letu 2020/21. Fakulteta za farmacijo praznuje 60 let od vzpostavitve popolnega študija farmacije na Univerzi v Ljubljani, kar predstavlja temeljni kamen vzpostavitve Fakultete za farmacijo. Spoštljivo zremo na pot, ki so jo prehodili snovalci fakultete, da lahko mi danes ustvarjamo svojo kariero ter odgovorno opravljamo poslanstvo kakovostnega izobraževanja, raziskovalne odličnosti in vpetosti v stroko. Ob tej priložnosti se zahvaljujem vsem, ki ste in ki danes soustvarjate ime Fakultete za farmacijo. Posebno zahvalo želim izreči vsem soavtorjem pričujočega jubilejnega Poročila o dosežkih, ki je rezultat dela vseh generacij sodelavcev fakultete. Vsem se iskreno zahvaljujem za požrtvovalnost.

V 60 letih delovanja je Fakulteta podelila več kot 6000 diplomskih, magistrskih in doktorskih listin, oblikovala prepoznavne snovalce idej in nosilce razvoja, počastila in obeležila izjemne dosežke stanovskih kolegov, študentov in poslovnih partnerjev. Šest tisoč formalno ali neformalno povezanih diplomantov soustvarja družbeni položaj poklicev in strok kakor tudi podobo Fakultete za farmacijo Univerze v Ljubljani (UL FFA).

UL FFA je krožišče številnih mladih karier, več kot 1500 študentom se letno pridruži blizu 100 tujih študentov na izmenjavi, podobno število naših študentov se izmenja na evropskih partnerskih fakultetah. Fakulteta predstavlja neločljiv preplet študentov in zaposlenih. Odlično sodelujemo na področjih mednarodnih aktivnosti, izboljšanja študijskih procesov, raziskovalnega dela in vpetosti v družbo.

Z leti se je Fakulteta razvila v vrhunsko znanstveno inštitucijo. Razvijali smo klasične farmacevtske discipline na področjih tehnologije, biofarmacije, farmacevtske kemije in farmakognozije, ob tem pa sledili in implementirali področja genetike, biotehnologije, celičnih in naprednih terapij, nanotehnologije, toksikologije in translacijskih raziskav.

UL FFA živi vizijo povezljivosti, mednarodne razsežnosti in vpetosti v razvoj za blaginjo sočloveka. S predanostjo uspehi ne izostanejo. Znanstvenih in strokovnih uspehov si ne predstavljamo brez interdisciplinarnih povezav, ki prepletajo stroke, institucije in ljudi ter presegajo nacionalne in regionalne meje. Tak pristop se zrcali v naših znanstvenih dosežkih, kar uvršča fakulteto v svetovnem merilu med 200 najboljših fakultet za farmacijo. Nova znanstvena in strokovna spoznanja vgrajujemo v študijske programe, tudi s pomočjo strokovnjakov iz prakse. Odlično sodelujemo s farmacevtsko industrijo, lekarniškimi zavodi, bolnišnicami in drugimi zaposlovalci diplomantov UL FFA. Povezovanje omogoča skupne vrhunske znanstvene dosežke in razvoj novih storitev na področju farmacije v skrbi za paciente.

Fakulteta deluje v urejenih, a utesnjenih prostorih, zato že vrsto let potekajo aktivnosti za oblikovanje konceptualnih in vsebinskih podlag in pridobitev urbanističnih in arhitekturnih pogojev za novogradnjo fakultetnih prostorov v

univerzitetnem kampusu Brdo. Leta 2020 smo zaključili javni, anonimni, dvostopenjski projektni urbanistični in arhitekturni natečaj za novogradnjo. Nagrajena rešitev projektantov ATELIERarhitekti v skupnem nastopu z ARHEMA razvije kompozicijo, ki uspešno integrira sproščen prostor akademskega in raziskovalnega ustvarjanja s kompaktno urejenim laboratorijskim okoljem. Ta obsega skupaj 31.150 m2 površin. Fakulteta ob tem izvaja številne aktivnosti, vezane na urejanja prostora, projektiranje novogradnje in zagotavljanje finančnih virov.

Jubilejno leto 2020/2021 pa je pred našo družbo postavilo nepredvidljive izzive. Pandemija okužbe z virusom Sars-Cov-2 je vstopila v naša življenja nepovabljena, a vendar vsaj toliko obzirno, da smo se lahko podučili o razvoju bolezni, epidemiološki sliki in lastnostih mikroorganizma ter terapevtskih in sociooloških ukrepih za zajezitev ter zaščito zdravja posameznikov.

Odločali smo se hitro, a pravilno. Skladno z odlokom Vlade in s sklepom rektorja smo na UL 11. marca 2020 prenehali z vsemi aktivnostmi. Pedagoško, raziskovalno in administrativno delo se je tako rekoč čez noč preselilo na medmrežje. Predavanja na daljavo so potekala s pomočjo komunikacijskih orodij MS Teams, ZOOM, Webex in Moodle. Soočili smo se z mnogimi izzivi, ki smo jim bili kos zaradi kolegialne pomoči profesorjev, asistentov, tehničnega in administrativnega osebja. Posebej želim izpostaviti veliko mero solidarnosti med zaposlenimi, kakor tudi študenti. Študenti so se na nove razmere odzvali izjemno dobro, predvsem pri oblikah individualnih študijskih vsebin. Razmere, ki smo jih predvideli za nekaj tednov, morda mesecev trajajo tudi drugo leto. Naš vsakdan poteka po res nepredvidljivih poteh, vendar z jasno zastavljenim ciljem, da v čim večjem obsegu napredujemo s študijskim procesom, saj delodajalci potrebujejo naše diplomante in družba novo znanje.

Kot družbeno odgovorna institucija smo se na pandemijo odzvali z ustanovitvijo delovne skupine, ki spremlja novosti na področju diagnostike infekcij z virusom SARS-CoV- 2 in terapije COVID-19 ter skrbi za informiranje laične in strokovne javnosti. Učitelji in raziskovalci FFA smo se odzvali na pandemijo SARS-Cov-2 tudi na raziskovalnem področju. Preusmerili smo raziskovalne kapacitete, oblikovali smo zasnove projektov in v interdisciplinarnih partnerstvih pridobivamo nova spoznanja za svetovno zakladnico znanj. Iz te zakladnice so črpala tudi globalna partnerstva farmacevtskih družb in akademskih inštitucij, kar je omogočilo silovit preboj. V manj kot letu dni so uspešno razvili cepiva proti virusu SARS-CoV-2. Znanost nas vedno znova navdušuje in upravičeno smo lahko ponosni na dosežke strok, za katere izobražujemo in so matične na Fakulteti za farmacijo Univerze v Ljubljani.

Ne glede na omejitve, ki jih prinaša pandemija, želimo leto 2020 obeležiti s pomembnimi dogodki sedanjosti in naše preteklosti, med katerimi nedvoumno izstopata 60. obletnica Fakultete za farmacijo in projekt novogradnje FFA Brdo. Častitljivi jubilej smo obeležili v posebni izdaji Farmacevtskega vestnika, saj smo želeli poudariti odlično povezavo fakultete in Slovenskega farmacevtskega društva. Prav tako smo želeli, da informacija o razvoju in uspehih doseže diplomante Fakultete za farmacijo, člane društva, saj je to skupen praznik. V počastitev 60. obletnice fakultete so sodelavci pripravili razstavo umetniških fotografij, ki so nastajale med eksperimentalnim delom zaposlenih.

Slavnostno akademijo smo načrtovali kot vrhunec praznovanja, zaradi epidemioloških omejitev smo jo preoblikovali in zapis prenesli v filmski medij, ki nestrpno čaka premiero v predpoletnih dneh. Temu bo sledila razstava o Fakulteti za farmacijo, ki se bo javnosti predstavila ob zgodnjepoletnih sprehajališčih ob Ljubljanici.

Želim, da smo ponosni na uspehe Fakultete za farmacijo Univerze v Ljubljani, ki že 60 let predano in vztrajno skrbi za razvoj stroke in ljudi. Ohranjamo in izboljšujemo pomembno vrednoto – zdravje ljudi.

Čestitam vsem, ki čutite to kot naš skupni jubilej.

Prof. dr. Irena Mlinarič-Raščan
dekanja Fakultete za farmacijo Univerze v Ljubljani

GREETINGS BY THE DEAN

Dear readers of the Jubilee Progress Report,

I am honoured to address you in the jubilee academic year 2020/21. The Faculty of Pharmacy is celebrating 60th anniversary of a complete pharmacy study establishment at the University of Ljubljana. This event is considered the cornerstone of the Faculty of Pharmacy establishment. We respectfully look at the path taken by the founders of the faculty, enabling current generations the development of careers and responsible fulfilment of mission in good-quality education, research excellence and professional input. I would like to take this opportunity to thank all of you who were and are today co-creating the name of the Faculty of Pharmacy. I would like to express special thanks to all the co-authors of this Jubilee Progress Report, which is the result of the work of all generations of faculty members. I sincerely thank everyone for their contribution.

In its 60 years of operation, the Faculty has awarded more than 6,000 diploma, master's and doctoral certificates, fostered recognizable creators and developers and honoured the outstanding achievements of colleagues, students and business partners. Six thousand formally or informally linked alumni form professional societies and reflect the image of the Faculty of Pharmacy of the University of Ljubljana (UL FFA).

UL FFA is a crossroads of many young careers, more than 1500 students are joined annually by close to 100 foreign exchange students, a similar number of FFA students are exchanged at European partner faculties. Faculty exemplifies an inseparable intertwining of students and employees. We are proud of excellent cooperation in the fields of international activities, improvement of study processes, research work and society outreach programmes.

Over the years, the Faculty has developed into excellent scientific institution. We have developed classical pharmaceutical disciplines in the fields of technology, biopharmacy, pharmaceutical chemistry and pharmacognosy, along with pursuing and implementing fields of genetics, biotechnology, cell and advanced therapies, nanotechnology, toxicology and translation research.

UL FFA lives a vision of networking, internationalization and involvement in the development of human well-being. With dedication, success cannot be left behind. We cannot imagine scientific and professional success without interdisciplinary connections that intertwine professions, institutions and people and transcend national and regional borders. Such an approach reflects scientific achievements, ranking the faculty among the 200 best faculties of pharmacy on a global scale. The faculty nurtures the study programmes by incorporating new scientific and professional knowledge, also with the help of external experts, representatives of pharmaceutical industry, pharmacies, hospitals and other employers of UL FFA graduates. The cooperation enables common scientific achievements and the development of new services in the field of pharmacy in patient care.

The faculty operates in well-regulated, but restricted spaces. Therefore, activities have been carried out for a number of years to conceive concepts and content and to obtain urbanistic and architectural requirements for construction of new faculty premises in Brdo University campus. In 2020 we completed a public, anonymous, two-stage project oriented urban and architectural competition for new construction. The award-winning architecture is of ATELIERarhitekti in a joint performance with ARHEMA. Proposed solution develops a composition that successfully integrates a relaxed space of academic and research creation with a compactly arranged laboratory environment. This covers a total of 31.150 m2. Furthermore, the faculty carries out numerous activities related to spatial planning, design of new buildings and provision of financial resources.

The jubilee year 2020/21 posed unpredictable societal challenges. The Sars-CoV-2 virus pandemic entered our lives uninvited, but at least it was considerate enough to permit learning about the disease development, the epidemiological characteristics and properties of the microorganism, as well as possible therapeutic and sociological measures to contain the infection and protect the health of individuals.

The decision making was fast and correct. In accordance with the decree of the Government and the Rectors instruction the activities at the University were passed on March, 11th 2020. Pedagogical, research and administrative work relocated to the internet almost overnight. Distance learning was set up with the help of MS Teams, ZOOM, Webex and Moodle communication tools. We were faced with immense challenges that were successfully addressed and tackled by the collegial assistance of professors, assistants, technical and administrative staff. Most importantly I wish to highlight a great deal of solidarity among faculty employees as well as students. The students responded extremely well to the new situation, mostly in the forms of individual assignments. The situation, which was expected to last for a few weeks or months now lasts for a second year. Our everyday lives run in truly unpredictable ways, but with a clearly set goal of advancing through the study process, since the employers are in need of our graduates and the society in need of new knowledge.

As a socially responsible institution we responded to pandemic by establishing a working group that monitors innovations in the field of diagnostics of Sars-CoV-2 virus infections and COVID-19 therapy, and informs the lay and professional public. FFA teachers and researchers responded to the Sars-CoV-2 pandemic in the research field as well. We have redirected research capacities, designed project concepts and through interdisciplinary partnerships gained new knowledge contributing to global knowledge treasury. Global partnerships of pharmaceutical companies and academic institutions have also benefited from this treasury, enabling powerful breakthroughs. In less than a year vaccines against the Sars-CoV-2 virus have been successfully developed. We are fascinated by science and we can be justifiably proud of the achievements of professions for which we educate and are a household stance of the Faculty of Pharmacy of the University of Ljubljana.

Regardless of the limitations of the pandemic, we wish to mark year 2020 with important events of the present and our past, among which are the 60th anniversary of the Faculty of Pharmacy and FFA Brdo new premises project. In the light of jubilee and to emphasize the excellent relation of the Faculty to Slovenian Pharmaceutical Society, a special issue of the Pharmaceutical Journal was dedicated to the 60th Anniversary. In this way a vast number of graduates of the Faculty of Pharmacy and members of the society were reached and addressed, since this is our common jubilee. On the occasion of the 60th anniversary faculty members have organised an exhibition of artistic photographs created during their experimental work.

The Academy was planned as a principal celebrating event; however, it was redesigned due to epidemic restrictions. The message was instead transferred to film media, which is eagerly awaiting the premiere in pre-summer period. Furthermore, early summer promenades along Ljubljanica river will present the activities and ambition of the UL FFA.

I wish us to share pride of the success of the Faculty of Pharmacy of the University of Ljubljana, which has been dedicated and persistent in the development of the professions and people for 60 years. We maintain and improve an important value - human health.

Congratulations to all of you who feel this as our common jubilee.

Prof. Dr. Irena Mlinarič-Raščan
Dean

1 60 let farmacije v Sloveniji
60 Years of pharmacy in Slovenia

ZGODOVINSKI PREGLED UNIVERZITETNEGA IZOBRAŽEVANJA FARMACEVTOV NA OZEMLJU DANAŠNJE SLOVENIJE

Prof. dr. Aleš Obreza

Področje lekarništva, ki je vsaj do konca 19. stoletja pri nas pokrivalo celotno področje farmacije, je med pomembnejše naloge uvrščalo tudi izobraževanje novega kadra, kar je navedeno že v leta 1710 izdanem Lekarnarskem redu Vojvodine Kranjske. V njem je med drugim zapisano: "... naj si lekarnarji prizadevajo dobiti pobožne, poštene in latinskega jezika vešče pomočnike in učence; preden jih za stalno sprejmejo, naj iste tudi našim ordinarijem prej predstavijo, vsaj obema najstarejšima in naj pomočniki pokažejo svoja spričevala, kje so se učili in kje so služili ..." Kratko obdobje, ko je bilo v Ljubljani kot sedežu Ilirskih provinc možno v sklopu Centralne šole tudi izobraževanje farmacevtskega programa, ki je zajemal teoretične vsebine farmacevtske kemije z materijo mediko in praktično delo v lekarni, kar bi danes ustrezalo farmacevtski tehnologiji, se je zaključilo z restavracijo Habsburške monarhije. Resnejših poskusov obnove študija farmacije v

HISTORICAL OVERVIEW OF THE UNIVERSITY EDUCATION OF PHARMACISTS IN THE TERRITORY OF TODAY'S SLOVENIA

Prof. Dr. Aleš Obreza

The field of apothecary art, which covered the entire field of pharmacy in Slovenia at least until the end of the 19th century, involved the education of new staff among the most important tasks, which is already written in the Apothecary Order of the Duchy of Carniola, published in 1710. Among other things, it is stated that: "... Pharmacists should strive to obtain pious, honest and Latin-speaking assistants and students; before accepting them permanently, they should present them to physicians, at least to the oldest two, and the assistants have to show their certificates, specifying where they studied and where they served before ...". For a short period, pharmaceutical education was possible in Ljubljana as the capital of the Illyrian provinces. A pharmaceutical programme of the Central School included theoretical contents of pharmaceutical chemistry with materia medica and practical work in a pharmacy, which would correspond to pharmaceutical technology today. The programme ended with the restoration of the Habsburg

Ljubljani ni bilo vse do zaključka 2. svetovne vojne. V času Kraljevine SHS, Kraljevine Jugoslavije in vse do šestdesetih let se je velika večina slovenskih farmacevtov izobraževala na farmacevtskem odseku Filozofske fakultete v Zagrebu, ki je z odlokom šele leta 1945 postala samostojna Farmacevtska fakulteta.

Med pomembnejšimi nalogami nove države po vojni je bila obnova zdravstvene strukture, med drugim lekarniške službe, o čemer je bil julija 1946 organiziran posvet v Zagrebu, ki se ga je udeležil tudi predstavnik Tehniške fakultete v Ljubljani. Pomembna sta bila zlasti naslednja dva sklepa:

1. Farmacevtski študij traja štiri leta. Fakultete so v sklopu univerze, vendar pod vodstvom Ministrstva za narodno zdravje dotične republike. Diplomant po zaključku študija dobi naslov »diplomirani farmacevt«.
2. Čim bodo okoliščine dopuščale, je treba študij podaljšati na pet let, sedaj le zaradi nujnih potreb farmacevtske službe ostane štiriletni študij.

Študijska programa v Zagrebu in Beogradu nista mogla zagotoviti dovolj farmacevtov za lekarništvo in nastajajočo farmacevtsko industrijo (Lek) v celotni Jugoslaviji. Samo v Sloveniji se je v prvem povojnem letu za študij prijavilo skoraj 100 kandidatov, ki jih prej omenjeni fakulteti zaradi preobremenjenosti nista mogli sprejeti. Posledično so na pobudo Ministrstva za narodno zdravje omogočili vpis študentov na Oddelku za kemijo Tehniške fakultete UL v letih 1946 in 1947. Študenti so lahko opravili štiri semestre, študij pa nato nadaljevali v Zagrebu ali Beogradu. Zaradi učiteljskega kadra so lahko v Ljubljani poslušali splošne naravoslovne vsebine, strokovni del pa se je nadaljeval v 3. in 4. letniku. Januarja 1947 v zapisniku 1. kongresa farmacevtov Slovenije najdemo sklep o postopni izgradnji študijskega programa farmacije v Ljubljani, semester za semestrom. Zaradi močnega nasprotovanja se želje niso uresničile in leta 1948 vpis v Ljubljani tudi za prvi letnik ni bil več možen.

Monarchy. There were no serious attempts to renew the study of pharmacy in Ljubljana until the end of World War II. During the Kingdom of SHS, the Kingdom of Yugoslavia and until the 1960s, the vast majority of Slovenian pharmacists studied at the pharmaceutical department of the Faculty of Arts in Zagreb, which only became an independent Faculty of Pharmacy by decree in 1945.

Among the most important tasks of the new state after the war was the restoration of the health sector, including the pharmacy service. A conference was organised in Zagreb in July 1946, which was attended by a representative of the Technical Faculty in Ljubljana. The following two conclusions were particularly important:

1. The pharmaceutical study shall last four years. The faculties are part of the university, but under the supervision of the Ministry of the national health of the republic concerned. After graduation the graduate receives the title of "diplomirani farmacevt".
2. As soon as the circumstances will allow, the study should be extended to five years; it is only due to the present urgent needs of the pharmaceutical service that it remains a four-year study.

Study programmes in Zagreb and Belgrade could not provide enough pharmacists for the community pharmacies and the emerging pharmaceutical industry (Lek) in the entire Yugoslavia. In Slovenia alone, in the first post-war year, almost 100 candidates applied to study, but the aforementioned faculties could not accept them due to overcrowding. As a result, at the initiative of the Ministry of National Health, students were allowed to enrol at the Department of Chemistry of the Technical faculty, University of Ljubljana, in 1946 and 1947. Students were able to complete four semesters and then continue their studies in Zagreb or Belgrade. Due to the teaching staff, they were able to attend general science subjects in Ljubljana, and the professional part continued in the 3rd and 4th year. In January 1947, in the minutes of the 1st Congress of Pharmacists of Slovenia, we came to a resolution on the gradual implementation of a study programme of pharmacy in Ljubljana, semester after semester. Due

Prizadevanja farmacevtske stroke za obnovo vsaj delnega študija v Ljubljani so se okrepila, ko je bilo leta 1950 ustanovljeno Farmacevtsko društvo Slovenije, katerega prvi predsednik je bil Dušan Karba, večkrat zapored predsednik Zveze farmacevtskih društev Jugoslavije, od leta 1955 tudi prvi direktor Zavoda za farmacijo in analizo zdravil, ki je nastal iz Laboratorija za analizo zdravil pri Centralnem higienskem zavodu.

Poleg zavzemanja številnih farmacevtov, zlasti Dušana Karbe in Pavla Bohinca, je bila za takšen projekt nujna tudi podpora Izvršnega sveta Ljudske republike Slovenije, ki je soglašal z idejo o ponovnem začetku študija farmacije in tudi priskrbel finančna sredstva. V študijskem letu 1955/56 je bil razpisan študij v prvem letniku s programom, ki je po štirih semestrih študija v Ljubljani ponovno omogočal nadaljevanje študija na Farmacevtski fakulteti v Zagrebu. Vse skupaj je bilo organizirano v naglici, zato je bilo obveščanje kandidatov za vpis neustrezno, prav tako ni možno najti seznama predavanj niti seznama vpisanih študentov študijskega leta 1955/56. Študij je potekal v okviru tedanje Prirodoslovno-matematično-filozofske fakultete UL v pritlični predavalnici in nekaj kletnih prostorih na Vegovi ulici.

Študijo z naslovom »Reforma farmacevtskega študija in ustanovitev popolnega farmacevtskega odseka na Naravoslovni fakulteti UL« je Farmacevtskemu društvu Slovenije 12. 5. 1960 poslal tedanji dekan Naravoslovne fakultete prof. dr. Dušan Hadži, podpisal jo je doc. dr. Miha Tišler. Z začetkom neprekinjenega študija na Univerzi v Ljubljani začenjamo kratek historični pregled po posameznih dekadah, ki vključuje podrobnejšo predstavitev nekaterih mejnikov v razvoju študija farmacije in kasneje Fakultete za farmacijo. Na koncu prispevka sledi še kratek kronološki pregled.

to strong opposition, the wishes did not come true and in 1948 enrolment in Ljubljana for the first year of study was no longer possible.

The efforts to renew at least part of the study programme in Ljubljana intensified, when the Pharmaceutical Society of Slovenia was founded in 1950, whose first president was Dušan Karba, consecutive president of the Association of Pharmaceutical Societies of Yugoslavia, and since 1955 also the first manager of the Pharmacy and Drug Analysis Institute, which emerged from the Laboratory for drug analysis at the Central Hygiene Institute.

In addition to the efforts of many pharmacists, particularly Dušan Karba and Pavle Bohinc, such a project required the support of the Executive Council of the People's Republic of Slovenia, which agreed with the idea of resuming the study of pharmacy and also provided funding. In the academic year 1955/56, the first year of study was announced with a programme which, after four semesters of study in Ljubljana, again enabled the continuation of studies at the Faculty of Pharmacy in Zagreb. Everything was organised in a hurry, so informing the candidates for enrolment was inadequate. It is also not possible to find a list of lectures or a list of enrolled students for the academic year 1955/56. The study took place within the Faculty of Natural Sciences, Mathematics and Arts, University of Ljubljana. A ground floor lecture hall and a few rooms in the basement on Vegova ulica were used.

The study entitled "Reform of pharmaceutical studies and the establishment of a complete department of pharmacy at the Faculty of Natural Sciences", was sent to the Pharmaceutical Society of Slovenia on 12 May 1960 by the then dean of the Faculty of Natural Sciences, Prof. Dr. Dušan Hadži. The document was signed by Assist. Prof. Dr. Miha Tišler. With the beginning of continuous study at the UL, we start a brief historical overview of individual decades, which includes a detailed presentation of some of the most important milestones in the study of pharmacy in Ljubljana and later the Faculty of Pharmacy. A short chronological overview follows at the end of the article.

PRVO DESETLETJE (1960–1969)

Ozadje začetka študija farmacije na UL lepo opisuje prispevek o X. rednem letnem občnem zboru Farmacevtskega društva Slovenije (FDS), ki je bil v skrajšani verziji objavljen v 3.-6. številki Farmacevtskega vestnika v letu 1960. V Ljudski republiki (LR) Sloveniji je bilo približno 280 farmacevtov, med katerimi jih je bilo 90 zaposlenih v farmacevtski dejavnosti zunaj lekarniške mreže (vojska, farmacevtska industrija, grosistična podjetja, različni laboratoriji). Skoraj 40 % višjega strokovnega kadra je bilo starejšega od 50 let, v 52 od skupaj 94 lekarn v LR Sloveniji je bil samo en zaposlen farmacevt. Zaradi tega je društvo med drugim predlagalo:

1. omogočiti je treba čim uspešnejše delo farmacevtskega odseka na Naravoslovni fakulteti v Ljubljani in pričeti s pripravami za organiziranje celotnega študija farmacije na Univerzi v Ljubljani,

2. zagotoviti ustrezen vpis zaradi pomanjkanja farmacevtov v LR Sloveniji in velikega interesa mladine za ta študij (FDS predlaga vpis 60 študentov letno).

Sledi zelo natančen izračun, kako naj bi v naslednjih osmih letih trenutni kader vsaj podvojili za nemoteno izvajanje vseh nalog na področju izdelave in preskrbe z zdravili. Zanimivo je, da se je na seji upravnega odbora FDS v začetku leta 1960 pojavila ideja, ne samo o popolnem študiju farmacije v Ljubljani, pač pa tudi o farmacevtski fakulteti. Dušan Karba je leta 1960 prevzel vodenje komisije, ki je pripravila dokončen načrt štiriletnega študija. Leta 1961 je bil izvoljen za rednega predavatelja na Naravoslovni fakulteti. Naziv višjega predavatelja je v istem letu prejel tudi Pavle Bohinc, ki je vseskozi sodeloval pri pripravi študija farmacije na UL. Pogoj za podporo in denar je bila izvedba inverznega stopenjskega študijskega programa. Strokovni predmeti so bili uvrščeni v nižje letnike do zaključka 1. stopnje, splošni naravoslovni predmeti pa so bili v glavnem sestavni del 2. stopnje. Takšna organiziranost predmetnika je omogočala hitro zaključevanje študija in vstop kadrov v delovno okolje že po zaključeni prvi stopnji.

FIRST DECADE (1960–1969)

A background to the beginning of the study of pharmacy at the University of Ljubljana (UL) is described in the article on the 10th Annual General assembly of the Pharmaceutical society of Slovenia (FDS), which was published in an abbreviated version in issues 3-6 of the Pharmaceutical Journal of Slovenia in 1960. In People's Republic of Slovenia (LRS) there were 280 pharmacists, 90 of whom were employed outside the pharmacy network (military, pharmaceutical industry, wholesale companies, various laboratories). Almost 40 % of the senior professional staff was older than 50 years, in 52 out of a total of 94 pharmacies in the LRS there was only one pharmacist, who was employed. For this reason, the Society proposed the following among other things:

1. to enable successful work of the pharmaceutical department at the Faculty of Natural Sciences in Ljubljana and to begin preparations for the organisation of the entire study of pharmacy at the UL,

2. to ensure adequate enrolment due to the lack of pharmacists in LRS and due to great interest of young people for this study (FDS proposes the enrolment of 60 students per year).

A very precise calculation follows on how the current staff should be at least doubled in the next eight years for the execution of all tasks in the field of manufacturing and supply of medicines. It is interesting that at the meeting of the Board of Directors of the FDS in 1960, the idea arose, not only of a complete study of pharmacy in Ljubljana, but also of the Faculty of Pharmacy. In 1960 Dušan Karba took over the leadership of the commission, which prepared a final plan for a four-year study of pharmacy. In 1961 he was elected a senior lecturer at the Faculty of Natural Sciences. In the same year, Pavle Bohinc, who also participated in the preparation of the study of pharmacy at the UL, received the same title. The condition for support and money was the so-called inverse level study programme, which meant that professional subjects were classified in lower years until the end of the 1st level, and general natural science subjects were mainly an integral part of the 2nd level. Such organisation of the curriculum enabled the rapid completion of studies and the entry of staff into work after the completion of the first level.

Že v študijskem letu 1960/61 se je s sklepom Izvršnega sveta LR Slovenije začel izvajati štiriletni študij farmacije po novem programu. Odsek za farmacijo je bil v reorganizaciji UL uvrščen v Oddelek za kemijo Fakultete za naravoslovje in tehnologijo (FNT). Prvi upravnik odseka je bil prof. dr. Ljubo Knop (1959–1960), prvi predstojnik pa doc. dr. Miha Tišler (1960–1962). Sledila sta jima višja predavatelja, kasneje doc. in izr. prof. Dušan Karba (1964-1966; 1967–1969 in 1973–1975) in Pavle Bohinc (1962–1964 in 1966–1967), ki sta pokrila področji materije medike in galenske farmacije, kar ustreza takratni farmacevtski kemiji in tehnologiji. Poleg številnih kemijskih predmetov in osnovnih znanj medicine (fiziologija z anatomijo, kasneje patološka fiziologija) so bili strokovni predmeti farmacevtska botanika, farmakologija, farmacevtska kvantitativna analitika in zgodovina farmacije. Slednjo je predaval izr. prof. Franc Minařik, ki mu je MF UL podelila vnaprejšnjo habilitacijo za izrednega profesorja zgodovine medicine. Študij je bilo mogoče zaključiti z diplomo višjega farmacevtskega tehnika ali pa ga nadaljevati na drugi stopnji, kjer med drugim najdemo matematiko, fiziko, fizikalno kemijo. Prvi diplomanti so štiriletni študij farmacije na UL dokončali leta 1965 z nazivom diplomirani farmacevt, po dveh letih se je naziv spremenil v diplomiranega inženirja farmacije. Vmes se je tudi inverzni način študija spremenil v klasičnega.

Že v nekaj letih po uvedbi so se nad študijem farmacije zgrinjale težave, saj so se kljub prej omenjenim ocenam začela pojavljati vprašanja v smislu, kaj bomo s tolikšnim številom farmacevtov. Zanimivo je, da so se podobna vprašanja porajala tudi FDS, kjer so se sredi 60. let pojavile napovedi, da bodo ob trenutnem trendu vsa mesta za zaposlitev v farmacevtski industriji zasedena več kot 10 let, bistveno bolje pa naj ne bi bilo tudi v lekarništvu.

Leta 1967 je dekan FNT prof. dr. Vinko Kuljiš od Odseka za farmacijo zahteval odgovor na dve vprašanji:

1. Ali naj FNT tudi v bodoče vzgaja farmacevte v dosedanjem obsegu in na dosedanji način?

As early as in the academic year 1960/61 a four-year study of pharmacy under a new programme began after the decision of the Executive Council of the LRS. In the reorganisation of the UL, the Section of Pharmacy was included in the Department of Chemistry of the Faculty of Natural sciences and Technology (FNT). The first manager of the section was Prof. Dr. Ljubo Knop (1959–1960) and the first head assist. Prof. Dr. Miha Tišler (1960–1962). They were followed by senior lecturers, later Assist. Prof. and Assoc. Prof. Dr. Dušan Karba (1964-1966; 1967–1969 and 1973–1975) and Pavle Bohinc (1962–1964 and 1966–1967) who covered the fields of materia medica and galenic pharmacy, which correspond to pharmaceutical chemistry and technology. In addition to many chemical subjects and basic knowledge of medicine (physiology with anatomy, later pathophysiology), the specialized subjects were pharmaceutical botany, pharmacology, pharmaceutical quantitative analytics and the history of pharmacy. The latter was lectured by Assoc. Prof. Franc Minařik, who was awarded habilitation in advance by the MF UL as an associate professor for the history of medicine. It was possible to complete the study with a diploma of a senior pharmaceutical technician or to continue the study at the second level, where there were subjects such as mathematics, physics, physical chemistry. The first graduates completed a four-year study of pharmacy at the UL in 1965 with the title of "diplomirani farmacevt" (graduate pharmacist), after two years the title changed to "diplomirani inženir farmacije" (graduate pharmaceutical engineer). In the meantime, the inverse mode of study has also changed to the classical one.

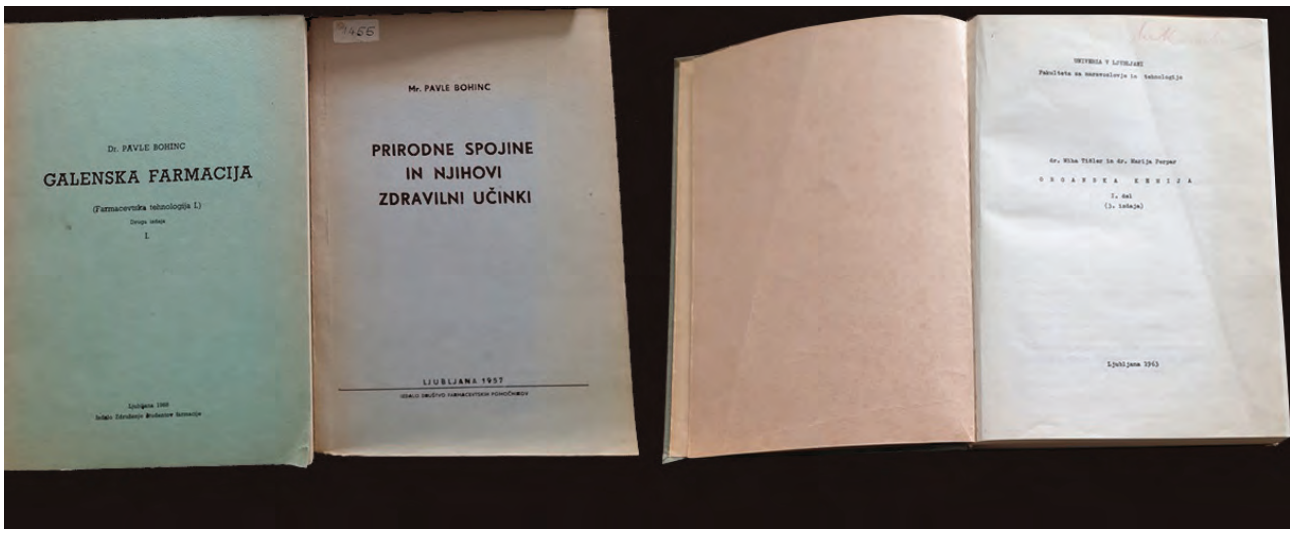
Within a few years of its introduction, the study of pharmacy was facing problems, as despite the aforementioned assessments, questions began to arise in terms of what we would do with such a large number of pharmacists. Interestingly, similar questions also came from the FDS, where in the mid-1960s there were predictions that with the current trend, all jobs in the pharmaceutical industry would be filled for more than 10 years, and the projections were not significantly better in community and hospital pharmacies. In 1967 the dean of the FNT, Prof. Dr. Vinko Kuljiš, asked the Section of Pharmacy to answer two questions:

2. Ali bi bilo glede na kvantitativne potrebe po farmacevtih morda bolj smotrno njihovo izobraževanje na farmacevtskih fakultetah v drugih republikah?

Začetno dekado študija farmacije v Ljubljani zaznamuje tudi preselitev na sedanjo lokacijo v prostore stare tehnike na Aškerčevi cesti. Šele leta 1968, osem let po tem, ko je Univerzitetni svet UL formalno dodelil večino zgradbe Stare tehnike za študij farmacije, je Odseku za farmacijo uspelo pridobiti sredstva za ureditev teh prostorov in jih delno usposobiti za delo študentov in učiteljev. Pri plačilu že izdelanega in več let skladiščenega pohištva je pomagal Izvršni svet SR Slovenije. Stavba pa ni bila v celoti last Odseka za farmacijo, saj so bile vse do srede 90. let v podstrešnem delu nekatere pisarne Ministrstva za šolstvo, v pritličju pa del Katedre za analizno kemijo. Pred tem so nekatere prostore uporabljali še Oddelek za matematiko in Laboratorij za ogrevalno tehniko FS.

1. Should the FNT continue to educate pharmacists in the current scope and in the current way?
2. Given the quantitative needs of pharmacists, might it not be more appropriate to educate them at pharmaceutical faculties in other republics?"

The initial decade of the Pharmacy study programme in Ljubljana was also marked by the relocation to the current location in the premises of "Stara Tehnika" on Aškerčeva Street. It was not until 1968, eight years after the University Council of the UL formally allocated most of the "Stara Tehnika" building for the purpose of pharmaceutical study, that the Section of Pharmacy was able to raise funds for these facilities and partially organise them for students and teachers. The Executive Council of the SR Slovenia participated in the payment for furniture that had already been manufactured and stored for several years. However, the building was not entirely owned by the Section of Pharmacy, as until the mid-1990s some of the offices of the Ministry of Education were in the attic and part of the Department of Analytical Chemistry on the ground floor. Before that some rooms had been used by the Department of Mathematics.



Fotografije nekaterih učbenikov, ki so jih v 60. letih uporabljali študenti farmacije na UL.
Photographs of some textbooks used by pharmacy students at UL in the 1960s.

DRUGO DESETLETJE 1970–1979

Prof. dr. Aleš Krbavčič
Prof. dr. Jelka Šmid Korbar

Stalno nasprotovanje posameznikov študiju farmacije v Ljubljani je bilo končano leta 1970, ko je univerzitetni svet UL na predlog pedagoško znanstvenega sveta FNT sprejel sklep o začetku podiplomskega študija farmacije. Na posvetu o lekarniški službi 1971 so zapisali: »Predvideni vsakoletni dotok 15 farmacevtov je premajhen, zato naj bo akcija za farmacevtske kadre načrtna, vodi naj jo Združenje lekarn Slovenije.« Tako so bodoči študentje farmacije dobili poleg Sklada za štipendiranje bodočih znanstvenih delavcev na področju farmacije, ki ga je osnoval Zavod za farmacijo in preizkušanje zdravil v letu 1967, še dodatno možnost za realizacijo vpisa.

Odsek za farmacijo je dobil na razpolago samo del prostorov Stare tehnike na Aškerčevi cesti, bivanjske razmere farmacevtskemu študiju namenjenih prostorov pa so bile nemogoče. Potrebno je bilo veliko napora za pridobivanje sredstev za obnovo in urejanje, da so bili vsaj delno usposobljeni za izvajanje izobraževalnega procesa. V sedemdesetih letih smo ugotovili, da so bile kanalizacija in inštalacije površno izdelane, leseni podi v pritličju Stare tehnike povsem prepereli in prerasli z lesno gobo.

Pomemben dogodek v razvoju študija farmacije na Univerzi v Ljubljani je bil Zakon o Univerzi, ki je

SECOND DECADE 1970 – 1979

Prof. Dr. Aleš Krbavčič
Prof. Dr. Jelka Šmid Korbar

The constant opposition of individuals to the study programme of pharmacy in Ljubljana ended in 1970, when University of Ljubljana adopted a decision to start postgraduate studies in pharmacy. At the 1971 conference on the pharmacy service, they wrote that the planned annual number of 15 new pharmacists is too small, so the campaign for new students should be led by the Association of Pharmacies of Slovenia. Thus, the scholarships for future students were set up by the pharmacies and Pharmacy and Drug Analysis Institute in 1967.

Section of Pharmacy received only a part of the premises of the "Stara Tehnika" on Aškerčeva Street. It took a great effort to raise funds for renovation of lecture rooms and laboratories, to make them at least partially qualified for the educational process. The installations and sewers were inadequate; the wooden floors on the ground floor of the "Stara Tehnika" building were completely weathered and overgrown with fungi.

An important event in the development of the study of pharmacy at the University of Ljubljana was the University Act, which prescribed the self-governing organisation of the University or faculties into the so-called TOZDs. The study of pharmacy was

predpisoval samoupravno organiziranje Univerze oziroma fakultet v temeljne organizacije združenega dela. Študij farmacije je bil organiziran pod imenom Visokošolska temeljna organizacija združenega dela – VTOZD Farmacija. Na tej osnovi je leta 1975 študij farmacije pridobil znatno samostojnost znotraj Fakultete za naravoslovje in tehnologijo. Leta 1977/1978 je bil uveden višješolski študij s farmacevtsko tehnološko in medicinsko-biokemijsko usmeritvijo kot študij ob delu in iz dela.

V dokumentu, ki ga je sestavil prof. dr. Dušan Karba, so bili navedeni vsi za delo potrebni pogoji: kadri za pedagoško in raziskovalno delo, izobraževalni program, uporabno raziskovalni program, teoretsko raziskovalni program. Za Univerzo nenavadno odrejeno preoblikovanje je bilo za študij farmacije rešilno. Bistvenega pomena je bilo, da je farmacija izobraževala kadre za točno določena področja v zdravstvu, javni lekarniški mreži, bolnišničnih lekarnah in v farmacevtski industriji. Samostojna VTOZD je pomenila tudi vzpostavitev organov upravljanja: Svet, ki ga sestavljajo delavci VTOZD, študenti in zunanji interesenti; nadalje strokovni kolegij, ki ga sestavljajo učitelji in asistenti, ekonomski odbor in predstojnik VTOZD Farmacija. V svet Visokošolske temeljne organizacije FNT je zbor delovnih ljudi izvolil pet delegatov, pet pa študenti.

Ustanovljene so bile posebne izobraževalne skupnosti. Farmacija se je znašla v nenavadni izobraževalni skupnosti (PIS) za kemijo, farmacijo, gumarstvo in nekovine. Dolgoletno dobro sodelovanje s stroko in Slovenskim farmacevtskim društvom je pomagalo prebroditi desetletje prilagajanja zaukazanim formalnim zahtevam PIS. Skupaj smo uspeli v programe podiplomskega izobraževanja vključiti podiplomsko usposabljanje za posebno zahtevna dela v stroki – specializacije farmacevtov po Zakonu o zdravstvenem varstvu. Tako so v sedemdesetih letih prejšnjega stoletja na VTOZD Farmacija stekla izvajanja vrste specializacij za farmacevte: iz oblikovanja zdravil, iz preskušanja zdravil, iz farmakognozije, iz biofarmacije, iz konziliarne farmacije, ki so se jim v naslednjih letih pridružile še druge, saj je bila ta

organised under the name "Visokošolska temeljna organizacija združenega dela", VTOZD Pharmacy, that could literally be translated as Higher education fundamental organisation of united labour. Based on this concept, the study of pharmacy gained considerable independence in 1975 within the FNT. In 1977/1978 a college study with medicinal-biochemical orientation and scope in pharmaceutical technology was organised.

In a document compiled by Prof. Dr. Dušan Karba, all the conditions necessary for work were listed: staff for pedagogical and research work, educational programme, applied research programme, theoretical research programme. An ordered transformation, unusual for the University was a lifeline for the study of pharmacy. It was essential that pharmacy educated staff for specific areas in healthcare, public pharmacy network, hospital pharmacies and pharmaceutical industry. An independent VTOZD also meant the establishment of governing bodies: a Council composed of VTOZD employees, students and external stakeholders, the Professional College, which consists of teachers and assistants, the Economic Committee and the Head of VTOZD Pharmacy. The assembly of working people and students both elected five delegates to the Council of VTOZD FNT.

Educational communities have been established. Pharmacy found itself in an unusual educational community (PIS) for chemistry, pharmacy, rubber, and nonmetals. Many years of good cooperation with the profession and the Slovenian Pharmaceutical Society have helped to overcome a decade of adapting to the prescribed formal requirements of the PIS. Together, we managed to start postgraduate training for particularly demanding jobs in the pharmaceutical profession - specializations in postgraduate education programmes of pharmacists under the Health Care Act. Thus, in the 1970s, a number of specializations for pharmacists were introduced at VTOZD Pharmacy: from medicinal design, medicinal testing, pharmacognosy, biopharmacy, consultative pharmacy, which were joined in the following years by others, as this was a form of further education

oblika nadaljnjega izobraževanja zelo zanimiva za farmacevte na različnih področjih farmacije.

Prva seja zbora izvajalcev pri posebni izobraževalni skupnosti Kemija, farmacija in gumarstvo je bila leta 1978. Pomembno je bilo, da se je preko te skupnosti stekal denar za delovanje visokošolskih in srednješolskih izobraževalnih TOZD-ov. Tudi VTOZD Farmacija je s tem prišla do denarja za svoj program dela in za plačevanje predavanj zunanjih sodelujočih učiteljev.

Ohranjen je bil stopenjski študij, ki je omogočal po opravljenih štirih semestrih vključitev v delo, dodana je bila potrebna razširitev biokemije, tako da je bil uveden predmet farmacevtska analizna biokemija. S tem je bilo zaobideno mnenje, da farmacija nima pristopa h kliničnemu delu in torej ne more imeti izobraževalnih vsebin s tem imenom. Vmes so posegle številne politične zamisli šolske reforme; s pomočjo Slovenskega farmacevtskega društva, ki je organiziralo problemsko konferenco o usmerjenem izobraževanju, je bil pridobljen opis del in nalog na značilnih delovnih mestih farmacevtov.

very interesting for pharmacists in various fields of pharmacy.

The first meeting of the PIS for chemistry, pharmacy and rubber was held in 1978. It was important that money flowed through this community for the operation of higher and secondary education TOZDs. VTOZD Pharmacy also came up with money for its programme of work and for paying the lectures of external teachers.

We maintained the degree study, which enabled inclusion in the work after four semesters. The necessary contents of biochemistry were added by introducing the subject of Pharmaceutical Analytical Biochemistry. By doing so, we have bypassed the view that pharmacy does not have access to clinical work and therefore cannot have subjects that included the word clinical. In the meantime, a number of political ideas of school reform intervened; with the help of the Slovenian Pharmaceutical Society, which organised a problem conference on directed education, we obtained job descriptions and tasks in typical jobs of pharmacists.

TRETJE DESETLETJE 1980–1989

Prof. dr. Franc Kozjek

Prof. dr. dr. h. c. Stanko Srčič

Na VTOZD Farmacija so v tem času aktivno delovali na:

1. podaljšanju študija na 5 let,
2. reorganizaciji kateder: uvedba Katedre za biofarmacijo in farmakokinetiko ter vpeljava vsebin socialne farmacije,
3. uvedbi izbirnih predmetov klinična farmacija in farmakoterapija ter s tem poudarek tudi na kliničnem delu farmacevta,
4. intenzivnem sodelovanju s farmacevtsko industrijo,
5. nakupu nove raziskovalne opreme,
6. uveljavitvi raziskovalnega programa Zdravila,
7. pripravi za osamosvojitev Fakultete za farmacijo.

Prof. dr. Franc Kozjek

Bližala so se osemdeseta leta in zaprosil sem za izvolitev v rednega profesorja. Prošnja je bila ugodno rešena in 26. februarja 1981 sem bil izvoljen v naziv rednega profesorja za področji farmacevtska tehnologija in biofarmacija s farmakokinetiko.

Znova sem se lahko v večji meri posvetil znanstvenoraziskovalnemu delu. Laboratorij se je

THIRD DECADE 1980 – 1989

Prof. Dr. Franc Kozjek

Prof. Dr. Dr. h. c. Stanko Srčič

At VTOZD Pharmacy we actively worked on:

1. the extension of study programme to 5 years
2. the reorganisation of chairs: introduction of the Chair of Biopharmaceutics and Pharmacokinetics and the introduction of social pharmacy
3. the introduction of the elective courses Clinical Pharmacy and Pharmacotherapy and the increased emphasis on the clinical work of the pharmacist
4. intensive cooperation with the pharmaceutical industry
5. the purchase of new research equipment
6. the implementation of the research programme Medicines
7. the first steps for the formation of Faculty of Pharmacy

Prof. Dr. Franc Kozjek

The 1980s were approaching and I applied to be elected a full professor. The application was favourably resolved and on 26 February 1981 I was elected a full professor in the fields of pharmaceutical technology and biopharmaceutics with pharmacokinetics.

Again, I was able to devote myself more to research work. The laboratory was renamed to the Chair of

preimenoval v Katedro za biofarmacijo in farmakokinetiko. Skupina se je močno okrepila s prihodom Aleša Mrharja, Staneta Primožiča, Vojka Kmetca, Marije Bogataj in Albina Kristla. Vsi so se takoj vključili v raziskovalne projekte in vpisali na podiplomski študij farmacije. Aleš Mrhar je magistriral leta 1978 v sklopu raziskovalne naloge: Uporaba analogno hibridnega računalnika v biofarmaciji, Vojko Kmetec in Stane Primožič pa leta 1983 v sklopu raziskovalne naloge: Načrtovanje optimalnih zdravilnih pripravkov. Albin Kristl je magistriral leta 1986. Vodja omenjenih raziskovalnih nalog in magisterijev sem bil sam. Vsi so nadaljevali s pripravo doktorskih disertacij in doktorirali. Pričelo pa se je tudi intenzivno sodelovanje s tovarnama zdravil Krka in Lek z določanjem biološke uporabnosti nekaterih njihovih zdravil. Klinični del teh raziskav smo izvajali na interni kliniki Univerzitetnega kliničnega centra v Ljubljani pod vodstvom prof. dr. Aleksandra Janežiča.

To je omogočilo številne objave in udeležbe na mednarodnih srečanjih strokovnjakov s področja dela farmacevtov, farmakologov in medicinskih inženirjev. Že do leta 1980 smo objavili več kot 40 znanstvenih člankov in se udeležili 30 mednarodnih strokovnih srečanj s svojimi prispevki.

Leta 1983 sem bil ponovno izvoljen za predstojnika VTOZD Farmacija. Spet so se pojavile težnje po preoblikovanju učnih programov. Upoštevali naj bi se tudi predlogi zaposlovalcev naših diplomantov, ki so bili za večjo prilagoditev praktičnemu delu. To je privedlo do tega, da smo študij podaljšali za eno leto in vpeljali večje število izbirnih predmetov, s katerimi bi se lahko študenti že usmerili v dejavnost, ki naj bi jo opravljali po diplomi. To je imelo svoje dobre in hkrati tudi slabe lastnosti. Študenti so se bolj opredeljevali za predmete, ki jih bodo lažje absolvirali in ne za tiste, ki bi jih morebiti potrebovali na svojem bodočem delovnem mestu. Sam sem tako pripravil program za izbirni predmet klinična farmacija in ga ob pomoči sodelavcev s Kliničnega centra tudi izvajal.

Preoblikovala se je tudi raziskovalna dejavnost. Raziskovalna skupnost Slovenije je razpisala natečaj

Biopharmaceutics and Pharmacokinetics. The group was greatly increased with the arrival of Aleš Mrhar, Stane Primožič, Vojko Kmetec, Marija Bogataj and Albin Kristl. All of them were immediately involved in research projects and enrolled in postgraduate studies in pharmacy. Aleš Mrhar received his master's degree in 1978 as part of his research project: The use of an analog hybrid computer in biopharmaceutics, and Vojko Kmetec and Stane Primožič in 1983 as part of research project: Design of optimal medicinal preparations. Albin Kristl received his master's degree in 1986. I was the Head of the mentioned research works and mentor of master's theses. They all continued with doctoral dissertations. Intensive cooperation with Krka and Lek pharmaceutical companies has begun, with the determination of the bioavailability of some of their medicines. The clinical part of research was performed at the Internal clinic of the University Medical Centre (UKC) in Ljubljana under the leadership of Prof. Dr. Aleksandar Janežič.

This has enabled numerous publications and participation in international meetings of pharmacists, pharmacologists and medical engineers. By 1980 we have published more than 40 scientific articles and attended 30 international professional meetings with our own publications.

In 1983 I was re-elected as Head of VTOZD Pharmacy. Again, there has been a tendency to redesign curricula. The suggestions of our graduates' employers, who were in favour of greater adaptation to practical work, were taken into account. As a result, we extended our studies by one year and introduced a larger number of elective courses, with which the students could already focus on the activity they were supposed to perform after graduation. Students opted for subjects that would make it easier for them to graduate rather than for those they might need in their future job. I prepared the elective course Clinical Pharmacy and, with the help of colleagues from the UKC, also implemented it.

Research activity has also been transformed. The Research Community of Slovenia has announced

za raziskovalne programe, ki naj bi v kar največji meri vsebovali naloge različnih raziskovalcev in raziskovalnih skupin. Leta 1986 so me imenovali za vodjo raziskovalnega programa Zdravila, kjer so bile vključene vse raziskovalne naloge s področja zdravil in so jih prijavljale skupine iz inštitutov, fakultet in industrije. V okviru tega programa smo pripravili projekt z naslovom: »Razvoj, proizvodnja in uporaba novih zdravil«. Projekt je potekal vse do leta 1992, nato je bilo ustanovljeno raziskovalno področje Farmacija, sam pa sem bil imenovan za njegovega nacionalnega koordinatorja, kar sem opravljal vse do leta 2000. V tem času je bilo izvedenih veliko aplikativnih raziskovalnih projektov v povezavi s farmacevtsko industrijo, kar je naši skupini omogočilo številne objave, patentne prijave in leta 1990 tudi nagrado Sklada Borisa Kidriča za raziskave na področju modeliranja in simulacije v farmakokinetiki.

Leta 1986 sem bil izvoljen za prodekana ter 1987 za dekana FNT. V tem času sem ponovno uvedel vsakoletno obvezno poročilo o strokovnih in znanstvenih objavah, ki ga je zelo vestno pripravljal prof. dr. Ramovš. Leta mojega dekanovanja so bila zelo burna. V splošnem vzdušju osamosvajanja so se tudi posamezni oddelki na FNT želeli preoblikovati v samostojne fakultete. Pri tem so bili najbolj vztrajni matematiki in fiziki, sledili pa so jim kemiki. Tudi sam sem se kot farmacevt nagibal k temu, da bi farmacija postala samostojna fakulteta in s tem uresničila dolgoletne želje po samostojnosti. To se je potem končno uresničilo po letu 1990.

a contest for research programmes, which should, as much as possible, contain the tasks of various researchers and research groups. In 1986 I was appointed Head of the Research Programme Medicines, which included all research assignments in the field of medicines. As part of this programme, we have prepared a project entitled: Development, production and use of new drugs. The project lasted until 1992, when the research field of Pharmacy was established, and I was appointed its national coordinator until 2000. During this time, many applied research projects related to the pharmaceutical industry were carried out, which enabled our group numerous publications, patent applications and in 1990 also the Boris Kidrič Fund Award for research in the field of modelling and simulation in pharmacokinetics.

In 1986 I was elected vice-dean and in 1987 dean of the FNT. During this time, I re-introduced the annual mandatory report on professional and scientific publications, which was very diligently prepared by Prof. Dr. Ramovš. The years of my deanship were very turbulent. In the general atmosphere of independence movement, individual departments at FNT also wanted to be transformed into independent faculties. Mathematicians and physicists were the most persistent in this, followed by chemists. As a pharmacist, I myself was inclined to make pharmacy an independent faculty, thus fulfilling my long-standing desires for independence. This then finally materialized after 1990.

Prof. dr. dr. h. c. Stanko Srčič

V letu 1980 sem bil na VTOZD Farmacija, Fakulteti za naravoslovje in tehnologijo, v tistem času največje fakultete na Univerzi Edvarda Kardelja v Ljubljani, asistent na Katedri za farmacevtsko tehnologijo I. Katedro je po odhodu profesorja Pavla Bohinca na Katedro za farmakognozijo prevzela in vodila prof. dr. Jelka Šmid Korbar. Ob njej smo bili še mag. Mila Božič (ki je kasneje odšla v Lek) in tehnična sodelavka gospa Anastazija Turk. Laboratorij (en sam!) je bil v pritličju na desni strani, kjer je še danes, in če se

Prof. Dr.h.c. Stanko Srčič

In 1980 I was at VTOZD Pharmacy, FNT, at that time the largest faculty at Edvard Kardelj University in Ljubljana, assistant at the Chair of Pharmaceutical Technology I. After the departure of Professor Pavle Bohinc to the Chair of Pharmacognosy, the chair was headed by Prof. Dr. Jelka Šmid Korbar. We were accompanied by Mag. Mila Božič (who later went to Lek) and Technical Assistant Mrs. Anastazija Turk. The laboratory was on the ground floor on the right, where it is still today, and if I remember correctly, one part

prav spomnim, je en del celo pripadal fizikalni kemiji (takratne Kemije) in v katerega je redno zahajal profesor Riko Repič, ki pa je imel kabinet v prostorih, ki so danes laboratoriji Katedre za farmacevtsko kemijo. Na Katedro so potem prišli še Julijana Kristl, Franci Vrečer (danes v Krki), Lili Čop (danes v Lekarni UKC LJ) in Mirjana Gašperlin. Janez Kerč je sicer bil v Leku, je pa s Katedro sodeloval zelo intenzivno raziskovalno, kar je bilo pomembno, saj je bila Katedra tako direktno povezana z realnim industrijskim okoljem.

Katedra za farmacevtsko tehnologijo je bila v začetku 80. let praktično brez raziskovalne opreme. Zame nikoli pozabljeni kos je npr. vzhodnonemški rotacijski viskozimeter Rheotest 2. Zato smo bili prisiljeni iskati možnosti uporabe raziskovalne opreme izven hiše, npr. na Kemijskem inštitutu (tedaj Kidričev inštitut), predvsem pa na VTOZD Kemija in kemijska tehnologija. Tu moram omeniti doc. dr. Petra Bukovca, ki je delal na področju termične analize. Ob spoznanju vrednosti te metode na farmacevtsko tehnološkem področju smo poskušali to dobiti tudi mi. Spominjam se, kako sva s prof. dr. Francem Kozjekom pred celotno kemijsko družbo v veliki dvorani Kemijskega inštituta predstavljala vrednost in pomen te opreme za področje farmacije. Če bi ne bilo podpore Leka, predvsem mag. Marije Lešnjak, pa tudi direktorja dr. Leva Premruja, bi tega ne dobili. Pa smo ga, bil je termični analizator Perkin Elmer DSC 1, s katerim smo odprli pomembno področje predformulacijskih raziskav in k nam so hodili tako iz Leka kot iz Krke. Z njim so bile izdelane številne diplome, magisteriji in doktorati. Včasih smo delovali že kot zunanji laboratorij ene ali druge domače tovarne.

Ko gledam danes na to obdobje, si ne morem misliti, kako smo lahko delovali brez računalnikov. Bili so le nekakšni kalkulatorji. Bil pa je v tem obdobju že zelo napreden kolega doc. dr. Stanislav Primožič iz »zgornje tehnologije« (danes Biofarmacije), ki je uporabljal Texas Instruments kalkulator z dodatno kartico. Fascinantno. Še bolj fascinantno pa je bilo, ko smo kot VTOZD kupili prvi mikroračunalnik Apple 2. Ta je bil nameščen v računalnici, zdaj avla v 1. nadstropju stare stavbe. Nekaj posebnega, skoraj sem se ga bal. Če smo želeli kaj delati

even belonged to physical chemistry and was regularly visited by Professor Riko Repič, who had a cabinet in the premises that are today the laboratories of the Chair of Pharmaceutical Chemistry. Julijana Kristl, Franci Vrečer (today in Krka), Lili Čop (today at the UKC Pharmacy) and Mirjana Gašperlin joined us later. Janez Kerč was at Lek, but he collaborated with the Chair very intensively on research, which was important because the Chair was thus directly connected to the real industrial environment.

The Department of Pharmaceutical Technology was virtually without research equipment in the early 1980s. We were forced to look for possibilities to use research equipment outside the faculty, e.g. at the Institute of Chemistry (then Boris Kidrič Institute), and especially at VTOZD Chemistry and Chemical Technology. Here I must mention Assist. Prof. Dr. Peter Bukovec, who worked in the field of thermal analysis. Recognizing the value of this method in the field of pharmaceutical technology, we also tried to purchase it. I remember how with Prof. Dr. Franc Kozjek we presented the value and importance of this equipment for the field of pharmacy in the big hall of the Institute of Chemistry. Had it not been for the support of Lek, especially Mag. Marija Lešnjak, as well as the director Dr. Lev Premru, we wouldn't have obtained it. Perkin Elmer DSC 1 thermal analyser enabled us to work on an important area of pre-formulation research and people came to us from both Lek and Krka. Many diplomas, master's degrees and doctorates were made on it. We used to operate as an external laboratory of one or other domestic pharmaceutical factory.

Looking at this period today, I can't imagine how we could have operated without computers. At that time, they were just a sort of calculators. However, our colleague Assist. Prof. Dr. Stanislav Primožič from "upper technology" (today Biopharmaceutics), used a Texas Instruments calculator with an additional card. It was even more fascinating when we, as VTOZD, bought the first Apple 2 microcomputer. It was installed in a computer room, now a lobby on the 1st floor of an old building. It was something special, I was almost afraid of it. If we wanted to do something or

ali se na njem le učiti, smo se morali za termin prijaviti vnaprej in na vrsto smo lahko prišli šele čez nekaj dni!

Iz tega časa se intenzivno spominjam naporov prof. dr. Jelke Šmid Korbar, da bi našo tehnologijo internacionalizirala. Bila je uspešna, navezala je stike z Madžari (prof. G. Kedvessy iz Szegeda), s Češkoslovaško (prof. Jarmila Zemanova), z Zahodno Nemčijo (prof. H. Junginger in prof. H. Rupprecht) in Vzhodno Nemčijo (zelo poseben in znan prof. R. Hüttenrauch (iz Jene) ter prof. M. Dittgen iz Greifswalda). Te povezave so nam bile pomembne, ker smo videli in spoznali, kaj in kako delajo drugje.

Kot Humboldtov štipendist sem leta 1987 odšel na postdoktorski študij v Regensburg k prof. H. Rupprechtu. Pomembno leto, ki me je zelo zaznamovalo: veliko novega sem se naučil in spoznal, sklenil prijateljstva, ki trajajo še danes in ki so nam bila vedno v podporo. V tem letu bivanja v Nemčiji se je doma spremenilo veliko: pojavila se je »Moja dežela«, velike napetosti v Jugoslaviji in zato so mi kolegi celo odsvetovali vrnitev. Nisem upošteval in po vrnitvi sem bil v letu 1989 izvoljen za predstojnika VTOZD. Takrat seveda nisem mogel vedeti, da bom skupaj z VTOZD preživljal zelo težke in odločilne spremembe: osamosvojitev Slovenije in vse težave, ki so bile s tem povezane. Podpora prof. dr. Franca Kozjeka, ki je bil takrat dekan FNT, mi je veliko pomenila in mi je zelo olajšala delovanje. Kot predstojnik sem imel v tajništvu dve osebi, na kateri sem se lahko vselej zanesel in oprl: gospo Mojco Grčar in gospo Lidijo Španinger. Kako sta mi pomagali pri selitvi arhivov v kletne prostore zaradi potencialnega uničenja ob rušilnih naletih jugoslovanskega letalstva! Tudi ne bom pozabil, ko sem kot predstojnik moral ob napovedi, da bo Ljubljana napadena iz zraka, poslati domov vse zaposlene na VTOZD. Študentov takrat k sreči ni bilo več, ker se je semester že zaključil. In tudi to, kako so me iz Izobraževalne skupnosti Republike Slovenije (ki je bila tedaj še v tej hiši) poklicali in prosili, naj iz telefonske centrale takoj umaknem gospoda, ki je govoril jugoslovanščino. Vsi, ki so klicali, so bili namreč prepričani, da je jugo vojska to stavbo že zasedla! Kakorkoli, končalo se je dobro. In desetletje, ki je sledilo, je bilo za VTOZD in slovensko farmacijo uspešno.

just learn from it, we had to register in advance for the term and we had to wait in the queue for a few days!

From this time, I vividly remember the efforts of Prof. Dr. Jelka Šmid Korbar to internationalize our Chair. She was successful and established contacts with the Hungarians (Prof. G. Kedvessy from Szeged), with Czechoslovakia (Prof. Jarmila Zemanova), also with West Germany (Prof. H. Junginger and Prof. H. Rupprecht), and the East Germany with a very special and well-known Prof. R. Hüttenrauch (from Jena) and Prof. M. Dittgen from Greifswald. These connections were important to us because we saw and learned what and how they work elsewhere.

As a Humboldt Fellow I went to Regensburg in 1987 for postdoctoral studies with Prof. H. Rupprecht. An important year that marked me forever: I learned and got to know a lot of new things, made friendships that continue to this day. During this year of my stay in Germany, a lot has changed at home: slogan "My Country" has appeared, great tensions were in Yugoslavia, and that is why my colleagues even advised me not to return. I did not take it into account and upon my return in 1989 I was elected Head of the VTOZD. At that time, of course, I could not have known that together with VTOZD I would be going through very difficult and decisive changes: the independence of Slovenia and all the problems that were associated with it. The support of Prof. Dr. Franc Kozjek, who was the dean of the FNT at the time, meant a lot to me and made my work much easier. As the Head of the Secretariat, I had two people I could always rely on: Mrs. Mojca Grčar and Mrs. Lidija Španinger. They helped me move the archives to the basements because of the potential destruction during the devastating raids of the Yugoslav Air Force! I will also not forget when I, as the Head of the Department, had to send all the employees of the VTOZD home, when the announcement came that Ljubljana would be attacked from the air. Fortunately, there were no more students at that time, because the semester had already ended. Either way, everything ended well and the decade that followed was successful for VTOZD and Slovenian pharmacy.

FAKULTETA ZA FARMACIJO

1991–1995

Prof. dr. Aleš Mrhar

1. septembra 1991 sem skupaj z namestnikoma izr. prof. dr. Julijano Kristl in doc. dr. Urošem Urlebom prevzel vodenje Oddelka za farmacijo z jasno vizijo preobraziti oddelek v samostojno fakulteto. Cilj je bil realen, saj je FNT zaključevala svoje zgodovinsko poslanstvo, na oddelku pa smo imeli že pripravljeno strategijo, kako izpolniti pogoje za ustanovitev svoje fakultete. Trenutek je bil ugoden, lahko rečem zgodovinski, vsesplošni optimizem zaradi osamosvojitve Slovenije je zavel tudi v akademskem okolju, kar je omogočalo rojevanje novih idej ter iskanje in uveljavljanje novih rešitev. Ker je bil proces preobrazbe Fakultete za naravoslovje in tehnologijo voden preudarno in z ustrezno dinamiko, smo lahko na oddelku načrtovane aktivnosti izvajali nemoteno.

Na Oddelku za farmacijo smo spomladi leta 1992 ob izselitvi Ministrstva za šolstvo in šport pridobili vse prostore Stare tehnike in se lotili prenove celotne stavbe, razen južnega trakta. Gradbena dela ter funkcionalno opremljanje laboratorijev in predavalnic smo zaključili jeseni 1994. Istočasno je potekalo tudi sprejemanje novih izobraževalnih programov, uvedli smo 9-semestrski študij farmacije in 5-semestrski študij klinične biokemije, uspeli pa smo pridobiti tudi prve temeljne raziskovalne programe. Z uvedbo

FACULTY OF PHARMACY

1991–1995

Prof. Dr. Aleš Mrhar

On 1 September 1991, together with vice-deans, Assoc. Prof. Dr. Julijana Kristl and Assist. Prof. Dr. Uroš Urleb I took over the management of the Department of Pharmacy with a clear vision to transform the department into an independent faculty. The goal was realistic, as the FNT was completing its historical mission, and the department had already prepared a strategy on how to meet the conditions for the establishment of our own faculty. The moment was favourable, I can say it was historical, academic environment was overwhelmed by the general optimism due to the independence of Slovenia, and this enabled the birth of new ideas and the search for and implementation of new solutions. As the process of transformation of the Faculty of Natural Sciences and Technology was managed prudently and with appropriate dynamics, we were able to carry out the planned activities at the department without interruption.

At the Department of Pharmacy, in the spring of 1992, when the Ministry of Education and Sports moved out, we acquired all the premises of the "Stara Tehnika" building and undertook the renovation of the entire building, except the southern wing. Construction work and functional equipping of laboratories and lecture halls were completed in autumn 1994. At the same

novih vsebin v 9-semestrskem študiju farmacije smo postavili temelje za Katedro za socialno farmacijo, ki je bila ustanovljena 3 leta kasneje, poskrbeli pa smo tudi za razvoj že novoustanovljene Katedre za klinično biokemijo. Vseh teh aktivnosti ne bi bilo mogoče izpeljati brez močne podpore slovenske farmacevtske industrije in slovenskega lekarništva, predvsem pa novoustanovljene slovenske države, ki je zelo hitro prepoznala pomen farmacije za njen družbeni in ekonomski razvoj.

Seveda smo se v tem obdobju pričeli intenzivno vključevati tudi v mednarodno okolje z navezovanjem stikov z evropskimi fakultetami in z vključevanjem v evropske inštitucije, kot sta EAFP (Evropsko združenje farmacevtskih fakultet) in EUFEPS (Evropska federacija za farmacevtske znanosti). Pod okriljem slednje smo pričeli s serijo srednjeevropskih simpozijev iz farmacevtske tehnologije. Prvega smo organizirali oktobra 1995, v letu 2021 pa bomo prisostvovali že trinajstemu, ki ga organizirajo naši poljski kolegi v Gdansku. Na teh simpozijih že 25 let uspešno pošiljamo v mednarodni raziskovalni prostor slovenske dosežke na področju farmacevtskih znanosti.

Tisto, kar je bilo najbolj pomembno, pa je bila polna podpora vseh zaposlenih na oddelku. Vsi sklepi, sprejeti na organih oddelka, so bili sprejeti s konsenzom, kar nam je dalo še dodaten zagon pri realizaciji strateškega plana. Tu moram še posebej omeniti vlogo prof. dr. Dušana Karbe, ki je bil tedaj sicer že upokojen, a se je še vedno živo zanimal za razvoj oddelka. Občasno sem ga obiskoval, ga obveščal o napredku, skupaj sva se veselila doseženih rezultatov.

Ko se je proces razdruževanja FNT konec leta 1994 zaključil s sklepom Sveta za visoko šolstvo, me je poklical tedanji rektor Univerze v Ljubljani, akademik prof. dr. Miha Tišler, po funkciji član sveta, in mi na kratko sporočil: »Prof. Mrhar, imate fakulteto.« Cilj je bil dosežen, položeni so bili čvrsti temelji za nadaljnji razvoj Fakultete za farmacijo v okviru Univerze v Ljubljani. V januarju 1995 me je rektor, prof. Tišler imenoval za v. d. dekana in mi s tem omogočil, da sem do septembra tega leta pripravil vse potrebno

time, new educational programmes were adopted. A 9-semester study of pharmacy and a 5-semester study of clinical biochemistry were introduced, and the first basic research programmes were obtained. With the introduction of new contents in the 9-semester study of pharmacy, we laid the foundations for the Chair of Social Pharmacy, which was established 3 years later, and we also took care of the development of the newly established Department of Clinical Biochemistry. All these activities would not be possible without the strong support of the Slovenian pharmaceutical industry and pharmacies, and especially the newly established Slovenian state, which very quickly recognized the importance of pharmacy for its social and economic development.

During this period, we began to be actively involved in the international environment by establishing contacts with European faculties and by joining European institutions such as EAFP (European Association of Pharmaceutical Faculties) and EUFEPS (European Federation of Pharmaceutical Sciences). Under the auspices of EUFEPS, we started a series of Central European Symposia on Pharmaceutical Technology. The first was organised in October 1995, and in 2021 we will be attending the thirteenth, which will be organised by our Polish colleagues in Gdansk. Through this symposium, we have been successfully presenting Slovenian achievements in the field of pharmaceutical sciences to the international research community for 25 years.

What was most important, however, was the full support of all employees in the department. All decisions by the governing bodies of the department were adopted by consensus, which gave us additional impetus in the implementation of the strategic plan. I must therefore especially mention the role of Prof. Dr. Dušan Karba, who was already retired at the time, but was still keenly interested in the development of the department. I visited him from time to time, kept him up to date on the progress, and together we looked forward to the results the department achieved.

When the process of disintegration of the FNT ended at the end of 1994 with a decision of the Council for

za izvolitev prvega dekana Fakultete za farmacijo s polnimi pooblastili.

Sedaj, po tolikih letih lahko samo rečem: »To so bili pionirski časi.«

Higher Education, I was called by the then rector of the University of Ljubljana, academician Prof. Dr. Miha Tišler, ex officio member of the council, who briefly informed me: "Professor Mrhar, you have a new faculty." The goal was achieved and solid foundations were laid for further development of the Faculty of Pharmacy within the University of Ljubljana. In January 1995, the rector, Prof. Dr. Miha Tišler appointed me as an acting dean and thus enabled me to prepare everything necessary for the election of the first dean of the Faculty of Pharmacy with full powers by September that year. Now, after so many years, I can only say: these were pioneering times ...

FAKULTETA ZA FARMACIJO

1995–1999

BURNO PRVO PETLETNO OBDOBJE DELOVANJA FAKULTETE

Prof. dr. Slavko Pečar

Razvoj UL FFA v obdobju 1995–1999 je potekal po več soodvisnih in prepletenih poteh. Pri prehodu oddelka v fakulteto se je administrativni segment moral preoblikovati v samostojno članico UL z vsemi atributi in strukturami, ki predstavljajo fakulteto. UL FFA je pol leta po vpisu v sodni register redno zaposlila prvo tajnico. Že v letu 1996 je začela izdajati vsakoletno poročilo o dosežkih pedagoškega in znanstvenoraziskovalnega dela, ki od takrat stalno raste tako po vsebini kot po obsegu.

Rešitev prostorske utesnjenosti UL FFA je bila glavni del programa vodstva tega obdobja, ker je imela fakulteta komaj četrtino potrebne površine za izvajanje svoje dejavnosti. Farmacevtska stroka je zaradi lastnega razvoja potrebovala vedno več visokošolsko izobraženih farmacevtov. Zato je bila pripravljena tudi finančno podpreti odpravo prostorske utesnjenosti. Edina rešitev so bili novi prostori in Ministrstvo za šolstvo in šport je leta 1996 sprejelo sklep o gradnji prizidka s približno 3000 m^2 dodatnih površin na mestu, kjer je stala stavba z minimalno izkoriščenostjo. Ta investicija bi omilila prostorsko stisko, ker bi pokrila polovico normativnih potreb in omogočila nadaljnji razvoj.

FACULTY OF PHARMACY

1995 – 1999

THE TURBULENT FIRST FIVE-YEAR PERIOD OF THE FACULTY

Prof. Dr. Slavko Pečar

The development of UL FFA in the period 1995-1999 took place in several interdependent and intertwined paths. Upon the transition of the department to the faculty, the administrative segment had to be transformed into an independent member of the UL with all the attributes and structures that represent the faculty. UL FFA employed a first faculty secretary, six months after the faculty was entered in the court register. As early as in 1996, we began publishing annual reports on the achievements of pedagogical and scientific-research work. Annual booklets have been steadily growing since then, both in terms of content and scope.

The solution to the spatial problem of UL FFA was the main part of the management programme of this period, because the faculty had only a quarter of the required area to carry out its activities. The pharmaceutical profession needed more highly educated pharmacists for its own development. Therefore, it was ready to financially support the improvement of working conditions. The only solution were the new premises and in 1996 the Ministry of Education and Sports adopted a decision on the construction of an extension with approximately 3000 m^2 of additional space on the site, where the building with minimal utilization stood previously. This investment

Ekipa na UL FFA, ki je začela in vodila ta podvig, je bila: prof. dr. Slavko Pečar (dekan), prof. dr. Stanko Srčič, doc. dr. Albin Kristl (prodekana) in Slavi Menard (tajnica) ter vsi člani Gradbenega odbora (GO), ki so zmogli vgraditi svoje daljnosežne vizije v tehnične opise prostorov. Pomagali so tudi zagovorniki investicije na Ministrstvu za šolstvo in šport ter stroka. Za učinkovito premagovanje administrativno birokratskih ovir je bil zaslužen g. Jože Kavčič.

Načrt ministrstva je predvideval dokončanje novogradnje leta 1998. Zaradi objektivnih okoliščin in vrste ovir se je dokončanje zavleklo za približno dve leti. Tako je bil 20. 12. 1999 opravljen tehnični pregled nove zgradbe, 4. 2. 2000 je bilo pridobljeno uporabno dovoljenje, otvoritev pa je bila v februarju 2000, vse že v mandatu dekanje prof. dr. Julijane Kristl.

Med zunanjimi razlogi, ki so prispevali k zamudi, je bila zakasnitev sprejemanja državnega proračuna in s tem povezano financiranje. Dogovor je bil, da Ministrstvo za šolstvo in Ministrstvo za znanost prispevata večino (80 % oziroma 5 %), sredstva za opremo (15 %) pa priskrbi UL FFA sama in z donacijami stroke. S temi sredstvi je UL FFA v kritični fazi gradnje premostila zakasnitev plačila gradnje, kar je bilo verjetno ključno za celoten projekt.

Ostale ovire so izvirale iz neposredne okolice. Nekaj članic na UL je že pred letom 1995 čakalo, da jim nekdo uredi njihove prostorske probleme. Ko se je pojavila UL FFA, je začela s svojo iniciativo, mimo čakajočih, reševati prostorsko utesnjenost. Najbolj prizadeta je bila Fakulteta za kemijo in kemijsko tehnologijo, ki je menila, da je rešitev njihovih potreb prednostna, ker so bili v t. i. »Mogetovem zakonu«. Na tej osnovi so celo zavrnili ponujeno sodelovanje UL FFA pri skupnem reševanju prostorske stiske obeh fakultet in kasneje (ko se je začela gradnja) celo tožili UL FFA, da gradi na njihovi »zemlji«. Nasprotovanje je seglo celo tako daleč, da je takratni rektor UL umaknil prvotno soglasje k novogradnji prizidka. Kasneje so se nasprotovanja polegla.

Prekinitve med gradnjo so pomagali prebroditi tudi študentje fakultete z originalnim zdravilom »Prostoral« za poslance. Med pobudniki je bil takratni predsednik

would alleviate space constraints as it would cover half of the normative needs and allow for further development.

The team at UL FFA that started and led this venture consisted of: Prof. Dr. Slavko Pečar (Dean), Prof. Dr. Stanko Srčič and Assist. Prof. Dr. Albin Kristl (Vice Deans), and Slavi Menard (Faculty Secretary) and all members of the Building Committee who were able to incorporate their far-reaching visions into the technical descriptions of the premises. Proponents of the investment at the Ministry of Education and Sports and the pharmaceutical companies and pharmacies also helped. Mr. Jože Kavčič was credited with effectively overcoming administrative and bureaucratic obstacles.

The ministry's plan foresaw the completion of the new construction in 1998. Due to objective circumstances and a series of obstacles, completion was delayed by about two years. Thus, on 20 December 1999, a technical inspection of the new building was carried out, on 4 February 2000 a permit for the use was obtained, and the opening took place in February 2000, all during the term of office of the Dean, Prof. Dr. Julijana Kristl.

Among the external reasons that contributed to the delay were the hold-up in the adoption of the state budget and related funding. The agreement was that the Ministry of Education and the Ministry of Science contribute the majority (80 % and 5 % respectively), the funds for equipment (15 %) should be provided by UL FFA itself and with donations from the pharmaceutical companies and pharmacies. With these funds, UL FFA bridged the delay in payment for construction in the critical construction phase, which was probably crucial for the entire project.

Other obstacles originated in the immediate vicinity. A few members at UL had already been waiting before 1995 for someone to sort out their spatial problems. When UL FFA appeared, it started with its own initiative, surpassing the waiting members of UL. The Faculty of Chemistry and Chemical Technology was most affected, because it believed the solution of its own needs was a priority. Based on this concept, they refused the UL FFA's offered cooperation in jointly resolving the space shortage of the two faculties and later (when construction began) even sued the UL FFA for building on their "land". The opposition went so

študentske organizacije na UL, Andrej Pučnik, študent UL FFA. Zdravilo naj bi pomagalo odpraviti vse prostorske probleme UL s posrečeno kombinacijo učinkovin prostoridola, blamažepama, proračunozina in dogradinolina. Na koncu se je pokazalo, da so tudi nasprotniki gradnje po svoje prispevali k zaključku, ker so skrbeli, da smo vsi neposredno udeleženi vsakodnevno utrjevali svojo vero in pripadnost investiciji in da smo delovali kot strnjen kolektiv.

Glavna in izjemno pomembna podpora gradnji je bila stroka, predvsem farmacevtska industrija, ki se je zavedala, da njihova uspešnost temelji tudi na kakovostno izobraženih kadrih ter usmeritev Ministrstva za šolstvo, da je bila ta investicija takrat realno izvedljiva in strateško pomembna za Slovenijo.

Gradnjo prizidka odlikuje še nekaj unikatnih posebnosti. Ob dejstvu, da je dodatnih 3000 m^2 pomenilo le polovično pokritje normativih potreb, je Gradbeni odbor (GO) UL FFA izdelal najbolj optimalno razporeditev in izrabo novih prostorov po meri uporabnikov. Projektanti so dobili jasne in dorečene opise zahtev za vsak prostor posebej, ki so se pokazali tako daljnosežni, da prostori še danes nespremenjeno služijo svojemu namenu. Kvaliteta opreme v laboratorijih pa po 20 letih še ne kaže, da bi jo načel zob časa.

Dograditev južnega prizidka je bila v tistih časih vsekakor enkratni in v bodočnost naravnani dogodek, česar se ob odprtju UL FFA nismo niti zavedali. Šele čas je pokazal tako v sferi farmacevtskega izobraževanja kot na raziskovalnem in strokovnem področju, da so novi prostori odločilno prispevali k razvoju, dvigu kakovosti farmacije ter omogočali doseganje evropske ter svetovne ravni.

Časovno oddaljen pogled pokaže, da je bilo to zelo dinamično in naporno obdobje intenzivnega dela ter iskanja originalnih rešitev tudi v na videz brezizhodnih situacijah, obdobje, ki je zaradi volje in vztrajnosti na koncu pripeljalo do uresničitve postavljenega cilja in danes sproža prijetne občutke ob dosežkih UL FFA.

far that the then rector of the University of Ljubljana withdrew his original consent to the new construction of the extension. Later, the opposition subsided.

The students of the faculty helped to overcome the interruptions during the construction with the original medicine "Prostoral" for the members of the National Assembly. Among the initiators was the then president of the student organisation at UL, Andrej Pučnik, a student of UL FFA. The drug was supposed to help eliminate all UL spatial problems with the lucky combination of the active ingredients named after different phases in the building process.

The main and extremely important support for the construction was the pharmaceutical profession, especially the pharmaceutical industry, which was aware that their success was also based on quality of education; and the Ministry of Education's policy that this investment was realistically feasible and strategically important for Slovenia.

The construction of the extension was distinguished by some unique features. Given the fact that the additional 3000 m^2 meant coverage of only half of the normative needs, FFA made the largest possible layout and the optimal use of new premises for users. The designers were given clear and precise descriptions of the requirements for each space separately, which proved to be so far-reaching that the rooms still serve their purpose. The quality of the equipment in the laboratories after 20 years does not seem to be damaged by the ravages of time.

The building of the southern extension was definitely a unique and future-oriented event in those days, which we were not even aware of at the opening of UL FFA. Only time has shown that the new premises have made a decisive contribution to the development in the field of pharmaceutical education, as well as in the research and professional field, raising the quality of pharmacy to the European and global levels.

A distant view shows that this was a very dynamic and exhausting period of intensive work and search for original solutions even in seemingly hopeless situations, a period which, due to will and perseverance, eventually led to the achievement of the set goal and today evokes pleasant feelings at the achievements of UL FFA.

FAKULTETA ZA FARMACIJO

1999–2003

DEKANOVANJE NA PRELOMU TISOČLETJA

Prof. dr. Julijana Kristl

Vsak jubilej sproža spomine, razmišljanja, pa tudi kritične presoje okoliščin, poteka in nosilcev pomembnih premikov in zastojev v razvoju UL FFA. Razvoj se je navzven izražal najprej v ustanovitvi in spremembah imen, nato v razvoju programov in organizacijski razvejanosti, naraščanju števila študentov in podeljenih diplomskih listin, povečevanju števila asistentov in profesorjev, v izjemnem razvoju raziskovalnih področij, številu znanstvenih objav in patentov. A kljub uspešnemu 40-letnemu delovanju UL FFA smo leta 1999 prof. dr. Julijana Kristl kot dekanja, izr. prof. dr. Borut Štrukelj in izr. prof. dr. Danijel Kikelj kot prodekana prevzeli zahtevno in pomembno zadolžitev.

Uvodoma podajam nekaj podatkov in pogledov, ki naj bodo v oporo pri razumevanju tedanjega časa in razmer. Delovanje UL FFA sem dobro poznala po 20. letih poučevanja, različnih funkcijah v odborih, kot namestnica predstojnika Oddelka za farmacijo FNT UL ter predstojnica Katedre za farmacevtsko tehnologijo. Delovanje UL mi je bilo bistveno manj poznano. Pogled na svet, univerze in raziskovalno

FACULTY OF PHARMACY

1999– 2003

DEAN'S OFFICE AT THE TURN OF THE MILLENNIUM

Prof. Dr. Julijana Kristl

Each jubilee of UL FFA brings up memories, reflections, as well as critical assessments of the circumstances, courses and bearers of important progress and setbacks in its development. Initially, this development was externally expressed in the establishment of the faculty, its institutional changes and renaming. Later it could be seen in programme development and organisational diversification, growth in the number of students, awarded diplomas, assistants and professors, exceptional development of research fields and the number of scientific publications or patents. But despite the successful 40-year operation of UL FFA, a demanding and important task was taken on in 1999, namely by Prof. Dr. Julijana Kristl as Dean and Assoc. Prof. Dr. Borut Štrukelj and Assoc. Prof. Dr. Danijel Kikelj as Vice Deans.

As an introduction, some data and views are presented with the aim of supporting the understanding of the time and situation in that period. After 20 years of teaching, various functions in committees and positions as the Deputy Head of the Pharmacy Department of FNT UL and the Head of the Department of Pharmaceutical Technology I knew the operation at the UL FFA well.

delo drugje se mi je temeljito spremenil, ko sem bila leta 1995 na izpopolnjevanju na univerzi v Ženevi, kjer sem spoznavala osnove nanotehnologije. Tam so že govorili o kriterijih za zagotavljanje kakovosti in standardih v visokem šolstvu. Po vrnitvi sem želela izboljšati čim več stvari, ki bi UL FFA povečale kakovost in mednarodno prepoznavnost. Tej smeri so takrat v Sloveniji dali zagon novi Zakon o visokem šolstvu RS, Odlok o oblikovanju Univerze v Ljubljani (Ur. list št. 28/00), Statut UL 2001. Ob kandidaturi za dekanjo sem v program zapisala ključna razvojna izhodišča, da »naj bi UL FFA kot edina izobraževalna institucija za farmacevtsko in kliničnobiokemijsko področje v Republiki Sloveniji delovala angažirano in s svojim znanstvenoraziskovalnim potencialom razvijala izobraževalno in raziskovalno področje kot neločljivo celoto. Ob upoštevanju zakonskih in drugih danih možnosti naj UL FFA sledi svetovnim trendom na področju izobraževanja študentov in razvoja farmacevtskih znanosti z večjim poudarkom na bioloških vsebinah. Krepi naj povezavo z UL in z vsemi segmenti farmacevtske stroke tako doma kot mednarodno. Za uresničevanje teh dejavnosti je fakulteta dolžna zagotavljati najvišje kriterije kakovosti in akademske odličnosti.« V programu sem poudarila »potrebo za povečanje proaktivnosti in samoiniciativnosti vseh zaposlenih, določitev prednostnih nalog, koordinacijo kriterijev in meril za doseganje sinergističnih učinkov«. Mislim, da ta izhodišča tudi/še danes niso nič manj aktualna.

Obdobje dekanovanja sem doživljala kot čas razvoja kakovosti in njene implementacije. UL FFA je pridobila samostojnost pred nekaj leti, nova stavba je bila predana v uporabo v začetku mandata. V novih in obnovljenih prostorih Stare tehnike (1992 in 1993) smo izvajali univerzitetni študijski program farmacije in visokošolski program laboratorijske biomedicine ter šest programov farmacevtskih specializacij in doktorske programe farmacevtskih znanosti, klinične biokemije in laboratorijske biomedicine ter toksikologije. Slednji so bili leta 1999 kot prvi akreditirani na UL v sklopu interdisciplinarnega

The operation of UL was significantly less familiar to me. My views on the world, universities, and research work elsewhere changed fundamentally in 1995 at the University of Geneva, where I learned basics of nanotechnology. There an open discussion was already taking place on the topic of quality assurance criteria and standards in higher education. Upon my return, I wanted to improve as many things as possible in order to increase quality and international recognition of UL FFA. During that time, the new Higher Education Act of the Republic of Slovenia, the Decree on the Establishment of the University of Ljubljana (Official Gazette No. 28/00), the Statute of the University of Ljubljana 2001 and the National Programme of Higher Education in the Republic of Slovenia 2002 gave impetus in this direction.

Upon my candidacy for Dean, I wrote down key development principles in the programme stating that "UL FFA, as the only educational institution for the pharmaceutical and clinical-biochemical field in the Republic of Slovenia, should be engaged and develop the educational and research field as an inseparable whole with its scientific research potential. Taking into account the legal and other possibilities, UL FFA should follow global trends in the field of student education and the development of pharmaceutical sciences with greater emphasis on biological content. It should strengthen the connection with UL and all segments of the pharmaceutical profession at home and internationally. In order to implement these activities, the faculty is obliged to ensure the highest criteria of quality and academic excellence". The programme emphasized "the need to increase proactivity and self-initiative of all employees, determination of priority assignments and coordination of criteria for achieving synergistic effects". It is my opinion that these starting points are no less current today.

I experienced the period of deanship as the time of quality development and its implementation. UL FFA had gained its independence a few years ago, and its new premises were handed over for use at the beginning of my term as Dean. In the new premises and renovated premises of "Stara Tehnika" (1992 and 1993), the university programme of Pharmacy,

doktorskega programa Biomedicina z namenom, da bi UL postala mednarodno primerljiva na osnovi postopkov in kriterijev znanih univerz.

Za to obdobje je značilna tudi bolonjska deklaracija, ki jo je leta 1999 podpisalo 29 evropskih držav, med njimi tudi Slovenija. Njen cilj je bil ustvariti evropski visokošolski prostor, povečati zaposljivost in mobilnost državljanov ter mednarodno konkurenčnost evropskega visokega šolstva. To naj bi uvedli s pripravo novostrukturiranih tristopenjskih programov, ECTS-kreditnim sistemom, ustanovitvijo Nacionalne agencije za zagotavljanje kakovosti (NAKVIS – Nacionalna agencija za kakovost v visokem šolstvu) in odpravo ovir za svobodno gibanje študentov, učiteljev in raziskovalcev. Večina evropskih držav se je lotila uvajanja teh načel takoj po podpisu, Senat UL pa tej ideji dolgo časa ni bil naklonjen in je zavračal kakršne koli aktivnosti v to smer. UL je leta 2003 le ustanovila delovno skupino za spremljanje bolonjskega procesa in prvič uvrstila med letne cilje aktivnosti za uvedbo kreditnega sistema in prilogo k diplomi.

Na UL FFA je bila zavest o nujnosti povezovanja z mednarodnim prostorom jasna že od same ustanovitve, bolonjska reforma pa je le še spodbudila večjo strukturno, organizacijsko in izvedbeno podobnost. V tem duhu si je postavila cilje in formalno pričela z razpravami in pripravami dokumentov, kar je potem potekalo še skozi celotno desetletje.

V nadaljevanju so navedeni pomembni dosežki, ki smo jih v mandatu uspeli realizirati:

1. Najpomembnejši dosežek UL FFA je bilo Poročilo Komisije za harmonizacijo izobraževanja farmacevtov v Evropski skupnosti, ki je ocenjevala skladnost našega univerzitetnega študijskega programa za reguliran poklic farmacevta, opredeljen z direktivo 85/432/ EEC. V Poročilu je komisija oznanila, da i) sta tako izobraževanje za poklic magistra farmacije kot celotna farmacevtska stroka v Sloveniji na zelo visoki ravni; ii) je program na UL FFA skladen z direktivo 85/432/ EEC in celo presega minimalne zahteve; iii) je program zadostna osnova za medsebojno priznavanje poklica.

the higher education programme of Laboratory Biomedicine and six programmes of pharmaceutical specializations and doctoral programmes of Pharmaceutical Sciences, Clinical Biochemistry and Laboratory Biomedicine, and Toxicology were carried out. The latter programmes were also the first to be accredited at UL in 1999 within the interdisciplinary doctoral programme in Biomedicine with the aim of making UL internationally comparable based on the procedures and criteria of well-known universities.

This period is characterized by the Bologna Declaration, signed by 29 European countries, including Slovenia in 1999. Its goal was to create a European Higher Education Area and increase employability and mobility of citizens along with international competitiveness of European higher education. This was to be introduced through the preparation of newly structured three-level programmes, the ECTS credit system, the establishment of a national quality assurance agency (SQAA - Slovenian Quality Assurance Agency for Higher Education) and the removal of obstacles to the free movement of students, teachers and researchers. Whereas most European countries started introducing these principles immediately after signing, the UL Senate was not in favour of this idea for a long time and rejected any activities in this direction. In 2003, UL set up a working group to monitor the Bologna process and for the first time the introduction of a credit system and a diploma supplement was introduced among the annual objectives.

The awareness of the need to establish connection with the international space was clear at UL FFA from the very beginning, and the Bologna reform only encouraged greater structural, organisational and implementation similarity. In this spirit, goals were set, formal discussions and preparation of documents were launched and these activities continued throughout the decade.

The following are important achievements that we managed to accomplish during our term of office:

1. The most important achievement of UL FFA was the Report of the Commission for the Harmonization of the Education of Pharmacists in the European Community, in which the compliance of our university

2. UL FFA je že v prvem letu internacionalizacije UL pripravila postopek za izmenjavo študentov iz - in na - UL FFA in podpisala prvi dve bilateralni pogodbi v okviru Socrates-Erasmus programa ter se vključila v TEMPUS, CEEPUS in GALENOS mreže. Ugled, ki ga je UL FFA imela v mednarodnem okolju, ji je že na začetku omogočal številne izmenjave, ki so bile z leti vse številčnejše in vsebinsko bogatejše.
3. UL FFA je uvedla fakultetne Prešernove nagrade in priznanja študentom, ki so redno študirali in dosegli povprečno oceno 8.5 ali več, ter slavnostni dogodek »Teden Univerze v Ljubljani na UL FFA«, kjer smo jih podelili.
4. UL FFA je leta 2002 ustanovila Inštitut za farmacijo.
5. UL FFA je prevzela del izvedbe programa za evropsko specializacijo iz radiofarmacije, ki jo vodi European Association of Nuclear Medicine in jo izvaja še danes.
6. V čast in spoštovanje do zaslužnih profesorjev za ustanovitev farmacevtskega študija v Ljubljani, smo v avli Stare tehnike odkrili portreta prof. dr. Dušanu Karbi in prof. dr. Pavlu Bohincu.
7. UL in članice smo vzpostavile novo grafično podobo; njena implementacija je v praksi tekla različno dolgo.

Fakulteta je bila vseskozi postavljena pred nova vprašanja, razvojne dileme in pričakovanja študentov ter stroke. Ponosna sem na zaposlene in njihove prispevke, s katerimi smo na UL FFA na številnih področjih sooblikovali napredne in trajne izobraževalne in raziskovalne procese. Dekanovanje mi je ostalo v prijetnem spominu.

study programme for the regulated profession of pharmacist with Directive 85/432/EEC was assessed. In the Report, the Commission announced that i) both the education for the profession of Master of Pharmacy and the entire pharmaceutical profession in Slovenia are at a very high level; ii) the programme at UL FFA complies with Directive 85/432/EEC and even exceeds the minimum requirements; iii) the programme presents sufficient basis for mutual recognition of profession.

2. In the first year of internationalization at UL level, a procedure for exchanging students from and to the UL FFA was established and the first two bilateral agreements under the Socrates-Erasmus programme were signed. UL FFA also joined the TEMPUS, CEEPUS and GALENOS networks. Right from the beginning, UL FFA's reputation in the international environment enabled its participation in many exchanges, which have become more numerous and richer in content over the years.
3. The Faculty introduced Prešeren awards in addition to commendations to students with regular advancements between years achieving a grade point average of 8.5 or higher. They were awarded at the gala event "University of Ljubljana Week at the FFA".
4. Institute of Pharmacy was established by the UL FFA in 2002.
5. UL FFA has taken over part of the Postgraduate European Radiopharmacy Course run by European Association of Nuclear Medicine, which is still being carried out today.
6. Portraits of Prof. Dr. Dušan Karba and Prof. Dr. Pavle Bohinc were unveiled in honour and respect for the professors of merit for establishing the pharmacy study in Ljubljana in 1960.
7. A new graphic image was designed at the UL and the UL FFA implemented it too.

The faculty consistently faced new questions, development dilemmas and expectations of students and the profession. I am proud of the employees and their contributions that added to the co-creation of advanced and ongoing educational and research processes in many areas. Deanship remained in my fond memory.

FAKULTETA ZA FARMACIJO

2003–2007

Prof. dr. Borut Štrukelj

Prof. dr. Albin Kristl

Novi južni prizidek je sicer predstavljal veliko izboljšavo in nadgradnjo pedagoškega, znanstvenega in strokovnega dela na Fakulteti za farmacijo. Kljub odprtju novega južnega prizidka v letu 2000 se je UL FFA še vedno soočala s hudo prostorsko stisko, saj so bili kabinetni prostori in predavalnice na podstrešju Stare tehnike popolnoma nefunkcionalni, brez toplotne in zvočne izolacije. Največjo nevarnost pa je predstavljala dotrajana konstrukcija z vidika potresne in požarne varnosti, zato smo v letu 2003 začeli s prenovo teh prostorov. Tako smo 3. februarja 2005 svečano odprli prenovljene prostore v mansardi stare stavbe UL FFA. S to obnovo smo pridobili nekaj novih seminarskih sob za delo z manjšimi skupinami študentov ter prenovili večje število kabinetov za pedagoški kader, tako da so postali prostori primerni za bivanje in delo. V povezavi s to prenovo smo na UL FFA pridobili tudi nove celično-biotehnološke laboratorije, za katere je opremo darovala tovarna zdravil Krka. Dodatni laboratoriji za delo s celičnimi kulturami so omogočili bistveno višjo kakovost raziskovalnega dela, obenem pa večjo povezavo na molekularno-celičnem delu med katedrami. Odprtje teh laboratorijev je bilo septembra 2005.

FACULTY OF PHARMACY

2003 – 2007

Prof. Dr. Borut Štrukelj

Prof. Dr. Albin Kristl

A new southern extension was representing enormous improvement in terms of scientific, pedagogical and professional work at the Faculty of Pharmacy. Despite the opening of a new southern extension in 2000, UL FFA still faced severe space constraints, as the cabinets and lecture halls in the attic of "Stara Tehnika" were completely non-functional, with no thermal and sound insulation. Therefore, in 2004 we started renovating these premises. On 3 February 2005, we ceremoniously opened the renovated premises in the attic of the old UL FFA building. With this renovation, we acquired some new seminar rooms for working with smaller groups of students and renovated a larger number of cabinets for teaching staff, so that the premises became suitable for living and working. In connection with this renovation, we also acquired new cell-biotechnological laboratories at UL FFA, for which the equipment was donated by Krka pharmaceutical company. Novel cell-biotechnical labs enabled improved quality of research as well as the bridge between chairs dealing with molecular and cell biology. These laboratories were opened in September 2005.

Aprila 2005 smo na UL FFA svečano obeležili dvatisočo diplomo na univerzitetnem študiju farmacije. Omeniti velja, da je v tistem letu prof. dr. Danijel Kikelj dobil Zoisovo priznanje in da se je prof. dr. Aleš Krbavčič upokojil. Ob tem je bil ob svečanosti na Univerzi v Ljubljani izvoljen v naziv zaslužni profesor. V letu 2005 se je število diplomantov univerzitetnega študija farmacije ustalilo nekje pri 120, število diplomiranih inženirjev laboratorijske biomedicine pa pri približno štirideset letno.

V letu 2006 sta bila na obisku na UL FFA oba resorna ministra, dr. Jure Zupan (Ministrstvo za visoko šolstvo, znanost in tehnologijo) ter g. Andrej Bručan (Ministrstvo za zdravje); opozorili smo ju predvsem na problematiko izvajanja obveznega praktičnega usposabljanja študentov farmacije v obsegu 6 mesecev v učnih enotah izven fakultete, kar je nadomeščalo pripravništvo oziroma stažiranje po diplomi. Takrat smo namreč reševali problematiko praktičnega usposabljanja z organizacijskega in finančnega vidika, ki smo ga v okviru študijskega programa začeli izvajati že naslednje leto.

Tako kot vsako leto so bili zaposleni in študenti UL FFA uspešni pri pridobivanju različnih nagrad in priznanj – od Prešernove nagrade UL študentke Alenke Kužnik do nagrade AD future doc. dr. Marka Anderluha za najboljše doktorsko delo. Redni profesorji pa so postali dr. Janko Kos, dr. Joško Osredkar in dr. Tomaž Šolmajer. Izpostaviti velja tudi, da smo v letu 2006 obeležili 50. obletnico vpisa na nepopoln študij farmacije v Ljubljani in da smo sodelovali z Lekarno Ljubljana pri organizaciji proslave ob 100-letnici lekarne Mirje, ki je kot dediščina prof. dr. Pavla Bohinca v lasti UL FFA. Leta 2006 smo šli tudi prvič na tako imenovano strokovno (športno) ekskurzijo – kar je potem postalo vsakoletna praksa.

Leta 2007 je bilo namenjeno predvsem zaključnim stopnjam bolonjske prenove obstoječih programov in pripravi novih. Svet za visoko šolstvo je tako potrdil prenovljeni enoviti magistrski študijski program Farmacija, prenovljeni prvostopenjski univerzitetni študijski program Laboratorijska biomedicina in

In April 2005, we solemnly celebrated two thousand diplomas at the university study of Pharmacy at UL FFA. It is worth mentioning that in that year Prof. Dr. Danijel Kikelj received the Zois Award and that Prof. Dr. Aleš Krbavčič retired. At the ceremony at the University of Ljubljana, he was elected Professor Emeritus. In 2005, the number of graduates of university studies in Pharmacy stabilized at around 120, and the number of graduates in Laboratory Biomedicine at around 40 per year.

In 2006, two ministers, Dr. Jure Zupan (Ministry of Higher Education, Science and Technology) and Mr. Andrej Bručan (Ministry of Health) visited our faculty. We drew their attention mainly to the issue regarding the implementation of compulsory practical training of pharmacy students in the scope of 6 months in study units outside the faculty, which replaced internships after graduation. At that time, we were solving the problem of practical training from the organisational and financial point of view, as we implemented it within the study programme the following year.

As every year, UL FFA employees and students were successful in obtaining various awards - from the Prešeren Award of UL, awarded to the student Alenka Kužnik, to the "AD future" award of Assist. Prof. Dr. Marko Anderluh for the best doctoral thesis. Dr. Janko Kos, dr. Joško Osredkar and dr. Tomaž Šolmajer acquired the titles of full professors. It should also be pointed out that in 2006 we marked the 50th anniversary of enrolment in incomplete studies of Pharmacy in Ljubljana and we cooperated with Lekarna Ljubljana in organising a celebration on the occasion of the 100th anniversary of the Mirje pharmacy, which as the legacy of Prof. Dr. Pavle Bohinc is owned by UL FFA. In 2006 we also went on a so-called professional (sports) excursion for the first time - which then became an annual practice.

In 2007 we were mainly involved in the final stages of the Bologna renovation of existing programmes and the preparation of new ones. The Higher Education Council thus approved the renewed uniform master

novi drugostopenjski magistrski študijski program Industrijska farmacija, ki smo ga pripravili ob sodelovanju s slovensko farmacevtsko industrijo. Vse tri prenovljene bolonjske programe smo začeli izvajati že v naslednjem študijskem letu 2008/2009. Nova programa, prvostopenjski univerzitetni študijski program Kozmetologija in drugostopenjski magistrski študijski program Laboratorijska biomedicina, sta bila v letu 2007 dokončana in pripravljena ter oddana v postopek akreditacije. V pripravi je bil takrat tudi prvostopenjski univerzitetni, medfakultetni magistrski študijski program Toksikologija, ki ga je UL FFA pripravljala skupaj z Medicinsko fakulteto, Veterinarsko fakulteto in Biotehnično fakulteto, vendar do realizacije ni prišlo. Poleg vseh navedenih programov smo izvajali tudi doktorski študij Biomedicina. Za kvalitetno izvedbo vseh teh programov smo se morali kadrovsko okrepiti. Tako je bil prvi korak v tej smeri narejen v letu 2007, ko smo na UL FFA na novo zaposlili tri univerzitetne učitelje in tri asistente. V letu 2007 smo ustanovili tudi pisarno za mednarodno sodelovanje, ki je skrbela za boljšo mobilnost študentov in učiteljev. Prof. dr. Borut Štrukelj je dobil Zoisovo priznanje za pomembne dosežke na področju farmacevtske biotehnologije.

study programme Pharmacy (Single-cycle master study programme Pharmacy), the renewed the academic bachelor study programme Laboratory Biomedicine and the new master study programme Industrial Pharmacy, which we prepared in cooperation with the Slovenian pharmaceutical industry. We started implementing all three renewed Bologna programmes in the next academic year 2008/2009. The new programmes, the academic bachelor study programme Cosmetology and the master study programme Laboratory Biomedicine, were completed in 2007 and submitted to the accreditation process. At that time, the first-level university, inter-faculty master's study programme Toxicology was also being prepared by UL FFA together with the Faculty of Medicine, the Faculty of Veterinary Medicine and the Biotechnical Faculty, but did not materialize. In addition to all the above programmes, we also conducted a doctoral study in Biomedicine. For the quality performance of all these programmes, we had to strengthen our staff. The first step in this direction was taken in 2007, when we hired three university teachers and three assistants anew. In 2007 we also established the start-up office for international cooperation, which was responsible for better mobility of students and teachers; Prof. Dr. Borut Štrukelj received the Zois Award for important achievements in the field of pharmaceutical biotechnology.

FAKULTETA ZA FARMACIJO

2007–2009

Prof. dr. Stanislav Gobec

Bolonjska prenova obstoječih študijskih programov in priprava novih sta zaznamovali prvo desetletje po letu 2000. Poseben izziv je bil začetek izvajanja novega magistrskega programa Industrijska farmacija, ki smo ga pripravili v sodelovanju s slovensko farmacevtsko industrijo. Že prvo leto se je na 40 razpisanih mest prijavilo 33 študentov. Ker so kljub temu da je bil študij razpisan kot redni, mnogi študenti študirali ob delu, smo program izvajali na modularni način in tudi med vikendi.

Leta 2009 smo začeli izvajati nov magistrski program Laboratorijska biomedicina. To leto smo si na področju študija zapomnili tudi zaradi prehajanja iz starih učnih programov v nove bolonjske programe, kar je povzročilo izzive hkratnega izvajanja nekaterih predmetov za dve generaciji študentov in vedno pogostejšega najemanja predavalnic izven UL FFA.

Rasti števila prenovljenih in novih programov je seveda sledila tudi rast vpisanih študentov na teh programih in z manjšim zamikom tudi kadrovska rast, saj smo zaposlovali nove učitelje in asistente. Vedno bolj je prihajala do izraza prostorska stiska UL FFA. Leta 2009 smo zato prenovili še zadnje laboratorije v stavbi Stare

FACULTY OF PHARMACY

2007-2009

Prof. Dr. Stanislav Gobec

The Bologna renewal of existing study programmes and the preparation of new ones marked the first decade after 2000. A special challenge was the start of the implementation of the new master study programme Industrial Pharmacy, which we prepared in cooperation with the Slovenian pharmaceutical industry. Already in the first year, 33 students applied for 40 advertised positions. Because, despite the fact that the study was announced as full-time, many students studied part-time, we implemented the programme in a modular way and also on weekends.

In 2009 we started implementing a new master study programme Laboratory Biomedicine. This year was also remembered in the field of studies due to the transition from the old curricula to the new Bologna programmes, which caused challenges of simultaneous execution of some subjects for two generations of students and increasingly frequent hiring of lecture halls outside UL FFA.

The growth in the number of renewed and new programmes was, of course, followed by the growth of enrolled students in these programmes and, with a slight delay, the growth of staff, as we hired

tehnike, kjer je Katedra za farmacevtsko tehnologijo dobila dva sodobna tehnološka laboratorija, potrebna za izvajanje Industrijske farmacije, in kabinet. Glede na rezultate prostorske preverbe, ki jo je za UL FFA opravilo podjetje PROPLUS d.o.o., je fakulteti že leta 2007 manjkalo šest manjših predavalnic, ena večja amfiteatralna predavalnica, 14 laboratorijev, 39 kabinetov in dodatne površine za potrebe knjižnice. Skupno je to pomenilo, da UL FFA primanjkuje kar 45 % potrebnih površin. V tem času smo zato začeli z intenzivnim iskanjem možnosti dolgoročnega najema zunanjih laboratorijev, začeli so se prvi razgovori z Ilirijo d.o.o.

Leta 2008 smo prvič organizirali Raziskovalni dan, ki je potekal v okviru Tedna Univerze. Na njem smo podelili nagrade tistim mladim raziskovalcem, ki so v minulem akademskem letu svoje rezultate objavili v najbolj prestižnih publikacijah z visokim dejavnikom vpliva (IF). Raziskovalni dan je še danes pomemben in dobro obiskan dogodek na UL FFA, ki zelo dobro prikaže kvaliteto raziskovalnega dela na fakulteti in izpostavi delo mladih raziskovalcev. Ni naključje, da smo ta dan prvič organizirali v obdobju intenzivne raziskovalne rasti UL FFA, ki ga najbolje ponazori rast celokupnega števila objav UL FFA: 72 (2007), 116 (2008), 124 (2009), itd.

new teachers and assistants. However, the UL FFA space constraints became increasingly pronounced.

In 2009 we therefore renovated the last laboratories in the "Stara Tehnika" building, where the Department of Pharmaceutical Technology received two modern technological laboratories needed for Industrial Pharmacy, and a cabinet. According to the results of the spatial inspection performed for UL FFA by the company PROPLUS d.o.o., the faculty in 2007 lacked six smaller lecture halls, one larger amphitheatre lecture hall, 14 laboratories, 39 cabinets and additional areas for the needs of the library. In total this meant that UL FFA lacked as much as 45 % of the required area. During this time, we began intensive search for the possibility of long-term lease of external laboratories, and the first interviews with Ilirija d.o.o.

In 2008 we organised a Research Day for the first time, which took place as part of the University of Ljubljana Week. We awarded prizes to those young researchers who published their results in the most prestigious publications with a high impact factor (IF) in the past academic year. The Research Day is still an important and well-attended event at UL FFA, which shows the quality of research work at the faculty and highlights the work of young researchers. It is no coincidence that this day was organised for the first time in the period of intensive research growth of UL FFA, which is best illustrated by the growth of the total number of UL FFA publications: 72 (2007), 116 (2008), 124 (2009), etc.

FAKULTETA ZA FARMACIJO

ZADNJE DESETLETJE 2010–2020

Prof. dr. Borut Božič, dekan 2011–2017
Prof. dr. Irena Mlinarič-Raščan, dekanja od leta 2017

UVOD

Šesto desetletje Fakultete za farmacijo je polno kontrastov. Po vpeljani bolonjski reformi in večjem številu študijskih programov je raslo število študentov, temu je sledilo tudi število diplomantov. Rast obsega raziskovalnega dela je prispevala k povečanju števila zaposlenih. Vsemu temu je sledilo povečanje sredstev za pedagoško in raziskovalno delo. Nato pa zlom – naslednjega pol desetletja je izrazito zaznamovala finančna in gospodarska kriza. Varčevalni ukrepi so zarezali v obseg in kakovost pedagoškega dela, povečale so se obremenitve zaposlenih, zmanjšal se je obseg sodelovanja z gospodarstvom. Drugo petletje je prineslo nov zagon v materialnem in ustvarjalnem vidiku. Z implementacijo razvojnega stebra financiranja smo dodajali nove vsebine s poudarkom na kakovosti študija, sodelovanju z okoljem in internacionalizaciji. Med poglavitne dosežke spadajo višji standardi kakovosti izvajanja študijskih vsebin, karierni razvoj sodelavcev, krepitev povezovalnih instrumentov, uveljavitev v mednarodnih partnerstvih in mrežah. Zaključek desetletja nas je postavil pred nepredvidljive izzive, povezane s pandemijo

FACULTY OF PHARMACY

IN THE LAST DECADE 2010 – 2020

Prof. Dr. Borut Božič, Dean 2011-2017
Prof. Dr. Irena Mlinarič-Raščan, Dean since 2017

INTRODUCTION

The sixth decade of the Faculty of Pharmacy is full of contrasts. After the introduction of the Bologna reform and a larger number of study programmes, the number of students grew, followed by a larger number of graduates. The scope of the research work increased and, consequently, also the number of employees. All this was followed by an increase in funding for pedagogical and research work. Then there was the collapse - the next half decade was marked by the financial and economic crisis. Austerity measures have cut into the scope and quality of pedagogical work, the workload of employees has increased, and the scope of cooperation with the economy has decreased. The second five years brought a new impetus from the material and creative aspect. With the implementation of the new way of financing, we improved the quality of studies, cooperation with the environment and internationalization. The main achievements include higher quality standards in the implementation of study content, career development of employees, and active participation in international partnerships and networks. The end of the decade presented us with unpredictable

Sars-Cov-2, kar je zahtevalo izjemne napore sodelavcev in študentov. Povezani, solidarni in odgovorni izpolnjujemo poslanstvo Fakultete za farmacijo.

DELOVANJE FAKULTETE

Za uspešno delovanje fakultete so ključni ljudje, ki svoj ustvarjalni potencial uresničujejo ob ustreznih materialih pogojih, dostopu do vrhunske opreme ter ustvarjalnem in človeku prijaznemu delovnemu okolju. Skupaj s partnerji iz stroke, kolegi iz akademskih inštitucij in snovalci politik oblikujemo pogoje, ki nam omogočajo, da izpolnjujemo poslanstvo.

Kriza je v obliki zakonskih ukrepov omejevanja sistemsko posegla v pogoje delovanja. Sredstva so se nam 2012 zmanjšala za petino, 2015 so bila za 22 % nominalno nižja od 2011. Stanje iz 2011 je bilo nominalno preseženo šele leta 2018. Fakulteta se je krepila v raziskovalni odličnosti, kar ji je omogočilo uveljavitev v evropskih partnerstvih in mrežah in s tem pridobitev virov financiranja. Z iskanjem novih priložnosti in uveljavljanjem novih konceptov smo s krepitvijo delovanja Inštituta za farmacijo in infrastrukturnih centrov pridobili projekte iz vira Evropskih kohezijskih instrumentov in pomembno izboljšali raziskovalno infrastrukturo. Situacija se je izboljšala šele v letih 2017–2018 s spremenjenim obravnavanjem variabilnega dela temeljnega stebra in uvedbo razvojnega stebra financiranja. Tak način financiranja nam je omogočil in nas hkrati zavezoval k uvajanju novih strateških vsebin na področjih internacionalizacije, sodelovanja z okoljem in kakovosti študija. Uvedli smo večje število predmetov v angleškem jeziku, omogočili vključitev več kot 100 gostujočih predavateljev, posodobili smo opremo za izvajanje laboratorijskih vaj, izvedli mednarodne izmenjave pedagoškega in strokovnega osebja.

Ob spremembah in rasti UL FFA nekatere rešitve iz devetdesetih niso več ustrezale, zato smo po večletni razpravi 2013 sprejeli nova Pravila o organiziranosti, ki so jih periodično obnavljali in posodabljali. Na tej

challenges related to the Sars-CoV-2 pandemic, which required the tremendous efforts of staff and students. Connected, supportive and responsible, we fulfil the mission of the Faculty of Pharmacy.

ORGANISATION OF THE FACULTY

The key to the successful operation of the faculty are people who realize their creative potential with appropriate material conditions, access to state-of-the-art equipment and a creative and benevolent work environment. Together with partners from the pharmaceutical profession, colleagues from academic institutions and policy makers, we create the conditions that enable us to fulfil our mission.

The crisis has systematically interfered with operating conditions in the form of legal restrictive measures. In 2012 our funds decreased by a fifth, in 2015 they were 22 % lower in nominal value than in 2011. The situation in 2011 was nominally exceeded only in 2018.

The faculty has strengthened its research excellence, which has enabled it to establish itself in European partnerships and networks and gain access to new funding sources. By looking for new opportunities and implementing new concepts through strengthening of the Institute of Pharmacy and infrastructure centres, we obtained projects of the European cohesion financial instruments and significantly improved the research infrastructure. The situation improved in 2017-2018 with a changed method of financing (Figure 1). New method of financing enabled and at the same time committed us to the introduction of new strategies in the areas of internationalization, cooperation with the environment and the quality of studies. We introduced a larger number of subjects in English, enabled the inclusion of more than 100 guest lecturers, updated equipment for laboratory exercises, and conducted international exchanges of pedagogical and professional staff.

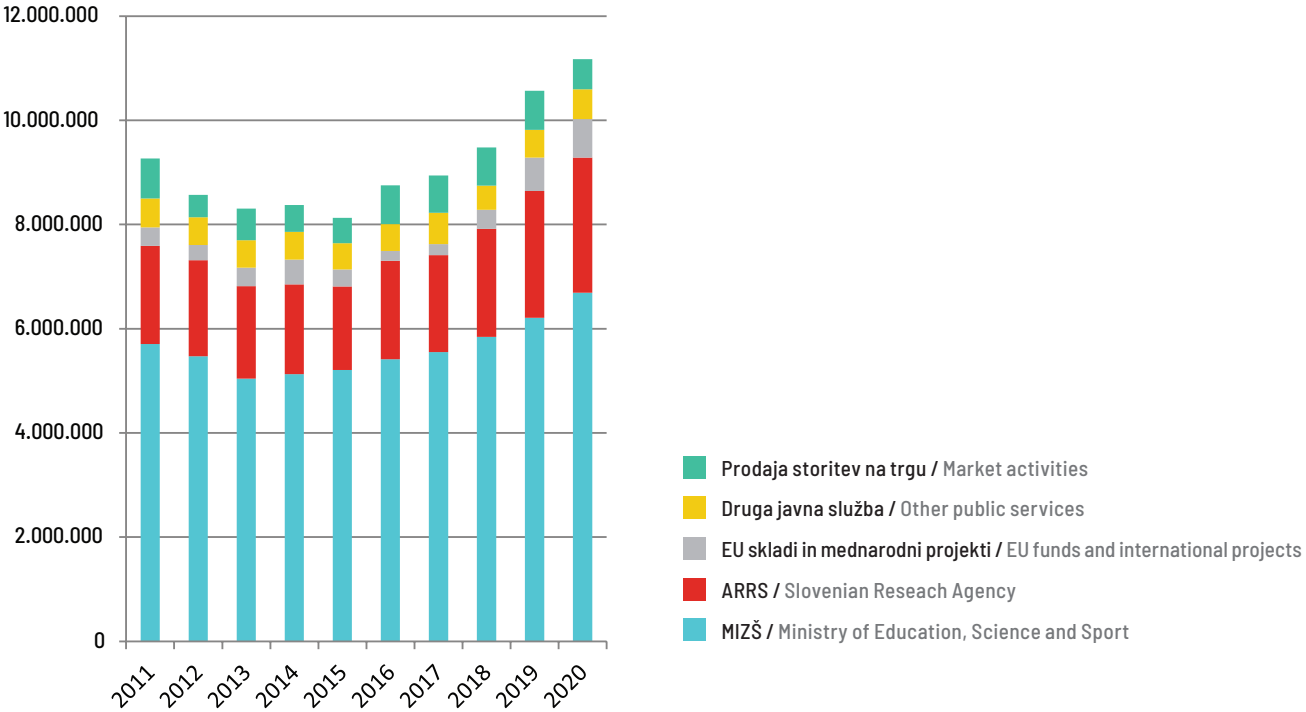
With changes and growth of the UL FFA, some solutions from the 1990s were no longer suitable, so after several years of discussions we adopted new Rules on Organisation in 2013, which were periodically updated and upgraded. Based on this progress, additional

podlagi so bili sprejeti dodatni interni akti – na primer za izboljšanje raziskovalnega sodelovanja znotraj in za izogibanje nasprotju interesov delovanja izven UL FFA.

UL FFA je vodilna raziskovalna visokošolska institucija na področju farmacije, klinične biokemije, toksikologije in kozmetologije v Sloveniji in je uspešno vpeta v evropski raziskovalni in izobraževalni prostor. Raziskovalno delo fakultete poteka znotraj štirih programskih skupin ter v okviru številnih nacionalnih in mednarodnih projektov. Raziskovalne dosežke objavljamo v prestižnih publikacijah s področja naravoslovja in medicine ter dosegajo znatno družbeno odmevnost. UL FFA aktivno sodeluje z gospodarskimi subjekti na področju farmacije, doma in v tujini. Ključnega pomena pri tem je prenos znanja v industrijo in hkrati bogatitev zaposlenih z dragocenimi strokovnimi izkušnjami na področju realnih izzivov iz prakse.

internal acts have been adopted, for example to improve research cooperation within and to avoid conflicts of interest in operations outside the UL FFA.

UL FFA is the leading research and higher education institution in the field of pharmacy, clinical biochemistry, toxicology and cosmetology in Slovenia and is successfully integrated into the European research and educational space. The research work of the faculty takes place within four programme groups and within numerous national and international projects. Research achievements have been published in prestigious journals in the field of natural science and medicine, and they have a significant social impact. UL FFA actively cooperates with economic entities in the field of pharmacy at home and abroad. The transfer of knowledge to the industry and at the same time the improvement of employees having valuable professional experience with real challenges from practice are of key importance.



Slika: Prihodki Fakultete za farmacijo glede na vir (v evrih)
Figure: Revenues of the Faculty of Pharmacy by source (in euros).

KADROVSKI POTENCIAL UL FFA

Leta krize so zelo posegla v načrtovano zaposlovanje in enakomerni kadrovski razvoj kateder. Izboljšanje razmerja med številom študentov in pedagogov bi pripomoglo h kakovosti študija.

Ne glede na dejstvo, da se je ukinil sistem usposabljanja stažistov zaradi razvoja akademskih karier, smo pomembno okrepili število raziskovalcev za pridobitev doktorata kakor tudi podoktorskih raziskovalcev, ki smo jih zaposlili za nedoločen čas. Uspešnost na raziskovalnem področju je omogočila pedagoško razbremenitev in delno zaposlitev učiteljev iz raziskovalnih virov, kar omogoča intenzivnejše raziskovalno udejstvovanje, predvsem pri izrazito raziskovalno usmerjenih profesorjih. V obdobju od 2010 se je število zaposlenih povečalo za tretjino. Dejavnosti UL FFA izvaja blizu 200 redno zaposlenih učiteljev, raziskovalcev in strokovnih sodelavcev, v sodelovanju z več kot 30 zunanjimi učitelji drugih članic UL ter več kot 100 gostujočimi predavatelji, raziskovalci ter mentorji praktičnega usposabljenja. Iz Tabele 1 je razvidno, da se je število delovnih mest povečalo na račun povečanja raziskovalnega dela. Vir financiranja torej ni sistemski, ampak prihaja iz konkurenčno pridobljenih nacionalnih, evropskih, mednarodnih in tržnih projektov. Ta podatek jasno izkazuje intelektualni potencial in podjetnost sodelavcev UL FFA, hkrati pa predstavlja ranljivost, saj je večina projektov kratkotrajne narave, posledično je torej večina raziskovalcev zaposlena za določen čas.

Verjamemo, da predstavljajo zaposleni in študenti UL FFA močan kolektiv, kar se je še posebej izkazalo v kriznih časih. Ne glede na težave smo sledili poslanstvu in mogoče se je prav zaradi zaostrenih pogojev delovanja v tem času izkristalizirala naša vizija: »Prispevati k sooblikovanju prihodnosti, ostati v svet odprta, odzivna in odgovorna akademska izobraževalna in raziskovalna ustanova, ki je razpoznavna med evropskimi farmacevtskimi fakultetami; z ustvarjanjem in širjenjem znanstvenih spoznanj delovati v dobrobit slovenskih državljanov, skrbeti za splošni razvoj ter tako utrjevati nacionalno samobitnost.« Prepoznavanje dosežkov in krepitev partnerstev obeležujemo na

HUMAN RESOURCES AT UL FFA

The years of crisis have greatly affected the planned and balanced employment and development of departments. Improving the ratio between the number of students and educators would contribute to the quality of studies.

Despite the fact that the system of training interns for the purpose of developing academic careers has been abolished, we have significantly strengthened the number of researchers for the purpose of obtaining a doctorate as well as postdoctoral researchers, employed for an indefinite period. Success in the field of research has also enabled partial employment of teachers from research sources, which enables more intensive research engagement, especially with highly research-oriented professors. In the period since 2010, the number of employees increased by a third. The UL FFA's activities are carried out by nearly 200 full-time teachers, researchers and technical staff, in collaboration with more than 30 external teachers from other UL faculties, and more than 100 guest lecturers, researchers and traineeship mentors. The number of employees increased due to an increase in research work. The source of funding is therefore not systemic, but comes from competitively acquired national, European, international and industrial projects. This information clearly shows the intellectual potential and entrepreneurship of UL FFA staff, but simultaneously presents a problem, as most projects are short-term in nature, so most researchers are employed on a part-time basis. We believe that UL FFA employees and students represent a strong team, which has been especially evident in times of crisis. Regardless of the difficulties, we followed the mission and perhaps because of the aggravated working conditions during this time, our vision became crystal clear: "To influence the future, to remain an open, responsive and responsible academic educational and research institution that is recognizable among European Faculties of Pharmacy; by creating and disseminating scientific knowledge in order to work for the benefit of Slovenian citizens, and thus strengthen national identity." Recognition of achievements and strengthening of partnerships have been celebrated at the Annual Research Day taking

vsakoletnem Raziskovalnem dnevu že od leta 2007. Dogodek povezuje simpozijski in slavnostni segment in predstavlja platformo za izmenjavo strokovnih spoznanj in kolegialnih pogledov na stroko.

place since 2007. The event consists of the symposium and the ceremonial part and represents a platform for the exchange of professional knowledge and collegial views on the profession.

Tabela 1: Število zaposlenih na UL FFA glede na delovna mesta
Table 1: Number of employees at UL FFA

	2010	2013	2015	2017	2018	2019	2020
VSI All	136,1	140,5	151,4	149,1	163,8	176,7	184,2
Pedagoška delovna mesta Pedagogical staff	67,2	70,9	73,9	76,1	76,8	77,6	78,4
Tehnične sodelavke Expert workers	15	15	15	15	16	16	16
Raziskovalci z doktoratom Postdoctoral researchers	4,9	7,6	10,5	6	8	9,10	13,8
Raziskovalci brez doktorata Doctoral researchers	/	/	3	1	4	7	7
Raziskovalci / dr. študenti** Researchers/doctoral students**	32	29	31	32	39	47	48
Skupne službe Secretariat	17	18	18	19	20	20	21

Legenda: Zaposleni na UL FFA, izraženo kot ekvivalent polne zaposlitve.
**Raziskovalci / dr. študenti; vir financiranja ARRS-MT in projekti, trg, mednarodni projekti.
Legend: Employed at UL FFA as full-time equivalent.
** Researchers/doctoral students; source of financing ARRS-MT, and projects, free market, international projects.

UVAJANJE BOLONJSKIH ŠTUDIJSKIH PROGRAMOV

Desetletje 2010-2019 je pomenilo prehod v bolonjske študijske programe ob hkratnem postopnem zaključevanju starih. Ob predpisani akreditaciji vsakih 7 let smo v tem desetletju izpeljali reakreditacije vseh študijskih programov. Krizni zakonski ukrepi iz leta 2012 so neposredno vplivali na kakovost študija; študente smo združevali v večje skupine, združevali smo izvajanje predmetov, individualnega dela je bilo manj. Sodelavci fakultete so vzdrževali kakovost študija z maksimalno angažiranostjo, tudi na račun

INTRODUCTION OF BOLOGNA STUDY PROGRAMMES

The decade 2010-2019 marked the transition to Bologna study programmes while gradually completing the old ones. In the course of prescribed accreditation every 7 years, we performed re-accreditations of all study programmes in this decade. The 2012 crisis legislation had a direct impact on the quality of studies; we gathered students into larger groups, subjects for different study programmes were performed together, there was less individual work. The faculty maintained the quality of studies with maximum commitment of

dela preko celega dne, dve leti celo ob sobotah brez finančne stimulacije, ker znižani prihodki tega niso omogočali.

Nadaljevali smo s sistemom izrednih sej senata o sistemskih vprašanjih pedagoškega dela, na katerih so sodelovali vsi skrbniki programov. Z letom 2015 smo jih preoblikovali v pedagoške konference, ki predstavljajo odprt forum pedagogov, raziskovalcev in študentov glede izzivov na področju izvedbe in kakovosti študija. Zaključki se v obliki priporočil posredujejo Senatu, ki sprejme izvedbene sklepe. Ob zavzetih pedagoških delavcih so motivirani študenti uspešno zaključevali študij, tako smo 2016 zaključili s predbolonjskimi študijskimi programi (Tabela 2).

POMEMBNI SO LJUDJE, KI POTREBUJEJO ZA DELO PROSTOR

Največje bogastvo UL FFA so vsekakor ljudje, ki potrebujejo za delo prostor. V širini delovanja UL FFA je ta prostor zelo različen – arhitekturni, miselni, ustvarjalni, regulatorni, virtualni. Čeprav se povezujejo, je eden od osnovnih prostorov fizični. Prostorska preverba je 2007 pokazala, da UL FFA manjka 40 % prostorov, leta 2013 že več kot 50 %. Ob izselitvi UL FKKT smo prevzeli stari »dekanat« in ga usposobili za študentski referat, seminarje in zagovor diplom. Najeti prostori na Tržaški cesti so nepogrešljivi za tekoče delo, vendar ne predstavljajo celostne in trajne rešitve. Skupaj z Lekarno Ljubljana smo intenzivno iskali možnosti za prenovo in povečanje funkcionalnosti lekarne Mirje. Otvoritev prenovljene lekarne leta 2018 omogoča tudi razvoj koncepta učne lekarne. Tudi ob ambicioznih načrtih prenove dvoriščne predavalnice so se pokazale nepremostljive ovire zaradi statike in arheološke dediščine pod njo, tako da je ostalo samo pri funkcionalni prenovi v obstoječih gabaritih.

Navedene situacije in poglobljene analize so pokazale, da na obstoječi lokaciji UL FFA ni mogoče pridobiti zadosti prostorov za ustrezen razvoj. Zato smo poskrbeli, da je prostorska problematika UL FFA

pedagogical staff, even at the expense of working all day, for two years even on Saturdays without financial incentives, because of the reduced income.

We continued with the system of additional senate sessions on systemic issues of pedagogical work, in which all programme administrators participated. In 2015, we transformed them into pedagogical conferences, which represent an open forum of pedagogues, researchers and students regarding the challenges in the field of implementation and quality of studies. The conclusions in the form of recommendations are forwarded to the Senate, which adopts them. With the dedicated pedagogical staff, motivated students successfully completed their studies, so we completed all pre-Bologna study programmes until 2016.

PEOPLE ARE IMPORTANT AND NEED SPACE TO WORK

The greatest asset of UL FFA is definitely the people who need the space to work. And in the breadth of mission of UL FFA, this space is very different - architectural, mental, creative, regulatory, virtual. Although they connect, one of the basic spaces is physical. The spatial inspection in 2007 showed that UL FFA was missing 40 % of the premises, in 2013 over 50 %. When UL FKKT moved to new location, we took over the old "dean's office" and transformed it for student's office, rooms for seminars and the presentations of diplomas and master's theses. Leased premises on Tržaška Street were indispensable for ongoing work, but they did not represent a comprehensive and permanent solution. Together with Lekarna Ljubljana, we intensively looked for opportunities to renovate and increase the functionality of the Mirje pharmacy. The opening of the renovated pharmacy in 2018 also enabled the development of the learning pharmacy concept. Even the ambitious plans to renovate the lecture hall in the faculty's courtyard showed insurmountable obstacles due to statics and archaeological heritage, so that we functionally renovated it in the existing dimensions.

These situations and in-depth analyses have shown that it is not possible to obtain sufficient premises for

Tabela 2: Število diplomantov
Table 2: Number of graduates

Leto Year Študijski program in naziv Study programme and official title	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
UN Farmacija – 10. sem. mag. farm. *	132	120	140	84	27	45				
EM Farmacija – 10. sem. mag. farm.			35	91	125	139	152	121	146	123
VSŠ LBM dipl. inž. lab. biomed.*	30	18	3	2	1	11				
S1 LBM dipl. inž. lab. biomed. (UN)	24	56	45	32	43	25	36	28	36	41
S1 KOZ dipl. kozmet. (UN)			5	22	43	28	34	23	32	31
S2 INF mag. ind. farm.	8	9	10	16	20	13	19	35	32	35
S2 LBM mag. lab. biomed.	4	12	13	30	26	37	35	31	27	32

Legenda:

okrajšava – **uradni naziv študijskega programa:**
* – predbolonjski programi zaključeni leta 2016

UN Farmacija – univerzitetni program farmacija

EM FAR – enoviti magistrski študijski program Farmacija

VSŠ LBM – višješolski študijski program Laboratorijska biomedicina

S1 LBM – univerzitetni študijski program prve stopnje Laboratorijska biomedicina

S1 KOZ – univerzitetni študijski program prve stopnje Kozmetologija

S2 INF – magistrski študijski program druge stopnje Industrijska farmacija

S2 LBM – magistrski študijski program druge stopnje Laboratorijska biomedicina

uradni pridobljeni naziv:

mag. farm. – magister/magistra farmacije

dipl. inž. lab. biomed. – diplomirani inženir / diplomirana inženirka laboratorijske biomedicine

dipl. inž. lab. biomed. (UN) - diplomirani inženir / diplomirana inženirka laboratorijske biomedicine (UN)

dipl. kozmet. (UN) – diplomirani kozmetolog / diplomirana kozmetologinja (UN)

mag. ind. farm. – magister / magistrica industrijske farmacije

mag. lab. biomed. – magister / magistrica laboratorijske biomedicine

Legend:

Legend: abbreviation – **official name of study programme:**
* – pre-Bologna programmes, finished in the year 2016

UN Farmacija – University programme Pharmacy

EM FAR – Uniform master study programme Pharmacy (Single-cycle master study programme Pharmacy)

VSŠ LBM – Higher education study programme Laboratory Biomedicine

S1 LBM – The academic bachelor study programme Laboratory Biomedicine

S1 KOZ – The academic bachelor study programme Cosmetology

S2 INF – The master study programme Industrial Pharmacy

S2 LBM – The master study programme Laboratory Biomedicine

Official title (according to Slovenian law it should not be translated):

mag.farm. - magister/magistra farmacije

dipl. inž. lab. biomed. - diplomirani inženir/diplomirana inženirka laboratorijske biomedicine

dipl. inž. lab. biomed. (UN) - diplomirani inženir/diplomirana inženirka laboratorijske biomedicine (UN)

dipl. kozmet. (UN) - diplomirani kozmetolog/diplomirana kozmetologinja (UN)

mag. ind. farm. - magister/magistrica industrijske farmacije

mag. lab. biomed. – magister / magistrica laboratorijske biomedicine

prišla v strateške dokumente UL in MIZŠ, nato smo ob spremembah Občinskega prostorskega načrta 2013 pripravili Dokument o izvedljivosti investicijskega projekta na lokaciji Brdo. V minulem desetletju smo realizirali načrte do faze izdelave dokumentacije projektantskih strok, da bo naslednje desetletje obdobje izgradnje nove stavbe UL FFA.

Ker nismo želeli samo preslikati obstoječega delovanja v prihodnost, smo se v dveh letih intenzivnih razprav znotraj UL FFA dogovorili o organizaciji dela na novi lokaciji in skupnih aktivnosti fakultete glede infrastrukturnih vozlišč in centrov z visokimi stopnjami biološke varnosti in zahtevnosti dobre laboratorijske/proizvodne prakse. Vključena je tudi učna lekarna, saj smo dosegli, da je po zakonu o lekarniški dejavnosti UL FFA lahko izvajalka te dejavnosti. Nove organizacijske vidike smo v letih 2019 - 2020 uspešno preslikali v izhodišča urbanistično-arhitekturnega natečaja.

INSTITUCIONALNE EVALVACIJE

V zadnjem desetletju smo imeli dve zunanji evalvaciji. V redno institucionalno akreditacijo UL smo bili vključeni kot ena od vzorčnih članic z našimi predstavniki na srečanjih evalvatorjev z dekani in senatorji UL.

Drugo smo izbrali sami. Ob vseh spremembah UL FFA in zavzetosti za kakovost smo se 2014 odločili za pogled v ogledalo, to je prvo zunanjo institucionalno presojo fakultete v njeni celotni zgodovini delovanja. Evalvacija in priprave nanjo so potekale dve leti v okviru projekta zagotavljanja kakovosti UL, izvedla jo je nemška agencija ASIIN. Fakultetna komisija za kakovost in akreditacijo v svoji razširjeni sestavi je opravila izjemno delo, bistvena pa je bila vključitev celotnega kolektiva fakultete v aktivnosti, ko je v večkrožnem sistemu razprav po organizacijskih enotah lahko vsak posameznik dodal svoj kamenček v mozaik. Pristop k samorefleksiji celotne skupnosti UL FFA in učvrstitev zavedanja, kaj smo, kdo smo in

proper development at the existing faculty site. We therefore made sure that spatial issues of UL FFA were included in the documents of the University and the Ministry, and then, when the Municipal Spatial Plan for 2013 was amended, we prepared a Document on the feasibility of the investment project at Brdo location. In the past decade we have realized plans up to the stage of preparing all necessary documentation to make it possible for the next decade to be the period of construction of the new faculty building.

As we did not just want to reflect the existing activities in the future, we agreed - in two years of intensive discussions within UL FFA - on the organisation of work at the new location regarding the joint activities of the faculty in the form of infrastructure hubs and centres with high levels of biological safety and complexity of GMP and GLP. A pharmacy for student training is also included; according to the Pharmacy Practice Act, we made it legally possible for the faculty to provide this activity. In the years 2019-2020, we successfully mapped the new organisational aspects into the starting points of the urban-architectural competition.

INSTITUTIONAL EVALUATIONS

We have had two external evaluations in the last decade. We were included in the regular institutional accreditation of UL as one of the sample members and through our representatives at the meetings of the evaluators with the deans and senators of UL.

We chose the second evaluation ourselves. With all the changes of UL FFA and commitment to quality, in 2014 we decided to join the first external institutional assessment of the faculty in its history. The evaluation and preparations were being carried out over a two-year period as part of the UL quality assurance project, carried out by a German agency ASIIN. The Faculty Commission for Quality and Accreditation in its expanded composition did an exceptional job, and it was essential to involve the entire faculty in the activities. The approach to self-reflection of the entire UL FFA community and the strengthening of awareness of what we are, who we are and where our

kje so naši izzivi, je bil naporen in dolgotrajen ter je zahteval veliko zavzetost vseh na UL FFA.

Mednarodna skupina presojevalcev je potrdila, da smo na pravi poti: prepoznavamo kakovost in smo ji zavezani. Ne zanima nas več samo, kako dobri smo na posameznem področju, temveč kaj lahko še dosežemo. Sklepna misel evalvatorjev je bila: »Razvojno usmerjeno vodstvo in zadostna kritična masa kvalitetnih delavcev ter zavzeti študenti so zagotovilo za kakovost.«

ODPRTOST IN SODELOVANJE Z OKOLJEM

Odprtost fakultete v okolje se kaže na več ravneh: Na lokalni/nacionalni ravni z vseživljenjskim izobraževanjem in usposabljanjem, na katerem se je v 10. letih srečalo 2000 udeležencev. Pa s sodelovanjem v teoretičnem delu strokovnih zdravstvenih specializacij farmacevtov in laboratorijskih strokovnjakov. In z vključevanjem strokovnjakov iz prakse v študijski proces, pri čemer so pomembno vlogo odigrali projekti z gospodarstvom in javnimi inštitucijami. Še posebej pomemben je projekt Razvoj kadrov, ki poteka že tretjo generacijo po tri leta. Omogoča razumevanje razlik med industrijsko in akademsko sfero, zvišuje kompetence mentorjev na obeh straneh, zagotavlja dotok študentov na doktorski študij in olajša mladim prehod iz študija v delovno okolje.

Mednarodno izmenjavo študentov smo v organizacijskem smislu prenesli z ravni koordinatorja na raven vodstva – prodekana za mednarodno sodelovanje, kar je omogočilo bolj strateški pristop k internacionalizaciji. Vanjo sodijo tudi izmenjave pedagogov, strokovnih in administrativnih delavcev, vključevanje tuje literature, mednarodnih baz podatkov, primerov iz mednarodnih praks, sodelovanje v mednarodnih raziskavah, katerih izkušnje in znanje se prelivajo v pedagoški proces (»internacionalizacija doma«).

challenges are, was arduous and time-consuming and required strong commitment from everyone at UL FFA.

An international team of auditors has confirmed that we are on the right track: we recognize quality and we are committed to it. We are no longer just interested in how good we are in every area, but also what we can achieve in the future. The conclusion of the evaluators was: "Development-oriented management and a sufficient critical mass of quality workers and dedicated students are a guarantee of quality."

OPENNESS AND COOPERATION WITH THE ENVIRONMENT

The openness of the faculty to the environment is reflected on several levels: At the local/national level through lifelong education and training, where 2,000 participants have met in 10 years. Additionally, we participated in the theoretical part of the professional medical specializations of pharmacists and laboratory experts. We included experts in practice to be involved in the study process and through this process the projects with the industry and public institutions played an important role. The Human Resources Development Project was particularly important, as it has been running for the third generation each time lasting three years. It increases the understanding of the differences between the industrial and academic spheres, increases the competencies of mentors on both sides, ensures the influx of students to doctoral studies and facilitates the transition of young people from study to the work environment.

In terms of organisation we transferred international student exchanges from the level of coordinator to the level of management - vice dean for international cooperation. This enabled a more strategic approach to internationalization. Internationalization also includes exchanges of teachers, researchers and administrative staff, inclusion of foreign literature, use of international databases, examples from international practices and participation in international research projects, where experience and knowledge flow into the pedagogical process ("internationalization at home").

PREPOZNAVNOST DOMA IN V TUJINI

Za prepoznavnost ne zadošča samo odlično delo, potrebno je tudi usmerjeno delovanje. Tako smo v tem desetletju povečali promocijske aktivnosti na vsebinski ravni s sodelovanjem ali vodenjem evropskih projektov in vključevanjem v mednarodne mreže kot tudi na formalni ravni s sporočili javnosti. Od mnogih dejavnosti, ki so razvidne iz letnih poročil o dosežkih in s spletne strani UL FFA, bi izpostavili predvsem tiste s področja kakovosti izobraževanja. Cilj projekta Pharmacy in Europe (Pharmine) je bila analiza stanja izobraževanja, usposabljanja in zaposlovanja farmacevtov ter primerjava programov farmacije v Evropi. V projektu EACEA – Zagotavljanje kakovosti izobraževanja in usposabljanja evropskih farmacevtov (PHAR-QA) smo vodili aktivnosti v eni od štirih regij. Organizirali smo 20. konferenco naše matične mednarodne organizacije Evropske zveze farmacevtskih fakultet EAFP na temo »Znanstveno temelječe izobraževanje: za boljša zdravila in boljšo skrb za paciente«. Sodelujemo oziroma smo sodelovali v mreži doktorskega izobraževanja Paul Ehrlich Euro-PhD, koordiniramo skupni doktorski program Marie Skłodowska-Curie European Training Network PhD4GlycoDrugs in sodelujemo v projektni mreži INTEGRATE. Pridobili smo raziskovalne projekte evropske komisije v FP6, Fp7 in H2020. Pridobili smo prvi projekt v partnerstvu inovativnih zdravil IMI. Aktivni smo tudi v evropski mreži raziskovalcev farmacevtske skrbi PCNE in drugih. Že dvajset let sodelujemo v mednarodnem partnerstvu izobraževalnega programa Radiofarmacija in smo partner mednarodnega izobraževanja o razvoju zdravil Central European Medicines Development Course (CEMDC). Po mnogih letih zagnanega dela smo postali nacionalni koordinator Evropske napredne translacijsko raziskovalne infrastrukture na področju biomedicine in farmacije EATRIS, kar nam omogoča dostopnost do raziskovalne opreme in do sredstev za nakup lastne. Vse to pomembno vpliva tudi na pedagoški proces.

RECOGNITION AT HOME AND ABROAD

In this decade we have increased promotional activities by participating in or managing European projects and joining international networks, as well as in formal level through public messages. Of the many activities that may be seen from the annual reports and from the faculty website, I would particularly highlight those in the field of education quality. The aim of the Pharmacy in Europe (Pharmine) project was to analyse the state of education, training and employment of pharmacists and to compare pharmacy programmes in Europe. In the project EACEA - Quality Assurance in European Pharmacy Education and Training (PHAR-QA), we led activities in one of the four regions. We organised the 20th conference of our parent international organisation, the European association of pharmaceutical faculties EAFP, on the topic "Science-based education: for better medicines and better patients' care". We participate (or have participated) in the Paul Ehrlich Euro-PhD doctoral education network, we coordinate the joint doctoral programme Marie Skłodowska-Curie European Training Network PhD4GlycoDrugs and participate in the INTEGRATE project network. We obtained research projects of the European Commission in FP6, Fp7 and H2020. We acquired the first project in partnership with innovative IMI medicines. We are also active in the European network of pharmaceutical care researchers PCNE and others. We have been participating in the international partnership of the Radiopharmacy education programme for twenty years and we are a partner of the Central European Medicines Development Course (CEMDC). After many years of hard work, we have become the national coordinator of the European Advanced Translational Research Infrastructure in the field of biomedicine and pharmacy EATRIS, which allows us access to research equipment and funds to purchase our own. All this also has a significant impact on the pedagogical process.

SKLEP

Kljub desetletju, ki se je začelo s finančno, gospodarsko in socialno krizo ter končalo z zdravstveno krizo, na UL FFA dokazujemo, da sledimo svoji viziji in izpolnjujemo svoje poslanstvo širjenja znanstvenih spoznanj, graditve na lastnem znanju in sooblikovanja smernic v širšem evropskem prostoru tudi preko Obzorja 2020.

CONCLUSION

Despite a decade that began with financial, economic and social crisis and ended with health crisis, we follow our vision at the faculty and fulfil our mission of disseminating scientific knowledge, building our own knowledge and co-creating guidelines across Europe also through Horizon 2020.

Fotografija: Primopredaja dekanovanja med prof. dr. Borutom Božičem in prof. dr. Ireno Mlinarič-Raščan
Photo: Handing over of the dean's office between Prof. Dr. Irena Mlinarič-Raščan and Prof. Dr. Borut Božič

BRDO IN TRG MBD 2

UL FFA NA POTI V UNIVERZITETNO SREDIŠČE BRDO

Projekt novogradnje Brdo oblikujemo v dialogu z nosilci stroke in oblikovalci politik na področjih zdravja in izobraževanja ter skladno s koncepti delovanja sodobnih, uspešnih fakultet na področjih farmacije in laboratorijske biomedicine. Podporo novogradnji so izrazile številne gospodarske družbe, ki so pomembni partnerji fakultete in delodajalci naših diplomantov.

IZHODIŠČA IN IZKAZANE POTREBE

Temeljni cilj investicije Brdo je odpraviti prostorske omejitve za uspešno izvajanje pedagoške, znanstvenoraziskovalne in razvojne ter strokovne dejavnosti UL FFA. Po uradni presoji prostorov ima UL FFA glede na standarde 50 % premalo površin za izvajanje dejavnosti, primanjkuje predavalnic, pedagoških in raziskovalnih laboratorijev ter kabinetov. Poglavitne pomanjkljivosti prostorov vključujejo potresno ogroženost. Osnovna stavba Stara tehnika (zgrajena 1925) je potresno najbolj neustrezna stavba UL. Prav tako ima številne tehnološke omejitve, ki se jih za potrebe sodobnega študija farmacije, laboratorijske medicine, toksikologije in kozmologije ne da enostavno odpraviti in nadgraditi. Primer je pridobitev standardov kakovosti za laboratorije, kar je pomembno za pridobivanje kompetenc študentov v sistemih, primerljivih realnemu delu, bodisi v industriji (GMP, GLP) bodisi v zdravstvenem sistemu (ISO15189 za medicinske laboratorije).

IZBOR NAGRAJENE NATEČAJNE NALOGE

Za začetek priprav investicije v novogradnjo štejemo izdelavo Prostorske preverbe leta 2008, ki ji je sledila izdelava dokumenta identifikacije investicijskega projekta (DIIP, 2013), ki ga je potrdil Upravni odbor Univerze v Ljubljani. Dokument je bil leta 2016

BRDO AND TRG MDB 2

UL FFA ON ITS WAY TO THE BRDO CAMPUS OF THE UNIVERSITY OF LJUBLJANA

The Brdo premises are planned in a dialogue with professionals and policy makers in health and education, and in agreement with contemporary concepts of operation of pharmacy or laboratory biomedicine faculties. Support for the project was expressed by many important partners of the Faculty, the employers of our graduates.

STARTING POINTS AND NEEDS

The objective of the investment Brdo is to eliminate spatial restrictions and allow for successful implementation of educational, research and professional activities of UL FFA. According to the assessment and standards, UL FFA is devoid of 50 % of areas to carry out activities, there is a lack of lecture halls, educational and research laboratories and cabinets. The main shortcomings of the premises include seismic hazard. The main building, "Stara Tehnika" (built in 1925) is seismically the most unsuitable UL building. It also has a number of technological limitations that cannot be easily overcome and upgraded for the purposes of modern study of pharmacy, laboratory medicine, toxicology and cosmology. An example is the acquisition of quality standards for laboratories, which is important for the acquisition of student competencies in systems comparable to real work, either in industry (GMP, GLP) or in the health system (ISO15189 for medical laboratories).

SELECTION OF THE AWARDED COMPETITION ASSIGNMENT

The preparation of the investment in the new building is considered to be the preparation of the Spatial Verification in 2008, followed by the preparation of the investment project identification document (DIIP, 2013), which was approved by the Management

posodobljen. Univerza v Ljubljani je za novogradnji Fakultete za farmacijo in Fakultete za strojništvo (UL FS) predvidela lokacijo v univerzitetnem središču Brdo. Sledila so leta oblikovanja natečajne naloge. Vodstvo UL FFA, vključujoč predstojnike in delovno skupino mlajših sodelavcev, je v sodelovanju z ABiro arhitekti oblikovalo izhodišča za izdelavo natečajne naloge, v kateri smo identificirali potrebe pedagoškega, raziskovalnega in upravnega delovanja fakultete.

Na UL FFA smo se posvetili študiju najboljših praks. Obiskali in proučili smo sodobne fakultete v Leidnu, Utrechtu, Frankfurtu in Gradcu. Pri oblikovanju koncepta infrastrukturnega centra in prototipnih laboratorijev smo se zgledovali po najboljših praksah v farmacevtki industriji.

V sodelovanju z Zbornico za arhitekturo in prostor Slovenije (ZAPS) smo v letu 2018 pripravili javni, anonimni, dvostopenjski projektni urbanistični in arhitekturni natečaj za novogradnji UL FFA in UL FS. Nagrajenci urbanistične faze razpisa za območje obeh fakultet so arhitekti Šabec Kalan Šabec. Drugo, arhitekturno fazo razpisa smo dorekli v začetku 2019. Natečajne elaborate s ponudbami je oddalo 9 natečajnikov. Komisija za izbor arhitekturne rešitve za UL FFA je podelila dve enakovredni nagradi, in sicer natečajnikom ATELIERarhitekt. v skupnem nastopu z ARHEMA in natečajniku ARK ARHITEKTURA KRUŠEC d. o. o. Nadalje smo izvedli javno naročilo po postopku s pogajanji. Drugonagrajenca javnega natečaja sta bila povabljena k dodelavi. Komisija je izbrala projektante ATELIERarhitekti v skupnem nastopu z ARHEMA. V mesecu oktobru 2020 smo podpisali pogodbo o projektiranju.
Vzporedno sta ocenjevalni komisiji UL FS in za UL FFA izbrali arhitekte Sadar+Vuga kot nagrajence za področje skupnega uvoza v obe podzemni garaži in ureditev zunanjih površin v širšem natečajnem območju. Ožja delovna skupina hkrati vodi številne postopke, vezane na urejanja prostora, projektiranje novogradnje in zagotavljanje finančnih virov.

Board of the University of Ljubljana. The document was updated in 2016. The University of Ljubljana had dedicated a location at Brdo for the University Campus and for the construction of Faculties of Pharmacy and Mechanical Engineering (UL FS). Years of designing a competition assignment followed. The management of UL FFA, including the heads and the working group of junior associates, in cooperation with ABiro architects, designed the starting points for the preparation of the competition task, in which the needs of pedagogical, research and administrative activities of the UL FFA were identified.

The working group had studied the best examples of modern faculties in Leiden, Utrecht, Frankfurt and Graz. When designing the concept of the infrastructural centre and prototype laboratories, the best practices in the pharmaceutical industry were followed.

In 2018 a public, anonymous, two-stage urban and architectural competition project for new buildings UL FFA and UL FS was prepared in cooperation with the Chamber of Architecture and Spatial Planning of Slovenia (ZAPS). The winners of the urban phase of the tender for the area of both faculties are the architects Šabec Kalan Šabec. The second, architectural phase of the tender was completed in early 2019. The competition studies with bids were submitted by 9 contestants. The commission for the selection of the architectural solution for UL FFA awarded two equivalent prizes, namely to the ATELIERarhitekt contestant in a joint performance with ARHEMA and the competitor ARK ARHITEKTURA KRUŠEC d.o.o. Furthermore, the public procurement following a negotiated procedure was carried out. The contestants ranking second in the public competition were invited to complete. The commission selected the designers of ATELIERarhitekti in a joint performance with ARHEMA. In October 2020 a contract was signed.

In parallel, the evaluation commissions of UL FS and UL FFA selected the architects Sadar + Vuga as winners for the area of joint underground garages and arrangement of outdoor areas in the wider competition area. At the same time, the core working group conducts a number of procedures related to spatial planning, new construction design and the provision of financial resources.

IZBRANA REŠITEV PROJEKTANTOV ATELIERARHITEKTI V SKUPNEM NASTOPU Z ARHEMA

SELECTED SOLUTION BY ATELIERARHITEKTI DESIGNERS IN A JOINT PERFORMANCE WITH ARHEMA

Nagrajena rešitev razvije kompozicijo, ki uspešno integrira sproščen prostor akademskega in raziskovalnega ustvarjanja s kompaktno urejenim laboratorijskim okoljem. Ta obsega skupaj 31.150 m^2 površin, brez parkirnih mest in zaklonišča pa 24.810 m^2. Projekt z morfološkim pristopom povzame obstoječe urbane strukture sosednjih stavb, jih poudari s podvojitvijo tipološke strukture ter umesti stavbo v prostor pod drugačnim / poševnim kotom.

The award-winning solution develops a composition that successfully integrates creative area of academic work and research with compactly arranged laboratory environment. This covers a total of 31.150 m^2 of space, and 24.810 m^2 without parking spots and shelters. With a morphological approach, the project summarizes the existing urban structures of the neighbouring buildings, emphasizes them by doubling the typological structure and places the building in the existing area at a different/oblique angle.

Nova zgradba fakultete je v kampusu kontekstualizirana z javnim prostorom, ki je zasnovan med obstoječimi in novimi fakultetnimi zgradbami. Projekt je povezan v to urbano strukturo na način, da je njegov vhod obrnjen proti drugim zgradbam fakultete. Lokacija glavnega vhoda se lepo navezuje na nastavljeno komunikacijo med Fakulteto za kemijo in kemijsko tehnologijo in bodočo stavbo Fakultete za strojništvo, tam formira »Južni trg«, ki lahko postane pomemben element urbanega utripa celegotnega kampusa. Volumen objekta je v prostor postavljen z odklonom od geometrije obstoječih objektov. S tem ustvari »Severni trg«, preko katerega se kompozicija prelije v naravne ambiente proti Rožniku. Odmik od nastavljene gradbene linije FKKT daje možnost močnejše drevesne ozelenitve in s tem zmanjšanje »arhitekturnega« vpliva velikega volumna v naravnem okolju. Infrastrukturni center je lociran izven glavne zgradbe, s čimer se artikulira vogalni element.

V volumnu ploščice pritlične etaže so organizirani učni programi – prostori večjih volumnov in bolj javnega dostopa, kar omogoča razmeroma enostavno bolj javno rabo predavalnic v širšem interesu. Nad pedagoško etažo sta v 1. in 2. nadstropju urejena sklopa raziskovalnih in pedagoških laboratorijev. Raziskovalni laboratoriji so umeščeni severno, pedagoški pa južno od komunikacijske osi. Kabineti vseh programov so urejeni v okviru terasne etaže. Kompozicija se precizno drži logike zmanjševanja dostopnosti po vertikali. Spodaj so najbolj javno dostopni prostori, ureditev kabinetov v okviru terasne etaže nakazuje najmanj dinamike. Vsi javni učni prostori se nahajajo v pritličju, s čimer se zunanji javni prostor poveže z notranjim v notranjost stavbe in s tem dobi pritličje pol javni značaj. Z gradbeno-tehničnega vidika je cilj investicije za potrebe UL FFA zgraditi stavbo, ki bo ustrezala najvišjim standardom funkcionalnosti, trajnostne gradnje, vseh vidikov tehnične varnosti ter gospodarnosti v izvedbi, obratovanju in vzdrževanju in bo predstavljala tudi arhitekturni dosežek.

The new faculty building is contextualized on campus by a public space designed between the existing and new faculty buildings. The project is connected to this urban structure in such a way that its entrance is facing buildings of other faculties. The location of the main entrance is neatly attached to the set communication between Faculty of Chemistry (FKKT) and the future Faculty of Mechanical Engineering, forming the "Southern Square", which can become an important element of the urban pulse of the entire campus. The object is placed on the ground with a deviation from the geometry of the existing objects. It therefore creates a "Northern Square", through which the composition is poured into natural ambiences towards Rožnik. The deviation from the set FKKT construction line gives the possibility of stronger tree greening and thus a reduction in the "architectural" influence of large volume in the natural environment. The infrastructure centre is located outside the main building, thus articulating the corner element. The main floor is dedicated to educational programmes - spaces of larger volumes and more public access, making it relatively easy to use lecture halls to also meet wider interest. Above the pedagogical floor, on the 1st and 2nd floors there are arranged sets of research and pedagogical laboratories. The research laboratories are located north and the pedagogical is located south of the communication axis. The cabinets of all programmes are arranged within the terrace floor. The composition adheres to the logic of reducing vertical accessibility. Below are the most publicly available spaces, and the arrangement of cabinets within the terrace floor indicates the least dynamics. All public learning spaces are located on the ground floor, thus connecting the outdoor public space with the interior in the interior of the building, thus giving the ground floor a half-public character.

From a construction and technical point of view, the objective of the investment for the needs of UL FFA is to build a building that meets the highest standards of functionality, sustainable construction, all aspects of technical safety and economy in the implementation, operation and maintenance and will also represent an architectural achievement.

KONCEPT NOVOGRADNJE UL FFA BRDO ODGOVARJA POTREBAM SODOBNE DRUŽBE

Sodoben koncept delovanja prinaša dodano vednost družbi, predvsem pa omogoča varno in spodbudno okolje za študij študentom in za delo pedagogom, raziskovalcem in strokovnim delavcem.

Sodobna fakulteta bo še bolj privlačna za tuje študente, povečali bomo mednarodno vpetost, sodobna infrastruktura bo prispevala k razvoju karier mladih doktorjev znanosti in njihovo integracijo, s tem bomo preprečili beg možganov. Novogradnja bo omogočila boljše doseganje potrebnih sodobnih kompetenc študentov v sodobno oblikovanih in opremljenih prototipnih laboratorijih ter razvoj specializiranih centrov s simulacijskim pristopom za pridobivanje veščin na področju lekarništva, klinične farmacije in laboratorijske diagnostike. Pridobljene kompetence bodo omogočile hitrejši in učinkovitejši prehod diplomantov iz akademskega v realno okolje delodajalcev. Investicija v novogradnjo in opremo UL FFA bo prispevala k rasti blaginje tako s povečanim BDP zaradi podpore dejavnostim z visoko dodano vrednostjo (npr. farmacevtska industrija) kakor tudi z nematerialnimi dobrinami, kot je npr. zdravje prebivalstva.

Jedro razvojnega koncepta predstavlja Infrastrukturni center za translacijske raziskave na področjih farmacije in laboratorijske biomedicine. Skupaj z novozgrajeno stavbo bo vrhunska raziskovalna oprema omogočila pogoje odličnosti za razvoj zdravil in diagnostičnih testov ter močnejšo podporo industriji v zgodnjih fazah razvoja zdravil in v logistiki kliničnega testiranja ter možnost razvoja in validacije novih diagnostičnih testov, skladno z EU direktivo, sprejeto 2017, ki bo stopila v veljavo leta 2022, kar je Sloveniji manjkalo v času epidemije COVID-19.

Koncept novogradnje Brdo omogoča učenje veščin na področju lekarništva, klinične farmacije in laboratorijske diagnostike s simulacijskim pristopom (simulacijski center) in z realnim okoljem (javna lekarna in akreditiran medicinski laboratorij), kar pomeni neprekinjen dotok diplomantov tudi v pogojih epidemije.

THE CONCEPT OF UL FFA BRDO MEETS THE NEEDS OF MODERN SOCIETY

The contemporary concept of activities brings added value to society and, above all, enables a safe and supportive environment for students to study and to work for educators, researchers and professionals.

The modern faculty will be even more attractive to foreign students and will enable increased international integration. Modern infrastructure will contribute to the development of careers of young PhD students and their integration, thus preventing a brain drain. The new construction will enable the necessary competences of students in modernly designed and equipped prototype laboratories and the development of specialized centres with a simulation approach for the acquisition of skills in the field of pharmacy, clinical pharmacy and laboratory diagnostics. Acquired competences will enable faster and more efficient transition of graduates from academic to working environment. The investment in new construction and equipment of the UL FFA will contribute to the growth of prosperity through both increased GDP support for high-value-added activities (e.g. the pharmaceutical industry) and through intangible goods such as population health.

The core of the development concept is the Infrastructure Centre for Translational Research in the fields of pharmacy and laboratory biomedicine. Together with the newly built premises, the cutting-edge research equipment will establish conditions of excellence for the development of medicines and diagnostic tests, and will provide stronger support to the industry in the early stages of drug development and in the logistics of clinical testing and the possibility of developing and vali-dating new diagnostic tests in accordance with the EU Directive adopted in 2017, which enters into force in 2022. These assets were lacking in Slovenia during the Covid-19 epidemic.

The concept of Brdo activities enables transfer of competencies and skills in the field of pharmacy, clinical pharmacy and laboratory diagnostics through simulation approach (simulation centre) and within a real-case environment (public pharmacy and accredited medical laboratory), which shall allow continuous educational process and completion of graduates even in epidemic conditions.

UMEŠČANJE PROJEKTA UL FFA BRDO V STRATEGIJE RAZVOJA RS

Na podlagi izkazanih potreb in podpore stroke je Vlada RS novogradnjo UL FFA leta 2020 uvrstila med prioritetne projekte Načrta za okrevanje in odpornost in v seznam pomembnih investicij k Zakonu za odpravo ovir pri izvedbi pomembnih investicij za zagon gospodarstva po epidemiji COVID-19 (Uradni list RS št. 80/20). Ministrstvo za izobraževanje, znanost in šport je projekt novogradnje UL FFA vključilo v dokument Naložbene potrebe Republike Slovenije za obdobje 2021–2027, ki se pripravlja za pogajanje z Evropsko komisijo.

Nove sheme financiranja bodo omogočile uresničitev projekta. Nova stavba bo pedagogom in študentom zagotovila kakovostne delovne pogoje za študij in raziskovanje ter vrhunske, sodobne in tehnično brezhibne laboratorijske ter druge z njimi povezane prostore in na sploh stimulativno univerzitetno okolje. Pri tem pa seveda potrebujemo širšo podporo stroke in družbe.

THE UL FFA BRDO PROJECT IN PRIORITY OF THE REPUBLIC OF SLOVENIA

On the basis of the demonstrated needs and support of the profession, the Government of the Republic of Slovenia placed the UL FFA Brdo project in 2020 as a priority project of the Recovery and Resilience Plan and in the list of significant investments in the Act for the removal of significant investments to start up the economy following the COVID-19 epidemic (Official Gazette of the Republic of Slovenia No. 80/20). The Ministry of Education, Science and Sport has included the UL FFA new construction project in the document Investment Needs of the Republic of Slovenia for the period 2021 to 2027, which is being prepared for negotiations with the European Commission.

Novel funding mechanisms shall provide the realization of the project. New building will provide educators and students with quality working conditions for study and research, as well as cutting-edge, modern and technically flawless laboratory and other related premises and in general, a stimulating university environment. In doing so we understandably need wider support from the professional line of business and society.

Fotografija: Razstava natečajnih elaboratov za izbiro strokovno najprimerjejših rešitev za nova objekta UL FFA in UL FS
Photo: Exhibition of competition solutions for the UL Faculty of Pharmacy and the UL Faculty of Mechanical Engineering

PROSTORI NA TRGU MDB 2

Fakulteta za farmacijo je leta 2002 postala na osnovi oporočnega darila zaslužnega prof. dr. Pavla Bohinca lastnica prostorov Lekarne Mirje na Trgu MDB 2 (dekanja J. Kristl). Z željo, da bi se v njej v okviru lekarniške dejavnosti nadgradile aktivnosti fakultete.

Do leta 2009 je nato senat obravnaval več dokumentov glede možnih tehničnih rešitev povezave kletnih in pritličnih prostorov stavbe z namenom vzpostavitve učnega centra, v katerem bi potekala dejavnost lekarne, del učnega programa za podiplomske študente, delovanje farmacevtsko informacijskega centra in svetovanje ter laboratorijska diagnostika. Načrtovana je bila celovita prenova prostorov v sodelovanju z Lekarno Ljubljana in s Slovenskim farmacevtskim društvom (dekana prof. B. Štrukelj, prof. A. Kristl). Fakulteta je bila namreč lastnica prostorov, nosilka lekarniške dejavnosti pa po takratni zakonodaji ni mogla biti.

Leta 2010 je Fakulteta dokupila 80 m2 prostorov v pritličju stavbe na Trgu MDB 2, da bi laže izpeljali predvideni program, saj je bila v prenovljene prostore načrtovana tudi preselitev Katedre za socialno farmacijo, ki vodi praktično usposabljanje farmacevtov (dekan prof. S. Gobec). Ker je morala Lekarna Ljubljana na tej lokaciji odpraviti nekatere pomanjkljivosti, smo ugotovili, da lahko s skupno prenovo rešimo več problemov – nadaljevanje lekarniške dejavnosti v povezavi z usposabljanjem in učnim procesom na Fakulteti, v sodelovanju s solastniki pa tudi celovito ogrevanje stavbe, fasado, stopnišče in okna. Fakulteta je pridobila mnenje Zavoda za varstvo kulturne dediščine glede dopustnega posega v fasado spomeniško zaščitene stavbe zaradi pridobitve službenega vhoda v lekarno, kar je bila ena od zahtev v inšpekcijski odločbi za delovanje lekarne.

Ob pripravi načrtov pa se je zapletlo, saj iz obstoječe dokumentacije, ki je bila Fakulteti na voljo, ni bilo mogoče enolično razbrati (so)lastništva posameznih kletnih prostorov. Pogovori s solastniki, predvsem z enim, so bili dolgotrajni in so večkrat zašli v slepo ulico.

PREMISES ON TRG MDB 2

In 2002 the Faculty of Pharmacy became an owner of the premises of Mirje pharmacy on Trg MDB 2 (the Dean J. Kristl), based on the testamentary disposition of the honorary Prof. Dr. Pavle Bohinc, with the wish to upgrade the activities of the Faculty within the scope of pharmacy practice.

By 2009 the Senate considered several documents regarding potential technical solutions related to premises in the basement and ground floor with the purpose of establishing a learning centre, where pharmacy activity would be running; part of the curriculum would be dedicated to postgraduate students along with the activities of the pharmaceutical information centre, counselling and laboratory diagnostics. The comprehensive space renovation was planned with the Ljubljana Pharmacy and with the Slovenian Pharmaceutical Society (B. Štrukelj, Prof. A. Kristl as the deans). The Faculty was the owner of the premises, but could not work as the holder of the pharmacy practice according to the legislation at that time.

In 2010 the Faculty bought another 80 m2 of premises in the ground floor of the building in TRG MDB 2 to facilitate the implementation of the predicted programme, because the relocation of the Department of Social Pharmacy, responsible for providing practical training for pharmacists (the Dean Prof. S. Gobec), was also scheduled. As Ljubljana Pharmacy had to eliminate certain deficiencies, it seemed that joint renovation would solve several problems - the continuation of the pharmacy practice in relation to training and learning process at the Faculty and heating the entire building, renovating the facade, staircase and windows in cooperation with the co-owners. The Faculty acquired the opinion of the Institute for the Protection of Cultural Heritage regarding the admissible operations in renovating the façade of the heritage protected building for the purpose of making a service entrance into the pharmacy, which was one of the requirements in the inspection decision in order for the pharmacy to work.

Fotografija: Lekarna Mirje, enota Lekarne Ljubljana. (avtor: Domen Grögl)
Pharmacy Mirje, Pharmacy Ljubljana

V vmesnem času je Lekarna Ljubljana v dogovoru s Fakulteto enoto Mirje zaprla zaradi prenove in naročila izdelavo projektne dokumentacije za rekonstrukcijo in prenovo objekta v dveh variantah – celovito in ožjo za prenovo samo pritličja.

Od upravnika, ki je leta 2012 po službeni dolžnosti vložil zahtevek za vpis etažne lastnine, smo 2014 dobili predlog sporazuma, vendar smo po podrobnem pregledu ugotovili, da je treba utemeljiti nekatere predlagane rešitve z merodajnimi dokumenti. Ker s strani drugih solastnikov ni bilo reakcije na sklep o preverjanju etažne lastnine, je Fakulteta 2015 sama sprožila nepravdni postopek ugotavljanja etažne lastnine pri Zemljiški knjigi (dekan prof. B.Božič).

However, things became complicated when preparing the plans, because it was impossible to clearly understand the (co-)ownership of individual basement premises from the existing documentation, available to the Faculty. Discussions with co-owners, particularly with ne, have been time-consuming and frequently to no avail. In the meantime, Ljubljana Pharmacy in agreement with the Faculty shut down Mirje pharmacy with the purpose of renovation and ordered the project documentation to be made so as to reconstruct and renovate the facility in two versions – comprehensive and partial to renovate the ground floor only.

In 2014 we received the agreement proposition from the building manager, who in 2012 as part of his

V vmesnem času je bila izpeljana prenova v ožjem obsegu znotraj prostorov obstoječe lekarne Mirje. Prenova je zadržala klasični duh stare Bohinčeve lekarne, hkrati pa omogočila sodoben pristop v poučevanju in usposabljanju študentov farmacije v partnerskem sodelovanju Fakultete in Lekarne Ljubljana.

Postopek vzpostavitve etažne lastnine v stavbi je bil v letu 2020 zaključen. Celovito reševanje prostorskih težav Fakultete se je preusmerilo v novogradnjo na Brdu. Ne glede na to pa v prenovljenih pritličnih prostorih uspešno nadaljujemo povezovanje lekarniške in izobraževalne dejavnosti v obliki učne lekarne Lekarne Ljubljana.

duties, submitted a claim for ownership registration. After careful consideration we decided that certain suggested solutions must be substantiated with credible documents. As the other co-owners did not respond to the decision regarding the verification of ownership, the Faculty launched non-judicial proceedings in 2015 to determine the ownership through Land Registry (The Dean Prof. B. Božič).

In the meantime, the small-scale renovation within the premises of the existing Mirje pharmacy was carried out. The renovation retained the classical spirit of the old pharmacy of Prof. Bohinc and also provided a contemporary approach in teaching and training pharmacy students in partnership cooperation between the Faculty and Ljubljana Pharmacy.

The procedure of establishing floor ownership of the building was completed in 2020. The comprehensive solving of issues regarding the premises of the Faculty redirected to new construction in Brdo. Regardless of that the connection processes of the pharmaceutical and educational activities in the form of the Ljubljana learning pharmacy are being successfully continued.

2 Predstavitev Fakultete za farmacijo
Presentation of the Faculty of Pharmacy

ORGANIZIRANOST

UL FFA je raziskovalno usmerjena pedagoška ustanova, kar izkazuje tako z objavami raziskovalnih dosežkov svojih zaposlenih v uglednih mednarodnih revijah kot tudi s prenosom teh znanj v pedagoški proces na vseh študijskih programih.

Osnovne naloge so ustvarjanje, prenašanje in ohranjanje znanja, kar ob inovativnosti in raziskavah pomeni tudi učinkovito poučevanje in ohranjanje zgodovinskega spomina, vezanega na stroko. S številom objav v znanstvenih revijah ter s številom citatov in projektov z gospodarstvom se UL FFA uvršča v sam vrh Univerze v Ljubljani. Tovrstni način dela in razmišljanja je vpet tudi v študijske programe.

UL FFA kot del Univerze v Ljubljani gradi svoj ugled, integriteto in razvoj na odličnosti, učinkovitosti ter etični drži učiteljev in študentov. Farmacevtske izkušnje se gradijo na dolgoletni tradiciji tako v slovenskem kot širšem prostoru, z vizijo usmerjenosti v prihodnost.

Po evropskih merilih je UL FFA srednje velika farmacevtska fakulteta, matična za širše področje farmacije, klinične biokemije in kozmetologije, ki letno sprejme 165 študentov na študijskem programu Farmacija, 90 študentov na programu Laboratorijska biomedicina (50 na 1. stopnji, 40 na 2. stopnji), 40 študentov na programu Kozmetologija, 40 študentov na programu Industrijska farmacija in 20 do 30 študentov doktorskega študija. V zadnjih letih je na UL FFA skupno s specializanti vpisanih okrog 1500 študentov.

UL FFA ima šest kateder, ki predstavljajo osnovne organizacijske enote pedagoškega in znanstvenoraziskovalnega dela ter Inštitut za farmacijo, ki izvaja temeljne in razvojne projekte za tekoče potrebe farmacevtske stroke. Ima naslednje organizacijske enote: vodstvo fakultete, tajništvo fakultete, katedre in Inštitut za farmacijo.

ORGANISATION

The Faculty of Pharmacy is a research-oriented teaching institution, which is clearly expressed through publications of research achievements in highly esteemed international journals, as well as in the transfer of knowledge in all study programmes.

The faculty's basic tasks are creating, transmitting and retaining knowledge. Its priority, alongside innovation and research, is therefore effective teaching and maintaining the profession-related historical memory. Its members' number of journal publications, number of citations and number of projects rank the faculty at the very top of the University of Ljubljana's member institutions. This way of working and thinking is also entwined in the study-programmes.

As part of the University of Ljubljana, the Faculty of Pharmacy builds its reputation, integrity and development on excellence, effectiveness and the ethical stance of its teachers and students. We are building the long-term tradition of pharmaceutical experience in Slovenia and beyond, while always looking toward the future.

According to European criteria, the faculty is a medium-sized educational institution in the field of pharmacy, central in the wider field of pharmacy, clinical biochemistry and cosmetology. Every year the faculty admits 165 students in the Pharmacy programme, 90 students to the Laboratory Biomedicine programme (50 undergraduate and 40 graduate students), 40 students to the Cosmetology programme, 40 students to the Industrial Pharmacy programme and 20 to 30 to doctoral studies. In the past years there have been about 1500 students together with specialist trainees enrolled at the Faculty of Pharmacy.

The Faculty of Pharmacy has six departments, which represent the basic organisational units of teaching and scientific research, and the Institute of Pharmacy, which implements basic and development projects for the current needs of pharmaceutical profession. In other words, the faculty has the following organisational units: faculty management, faculty secretariat, departments and the Institute of Pharmacy.

Učitelji in sodelavci so večinoma registrirani kot raziskovalci pri Javni agenciji za raziskovalno dejavnost (ARRS) in imajo nedvomno velik raziskovalno-razvojni potencial.

Družbena odgovornost UL FFA se kaže v sodelovanju z uporabniki znanja na kulturnih, gospodarskih in socialnih področjih. Tako vlogo želi ohraniti in utrditi tudi v prihodnje in stremeti k povečevanju uveljavljenosti in ugledu v mednarodnem prostoru. S tem namenom se vključuje v mednarodna združenja in sklepa mednarodna partnerstva.

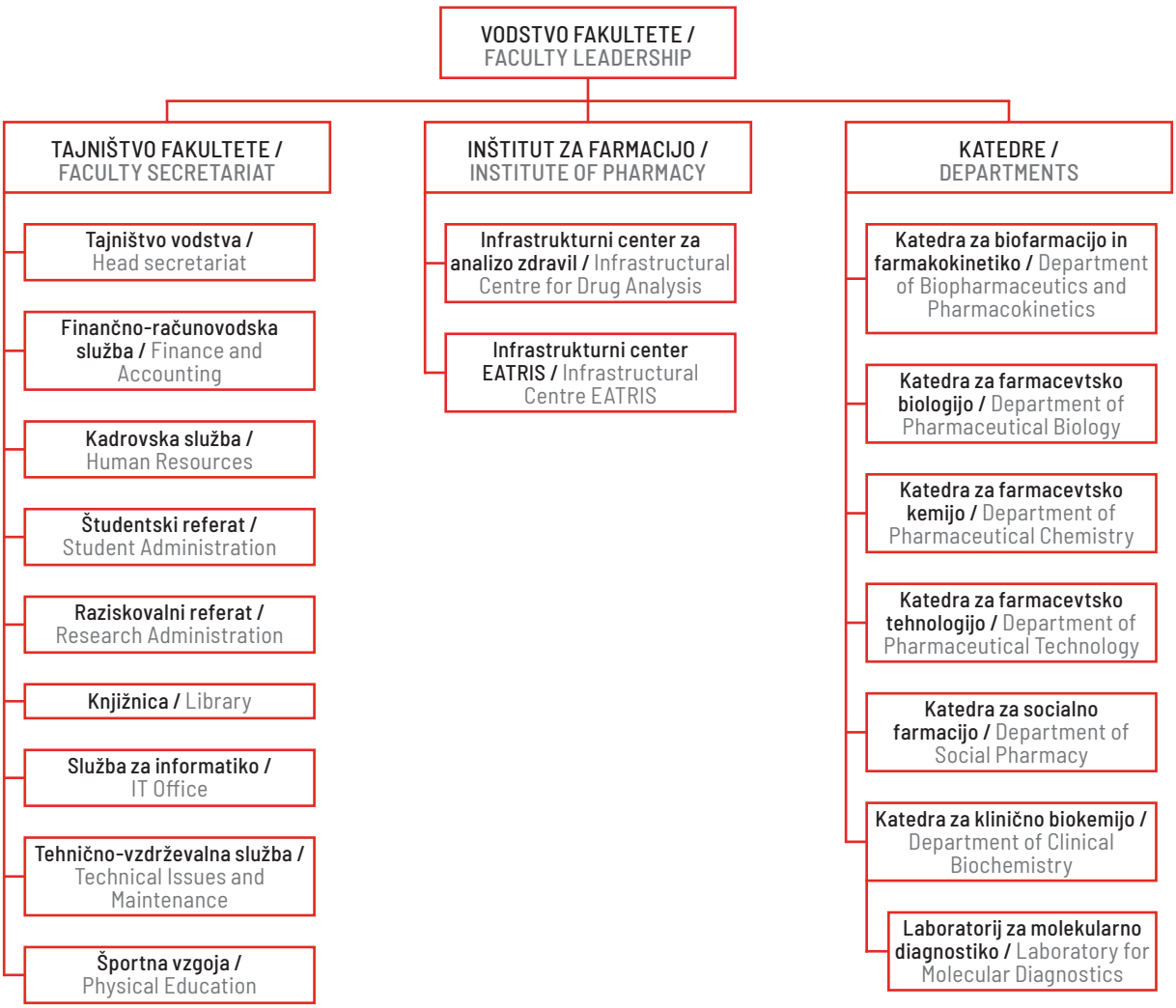
Vizija UL FFA je prispevati k sooblikovanju prihodnosti ter ostati v svet odprta, odzivna in odgovorna akademska izobraževalna in raziskovalna ustanova. Obenem stremi k ustvarjanju in širjenju znanstvenih spoznanj in delovanju v dobrobit slovenskih državljanov, s čimer prispeva k povečevanju splošnega razvoja in utrjevanju nacionalne samobitnosti.

Teachers and associates are mostly registered as researchers with the Slovenian Research Agency (ARRS) and undoubtedly have great research and development potential.

The social responsibility of the Faculty of Pharmacy is reflected in the cooperation with users of knowledge in the cultural, economic and social fields. The faculty wants to maintain and consolidate that role in the future and strive to increase its high standing rank and reputation in the international arena. To this end the faculty joins international associations and forms international partnerships.

The vision of the Faculty of Pharmacy is to contribute to creating the future and to remain an accessible, responsive and responsible academic educational and research institution. At the same time, it strives to create and disseminate scientific knowledge and work for the benefit of the Slovenian citizens, thus contributing to general development and strengthening national identity.

ORGANIZACIJSKE ENOTE UL FFA / FACULTY OF PHARMACY'S ORGANISATIONAL UNITS



VODSTVO FAKULTETE (mandat: 1. 10. 2019 do 30. 9. 2023)
FACULTY'S GOVERNANCE (mandate: 1 October 2019 to 30 September 2023)

Od leve proti desni / From left to right:
izr. prof. dr. Rok Dreu, prodekan za znanstvenoraziskovalno področje / Vice-Dean for Scientific Research Matters
prof. dr. Irena Mlinarič-Raščan, dekanja / Dean
izr. prof. dr. Mojca Lunder, prodekanja za mednarodno sodelovanje / Vice-Dean for International Relations
prof. dr. Marko Anderluh, prodekan za študijsko področje / Vice-Dean for Education

KATEDRE FAKULTETE ZA FARMACIJO

Katedra za biofarmacijo in farmakokinetiko
predstojnik: prof. dr. Albin Kristl, mag. farm.

Katedra za farmacevtsko biologijo
predstojnik: izr. prof. dr. Tomaž Bratkovič, mag. farm.

Katedra za farmacevtsko kemijo
predstojnik: prof. dr. Stanislav Gobec, mag. farm.

Katedra za farmacevtsko tehnologijo
predstojnica: prof. dr. Mirjana Gašperlin, mag. farm.

Katedra za socialno farmacijo
predstojnik: prof. dr. Mitja Kos, mag. farm.

Katedra za klinično biokemijo
predstojnica: izr. prof. dr. Nataša Karas Kuželički, mag. farm.

Laboratorij za molekularno diagnostiko
vodja: prof. dr. Joško Osredkar, mag. farm., spec. med. biokem.

DEPARTMENTS IN THE FACULTY OF PHARMACY

Department of Biopharmaceutics and Pharmacokinetics
Head: Prof. Dr. Albin Kristl, M. Pharm.

Department of Pharmaceutical Biology
Head: Assoc. Prof. Dr. Tomaž Bratkovič, M. Pharm.

Department of Pharmaceutical Chemistry
Head: Prof. Dr. Stanislav Gobec, M. Pharm.

Department of Pharmaceutical Technology
Head: Prof. Dr. Mirjana Gašperlin, M. Pharm

Department of Social Pharmacy
Head: Prof. Dr. Mitja Kos, M. Pharm.

Department of Clinical Biochemistry
Head: Assoc. Prof. Dr. Nataša Karas Kuželički, M. Pharm.

Laboratory for Molecular Diagnostics
Head: Prof. Dr. Joško Osredkar, M. Pharm., EuSPLM

INŠTITUT ZA FARMACIJO

predstojnik: izr. prof. dr. Rok Dreu, mag. farm.

Infrastrukturni center: EATRIS
vodja: prof. dr. Irena Mlinarič-Raščan, mag. farm.

Infrastrukturni center za analizo zdravil
vodja: prof. dr. Anamarija Zega, mag. farm.

INSTITUTE OF PHARMACY

Head: Assoc. Prof. Dr. Rok Dreu, M. Pharm.

Infrastructural centre: EATRIS
Head: Prof. Dr. Irena Mlinarič-Raščan, M. Pharm.

Infrastructure Centre for Analysis of Medicinal Products
Head: Prof. Dr. Anamarija Zega, M. Pharm.

ORGANI FAKULTETE

Senat
predsednica: prof. dr. Irena Mlinarič-Raščan, mag. farm.

Akademski zbor
predsednica: prof. dr. Marija Sollner Dolenc, mag. farm.

Upravni odbor
predsednik: prof. dr. Matjaž Jeras, mag. farm.

Študentski svet
Predsednik: Jaka Rotman Primec

THE FACULTY'S GOVERNING BODIES

Senate
Chair: Prof. Dr. Irena Mlinarič-Raščan, M. Pharm.

Academic Assembly
Chair: Prof. Dr. Marija Sollner Dolenc, M. Pharm.

Managing Board
Chair: Prof. Dr. Matjaž Jeras, M. Pharm.

Student Council
Chair: Jaka Rotman Primec

TAJNIŠTVO

Tajnik fakultete
Katja Višnjevec Vahčič, univ. dipl. prav.

Tajnica vodstva
Lidija Mataija, dipl. ekon.

FACULTY SECRETARIAT

Faculty Secretary
Katja Višnjevec Vahčič, LLB

Head Secretary
Lidija Mataija, BS Econ.

Finančno-računovodska služba
Aleš Kolenko, univ. dipl. ekon., vodja službe

Kadrovska služba
Zdenka Gantar, viš. upr. del., vodja službe

Študentski referat
Tanja Kadunc, dipl. org. tur., vodja referata

Raziskovalni referat
Judita Merjasec, mag. manag., vodja referata

Knjižnica
Borut Toth, prof. fil. in sociol., vodja knjižnice

Služba za informatiko
Tanja Gregorič, univ. dipl. org. inf., vodja službe

Športna vzgoja
pred. Dušan Videmšek, prof. športne vzgoje

KOMISIJE SENATA UL FFA

Komisija za študijsko področje
predsednik: prof. dr. Marko Anderluh, mag. farm.

Komisija za doktorski študij
predsednik: izr. prof. dr. Rok Dreu, mag. farm.

Komisija za raziskovalno in razvojno delo
predsednik: izr. prof. dr. Rok Dreu, mag. farm.

Habilitacijska komisija
predsednica: prof. dr. Marija Bogataj, mag. farm.

Komisija za priznanja in nagrade
predsednik: prof. dr. Odon Planinšek, mag. farm.

Komisija za priznavanje tuje izobrazbe
predsednik: prof. dr. Marko Anderluh, mag. farm.

Komisija za kakovost in akreditacijo
predsednik: izr. prof. dr. Bojan Doljak, mag. farm.

Komisija za strokovna vprašanja
predsednica: prof. dr. Mirjana Gašperlin, mag. farm.

Komisija za internacionalizacijo
predsednik: izr. prof. dr. Mojca Lunder, mag. farm.

Komisija fakultete za etična vprašanja
predsednica: doc. dr. Alenka Šmid, mag. farm.

Office for Finance and Accounting
Head: Aleš Kolenko, BS Econ.

Human Resources
Head: Zdenka Gantar, Snr. Admin. Work.

Student Administration
Head: Tanja Kadunc, BSc (Tourism)

Research Administration
Head: Judita Merjasec, M.Sc. (Administrative Sciences)

Library
Head: Borut Toth, Prof. Phil. and Soc.

IT Office
Head: Tanja Gregorič, BSc (Organisational Informatics)

Physical Education
Dušan Videmšek, Sport Education Professor

SENATE COMMITTEES

Study Affairs Committee
Chair: Prof. Dr. Marko Anderluh, M. Pharm.

Doctoral Study Committee
Chair: Assoc. Prof. Dr. Rok Dreu, M. Pharm.

Research and Development Committee
Chair: Assoc. Prof. Dr. Rok Dreu, M. Pharm.

Habilitation Committee
Chair: Prof. Dr. Marija Bogataj, M. Pharm.

Awards and Decorations Committee
Chair: Prof. Dr. Odon Planinšek, M. Pharm.

Recognition of Foreign Education Committee
Chair: Prof. Dr. Marko Anderluh, M. Pharm.

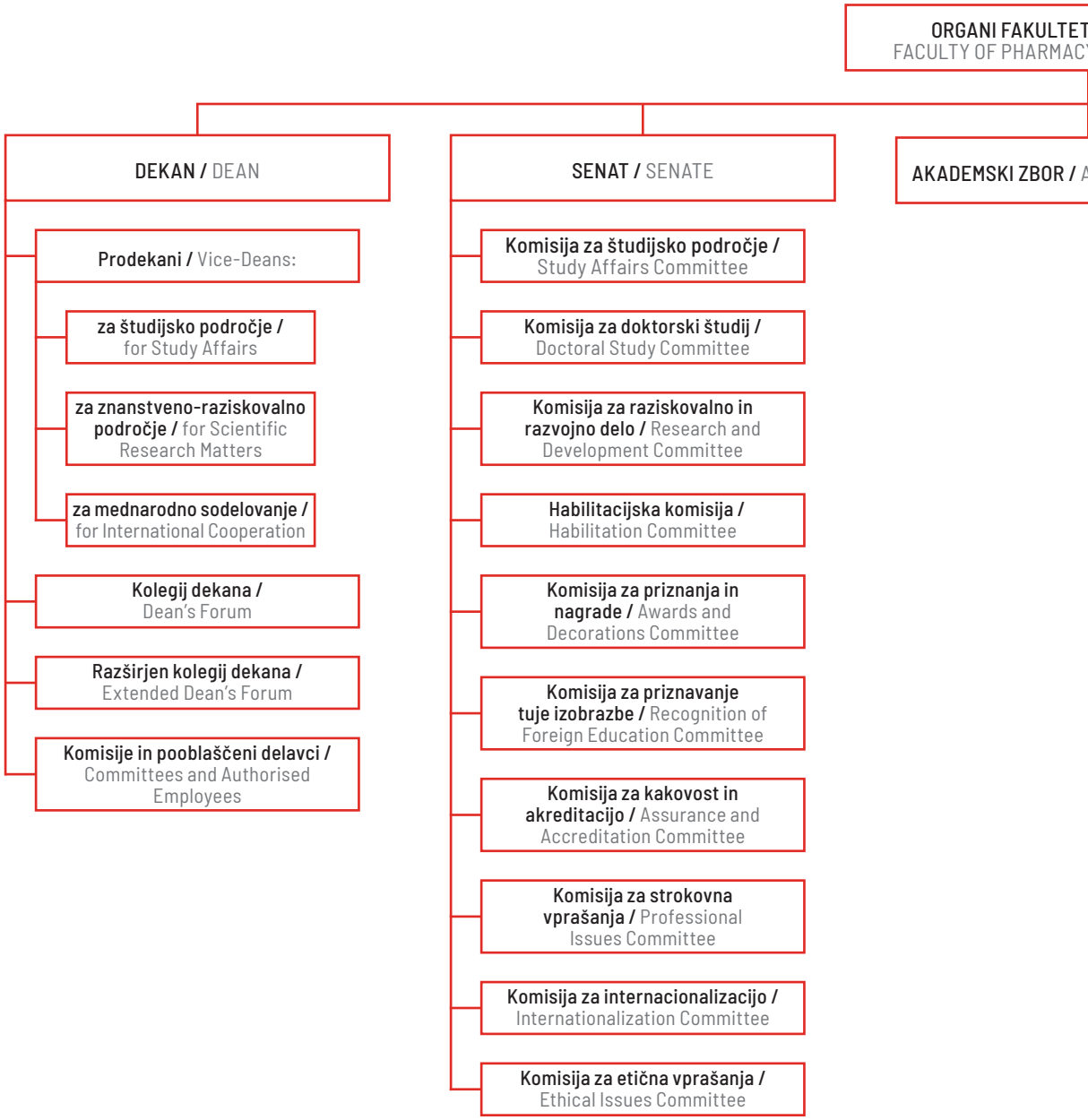
Assurance and Accreditation Committee
Chair: Assoc. Prof. Dr. Bojan Doljak, M. Pharm.

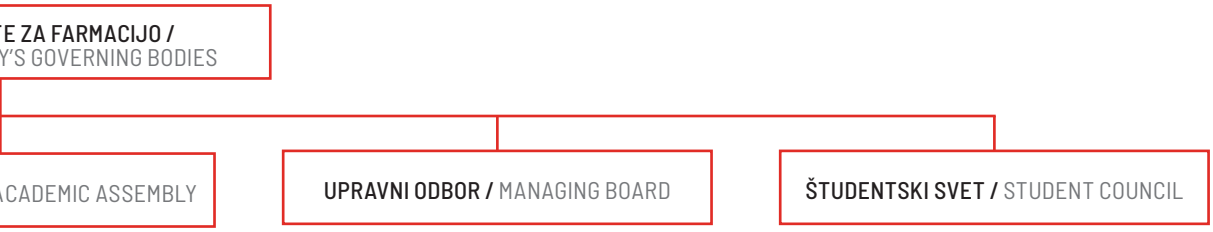
Professional Issues Committee
Chair: Prof. Dr. Mirjana Gašperlin, M. Pharm.

Internationalization Committee
Chair: Assoc. Prof. Dr. Mojca Lunder, M. Pharm.

Ethical Issues Committee
Chair: Assist. Alenka Šmid, M. Pharm.

ORGANI UL FFA / GOVERNING BODIES OF THE FACULTY OF PHARMACY

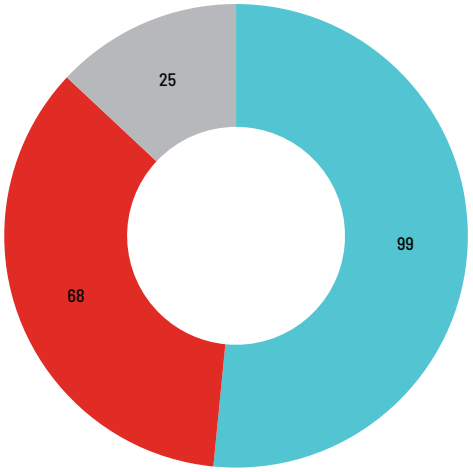



E ZA FARMACIJO /
Y'S GOVERNING BODIES
ACADEMIC ASSEMBLY
UPRAVNI ODBOR / MANAGING BOARD
ŠTUDENTSKI SVET / STUDENT COUNCIL

ZAPOSLENI NA FAKULTETI ZA FARMACIJO / FACULTY OF PHARMACY'S EMPLOYEES

na dan 31. 12. 2020 / on 31/12/2020	po delovnih mestih / by work posts
Univerzitetni učitelji / University teachers	42
Univerzitetni učitelji z delno zaposlitvijo / University teachers	7
Asistenti / Assistants	36
Raziskovalci / Researchers	47
Mladi raziskovalci/ Junior researchers	21
Strokovne – tehnične sodelavke / Technical assistants	16
Tajnik fakultete / Faculty secretary	1
Strokovni – administrativni in tehnični sodelavci / Expert administrative and technical staff	21
Predavatelj športne vzgoje / Sport education teacher	1

IZOBRAZBENA STRUKTURA ZAPOSLENIH NA UL FFA / EDUCATION STRUCTURE OF THE EMPLOYEES AT THE FACULTY OF PHARMACY



- VIII. raven izobrazbe (doktorat) / doctorate
- VII. raven izobrazbe (2. bolonjska oz. prejšnja univerzitetna) / 7th level of education (2nd Bologna cycle; previously University degree)
- Ostali /other

PREDSTAVITEV ORGANIZACIJSKIH ENOT
PRESENTATION OF DEPARTMENTS

KATEDRA ZA KLINIČNO BIOKEMIJO
DEPARTMENT OF CLINICAL BIOCHEMISTRY

Predstojnica Katedre /
Head of the Department:
doc. dr. Nataša Karas Kuželički

Člani Katedre v letu 2020 / Members of the Department in 2020

- prof. dr. Borut Božič, prof. dr. Darko Černe, prof. dr. Janja Marc, prof. dr. Irena Mlinarič-Raščan, prof. dr. Joško Osredkar
- izr. prof. dr. Matjaž Jeras, izr. prof. dr. Barbara Ostanek
- doc. dr. Mojca Božič Mijovski, doc. dr. Martina Gobec, doc. dr. Marija Nika Lovšin, doc. dr. Helena Podgornik, doc. dr. Alenka Šmid, doc. dr. Janja Zupan
- dr. Klemen Čamernik, dr. Jasna Lojk, dr. Tijana Markovič, dr. Jasna Omersel, dr. Irena Prodan Žitnik, dr. Dunja Urbančič, Damjan Avsec, Manja Cedilnik, Petra Ferkov, Matej Godec, Simona Gričar, Sanja Nabergoj, Majda Sirnik, Lara Smrdel, Lucija Ana Vrščaj, Taja Zore

Slika: Katedra za klinično biokemijo / Photo: Department of Clinical Biochemistry

Poslanstvo Katedre za klinično biokemijo je skrb za izobraževanje in usposabljanje strokovnjakov laboratorijske medicine ter znanstveni in strokovni razvoj te dejavnosti. Razvijamo področje medicinske biokemije, katere namen je uporaba kemijskih, molekulskih in celičnih pristopov za razumevanje človekovega zdravja, patogeneze in diagnostike bolezni.

Sodelavci Katedre smo nosilci in izvajalci prvostopenjskega in magistrskega študijskega programa Laboratorijske biomedicine ter znanstvenega področja Klinična biokemija in laboratorijska biomedicina na doktorskem študiju Biomedicine, sodelujemo tudi pri izvedbi študijskih programov Farmacija in Kozmetologija.

Več kot dve desetletji razvijamo tudi področje personaliziranih diagnostičnih in terapevtskih pristopov. Iščemo diagnostične kazalce etiopatogeneze kompleksnih bolezni (osteoporoze, osteoartroze, sarkopenije, metabolnega sindroma, kronične limfocitne levkemije, prirojene srčne napake, orofacialne shize, ateroskleroze avtoimunskih bolezni). Personalizirane terapevtske pristope smo osnovali na farmakogenomiki, nutrigenomiki, TDM (Therapeutic Drug Monitoring) in celičnem zdravljenju. Katedra je začetnica razvoja farmakogenomike na UL FFA ter raziskav z matičnimi celicami za namene regenerativne medicine zdravljenja sklepov.

Katedra je močno povezana z zdravniško stroko in strokovnimi združenji (SZKKLM – Slovensko združenje za klinično kemijo in laboratorijsko medicino, ZLMS – Zbornica laboratorijske medicine Slovenije, Razširjeni strokovni kolegij za laboratorijsko medicino), kar se odraža v visoki stopnji prenosljivosti naših raziskovalnih rezultatov v klinično prakso. Rezultat tega je tudi medicinski laboratorij, Laboratorij za molekularno diagnostiko (LMD), ki z dovoljenjem za delo Ministrstva za zdravje RS deluje že od leta 2009.

The mission of the Department of Clinical Biochemistry is to provide educated professionals of Laboratory medicine and research in the field of Clinical biochemistry. Clinical biochemistry utilizes chemical, molecular, and cellular approaches to investigate and explain mechanisms of human health and diagnose the illness.

Our educational activities include preparation of programmes and teaching at Master's study programme Laboratory Biomedicine and doctoral study programme in Biomedicine, scientific field Clinical Biochemistry and Laboratory Biomedicine, we also carry out study programmes of Pharmacy and Cosmetology.

For more than two decades, we have been intensively involved in the research of modern personalized diagnostics and therapeutic approaches in medicine. We are searching for new biomarkers for complex human traits and diseases (osteoporosis, osteoarthrosis, sarcopenia, metabolic syndrome, chronic lymphocytic leukaemia, congenital heart defects, orofacial clefts, atherosclerosis, autoimmune diseases. Personalized therapeutic approaches are based on pharmacogenomics, nutrigenomics, TDM and cell therapy. The Department of Clinical Biochemistry is a pioneer at the UL FFA in developing pharmacogenomics, and for several years we have been intensifying stem cell research for use in regenerative medicine.

In all these areas, the department cooperates with professional societies, which leads to transferability of its research results into clinical practice. As of 2009 our department also operates a medical laboratory, Laboratory for Molecular Diagnostics, licensed by the Slovenian Ministry of Health.

KLJUČNI DOSEŽKI V LETU 2020

Asist dr. Klemen Čamernik, prejemnik dekanove nagrade 2020

Asist. dr. Klemen Čamernik je za svojo raziskavo o primerjavi lastnosti mezenhimskih matičnih celic subhondralne kosti bolnikov s primarno in displastično osteoartrozo, objavljeno v *Stem cell reviews and reports, 2020, 16(4):742-75),* prejel dekanovo nagrado.

Številne objave na področju matičnih celic in regenerativne medicine

Rezultati večletnih raziskav raziskovalcev asist. dr. Klemna Čamernika, doc. dr. Janje Zupan in prof. dr. Janje Marc na področju izolacije in uporabe matičnih celic so bili objavljeni uglednih revijah *(Stem cell reviews and reports,* 2020, 16(4):742-75, *Stem cell research& therapy,* 2020, 11(1):1-14, *Advances in experimental medicine and biology,* 2020, 33-46) in strokovnih monografijah *(Cell engineering and regeneration, (Reference Series in Biomedical Engineering), Springer nature. 2020).*

Objava v reviji z visokim faktorjem vpliva (IF= 10,7)

V sodelovanju z Univerzo v Bernu, Švica, je skupina prof. dr. Irene Mlinarič-Raščan (LIU, He, HE, Zhaoyue, GERMIČ, Nina, ADEMI, Hyrijie, FRANGEŽ, Živa, FELSER, Andrea, PENG, Shuang, RIETHER, Carsten, DJONOV, Valentin, NUOFFER, Jean-Marc, MLINARIČ-RAŠČAN, Irena, et al.) objavila znanstveni članek ATG12 deficiency leads to tumor cell oncosis owing to diminished mitochondrial biogenesis and reduced cellular bioenergetics v reviji *Cell death and differentiation,* 2020, 27(6): 1965-1980. V raziskavi so dokazali pomen funkcionalnih mitohondrijev za zagotavljanje oskrbe z energijo rakavih celic in vlogo avtofagnega proteina 12 (ATG12) pri uravnavanju mitohondrijske biogeneze.

Pridobljeni projekti

Za leto 2020-2021 je ARRS odobrila razširitev vsebine v zvezi s pandemijo COVID-19 in povečanje financiranja dveh raziskovalnih programov:

- P3-298 (vodja: prof. dr. Andrej Janež (UL MF), koordinator na UL FFA: prof. dr. Janja Marc): SARS-CoV-2 in RANK: interference, modulacija in vpliv vitamina D.
- P1-208 (vodja: prof. dr. Stanislav Gobec, koordinatorica na Katedri: prof. dr. Irena Mlinarič-Raščan): Iskanje novih terapevtskih tarč in modelov za razvoj učinkovin proti SARS-CoV-2 na osnovi interindividualnih razlik v odzivu na infekcijo s SARS-CoV-2.

Knjiga Preiskave v laboratorijski hematologiji

Sodelavci, doc. dr. Helena Podgornik, asist. dr. Katarina Reberšak, asist. dr. Martina Fink, so pod okriljem Hematološkega združenja izdali kvalitetno strokovno publikacijo, ki bo služila tudi kot sodobni učbenik študentom laboratorijske biomedicine.

KEY ACHIEVEMENTS IN 2020

Assist Dr. Klemen Čamernik, Dean´s award 2020

Assist. dr. Klemen Čamernik received the Dean's reward for a research paper entitled Increased Exhaustion of the Subchondral Bone-Derived Mesenchymal Steam/Stromal Cells in Primary versus Dysplastic Osteoarthritis (Stem cell reviews and reports, 2020, 16(4):742-75).

Numerous research publications in the field of stem cells

Researchers assist. dr. Klemen Čamernik, Assist. Prof. Dr. Janja Zupan, Prof. Dr. Janja Marc published the results of intensive research in the field of isolation and use of stem cells in bone tissue engineering and bone regeneration (Stem cell reviews and reports, 2020, 16(4):742-75, Stem cell research& therapy, 2020, 11(1):1-14, Advances in experimental medicine and biology, 2020, 33-46; Cell engineering and regeneration, (Reference Series in Biomedical Engineering), Springer nature. 2020).

Publication in journal with a high-impact-factor (IF=10.7)

In collaboration with the University of Bern, Switzerland, Prof. Dr. Irena Mlinarič-Raščan's group published a scientific article in a journal Cell death and differentiation, 2020, 27 (6): 1965-1980. The study showed the importance of functional mitochondria for the energy supply of cancer cells and the role of autophagic protein 12 (ATG12) in the regulation of mitochondrial biogenesis.

New grants in 2020

Slovenian Research Agency (ARRS) approved increased financing of two research programmes for topics related to COVID-19 pandemic:

- P3-298 (leader: dr. Andrej Janež (UL MF), coordinator at UL FFA: Prof. Dr. Janja Marc): Sars-CoV-2 and RANKL: interferences, modulation and role of Vitamin D
- P1-208 (leader: Prof. Dr. Stanislav Gobec, coordinator at Chair: Prof. Dr. Mlinarič-Raščan): Search for new therapeutic targets and models for the development of anti-SARS-CoV-2 drugs based on the inter-individual variability of the SARS-CoV-2 infection response

Book publishing: Laboratory Tests in Hematology

Members assist. Prof. Dr. Helena Podgornik, Assist. Dr. Katarina Reberšak, Assist. Dr. Martina Fink, published a book Laboratory Tests in Hematology. The book will help students and professionals understand the diagnostic algorithms, the choice of laboratory test and the meaning of the result in hematology.

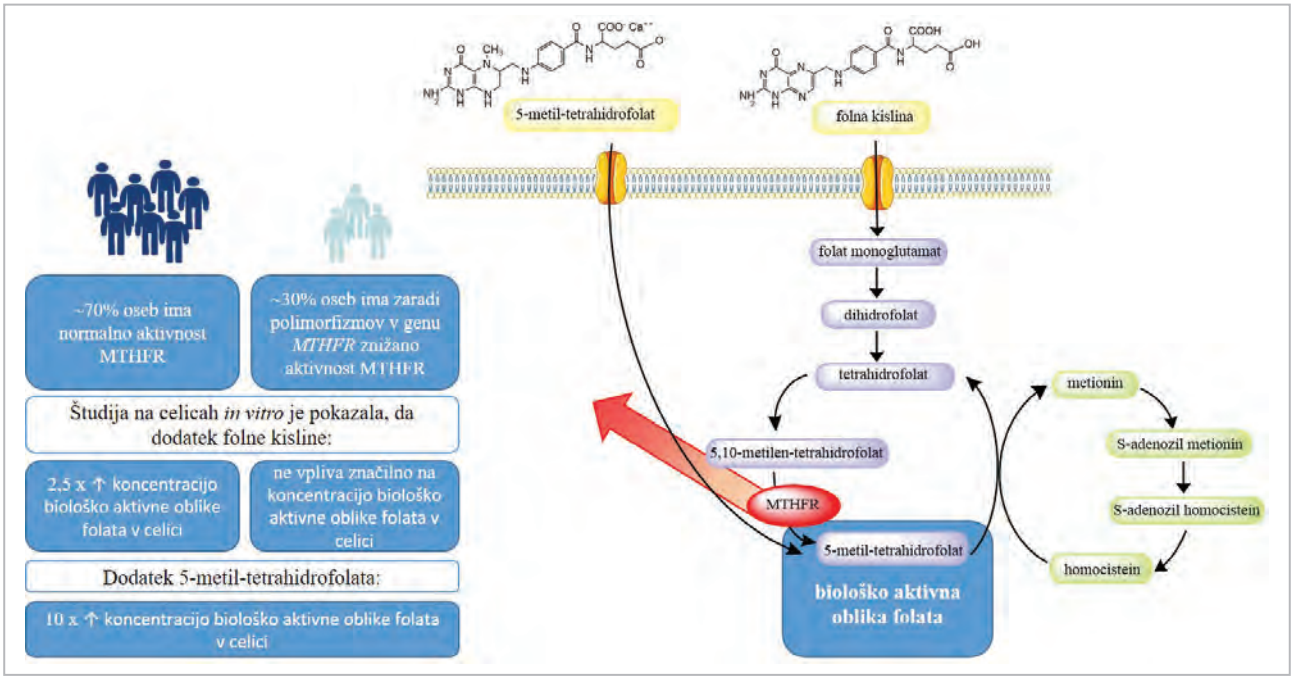
NAJBOLJŠE PUBLIKACIJE KATEDRE ZA KLINIČNO BIOKEMIJO V LETU 2020

Članek 1/: VIDMAR, Maša, ŠMID, Alenka, KARAS KUŽELIČKI, Nataša, TRONTELJ, Jurij, GERŠAK, Ksenija, MLINARIČ-RAŠČAN, Irena. Pomanjkanje folata zaradi deficita MTHFR lahko zaobidemo s 5-metiltetrahidrofolatom. *Journal of clinical medicine.* 2020, vol. 9, iss. 9, str. 1-18.

Ustrezen nivo folata je pomemben za homeostazo organizma, preprečevanje prirojenih nepravilnosti in odpravljanje različnih bolezenskih stanj. Poleg vnosa s prehrano na plazemski nivo folatov vpliva tudi genetska predispozicija. Ključen encim pri biosintezi aktivne oblike folata, 5-metiltetrahidrofolata (5-Me-THF), je 5,10-metilentetrahidrofolat reduktaza (MTHFR).

Avtorji so vlogo folatov pri vitalnih celičnih procesih raziskovali s pristopom translacijske farmakogenetike z uporabo limfoblastoidnih celičnih linij (LCL). Te so bile glede na genotip razdeljene v skupino z nizko in normalno aktivnostjo MTHFR. Na podlagi metabolne aktivnosti celic in znotrajcelične koncentracije 5-Me-THF, izmerjene z metodo LC-MS/MMS, avtorji sklepajo, da dodajanje FA zadostuje za vzdrževanje ustrezne ravni folata v celicah z normalno aktivnostjo MTHFR, medtem ko celice z nizko aktivnostjo MTHFR za premagovanje presnovnih deficitov, ki so posledica polimorfizmov v genu *MTHFR*, potrebujejo dodatek 5-Me-THF. V celicah z normalno aktivnostjo MTHFR je dodatek FA povzročil 2,5-kratno povečanje koncentracije 5-Me-THF, medtem ko v celicah z nizko aktivnostjo MTHFR zaznanega povečanja 5-Me-THF ni bilo. Ko so bile celice LCL izpostavljene 5-Me-THF, se je znotrajcelična koncentracija tega metabolita kar 10-krat povečala.

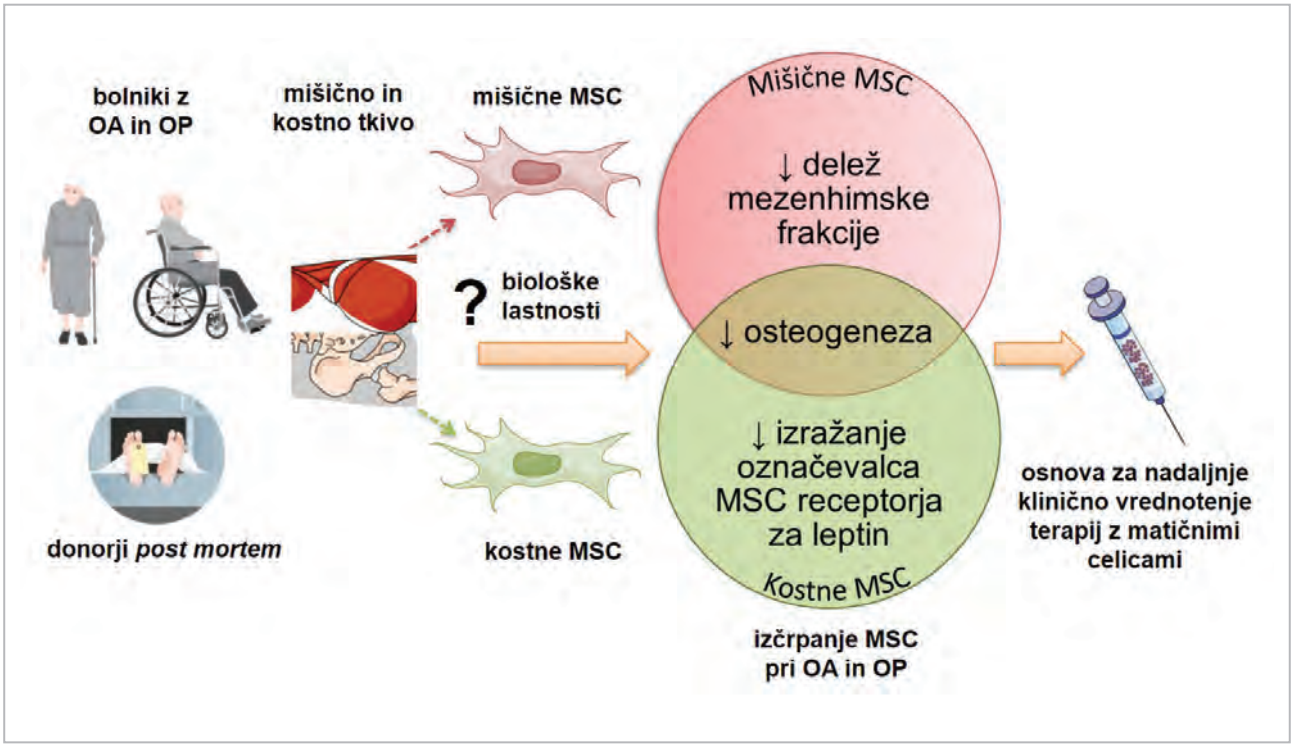
Rezultati študije nakazujejo na potencialno korist farmakogenetsko prilagojene izbire folatne terapije pri bolnikih, ki folatne dodatke jemljejo zaradi zdravljenja z antifolatnimi učinkovinami ali zaradi povečanih potreb po folatu.



Slika 1: Pomanjkanje folata zaradi zmanjšane aktivnosti MTHFR lahko zaobidemo s 5-metiltetrahidrofolatom.

Članek 2: ČAMERNIK, Klemen, MIHELIČ, Anže, MIHALIČ, Rene, HARING, Gregor, HERMAN, Simon, MAROLT, Darja, JANEŽ, Andrej, TREBŠE, Rihard, MARC, Janja, ZUPAN, Janja. Vrednotenje mezenhimskih matičnih / stromalnih celic iz skeletnih mišic in kosti pri bolnikih z osteoartrozo in zlomom vratu stegnenice. *Stem cell research & therapy*. Apr. 2020, vol. 11, iss. 1, str. 1-14.

Mezenhimske matične / stromalne celice (MSC) nadomeščajo ostarele celice pri odraslih organizmih. Za proces staranja je značilno, da se matične celice pri svojem delu izčrpajo, kar vpliva tudi na zmanjšanje njihovega regenerativnega potenciala. Avtorji tega članka so raziskali, ali je izčrpanost prisotna tudi pri mišičnih in kostnih MSC, pridobljenih od bolnikov z osteoartrozo (OA) in osteoporozo (OP) v primerjavi s kontrolnimi darovalci. Skupine vzorcev MSC so primerjali z uporabo *ex vivo* ter *in vitro* analiz, kot so imunofenotipizacija, sposobnost tvorbe kolonij, kinetika rasti, staranje celic, diferenciacijski potencial in izražanje genov za označevalce MSC. Ugotovili so, da je delež frakcije mezenhimskih celic (definirane kot CD45 / CD34 / CD14 / CD19 negativne), pridobljenih iz mišic pri bolnikih z OA bistveno nižji kot pri bolnikih z OP in kontrolah. MSC iz mišic in kosti pri bolnikih z OA so tudi pokazale znatno nižji osteogeni potencial v primerjavi z MSC pri bolnikih z OP. Pri MSC, pridobljenih iz kosti pri bolnikih z OA, so ugotovili tudi nižje izražanje receptorja za leptin, označevalca populacije MSC, ki predstavlja glavni vir teh celic v odraslem kostnem mozgu. Rezultati tega članka nakazujejo, da je izčrpanost MSC iz skeletnih mišic in kosti prisotna pri OA in OP, kar je potrebno upoštevati tudi pri nadaljnjih kliničnih preskušanjih za oceno učinkovitosti terapij z matičnimi celicami pri teh dveh degenerativnih boleznih.



Slika 2: Mišično in kostno tkivo je bilo odvzeto bolnikom z osteoartrozo (OA) in zlomom vratu stegnenice/osteoporozo (OP) ter *post mortem* donorjem, ki so predstavljali kontrolno skupino. Iz obeh tkiv so izolirali mezenhimske matične/ stromalne celice (MSC) in primerjali njihove lastnosti v pogojih *in vitro* med posameznimi skupinami preiskovancev.

THE BEST PUBLICATIONS OF THE DEPARTMENT OF CLINICAL BIOCHEMISTRY IN 2020

Publication 1: Folate insufficiency due to MTHFR deficiency Is bypassed by 5-Methyltetrahydrofolate; VIDMAR, Maša, ŠMID, Alenka, KARAS KUŽELIČKI, Nataša, TRONTELJ, Jurij, GERŠAK, Ksenija, MLINARIČ-RAŠČAN, Irena; Journal of clinical medicine. 2020, vol. 9, iss. 9, str. 1-18

Adequate folate levels are essential for homeostasis of the organism, prevention of congenital malformations, and rescue from predisposed disease states. In addition to dietary intake, plasma levels of folates are also modulated by genetic predisposition. In the organism, folates are converted by 5,10-methylenetetrahydrofolate reductase (MTHFR) into an active form, 5-methyltetrahydrofolate (5-Me-THF).

The authors investigated the role of folates in vital cellular processes by translational pharmacogenetics using lymphoblastoid cell lines (LCLs), which were divided into low- and normal MTHFR activity group based on their genotype. Based on cells' metabolic activity and intracellular 5-Me-THF levels determined by LC-MS/MS, they concluded that folic acid (FA) supplementation is sufficient to maintain adequate folate levels in the normal MTHFR activity group, whereas cells with low MTHFR activity require 5-Me-THF to overcome the metabolic defects caused by polymorphisms in the MTHFR gene. FA supplementation resulted in a 2.5-fold increase in 5-Me-THF in cells with normal MTHFR activity, but no increase was achieved in cells with low MTHFR activity. When LCLs were exposed to 5-Me-THF, a 10-fold increase in intracellular levels of this metabolite was observed.

These results suggest that patients receiving folate supplementation to counteract anti-folate therapies or patients with increased folate requirements would benefit from pharmacogenetics-based therapy selection.

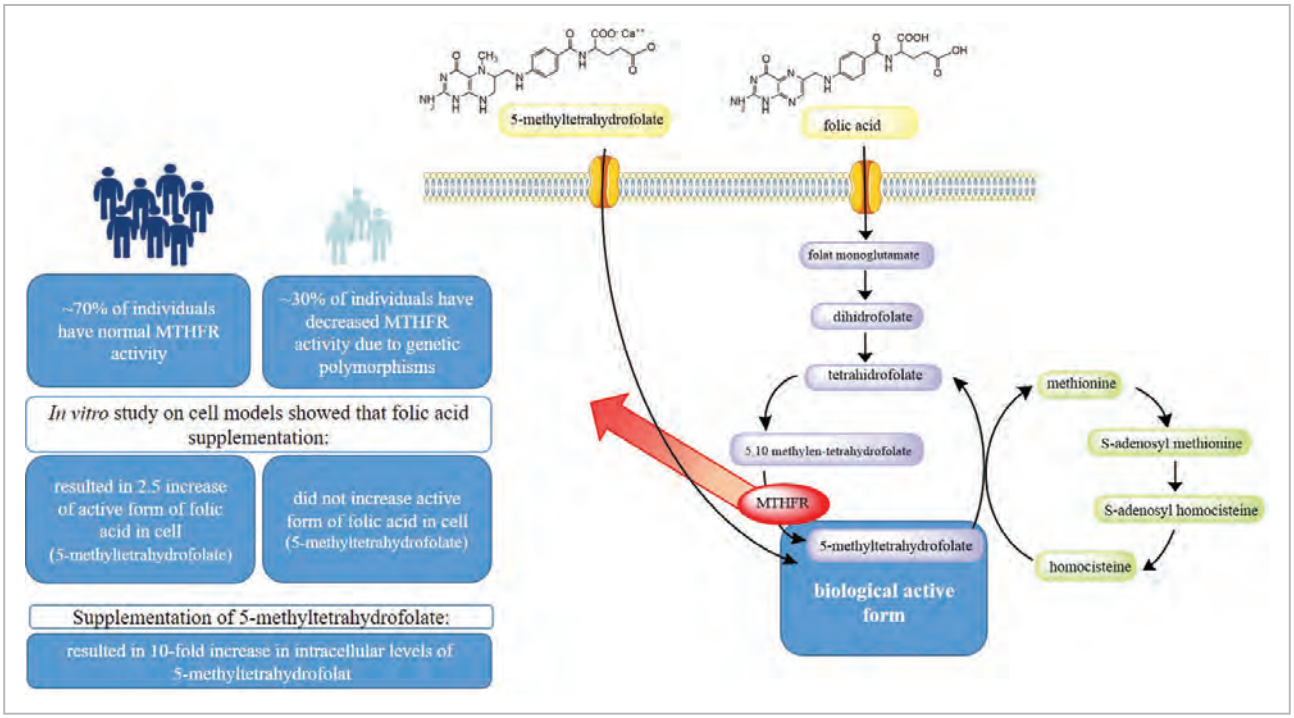


Figure 1: Folate insufficiency due to MTHFR deficiency is bypassed by 5-methyltetrahydrofolate

Publication 2: Comprehensive analysis of skeletal muscle- and bone-derived mesenchymal stem/stromal cells in patients with osteoarthritis and femoral neck fracture; ČAMERNIK, Klemen, MIHELIČ, Anže, MIHALIČ, Rene, HARING, Gregor, HERMAN, Simon, MAROLT, Darja, JANEŽ, Andrej, TREBŠE, Rihard, MARC, Janja, ZUPAN, Janja; Stem cell research & therapy. Apr. 2020, vol. 11, iss. 1, str. 1-14

Mesenchymal stem/stromal cells (MSCs) replenish the aged cells in adult life. Stem cell exhaustion and decrease in their regenerative potential have been suggested to be the hallmarks of aging. Authors investigated whether muscle- and bone-derived MSCs of patients with osteoarthritis (OA) and osteoporosis (OP) are affected by this exhaustion, compared to healthy donors' controls. Sample groups were compared using ex vivo and *in vitro* analyses: including immunophenotyping, colony-forming unit fibroblast assays, growth kinetics, cell senescence, multilineage potential, and MSC marker gene expression profiling.

The proportion of the mesenchymal cell fraction (CD45/CD34/CD14/CD19 negative cells) for the muscle-derived MSCs was significantly lower in OA patients compared to OP patients and controls. Muscle- and bone-derived MSCs from OA patients showed significantly lower osteogenic potential compared to MSCs from OP patients.

In bone-derived MSCs from patients with OA, they also identified a lower expression of the MSC marker-leptin receptor that presents a major source of MSCs in the adult bone marrow.

Altogether, results suggest that exhaustion of skeletal muscle- and bone-derived MSCs is a hallmark of OA and OP, which defines the need for further clinical trials to evaluate the properties of stem cell therapies in these two degenerative disorders.

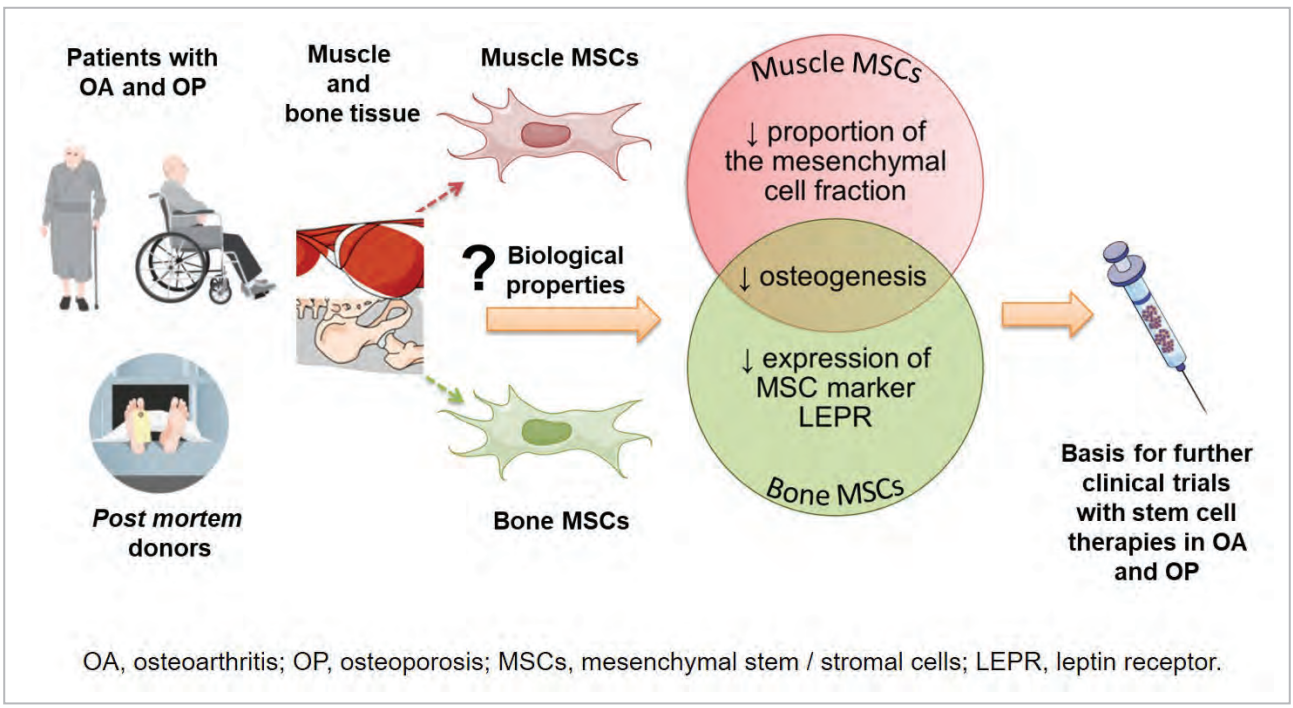


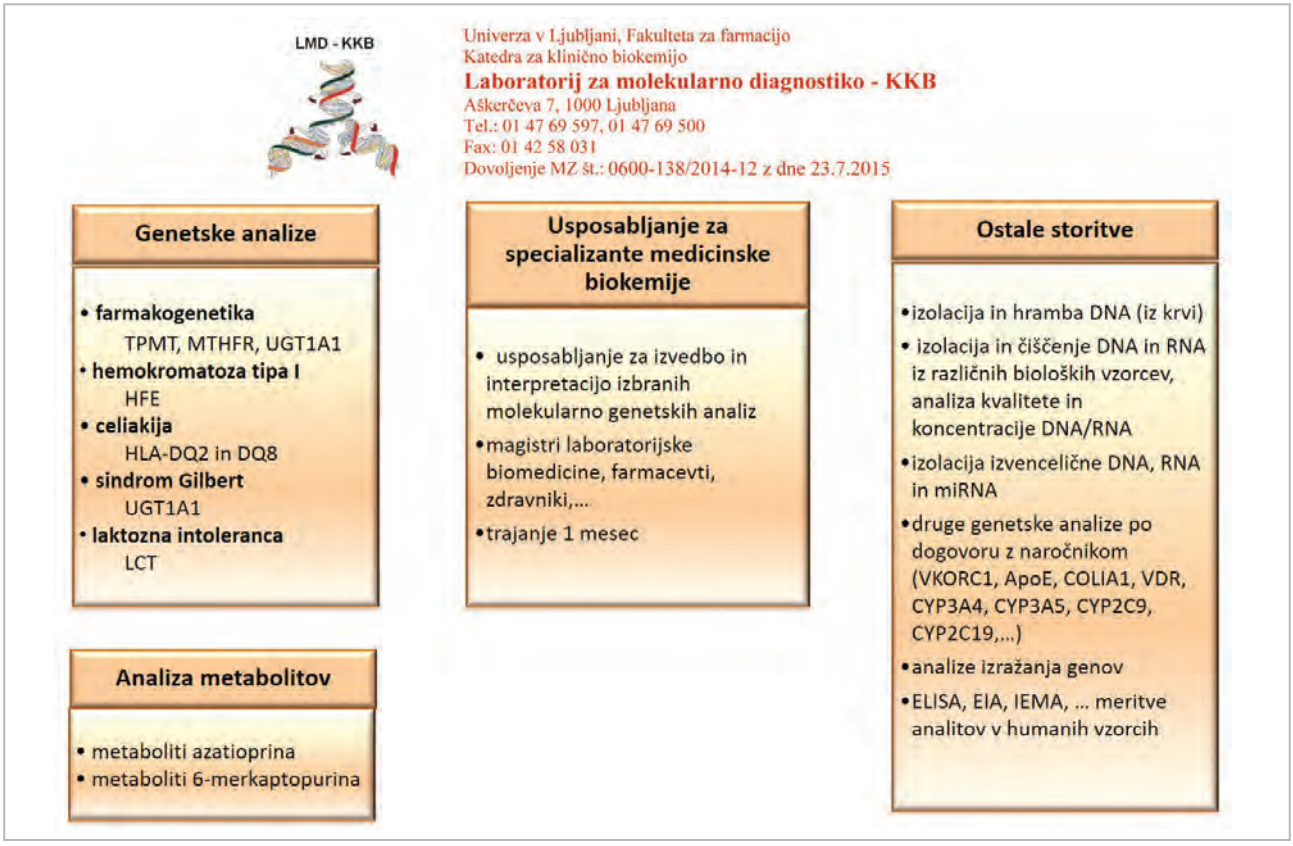
Figure 2. Muscle and bone tissue were collected from patients with osteoarthrosis (OA), osteoporosis (OP) and post mortem donors (control group). Mesenchymal stem/stromal cells (MSCs) from both tissues were isolated, their characteristics were compared between sample groups.

LABORATORIJ ZA MOLEKULARNO DIAGNOSTIKO

Laboratorij za molekularno diagnostiko (LMD-KKB) je organizacijska podenota UL FFA, ki deluje v okviru Katedre za klinično biokemijo od leta 2005. Leta 2009 je od Ministrstva za zdravje RS pridobil dovoljenje za delo kot medicinski laboratorij. V LMD-KKB opravljamo preiskave, namenjene diferencialni laboratorijski diagnostiki kot podporo personalizirani medicini na področju kroničnih in vrojenih metabolnih motenj. Uporabljamo tudi metode, ki smo jih razvili sami. Kot edini v Sloveniji izvajamo farmakogenetske preiskave in spremljanje nivoja tiopurinskih zdravil ter nabor 11 molekularno genetskih preiskav. Letno izvedemo več kot 400 analiz. Kakovost svojega dela zagotavljamo z visoko izobraženim kadrom, s sodelovanjem v mednarodnih shemah zagotavljanja kakovosti in z medlaboratorijskimi primerjavami. Možnost neposrednega stika s sodelavci in raziskovalci s Katedre nam omogoča takojšen prenos znanj iz razvojno-raziskovalnega področja v laboratorijsko prakso; majhen delovni kolektiv in strokovna neodvisnost znotraj UL FFA pa nudita fleksibilnost in stalen strokovni razvoj, usmerjen v korist bolnika, laboratorijske medicine in zdravstva.

LMD-KKB uspešno sodeluje s specialisti številnih ustanov, med drugim Interne klinike in Pediatrične klinike UKC Ljubljana, UKC Maribor, Splošnih bolnišnic Izola, Novo mesto, Jesenice, Celje, Nova Gorica. Je tudi pooblaščen izvajalec specializacije iz medicinske biokemije za področje molekularne genetike pri Zbornici za laboratorijsko medicino Slovenije.

Ustanoviteljica laboratorija je zasl. prof. dr. Jana Lukač Bajalo, spec. med. biokem., nasledila jo je vodja prof. dr. Janja Marc, spec. med. biokem. (2005–2018), in nato prof. dr. Joško Osredkar, spec. med. biokem. (2018–danes).



Slika 1: Dejavnosti Laboratorija za molekularno diagnostiko

LABORATORY FOR MOLECULAR DIAGNOSTICS

The Laboratory for Molecular Diagnostic (LMD-KKB) was established in 2005, as a part of the Department of Clinical Biochemistry. Since 2009 LMD-KKB has been a medical laboratory, licensed by the Slovenian Ministry of Health, based on the fulfilment of all legal requirements and regulations in the field of Laboratory Medicine in Slovenia. In the laboratory we perform tests for differential diagnosis and personalized medicine in selected chronic and inborn metabolic diseases. We also use methods developed and validated by our own experts. We are the only ones in Slovenia performing pharmacogenetics and monitoring the level of thiopurine drugs, in addition we perform a set of 11 other molecular genetic tests. We perform over 400 analyses annually. The quality of our work is ensured by highly qualified staff, participation in proficiency test schemes for external quality assessment (EQA) and interlaboratory comparisons. The possibility of direct contact with the staff and researchers of the Department of Clinical Biochemistry allows an immediate transfer of knowledge from the field of research and development to laboratory practice; a small working team and professional independence within the Faculty provide flexibility and continuous training for the benefit of the patient, laboratory medicine and health care.

LMD-KKB successfully cooperates with specialists in Slovenian clinics (Internal Clinic and Paediatric Clinic at the University Medical Centre Ljubljana, University Medical Centre Maribor and general hospitals in Izola, Novo mesto, Jesenice, Celje, Nova Gorica). The laboratory is also an authorized contractor for training programmes in specialization in Medical Biochemistry at the Slovenian Chamber of Laboratory Medicine.

Founder of the laboratory was the honorary Prof. Dr. Jana Lukač Bajalo, spec. med. biokem.; former and current leaders are: Prof. Dr. Janja Marc, spec. med. biokem. (2005-2018), Prof. Dr. Joško Osredkar, spec. med. biokem. (2018-present).

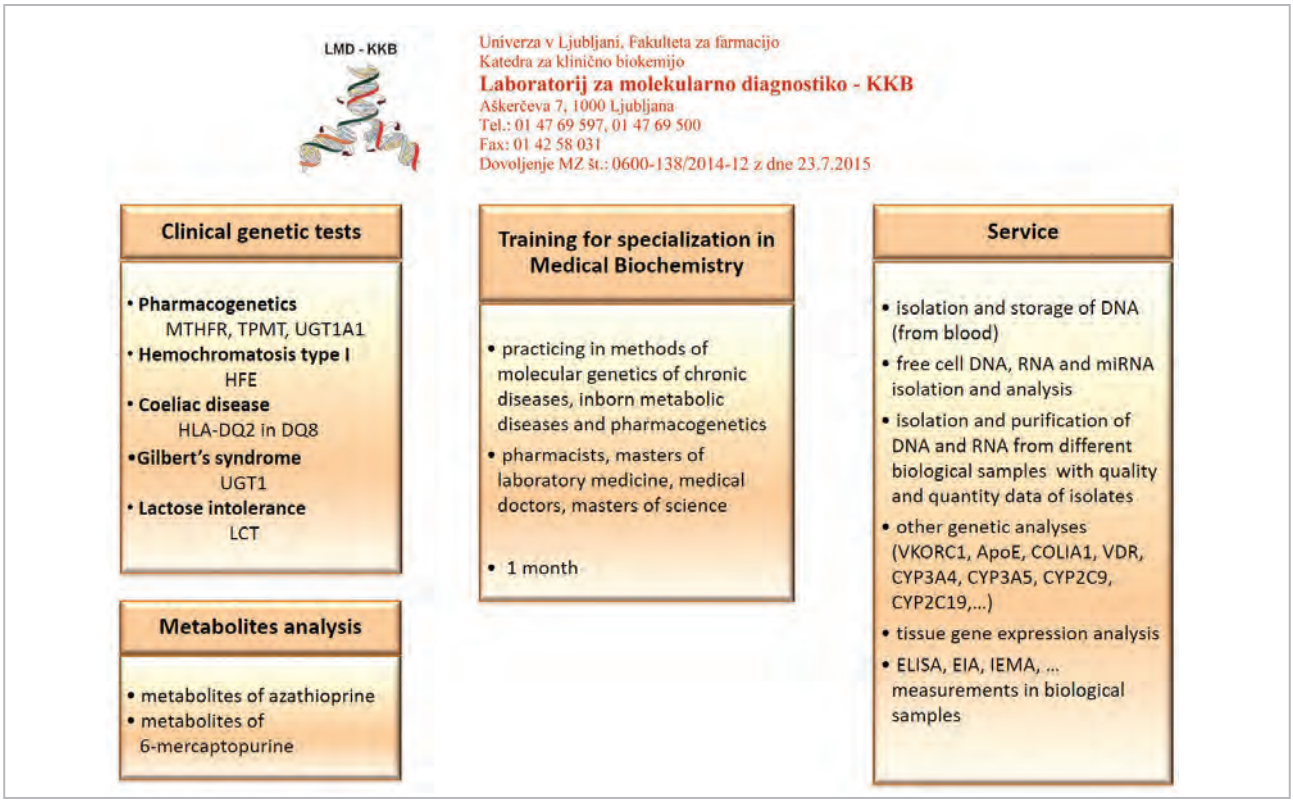


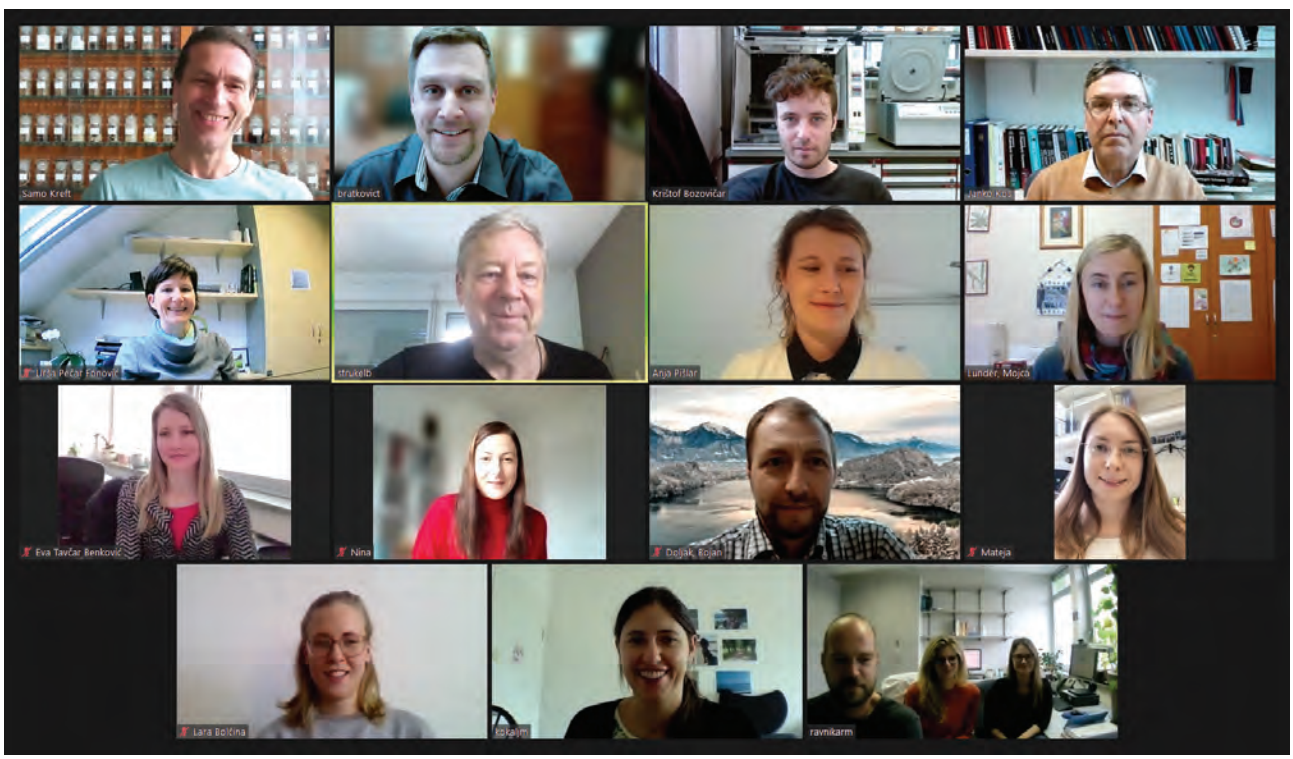
Figure 1: Activities of Laboratory for Molecular Diagnostics.

KATEDRA ZA FARMACEVTSKO BIOLOGIJO
DEPARTMENT OF PHARMACEUTICAL BIOLOGY

Predstojnik Katedre /
Head of the Department:
izr. prof. dr. Tomaž Bratkovič

Člani Katedre v letu 2020 / Members of the Department in 2020

- prof. dr. Janko Kos, prof. dr. Samo Kreft, prof. dr. Borut Štrukelj
- izr. prof. dr. Bojan Doljak, izr. prof. dr. Nina Kočevar Glavač, izr. prof. dr. Mojca Lunder
- doc. dr. Urša Pečar Fonović, doc. dr. Anja Pišlar, doc. dr. Eva Tavčar Benković
- dr. Tanja Jakoš, dr. Meta Kokalj Ladan, dr. Matjaž Ravnikar, Lara Bolčina, Krištof Bozovičar, Irena Klančnik Mavec, Darja Kolar, Mateja Matjaž, Nina Poljšak, Katja Schoss



Slika: Katedra za farmacevtsko biologijo / Photo: Department of Pharmaceutical Biology

Katedra za Farmacevtsko biologijo se v okviru svojega pedagoškega in raziskovalnega dela ukvarja s temami, ki so v tem času med najbolj aktualnimi. Pedagoški proces izvajamo na vseh študijskih programih UL FFA, tematike pa vključujejo celično biologijo, genetiko in genska zdravila, biotehnologijo v farmaciji in kozmetologiji, biokemijo in bolj podrobno biokemijo nastanka in napredovanja raka, proteomiko, zdravila iz zdravilnih rastlin, prehranska dopolnila, zdravila v alternativni medicini, kozmetične sestavine naravnega izvora, razvoj in vpeljava diagnostičnih metod in načrtovanje ter zagotavljanje kakovosti v medicinskih laboratorijih.

Raziskovalno pokrivamo različna področja, najbolj aktualne so raziskave kanabinonoidov, spojin rastlinskega izvora z antiholinergičnim učinkom, vloge maščobnih olj pri celjenju ran, imunoterapije s peptidnimi mimetiki alergenov in mehanizmi protitumornega imunskega odziva. V zadnjem letu smo raziskovalno delo nadgradili tudi s tematiko COVID-19. V letu, ki ga je najbolj zaznamoval COVID-19, so sodelavci naše katedre sodelovali v številnih intervjujih in oddajah, kjer so podajali strokovne in znanstvene odgovore in tako pripomogli k boljšemu poznavanju tematike v javnosti. Člani naše katedre so sodelovali tudi v Skupini za obveščanje strokovne in laične javnosti o cepivih in zdravilih v pandemiji COVID-19 v sklopu UL FFA in Delovni skupini za pripravo predloga o preskrbi s cepivi za preprečevanje širjenja okužb z virusom SARS-CoV-2 ter zdravljenja COVID-19 pri MZ.

At the Department of Pharmaceutical Biology, our teaching and research topics are among the most current at this time. The teaching process is carried out in all UL FFA study programmes, and topics include cell biology, genetics and gene therapy and pharmaceutical biotechnology and biotechnology in cosmetology, biochemistry and a more detailed biochemistry of cancer, proteomics, herbal medicines, dietary supplements, drugs in alternative medicine, cosmetic ingredients of natural origin, development and implementation of diagnostic methods and design and quality assurance in medical laboratories.

We cover various areas of research, the most current being research on cannabinonoids, plant derived compounds with anticholinergic effect, the role of vegetable oils in wound healing, immunotherapy with peptide mimetics of allergens and mechanisms of antitumor immune response. In the last year, our research also included COVID-19. Through our work, we have a significant influence through the media, such as television, radio and newspapers. In the year most marked by COVID-19, the staff of our department participated in numerous interviews and broadcasts, where they provided professional and scientific answers and thus contributed to better knowledge of the topic in public. Members of our department also participated in the Group for informing the professional and lay public about vaccines and drugs in the COVID-19 pandemic within UL FFA and the Working Group for the preparation of a proposal on the supply of vaccines to prevent the spread of Sars-CoV-2 virus infection and treatment of the coronavirus disease 19 in MH.

KLJUČNI DOSEŽKI V LETU 2020

Asist. Darja Kolar in prof. dr. Samo Kreft sta v letu 2020 na Svečani akademiji Slovenske znanstvene fundacije, ki je potekala v prostorih Državnega zbora, prejela priznanje Prometej znanosti za odličnost v komuniciranju.

Izr. prof. dr. Tomaž Bratkovič, izr. prof. dr. Mojca Lunder in Krištof Bozovičar so za projekt Robustne stacionarne faze za afinitetno čiščenje in imobilizacijo protiteles prejeli sredstva razpisa Inovacijskega sklada UL. Cilj projekta je optimizacija adsorpcijskih matriksov na osnovi peptidnih ligandov imunoglobulinov G ter podrobna in sistematična analiza funkcionalnosti in robustnosti prototipne afinitetne kromatografske kolone.

Članek Krištofa Bozovičarja in izr. prof. dr. Tomaža Bratkoviča Evolving a Peptide: Library Platforms and Diversification Strategies je bil izbran med 370 znanstvenimi članki za naslovnico revije International Journal of Molecular Sciences.

Abida Zahirović je zagovarjala doktorsko disertacijo z naslovom Identifikacija in ovrednotenje mimotopov glavnega alergena čebeljega strupa Api m 1 za razvoj specifične imunoterapije (mentorica izr. prof. dr. Mojca Lunder).

Tanja Jakoš je zagovarjala doktorsko disertacijo z naslovom Vloga katepsina X pri protitumorskem imunskem odzivu (mentor prof. dr. Janko Kos). Za delo v okviru doktorske disertacije je prejela tudi dekanovo nagrado za odlične znanstvene dosežke UL FFA.

KEY ACHIEVEMENTS IN 2020

Assist. Darja Kolar and Prof. Dr. Samo Kreft received the Prometheus of Science award for excellence in communication at the Ceremonial Academy of the Slovenian Science Foundation.

Assoc. Prof. Dr. Tomaž Bratkovič, Assoc. Prof. Dr. Mojca Lunder and Krištof Bozovičar received funding from the UL Innovation Fund for the Robust Stationary Phases project for affinity purification and immobilization of antibodies. The aim of the project is the optimization of adsorption matrices based on peptide ligands of immunoglobulin G and a detailed and systematic analysis of the functionality and robustness of the prototype affinity chromatographic column.

The article by Krištof Bozovičar and Assoc. Prof. Dr. Tomaž Bratkovič, entitled Evolving a peptide: library platforms and diversification strategies; it was selected from 370 scientific articles for the cover of the International Journal of Molecular Sciences.

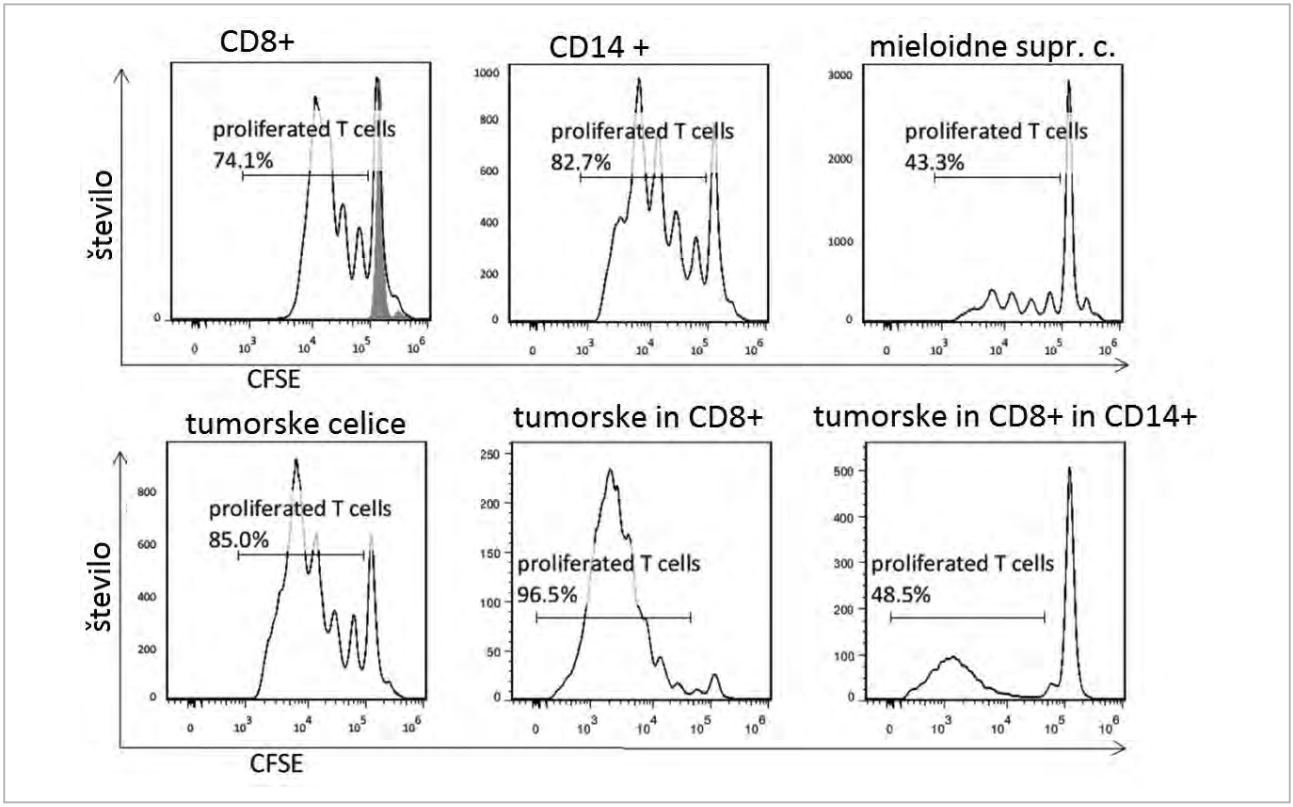
Abida Zahirović defended her doctoral dissertation entitled Identification and characterization of major bee venom allergen Api m 1 mimotopes for the development of specific immunotherapy (mentor Assoc. Prof. Dr. Mojca Lunder).

Tanja Jakoš defended her doctoral dissertation entitled The role of cathepsin X in antitumor immune response (mentor Prof. Dr. Janko Kos). For her work within her doctoral dissertation, she also received the Dean's Award for Outstanding Scientific Achievements of the UL FFA.

NAJBOLJŠE PUBLIKACIJE KATEDRE ZA FARMACEVTSKO BIOLOGIJO V LETU 2020

Članek 1: JAKOŠ, Tanja, PIŠLAR, Anja, PEČAR FONOVIĆ, Urša, ŠVAJGER, Urban, KOS, Janko. Cysteine cathepsins L and X differentially modulate interactions between myeloid-derived suppressor cells and tumor cells. Cancer immunology and immunotherapy 2020, vol. 69, str. 1869-1880.

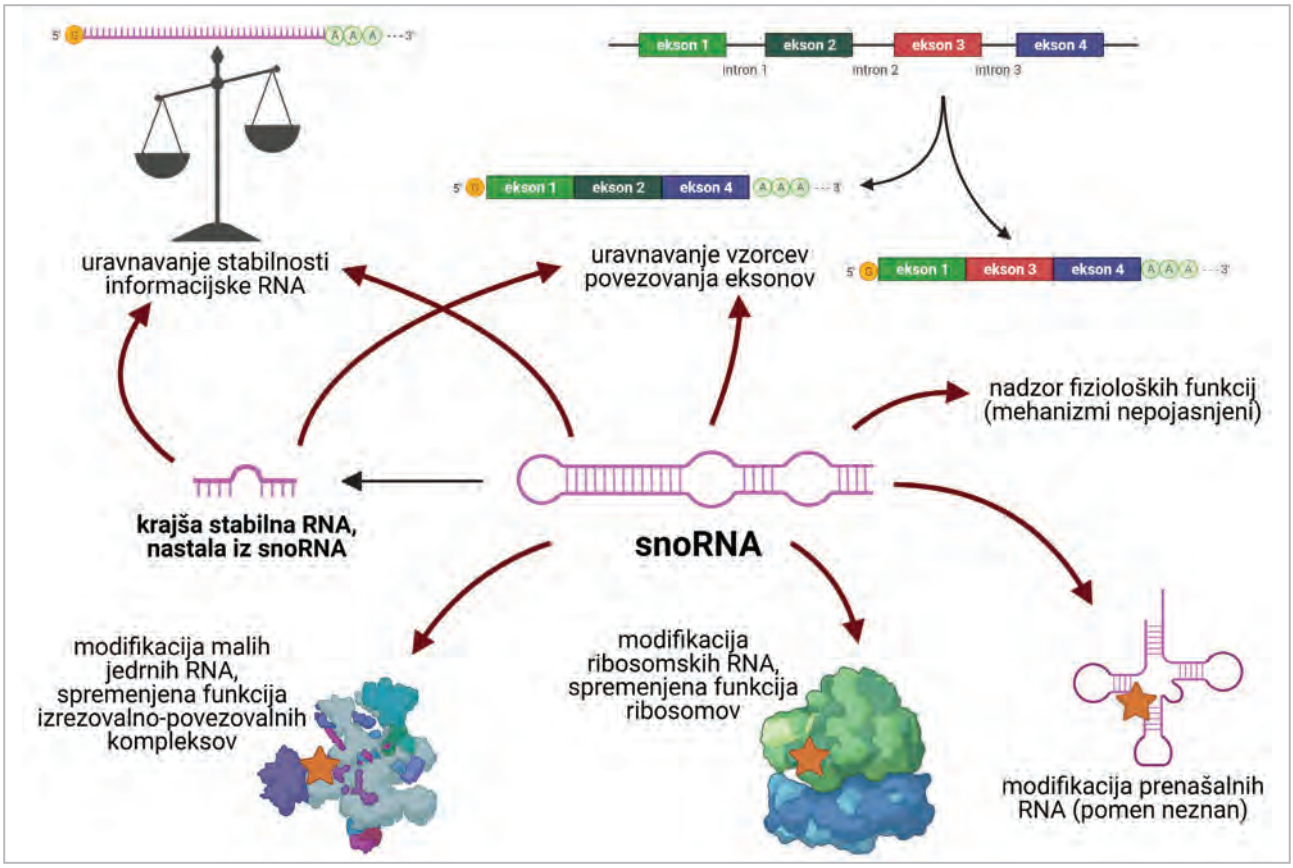
Vloga povečane proteolitične aktivnosti cisteinskih katepsinov pri malignem napredovanju raka je že dolgo poznana, zato so cisteinski katepsini pomembna tarča pri iskanju zdravil za zdravljenje raka. Pri raku je zelo pomembna tudi komunikacija med tumorskimi in imunskimi celicami, predvsem mieloidnimi supresorskimi celicami. V članku prikazujemo potencial celične linije raka dojke MDA-MB-231 za pridobivanje mieloidnih supresorskih celic iz celic CD14+ zdravih darovalcev. V pridobljenih celicah smo opazili povečanje ravni cisteinskih katepsinov, predvsem katepsinov L in X. Proučevali smo vpliv zaviranja njune aktivnosti v ko-kulturnem modelu tumorskih in imunskih celic. Imunske celice so zmanjšale invazivnost tumorskih celic, zaviranje katepsina X pa je povrnilo sposobnost invazije. Zaviranje katepsina L pa je signifikantno povečala citotoksičnost celic CD8+. Pri posameznih tumorskih in imunskih celicah, zaviranje katepsinov L in X ni povzročilo teh pomembnih funkcijskih sprememb. Naša raziskava prikazuje pomembnost komunikacije med tumorskimi in imunskimi celicami s poudarkom na vrednotenju zaviralcev cisteinskih katepsinov kot protirakavih učinkovin.



Slika 1: Prikaz proliferacije T-celic mono v ko-kulturah z različnimi celicami, ki prikazuje pomembnost komunikacije med tumorskimi in imunskimi celicami

Članek 2: BRATKOVIČ, Tomaž, BOŽIČ, Janja, ROGELJ, Boris. Functional diversity of small nucleolar RNAs. Nucleic acids research 2020, vol. 48, issue. 4, str. 1627-1651.

Tomaž Bratkovič je v sodelovanju z raziskovalcema z Instituta Jožef Stefan, Janjo Božič in prof. dr. Borisom Rogljem, v ugledni znanstveni reviji *Nucleic Acids Research* objavil pregledni članek o bioloških funkcijah malih nukleolarnih RNA (snoRNA). snoRNA so kratke molekule RNA, ki ne kodirajo proteinov, temveč z usmerjanjem sprememb v strukturi ribosomskih in malih jedrnih RNA igrajo pomembno vlogo pri uravnavanju delovanja ribosomov in izrezovalno-povezovalnih kompleksov. Novejše raziskave razkrivajo nekatere nepričakovane kompleksne funkcije snoRNA pri regulaciji novih vrst post-transkripcijskih procesov, kot so acetilacija ribosomskih RNA, modulacija vzorcev povezovanja eksonov, uravnavanje stabilnosti informacijske RNA in učinkovitosti translacije. Celice nekatere snoRNA pretvorijo v krajše stabilnejše izooblike, ki opravljajo alternativne naloge ali pa so osrednja biološko aktivna oblika transkripta. Določene snoRNA se izražajo tkivno specifično ali spremenijo celično lokacijo pod vplivi zunanjih dejavnikov. Ob novih in nepredvidenih vlogah snoRNA ter domnevnih mehanizmih delovanj avtorji razpravljajo tudi o sodobnih eksperimentalnih pristopih za proučevanje biologije snoRNA, kot so kartiranje interakcij med RNA in proteini ali med molekulami RNA, metode za analizo modifikacij RNA ter relevantni celični in živalski raziskovalni modeli.



Slika 2: Prikaz pomembnejših bioloških funkcij malih nukleolarnih RNA (snoRNA) /

THE BEST PUBLICATIONS OF THE DEPARTMENT OF PHARMACEUTICAL BIOLOGY IN 2020

Publication 1: JAKOŠ, Tanja, PIŠLAR, Anja, PEČAR FONOVIĆ, Urša, ŠVAJGER, Urban, KOS, Janko. Cysteine cathepsins L and X differentially modulate interactions between myeloid-derived suppressor cells and tumor cells. Cancer immunology and immunotherapy 2020, vol. 69, str. 1869-1880

The role of increased proteolytic activity of cysteine cathepsins in malignant cancer progression has long been known, therefore cysteine cathepsins are an important target for cancer therapies. Communication between tumor and immune cells, especially myeloid suppressor cells, also plays an important role in cancer cell invasion. This paper presents the potential of the MDA-MB-231 breast cancer cell line for obtaining myeloid suppressor cells from CD14 + cells of healthy donors. During this conversion, an increase in the levels of cysteine cathepsins, especially cathepsins L and X, was observed. The effect of inhibition of their activity on the co-culture of tumor and immune cells was studied. Immune cells reduced cell invasion of tumor cells, while inhibition of cathepsin X activity restored invasion. Inhibition of cathepsin L significantly increased CD8 + cytotoxicity. In tumor and immune cell monocultures, inhibition of cathepsins X and L did not promote these significant functional changes. Our research demonstrates the importance of the interaction between tumor and immune cells while evaluating the anti-cancer potential of cysteine cathepsin inhibitors.

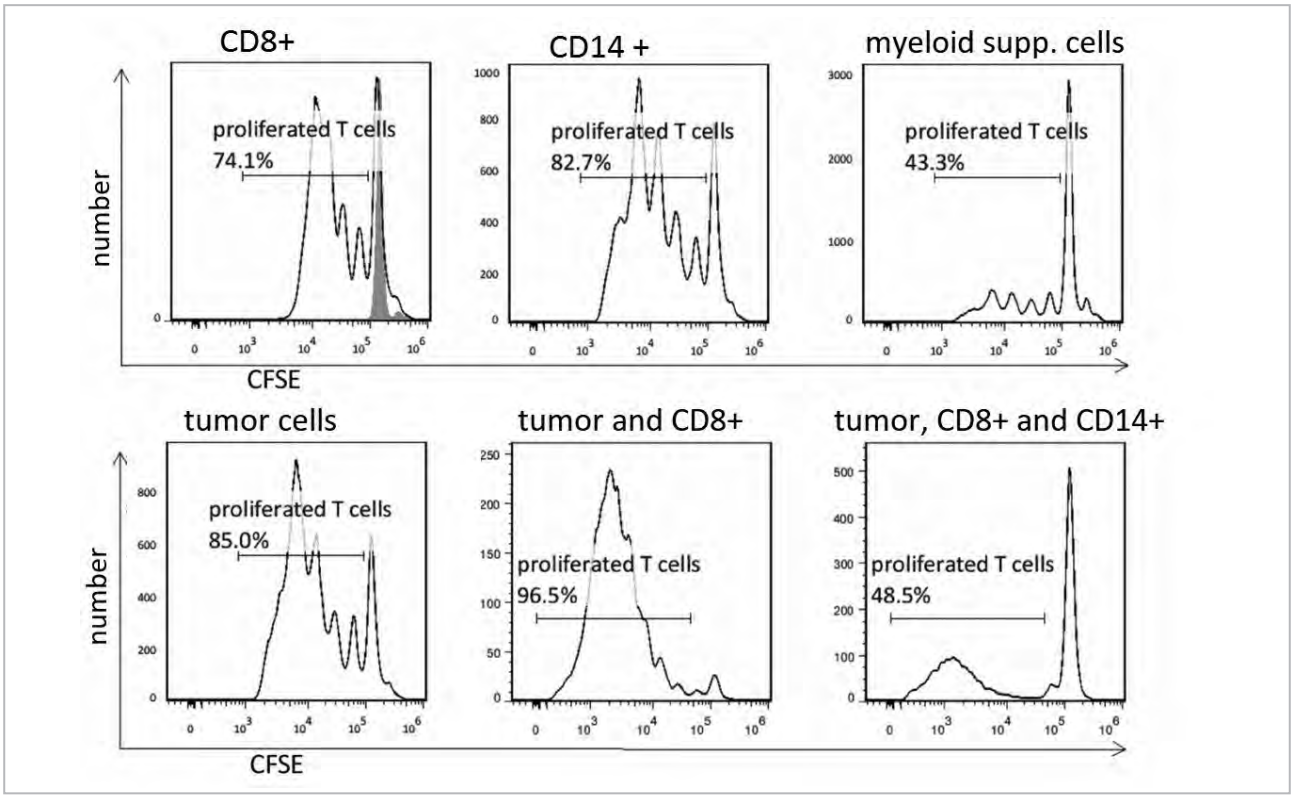


Figure 1: T-cell proliferation when T cells were cultured alone and in co-cultures, representing importance of interaction between tumor and immune cells

Publication 2: BRATKOVIČ, Tomaž, BOŽIČ, Janja, ROGELJ, Boris. Functional diversity of small nucleolar RNAs. Nucleic acids research 2020, vol. 48, issue. 4, str. 1627-1651

In cooperation with researchers from the Jozef Stefan Institute Janja Božič and Boris Rogelj, Tomaž Bratkovič has published a review paper on biological functions of small nucleolar RNAs (snoRNAs) in the esteemed scientific journal Nucleic Acids Research; snoRNAs are short non-protein-coding RNA molecules that play an important role in regulating ribosomal and spliceosomal function by directing structural modifications on ribosomal RNAs and small nuclear RNAs, respectively. Recent studies have revealed some complex unexpected functions of snoRNAs in regulating new post-transcriptional modification types. These include ribosomal RNA acetylation, modulation of splicing patterns, regulation of mRNA abundance and translational efficiency. Certain snoRNAs are processed to shorter stable bioactive species that perform additional roles or are the predominant functional isoform. Some snoRNAs display unusual cellular localization under exogenous stimuli, or tissue-specific distribution. In addition to new and unforeseen roles of small nuclear RNAs with emphasis on the presumed mechanisms of action, the authors discuss state-of-the-art experimental approaches for snoRNA biology research, such as high resolution RNA:protein and RNA:RNA interaction mapping, techniques for analysing modifications on targeted RNAs, and the relevant cellular and animal models.

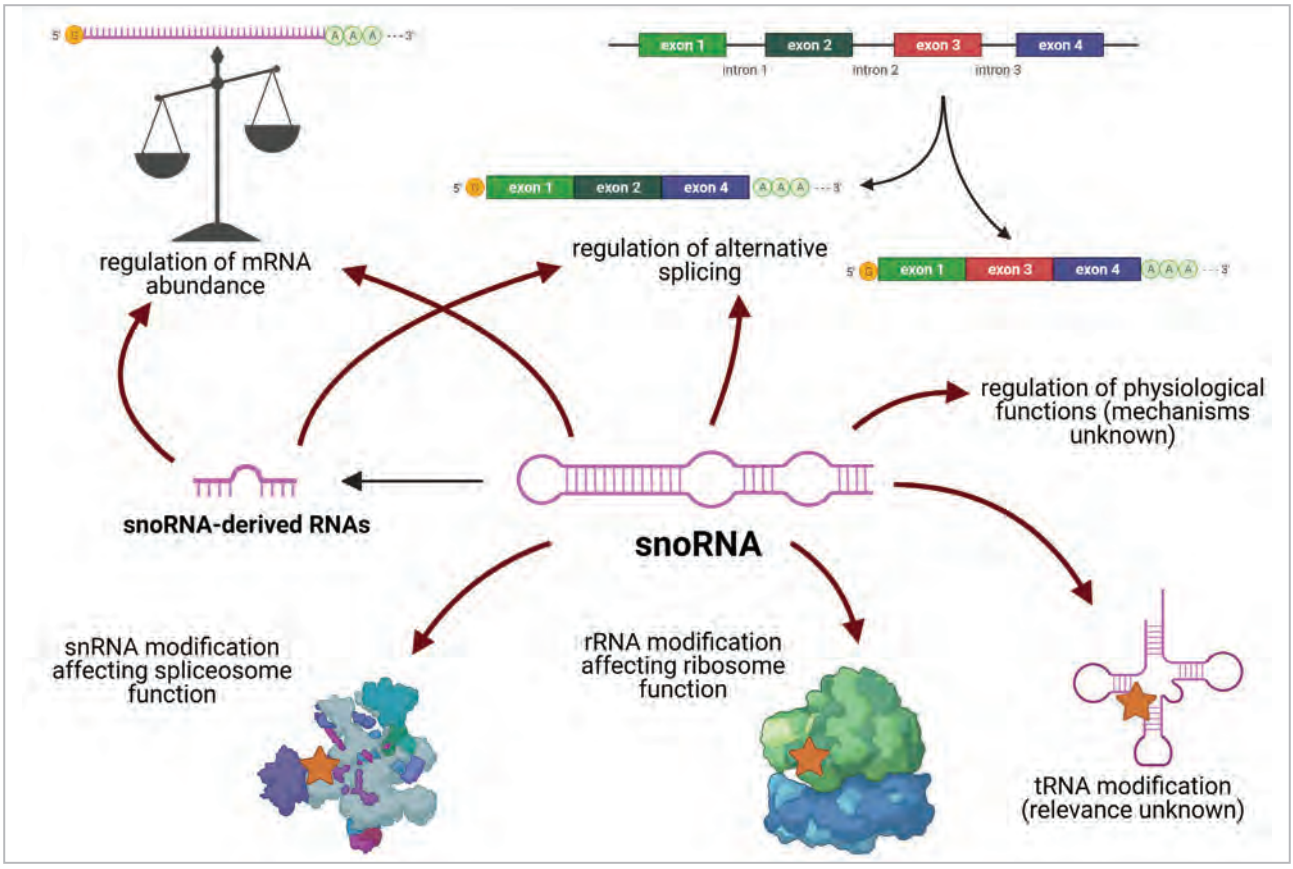


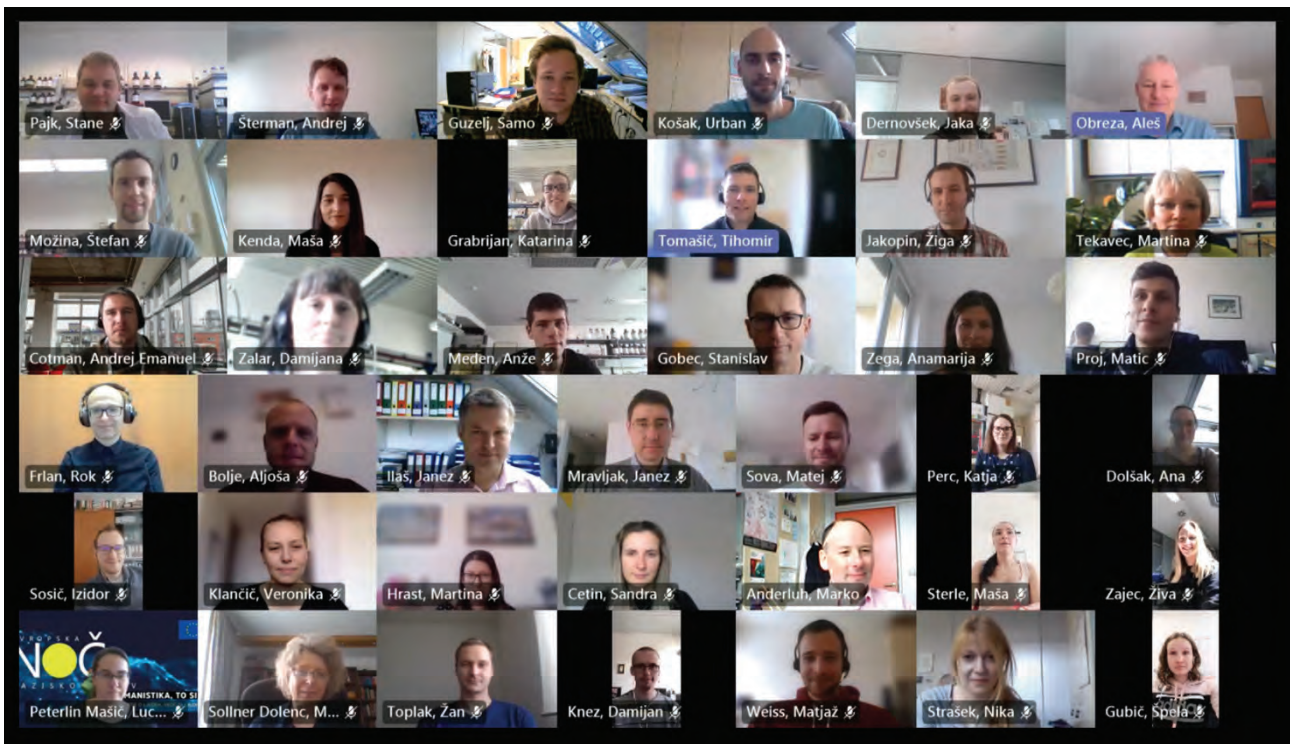
Figure 2: Biological functions of small nucleolar RNAs (snoRNAs)

KATEDRA ZA FARMACEVTSKO KEMIJO
DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

Predstojnik Katedre /
Head of the Department:
prof. dr. Stanislav Gobec

Člani Katedre v letu 2020 / Members of the Department in 2020

- prof. dr. Marko Anderluh, prof. dr. Janez Ilaš, prof. dr. Danijel Kikelj, prof. dr. Aleš Obreza, prof. dr. Lucija Peterlin Mašič, prof. dr. Marija Sollner Dolenc, prof. dr. Anamarija Zega, prof. dr. Zdenko Časar, prof. dr. Uroš Urleb
- izr. prof. dr. Žiga Jakopin, izr. prof. dr. Janez Mravljak, izr. prof. dr. Matej Sova, izr. prof. dr. Tihomir Tomašič, izr. prof. dr. Nace Zidar
- doc. dr. Rok Frlan, doc. dr. Martina Hrast, doc. dr. Damijan Knez, doc. dr. Stane Pajk, doc. dr. Izidor Sosič, znan. sod. dr. Andrej Emanuel Cotman,
- dr. Aljoša Bolje, dr. Urban Košak, dr. Eva Krajnc, dr. Štefan Možina, dr. Eva Ogorevc, dr. Žiga Skok, dr. Nina Strah, dr. Petra Zadravec, Aleša Bricelj, Jaka Dernovšek, Sandra Cetin, Ana Dolšak, Martina Durcik, Federica Fulgheri, Katarina Grabrijan, Špela Gubič, Samo Guzelj, Katarina Hočevar, Luka Hiti, Maša Kenda, Veronika Klančič, Maria Elena Loi, Anže Meden, Katja Perc, Matic Proj, Eva Shannon Schiffrer, Daniela Secci, Maša Sterle, Nika Strašek, Andrej Šterman, Martina Tekavec, Žan Toplak, Sjors Van Klaveren, Matjaž Weiss, Živa Zajec, Damijana Zalar



Slika: Katedra za farmacevtsko kemijo / Photo: Department of Pharmaceutical Chemistry

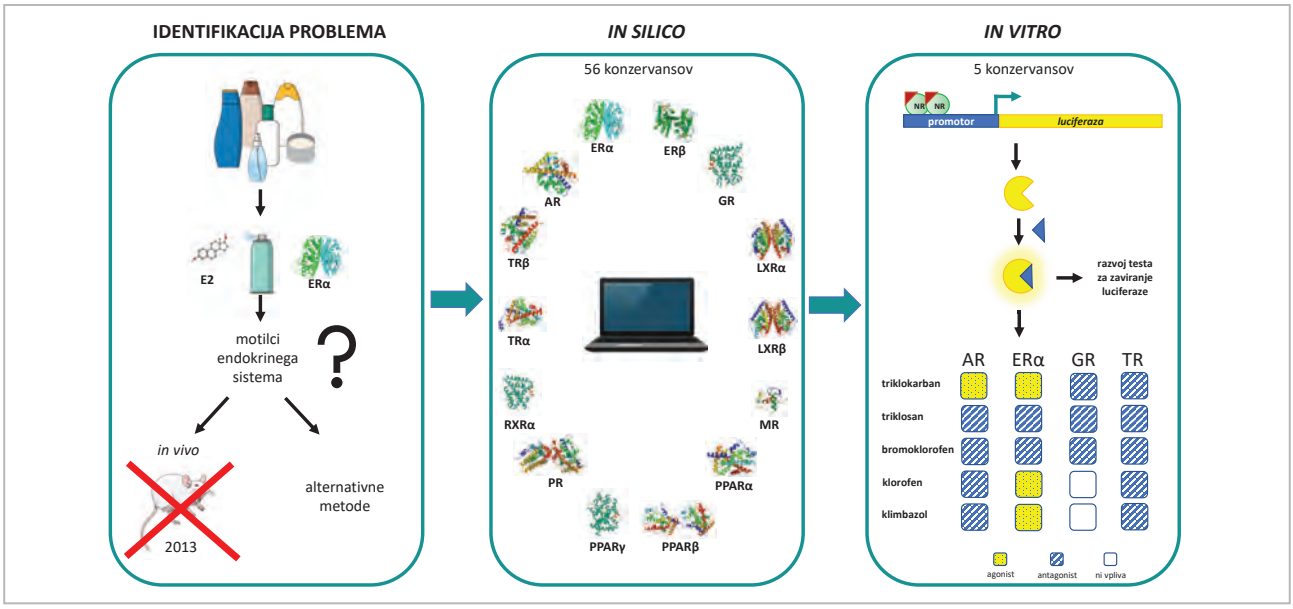
Na Katedri za farmacevtsko kemijo organiziramo in opravljamo pedagoško, znanstvenoraziskovalno in strokovno delo na širšem področju farmacevtske kemije, farmacevtske analize, toksikologije in zgodovine farmacije. Izvajamo raziskave načrtovanja, sinteze in biološkega vrednotenja spojin in razvoj novih molekulskih orodij za proučevanje interakcij z biološkimi makromolekulami. Glavni raziskovalni poudarki so na razvoju novih učinkovin za naslednje tarče: encimi, ki so udeleženi v sintezi bakterijske stene, encimi, udeleženi v biosintezi mikolnih kislin mikobakterij, encimi, ki so pomembni pri nastanku nevrodegenerativnih obolenj, natrijevi in kalijevi kanali, proteini toplotnega šoka (Hsp90), Toll-u podobni receptorji (TLR), NOD receptorji, lektini (galektini, Siglec, DC-SIGN in FimH), encimi, vpleteni v posttranslacijske modifikacije (OGT: O-□-N-acetilglukozaminil transferaza) imuno-proteasom in tarče v procesu koagulacije krvi. Razvijamo nove sintezne poti, nove separacijske in analizne metode za karakterizacijo spojin, nove metode za biološko karakterizacijo sintetiziranih spojin, nove antioksidante, nove stabilne nitroksidne ter fluorescenčne označevalce. Glavnina raziskav na katedri poteka v okviru programske skupine Farmacevtska kemija: načrtovanje, sinteza in vrednotenje učinkovin (2015–2020), del pa v povezavi UL FKKT, UL MF, UL VF, Kemijskim inštitutom in Institutom Jožef Stefan ter v okviru domačih in mednarodnih projektov.

At the Department of Pharmaceutical Chemistry, we organise and perform pedagogical, research and professional work in the fields of pharmaceutical chemistry, pharmaceutical analysis, toxicology and the history of pharmacy. We conduct research on the design, synthesis and biological evaluation of compounds and the development of new molecular tools to study interactions with biological macromolecules. The main research focus is on the development of new active ingredients for the following targets: enzymes involved in bacterial wall synthesis, enzymes involved in mycobacterial mycolic acid biosynthesis, enzymes important in the development of neurodegenerative diseases, sodium and potassium channels, heat shock proteins (Hsp90), Toll-like receptors (TLRs), NOD receptors, lectins (galectins, Siglec, DC-SIGN and FimH), enzymes involved in posttranslational modifications (OGT: O-b-N-acetylglucosaminyl transferase), immuno-proteasome and targets involved in blood coagulation process. We are developing new synthetic routes, new separation and analytical methods for the characterization of compounds, new methods for the biological characterization of synthesized compounds, new antioxidants, new stable nitroxide and fluorescent markers. The majority of research at the department takes place within the programme group Pharmaceutical chemistry: design, synthesis and evaluation of active ingredients (2015 2020), and part in collaboration with the UL FKKT, UL MF, UL VF, Institute of Chemistry and Jo~ef Stefan Institute and within national and international projects.

KLJUČNI DOSEŽKI V LETU 2020

V letu 2020 smo objavili več kot 110 izvirnih in preglednih znanstvenoraziskovalnih člankov, med katerimi jih je približno tretjina v revijah prvega kvartila, nekatere tudi v skupini zgornjih 5 % revij na različnih področjih. Predstavili smo številne novoodkrite bioaktivne molekule, ki zavirajo bakterijske encime, npr. topoizomeraze, protimikrobne učinkovine z delovanjem na dve tarči, zaviralce indolamin in triptofan 2,3-dioksigenaz, monoamin oksidaz in številnih drugih tarč. Za sintezo novih zaviralcev monoamino oksidaz je bil v letu 2020 podeljen patent pri Evropskem patentnem uradu.

Na področju toksikologije omenjamo odlična prispevka o *in vitro* estrogenem delovanju zmesi bisfenolov in ovrednotenju endokrine aktivnosti konzervansov, ki so pogoste sestavine kozmetičnih izdelkov. Članek je posebnega pomena tudi zaradi raziskav na v preteklosti nekoliko zanemarjenem področju kozmetologije na UL FFA. Rezultati omogočajo razširitev zavedanja o tveganjih zaradi izpostavljenosti konzervansom za zdravje ljudi in okolja. Prispevali bodo tudi k urejanju regulatornega statusa proučevanih konzervansov in določanja mej varne uporabe, ki je predmet razprav v ustreznih delovnih telesih tako v EU kot na nivoju OECD.



Slika 1: Shematski prikaz vrednotenja estrogenega delovanja konzervansov

Na Katedri smo v letu 2020 uspešno prijavljali projekte, saj je bilo z naslova načrtovanja in sinteze novih učinkovin odobrenih skupaj šest projektov, večina je znova vezana na protibakterijsko in protirakavo delovanje. Novost v tem letu pa sta bila podeljena projekta za področje totalne sinteze biološko aktivnih naravnih produktov in prvi projekt katedre, vezan na pripravo radiofarmakov z antagonističnim delovanjem na holecistokininski receptor B.

Med odmevnimi nagradami smo dosegli 2. mesto na natečaju rektorjeva nagrada za naj inovacijo Univerze v Ljubljani 2020, prof. dr. Marko Anderluh pa je za strokovno delo v okviru SFD prejel Minařikovo priznanje. Na kakovost našega dela kaže tudi dejstvo, da smo aktivno sodelovali pri organizaciji domačih in mednarodnih strokovnih in znanstvenih srečanj, simpozija ob skupščini SFD in EFMC-ISMC 2020 International Symposium on Medicinal Chemistry. V medijih smo pomembno prispevali k promociji UL FFA, zlasti s predstavitvami knjige o mineralih in vitaminih, s strokovnim svetovanjem in nastopi v dokumentarnih oddajah.

KEY ACHIEVEMENTS IN 2020

In 2020 we published more than 110 original and review scientific articles, of which about a third were in first-quarter journals, some also in the group of the top 5 % of journals in various fields. We have presented a number of newly discovered bioactive molecules that inhibit bacterial enzymes, e.g. topoisomerases, dual antimicrobial agents, indolamine and tryptophan 2,3-dioxygenase inhibitors, monoamine oxidases and many other targets. A patent was granted in 2020 by the European Patent Office for the synthesis of new monoamine oxidase inhibitors.

In the field of toxicology, we mention the excellent contributions on the *in vitro* estrogenic activity of a mixture of bisphenols and the evaluation of the endocrine activity of preservatives, which are common ingredients in cosmetic products. The paper is of particular importance also due to research in the previously somewhat neglected field of cosmetology at UL FFA. The results make it possible to raise awareness of the risks of exposure to preservatives for human health and the environment. They will also contribute to the regulatory status of the preservatives studied and for setting the limits for safe use, which are the subject of discussions in the relevant working bodies both in the EU and at the OECD level.

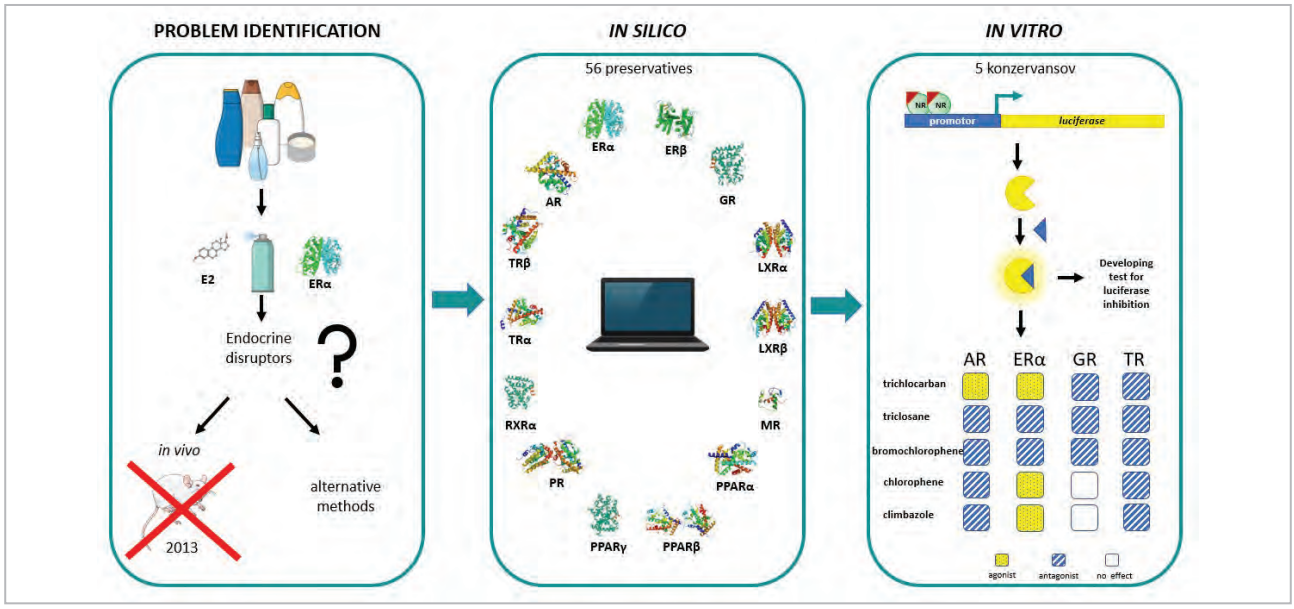


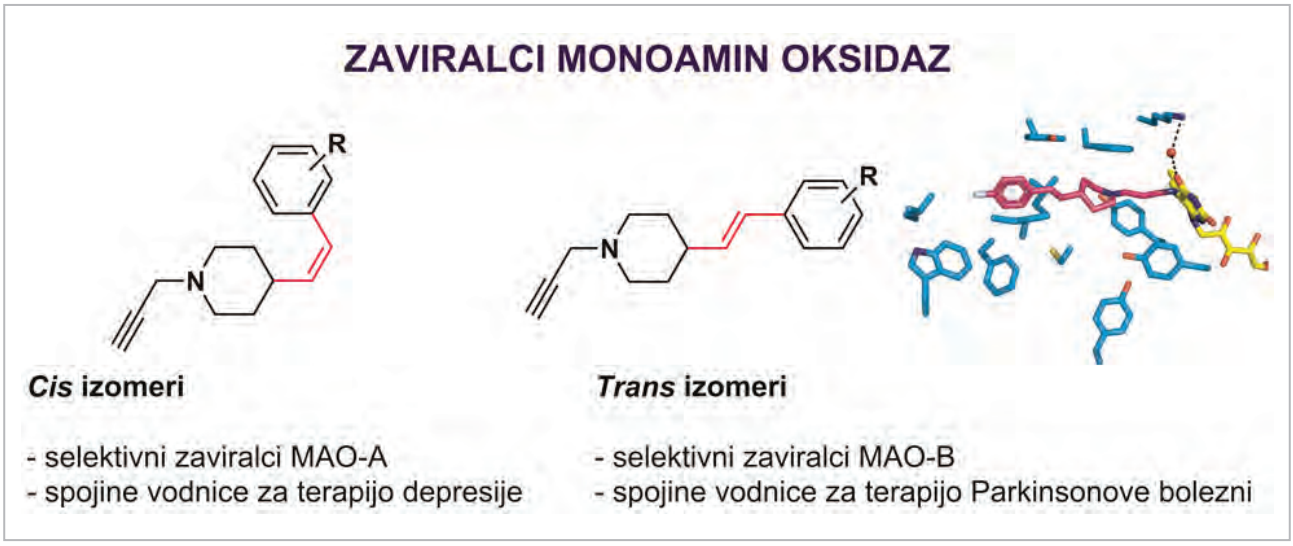
Figure 1: Schematic presentation of the evaluation of estrogenic action of preservatives

In 2020 we successfully applied for projects, as a total of six projects were approved for design and synthesis of new active ingredients, most of which are again related to antibacterial and anticancer activities. A significant novelty this year are the department's first projects on the total synthesis of biologically active natural products and the preparation of radiopharmaceuticals with cholecystokinin B receptor antagonist activity.

Among the resounding awards in 2020, we ranked second in the Rector's Award for the best innovation of the University of Ljubljana 2020, Prof. Dr. Marko Anderluh received the Minařik Award for his professional work within the Slovenian pharmaceutical society (SFD). The quality of our work is also shown by the fact that we actively participated in the organisation of domestic and international professional and scientific meetings, the Symposium at the SFD Assembly and the EFMC-ISMC 2020 International Symposium on Medicinal Chemistry. In media we made an important contribution regarding the promotion of the UL FFA, especially through the presentation of a book on minerals and vitamins, professional counselling and appearances in documentaries.

NAJBOLJŠE PUBLIKACIJE KATEDRE ZA FARMACEVTSKO KEMIJO V LETU 2020

Članek 1: KNEZ, Damijan, COLETTIS, Natalia, IACOVINO, Luca G., SOVA, Matej, PIŠLAR, Anja, KONC, Janez, LEŠNIK, Samo, HIGGS, Josefina, KAMECKI, Fabiola, MANGIALAVORI, Irene, DOLŠAK, Ana, ŽAKELJ, Simon, TRONTELJ, Jurij, KOS, Janko, BINDA, Claudia, MARDER MARIEL, Nora, GOBEC, Stanislav. Stereoselective activity of 1-propargyl-4-styrylpiperidine-like analogues that can discriminate between monoamine oxidase isoforms A and B. *Journal of medicinal chemistry.* ISSN 0022-2623, 2020, vol. 63 iss. 3, str. 1361-1387, [COBISS.SI-ID 4872561]



Slika 2: Načrtovanje zaviralcev monoamine oksidaz

Patent: KNEZ, Damijan, SOVA, Matej, GOBEC, Stanislav. Disubtituted azetidines, pyrrolidines, piperidines and azepanes as inhibitors of monoamine oxidase B for the treatment of neurodegenerative diseases: European patent specification EP3426634 B1, 2020-01-22. München: European Patent Office, 2020. 78 f., [COBISS.SI-ID 4497009]

Izoencima monoamin oksidaza A in B (MAO-A/B) sta povezana s številnimi nevrološkimi in nevrodegenerativnimi boleznimi. Avtorji so v raziskavi predstavili, kako lahko s pomočjo *cis* in *trans* izomerov 1-propargil-4-stirilpiperidina dosežemo selektivno zaviranje MAO-A ali MAO-B izooblike. Medtem ko so *cis* izomeri selektivni zaviralci MAO-A, *trans* analogi selektivno zavirajo samo MAO-B. Zaviranje encima so proučili s kinetično analizo, z analizo UV-Vis spektrov FAD kofaktorja in rentgensko kristalografijo. Selektivno zaviranje so potrdili *ex vivo* na homogenatih mišjih možganov, *in vivo* študije na miših pa so pokazale terapevtski potencial za zdravljenje motenj centralnega živčnega sistema. Študija predstavlja edinstven primer stereoselektivne aktivnosti *cis/trans* izomerov, ki lahko razlikujejo med strukturno sorodnimi encimi.

THE BEST PUBLICATIONS OF THE DEPARTMENT OF PHARMACEUTICAL CHEMISTRY IN 2020

Publication 1: KNEZ, Damijan, COLETTIS, Natalia, IACOVINO, Luca G., SOVA, Matej, PIŠLAR, Anja, KONC, Janez, LEŠNIK, Samo, HIGGS, Josefina, KAMECKI, Fabiola, MANGIALAVORI, Irene, DOLŠAK, Ana, ŽAKELJ, Simon, TRONTELJ, Jurij, KOS, Janko, BINDA, Claudia, MARDER MARIEL, Nora, GOBEC, Stanislav. Stereoselective activity of 1-propargyl-4-styrylpiperidine-like analogues that can discriminate between monoamine oxidase isoforms A and B. Journal of medicinal chemistry. ISSN 0022-2623, 2020, vol. 63 iss. 3, str. 1361-1387, [COBISS.SI-ID 4872561]

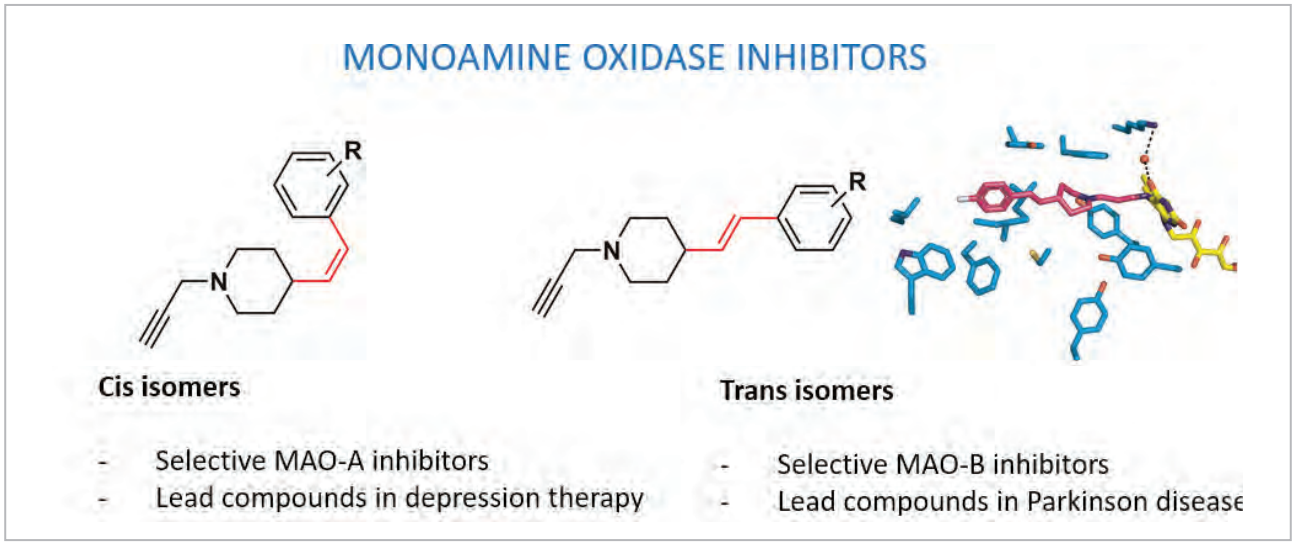


Figure 2: Design of monoamine oxidases inhibitors

Patent: KNEZ, Damijan, SOVA, Matej, GOBEC, Stanislav. Disubstituted azetidines, pyrrolidines, piperidines and azepanes as inhibitors of monoamine oxidase B for the treatment of neurodegenerative diseases: European patent specification EP3426634 B1, 2020-01-22. München: European Patent Office, 2020. 78 f., [COBISS.SI-ID 4497009]

Monoamine oxidases A and B (MAO-A/B) are related to numerous neurological and neurodegenerative diseases. The authors shed the light on how selective inhibition of MAO-A and MAO-B can be achieved by geometric isomers of cis- and trans-1-propargyl-4-styrylpiperidines. While the cis isomers are potent human MAO-A inhibitors, the trans analogues selectively target only the MAO-B isoform. The inhibition was studied by kinetic analysis, measurements of UV-Vis spectrum for FAD cofactor, and X-ray crystallography. The selective inhibition of the MAO-A and MAO-B isoforms was confirmed ex vivo in mouse brain homogenates, and additional *in vivo* studies in mice show the therapeutic potential for central nervous system disorders. This study represents a unique case of stereoselective activity of *cis/trans* isomers that can discriminate between structurally related enzyme isoforms.

KATEDRA ZA FARMACEVTSKO TEHNOLOGIJO
DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY

Predstojnica Katedre /
Head of the Department:
prof. dr. Mirjana Gašperlin

Člani Katedre v letu 2020 / Members of the Department in 2020

- prof. dr. Julijana Kristl, prof. dr. Odon Planinšek, prof. dr. Stanko Srčič, prof. dr. Janez Kerč, prof. dr. Franc Vrečer
- izr. prof. dr. Rok Dreu, izr. prof. dr. Petra Kocbek, izr. prof. dr. Pegi Ahlin Grabnar, izr. prof. dr. Ilija German Ilić, izr. prof. dr. Alenka Zvonar Pobirk
- doc. dr. Mirjam Gosenca Matjaž, doc. dr. Špela Zupančič, doc. dr. Biljana Janković
- dr. Katarina Bolko Seljak, dr. Zoran Lavrič, dr. Barbara Sterle Zorec, Ana Baumgartner, Maja Bjelošević, Črt Dragar, Valerija Garb, Blaž Grilc, Nina Katarina Grilc, Tatjana Hrovatič, Mojca Keržan, Janja Mirtič, Mitja Pohlen, Tanja Potrč, Mercedes Vitek, Anže Zidar

Slika: Katedra za farmacevtsko tehnologijo / Photo: Department of Pharmaceutical Technology

Na Katedri za Farmacevtsko tehnologijo organiziramo in izvajamo pedagoški proces na vseh stopnjah študija ter hkrati koordiniramo tri študijske programe. Pedagoško, znanstvenoraziskovalno in strokovno pokrivamo področja farmacevtske tehnologije, nanotehnologije, industrijske farmacije, farmacevtskega inženirstva, fizikalne farmacije, farmacevtsko tehnološke analitike ter kozmetologije.

Naš poglavitni raziskovalni cilj je razvoj in vrednotenje pacientom prijaznih zdravil. Usmerjeni smo tako v izdelavo klasičnih farmacevtskih oblik kot inovativnih dostavnih sistemov, uporabljamo tudi moderne tehnologije, ki podpirajo izdelavo zdravil z vgrajeno kakovostjo. Uspešno sledimo sodobnim trendom tako z razvojem inovativnih nanodostavnih sistemov, formulacij za biofarmacevtike in teranostike kot tudi široko uveljavljenih oblik s prirejenim sproščanjem, tekoče kristalnih struktur, orodisperzibilnih in večenotnih farmacevtskih oblik ter z različnimi pristopi za izboljšanje topnosti učinkovin. Člani Katedre so eksperti na področju predformulacijskih študij in vrednotenja končnih farmacevtskih oblik ter naprednih dostavnih sistemov z najsodobnejšimi tehnološko analiznimi tehnikami. Z vključevanjem zanesljivih numeričnih modelov za napovedovanje procesov in formulacij s simulacijami ter našo ekspertizo se učinkovito vključujemo tudi v reševanje perečih izzivov industrijsko že uveljavljenih tehnologij.

Katedra je vključena v raziskovalni program Farmacevtska tehnologija in je aktivna v različnih programih (npr. CEEPUS, PSSRC, ORBIS, RISE). Ponosni smo na naše dolgoletno sodelovanje s farmacevtsko industrijo ter močno vpetost posameznih članov v aktivnosti stroke v domačem in mednarodnem okolju, kjer sodelujemo pri organizaciji simpozijev, smo člani številnih komisij in uredniških odborov, ocenjevalci doktorskih nalog na tujih univerzah, cenjeni recenzenti in drugo.

At the Chair of Pharmaceutical Technology, we organise and carry out pedagogical activities at all stages of study, and coordinate three programmes. Our teaching, research, and professional work encompass the fields of Pharmaceutical Technology, Nanotechnology, Industrial Pharmacy, Pharmaceutical Engineering, Physical Pharmacy, Pharmaceutical Analytics, and Cosmetology.

Our main research focus is development and evaluation of patient friendly medicines, based on classical dosage forms, as well as innovative delivery systems combined with implementation of modern technologies in manufacturing medicines with integrated quality. We successfully follow the contemporary trends by developing innovative nanocarriers, formulations for biopharmaceuticals and theranostics, and liquid-crystalline systems in addition to well-established controlled release or solubility enhancing formulations along with orally disintegrating and multiunit dosage forms as most noticeable. Members of our Chair are experts on preformulation studies and characterization of final dosage forms and novel delivery systems by using state-of-the-art analytical techniques. By incorporating reliable numerical models for the prediction of processes and formulations through simulations, we provide comprehensive and expertise based solutions for the challenges arising within industrially established technologies as well.

The Chair is a part of the Pharmaceutical Technology research programme, and active in many programmes (e.g. CEEPUS, PSSRC, ORBIS, and RISE). We are proud of our long-term cooperation with pharmaceutical industry, and strong involvement of individual members in professional activities by symposia at national and international level and, as members of the (inter)national committees and editorial boards, evaluators of doctoral dissertations at foreign universities, recognized reviewers and elsewhere.

KLJUČNI DOSEŽKI V LETU 2020

Uspeh članov Katedre na 50. Krkinih nagradah

Veliko Krkino nagrado je prejela **dr. Janja Mirtič** za svoje doktorsko delo za naslovom *Neizkoriščen potencial polielektrolitov za razvoj naprednih dostavnih sistemov za zdravilne učinkovine in probiotike* (mentorica prof. dr. Julijana Kristl), ki je eno od sedmih zaključenih doktorskih del na naši Katedri v letu 2020. Uspeh sta lepo dopolnili **Krkini nagradi, podeljeni Črtu Dragarju** (mentorici izr. prof. dr. Petra Kocbek in prof. dr. Eva Robbleg) in **Sandiju Svetiču** (mentorja izr. prof. dr. Rok Dreu in Teja Brezovar). Člani Katedre so mentorirali tudi raziskovalna dela **Nine Katarine Grilc, Katje Murnc** in **dr. Petra Grdešiča**, ki so prejeli **Krkina priznanja (s posebno pohvalo).**

Prejemnica globalne Novartisove nagrade "VIVA Leading Science Award" v letu 2020 je doc. dr. Biljana Janković, raziskovalka in predavateljica na Katedri za farmacevtsko tehnologijo UL FFA, zaposlena kot vodja skupine IVIVC v Razvojnem Centru Lek, Sandoz, Slovenija. Njeno odlično raziskovalno delo se odraža v vzpostavitvi 14 znanstvenih inkubatorjev.

Podeljeni patent US 10568837 B2 potrjuje inovativno naravnanost Katedre za farmacevtsko tehnologijo pri razvoju boljših zdravil. Izumu *Delci sferičino aglomerirane laktoze za direktno stiskanje in metoda njihove izdelave,* z izumitelji **dr. Dejanom Lamešićem, prof. dr. Odonom Planinškom, izr. prof. dr. Ilijo German Ilićem** in **asist. dr. Zoranom Lavričem** je bil podeljen ameriški patent.

Nova raziskovalna oprema (istosmerni dvopolžni ekstrudor in Raman-AFM)

V letu 2020 smo opremljenost laboratorijev nadgradili z istosmernim dvopolžnim ekstrudorjem, ki bo omogočil raziskave na področju iztiskanja in granuliranja s talinami ter podprl našo ekspertizo na področjih tehnologij z vgrajeno kakovostjo (QbD), kontinuirane proizvodnje ter procesno analiznih tehnologij (PAT) kot pomembnih elementov sodobne industrijske farmacije. Naša druga pridobitev je konfokalni ramanski mikroskop sklopljen z mikroskopijo na atomsko silo, ki bo pomembno izboljšal konkurenčnost v predformulacijskih študijah in pri vrednotenju končnih farmacevtskih oblik.

Med dosežke za izbor **Odlični v znanosti 2020** je bil po sklepu Javne agencije za raziskovalno dejavnost uvrščen članek doc. dr. Špele Zupančič s sodelavci, z naslovom *Potencial nanovlaken s protimikrobnimi učinkovinami za lokalno zdravljenje parodontalne bolezni* (Journal of Controlled Release 2019, 316: 223-235).

KEY ACHIEVEMENTS IN 2020

Success of our members at 50th Krka Awards

Dr. Janja Mirtič won the Krka Grand Prize for special research achievements for her PhD thesis entitled Unexploited Potential of Polyelectrolytes for Development of Advanced Delivery Systems of Drugs and Probiotics (mentor Prof. Dr. J. Kristl), being one of the 7 completed PhD thesis in 2020 at our Chair. In addition, **Krka Prizes were given to Črt Dragar** (mentors Assoc. Prof. Dr. Kocbek, Prof. Dr. Eva Robbleg) and **Sandi Svetič** (mentors Assoc. Prof. Dr. Rok Dreu and Teja Brezovar). Our member also supervised research works of **Nina Katarina Grilc, Katja Murnc,** and **Dr. Peter Grdešič** obtaining **Krka's (special) recognitions.**

Novartis Leading Scientist Award was presented to Assist. Prof. Dr. Biljana Janković, researcher and lecturer at the Chair of Pharmaceutical Tehnology UL FFA, employed at Sandoz Development Centre Lek Slovenia as the Head of the IVIVC Team. She was awarded for her exceptional research contribution resulting in 14 formed scientific incubators.

Granted patent US 10568837 B2 proves innovation-oriented approach of the Chair of Pharmaceutical technology in developing better medicines. The invention Particles of spherically agglomerated lactose for direct compression and method of preparation thereof by inventors **Dr. Lamešić Dejan, Prof. Dr. Planinšek Odon, Assoc. Prof. Dr. German Ilić Ilija** and **Assist. Dr. Zoran Lavrič** was protected by a grant of a US patent.

New Research Equipment

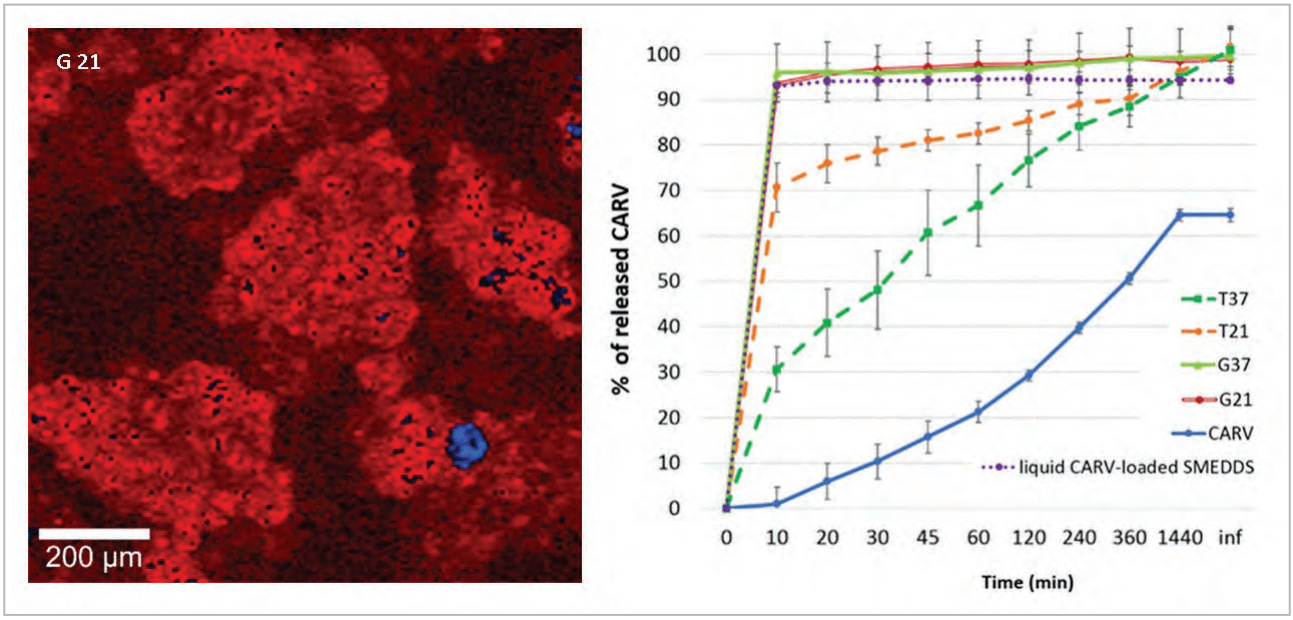
In 2020 we modernized our laboratories with corotating twin screw extruder that expands the scope of our research into the fields of hot-melt extrusion and twin screw granulation. This will further support our expertise in the areas of quality by design (QbD), continuous manufacturing and process analytical technology (PAT), serving as important elements of contemporary Industrial Pharmacy. Raman spectroscopy microscope coupled with an atomic force microscope (AFM) as our second acquisition will serve as an important pillar in various preformulation studies and characterization of broad range of final dosage forms.

The publication Potential of nanofibers with antimicrobial agents for local treatment of periodontal disease, written by Assist. Prof. Dr. Špela Zupančič et al. (Journal of Controlled Release 2019, 316: 223-235) was ranked among **Excellent in Science 2020** by the Slovenian Research Agency.

NAJBOLJŠE PUBLIKACIJE KATEDRE ZA FARMACEVTSKO TEHNOLOGIJO V LETU 2020

Članek 1: MANDIĆ, J. PIRNAT, V. LUŠTRIK, M. GERMAN ILIĆ, I. VREČAR, F. GAŠPERLIN, M. ZVONAR POBIRK, A. Solidification of SMEDDS by fluid bed granulation and manufacturing of fast drug release tablets. Int. J. Pharm. 2020, 583: 119377.

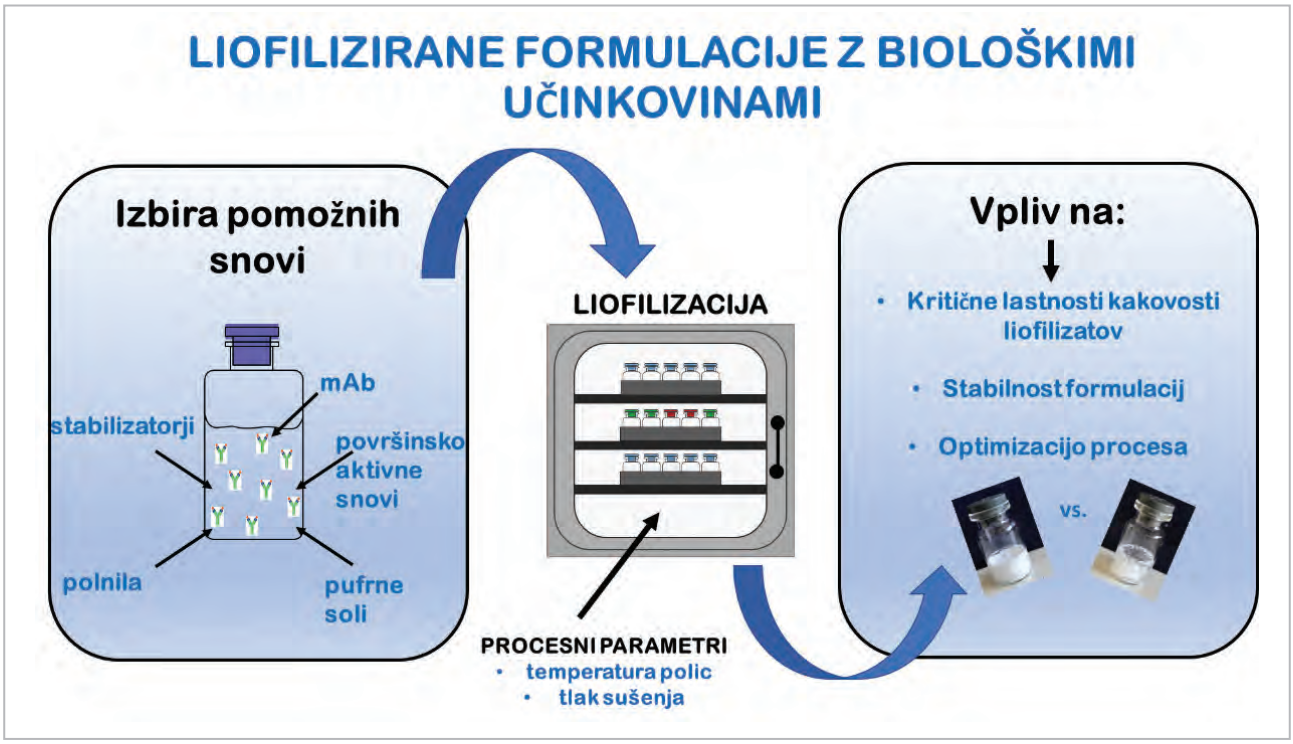
V študiji *Pretvorba SMES v trdno farmacevtsko obliko z granuliranjem v zvrtinčenih plasteh in izdelava tablet s hitrim sproščanjem zdravilne učinkovine* smo pokazali, da granuliranje v zvrtinčenih plasteh predstavlja perspektivno alternativo za pretvorbo samomikroemulgirajočih sistemov (SMES) v trdno obliko z ohranjenimi samoemulgirajočimi lastnostmi, sprejemljivo vsebnostjo učinkovine in njenim popolnim sproščanjem. Granulacija v zvrtinčenih plasteh je v literaturi dokaj neraziskana metoda solidifikacije SMES, a z velikim potencialom za industrijsko uporabo. Najboljša zrnca, ki smo jih izdelali s prilagajanjem formulacijskih in procesnih spremenljivk ter proučevanjem njihovega vpliva na lastnosti produkta, smo vmešali v optimalno zmes za tabletiranje in stisnili v tableto s hitrim sproščanjem učinkovine z ohranjenimi prednostmi SMES.



Slika 1: Ramansko mapiranje površine zrnc G21 pod 10 x povečavo (levo) in profil sproščanja kristalnega karvedilola (CARV), SMES s CARV (CARV-loaded SMEDDS), zrnc (G21 in 37) in tablet (T21 in 37) v pH 6.8 (desno)

Članek 2: BJELOŠEVIČ, M. ZVONAR POBIRK, A. PLANINŠEK, O. AHLIN GRABNAR, P. Excipients in freeze-dried biopharmaceuticals: contributions toward formulation stability and lyophilisation cycle optimisation. Int. J. Pharm. 2020, 576: 119029.

V članku *Pomožne snovi v liofiliziranih bioloških zdravilih: prispevek k stabilnosti formulacije in optimizaciji liofilizacijskega cikla* smo predstavili vrste in mehanizme delovanja pomožnih snovi, ki jih dodajamo v formulacije z biološkimi učinkovinami. Zaradi proteinske narave učinkovin so slednje večinoma formulirane v obliki raztopin za injiciranje, katerih stabilnost pogosto izboljšamo z liofilizacijo. Slednja je dolgotrajen in drag proces, zato potekajo intenzivne raziskave na področju (novih) pomožnih snovi, kot so stabilizatorji, površinsko aktivne snovi, pufrne soli in polnila, ki izboljšajo stabilnosti biološke učinkovine in sočasno znatno skrajšajo process sušenja. V našem pregledu tega področja smo izpostavili nujnost raziskav o učinkih pomožnih snovl v kombinaciji s specifičnim proteinom, saj se lastnosti slednjih pomembno razlikujejo.



Slika 2: Vpliv pomožnih snovi na proces liofilizacije in lastnosti kakovosti formulacij s proteini

THE BEST PUBLICATIONS OF THE DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY IN 2020

Publication 1: J. Mandić, V. Pirnat, M. Luštrik, I. German Ilić, F. Vrečer, M. Gašperlin, A. Zvonar Pobirk. Solidification of SMEDDS by fluid bed granulation and manufacturing of fast drug release tablets. Int. J. Pharm. 2020, 583: 119377

In the study Solidification of SMEDDS by fluid bed granulation and manufacturing of fast drug release tablets, we confirmed that fluid-bed granulation is a perspective alternative for solidification of self-microemulsifying drug delivery systems (SMEDDS), enabling preservation of self-microemulsifying properties, acceptable drug loading and complete release. Fluid-bed granulation with SMEDDS is rather unexplored in literature, yet with important potential for pharmaceutical industry. By studying formulation and process variables and their influence on product characteristics, the most promising granules were admixed into optimal tableting mixture and further compressed into fast drug release tablet with preserved SMEDDS benefits.

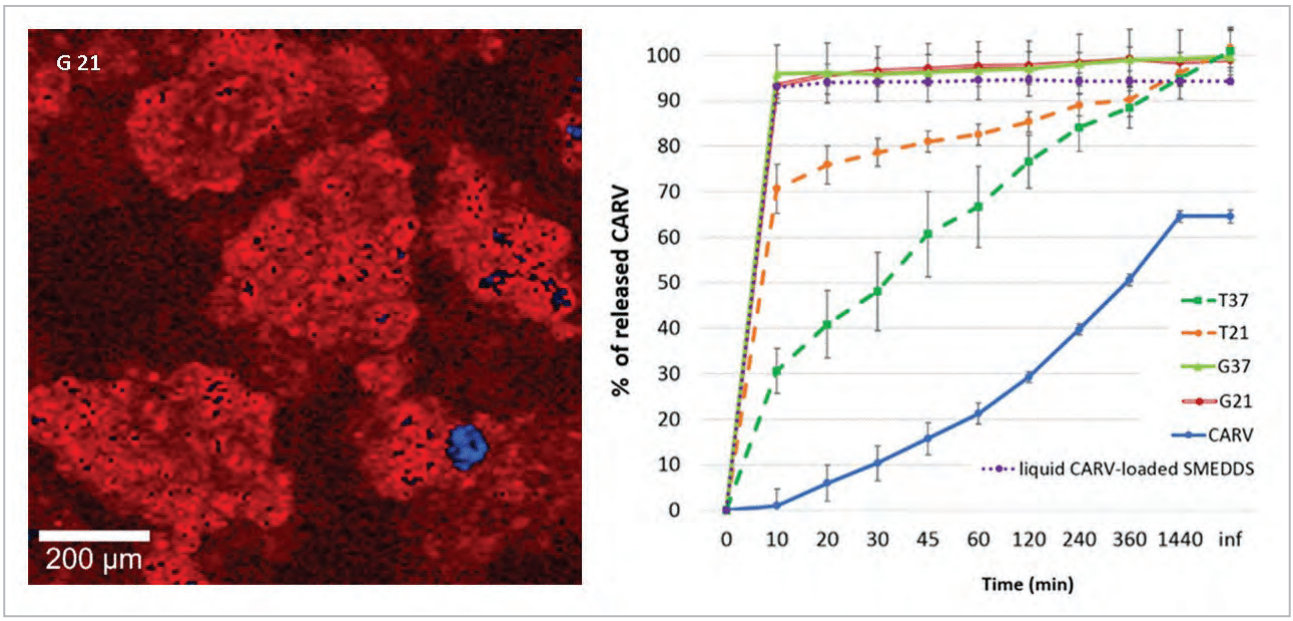


Figure 1: Raman mapping of granulate G21 under 10× magnification (left), and dissolution profile of crystalline carvedilol (CARV), CARV-loaded SMEDDS, granulates (G21 and 37), and tablets (T21 and 37) in pH 6.8 (right)

Publication 2: M. Bjelošević, A. Zvonar Pobirk, O. Planinšek, P. Ahlin Grabnar. Excipients in freeze-dried biopharmaceuticals: contributions toward formulation stability and lyophilisation cycle optimisation. Int. J. Pharm. 2020, 576: 119029

In the article we discuss the type and mechanisms of excipients, which are incorporated in protein formulations. Due to the protein nature of biological drugs, they are typically formulated as solutions for injection, which stability is usually enhanced with lyophilisation. Lyophilisation is a lengthy and expensive process, therefore intensive research in the field of novel excipients, such as stabilisers, surfactants, buffers and bulking agents is carried out. Excipients contribute significantly to the stability of protein drug and meanwhile shorten lyophilisation. In the present review of this area, we highlighted the need for in-depth research on effective excipients in combination with specific proteins, as they are substance specific.

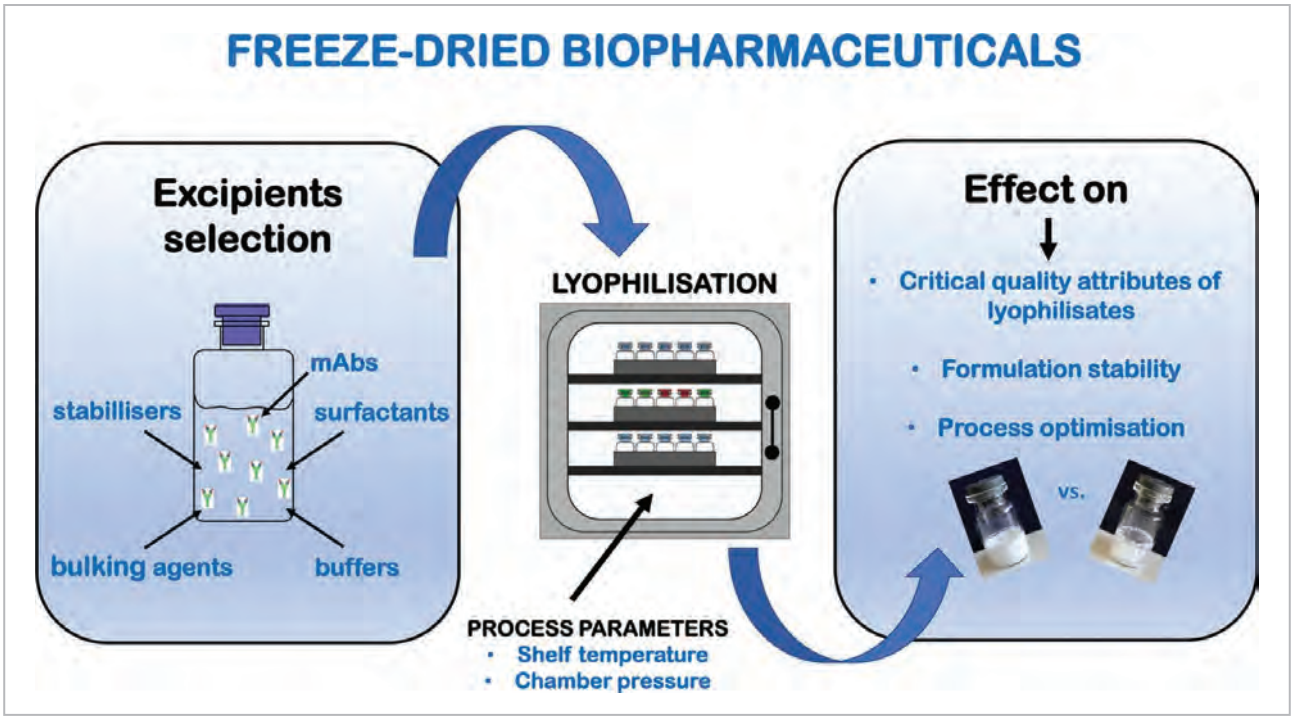


Figure 2: Effect of excipients on the lyophilisation process and quality attributes of protein formulation

KATEDRA ZA BIOFARMACIJO IN FARMAKOKINETIKO
DEPARTMENT OF BIOPHARMACEUTICS AND PHARMACOKINETICS

Predstojnik Katedre/
Head of the Department:
prof. dr. Albin Kristl

Člani Katedre v letu 2020 / Members of the Department in 2020

- prof. dr. Marija Bogataj, prof. dr. Iztok Grabnar, prof. dr. Robert Roškar
- izr. prof. dr. Mojca Kerec Kos, izr. prof. Tomaž Vovk, izr. prof. dr. Simon Žakelj
- doc. dr. Tina Trdan Lušin, doc. dr. Jurij Trontelj
- Margareta Cof, Tjaša Felicijan, Andrej Grobin, Mihaela Kolarev, Nevenka Lilik, Nika Osel, Timeja Planinšek Parfant, Katarina Rede, Žane Temova Rakuša, Armando Tratenšek, Jurij Zdovc

Slika: Katedra za biofarmacijo in farmakokinetiko / Photo: Department of Biopharmaceutics and Pharmacokinetics

Na Katedri za biofarmacijo in farmakokinetiko raziskujemo procese, ki potekajo v človeškem telesu po aplikaciji zdravila. Te procese lahko razdelimo na sproščanje zdravilne učinkovine iz farmacevtske oblike, njeno absorpcijo, porazdelitev, metabolizem in izločanje (sistem LADME).

Za vrednotenje farmakokinetike spojin razvijamo različne kromatografske metode z UV/VIS, EC, fluorescenčno in MS-MS detekcijo. V okviru predformulacijskih raziskav proučujemo njihove fizikalno-kemijske lastnosti, kot so topnost, hitrost raztapljanja, stabilnost, ionizacija, permeabilnost ter metabolične pretvorbe. Na osnovi teh parametrov in profilov sproščanja *in vitro* napovedujemo lastnosti farmacevtske oblike *in vivo*.

S tako pridobljenim znanjem razvijamo tudi farmakokinetično-farmakodinamične modele, ki omogočajo napovedovanje kliničnih učinkov zdravil ter iskanje vzrokov za njihovo variabilnost. Ti modeli omogočajo uvedbo individualnega odmerjanja zdravil glede na posameznikove genotipske in fenotipske značilnosti. Raziskave, ki so podprte z vsemi najsodobnejšimi tehnologijami, pripomorejo k učinkovitejšemu in varnejšemu zdravljenju z zdravili. Ker nas zanima tudi nadaljnja usoda zdravilnih učinkovin in njihovih metabolitov, raziskujemo njihovo pojavnost v okoljskih vzorcih odpadnih, površinskih in pitnih vod s pomočjo zelo občutljivih in selektivnih LC-MS/MS metod.

The Department of Biopharmaceutics and Pharmacokinetics studies the processes taking place in the human body after the drug application. These processes comprise the liberation of the active substance from the pharmaceutical form, drug absorption, distribution, metabolism, and excretion (the LADME system).

To evaluate the pharmacokinetics of substances, we develop various chromatographic methods using UV/VIS, EC, fluorescent and MS-MS detection. As part of preformulation studies we assess physico-chemical properties such as solubility, dissolution rate, stability, ionization, permeability, and metabolic conversion. Based on these parameters and *in vitro* release profiles, we predict the *in vivo* properties of a pharmaceutical form.

Such knowledge allows us to develop pharmacokinetic and pharmacodynamic models, which can be used to predict the clinical effects of drugs and to explain the underlying variability in the response to treatment. By studying and accounting for the effects of an individual patient's characteristics (e.g. genotype, phenotype), these models enable more personalized dosing. Studies supported by these kinds of modern technologies contribute to more effective and safer drug treatment. In addition, we further study the fate of active pharmaceutical ingredients and their metabolism by investigating their occurrence in environmental samples of waste, surface water and drinking water using highly sensitive and selective LC-MS/MS methods.

KLJUČNI DOSEŽKI V LETU 2020

Znanstvenoraziskovalno odličnost Katedre v letu 2020 kažejo številne objave člankov, med drugim tudi v uglednih revijah z visokim dejavnikom vpliva. Na področju farmakokinetike-farmakodinamike smo v sodelovanju z UKC Ljubljana in Univerzo v Leuvnu v reviji *Clinical Gastroenterology & Hepatology* (IF 8.55) poročali o možnostih napovedovanja izida zdravljenja Crohnove bolezni na podlagi zgodnjih meritev serumske koncentracije ustekinumaba, kar je pomembno za individualizacijo zdravljenja. Pri raziskavi so sodelovali asist. Jurij Zdovc, izr. prof. dr. Tomaž Vovk in prof. dr. Iztok Grabnar.

Na področju analitike smo za sočasno vrednotenje vseh najpogosteje uporabljanih vodotopnih vitaminov v izdelkih razvili inovativno stabilnostno-indikativno HPLC-DAD analizno metodo in jo predstavili v reviji Food Chemistry (IF 6,31). Avtorji raziskave so asist. Žane Temova Rakuša, asist. Andrej Grobin in prof. dr. Robert Roškar.

Prva avtorja omenjenih raziskav, asist. Žane Temova Rakuša in asist. Jurij Zdovc, sta za objavi prejela dekanovo nagrado in izsledke predstavila na Raziskovalnem dnevu FFA.

Strokovno smo med drugim sodelovali pri organizaciji pomembnih dogodkov. Največji je bilo srečanje Upravnega odbora in vseh delovnih skupin COST UNGAP projekta (Understanding Gastrointestinal Absorption-related Processes) na UL FFA. Vsebina srečanja je zaobjemala procese, ki v širokem smislu opisujejo absorpcijo iz prebavnega trakta. Sodelujoči člani: prof. dr. Marija Bogataj, prof. dr. Albin Kristl, Tjaša Felicijan, asist. Katarina Rede, asist. Jurij Zdovc, Nevenka Lilik, Greta Cof, Mihaela Kolarev.

Širše prepoznana je bila tudi dobra pedagoška praksa, saj je bil prof. dr. Robert Roškar uspešen na 11. podelitvi nagrade Mentor leta, ki jo organizira Društvo Mlada akademija. Nagrada je namenjena promociji dobrih mentorskih praks pa tudi osebnemu priznanju posameznih dobrih mentorjev. Med 78 nominacijami je bil prof. dr. Robert Roškar izbran za enega izmed petih finalistov izbora Mentor leta 2019.

KEY ACHIEVEMENTS IN 2020

Scientific excellence of the department in 2020 is reflected in many scientific articles, including publications in high impact factor (IF) journals. In the field of pharmacokinetics-pharmacodynamics, we have reported that the response of Crohn's disease patients can be predicted based on the early serum ustekinumab concentration measurement, which is important for treatment individualization. The research was done in collaboration with the UMC Ljubljana, and KU Leuven, and was published in the Clinical Gastroenterology & Hepatology (IF 8.55). The co-authors of the study are Assist. Jurij Zdovc, Assoc. Prof. Dr. Tomaž Vovk and Prof. Dr. Iztok Grabnar.

In the field of analytics, we have developed an innovative stability-indicative HPLC-DAD analytical method for the simultaneous analysis of all most used water-soluble vitamins in the preparations and presented the results in the Food Chemistry (IF 6,31). The authors of the study are Assist. Žane Temova Rakuša, Assist. Andrej Grobin and Prof. Dr. Robert Roškar.

First authors of the above publications, Assist. Žane Temova Rakuša and Assist. Jurij Zdovc, received the Dean's award and presented the results on the Research day of the Faculty of Pharmacy.

Members were professionally active in event organisation committees. The most relevant was the meeting of the Management Committee and all working groups of the COST UNGAP project (Understanding the Gastrointestinal Absorption-related Processes). The meeting comprised a broad spectrum of research related to oral absorption. Participating members: Prof. Dr. Marija Bogataj, Prof. Dr. Albin Kristl, Tjaša Felicijan, Katarina Rede, Jurij Zdovc, Nevenka Lilik, Greta Cof, Mihaela Kolarev.

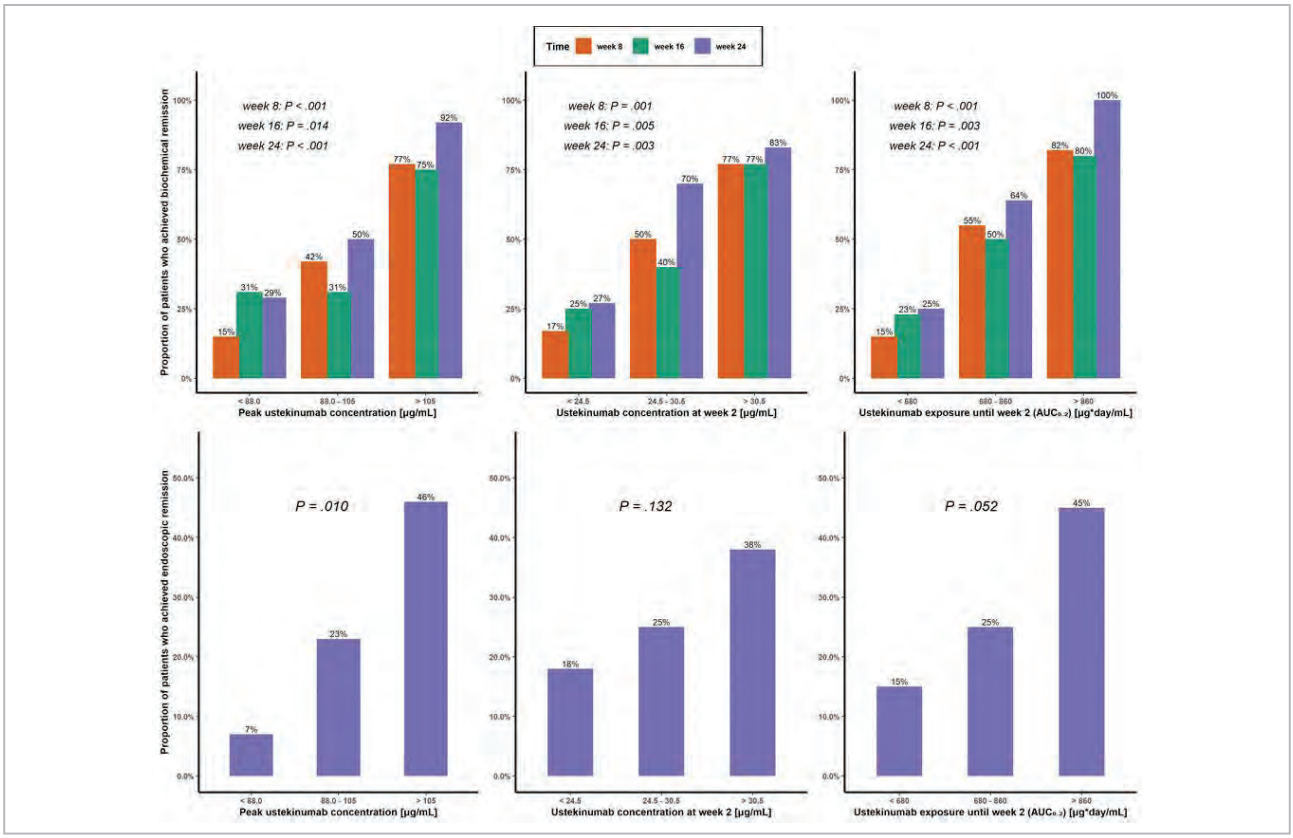
The pedagogic excellence of members was recognized as well. Prof. Dr. Robert Roškar was successful on the 11th award ceremony for the Mentor of the Year, organised by Društvo Mlada akademija (The Young Academy Association). The award is dedicated to the promotion of good mentorship practices and as well counts as a personal acclaim to good mentors. Prof. Dr. Roškar was chosen as one of the five finalists among 78 nominations of the Mentor of the year 2019.

NAJBOLJŠE PUBLIKACIJE KATEDRE ZA BIOFARMACIJO IN FARMAKOKINETIKO V LETU 2020

Članek 1: HANŽEL, Jurij, ZDOVC, Jurij, KURENT, Tina, SEVER, Nejc, JAVORNIK, Katarina, TUTA, Katja, KOŽELJ, Matic, SMREKAR, Nataša, NOVAK, Gregor, ŠTABUC, Borut, DRESSEN, Erwin, THOMAS, Debby, VOVK, Tomaž, GRABNAR, Iztok, DROBNE, David. Peak concentrations of ustekinumab after intravenous induction therapy identify patients with Crohn's disease likely to achieve endoscopic and biochemical remission. Clinical gastroenterology and hepatology. 2021, vol. 19, iss. 1, str. 111-118.

Povezava med izpostavljenostjo ustekinumabu in odzivom na zdravljenje pri Crohnovi bolezni

V sodelovanju z UKC Ljubljana in Univerzo v Leuvenu smo v reviji Clinical Gastroenterology & Hepatology (IF 8.55) poročali o možnostih napovedovanja izida zdravljenja Crohnove bolezni na podlagi zgodnjih meritev serumske koncentracije ustekinumaba, kar je pomembno za individualizacijo zdravljenja. Ustekinumab je monoklonsko protitelo proti podenoti p40 interlevkinov 12 in 23, ki se uporablja tudi za zdravljenje zmerne do hude oblike Crohnove bolezni. Približno polovica bolnikov se na zdravljenje ne odziva. Predhodne raziskave so pokazale, da je odziv na zdravljenje povezan z minimalnimi koncentracijami ustekinumaba v serumu po osmih tednih zdravljenja. V omenjeni raziskavi smo poročali o možnosti napovedi odziva na zdravljenje že z meritvijo ob koncu infuzije v indukcijski fazi zdravljenja (dve uri od začetka zdravljenja), kar omogoča zgodnje odločitve o spremembi terapije ali intenzivnejšem zdravljenju. Na ta način je zdravljenje z dragim zdravilom klinično in stroškovno bolj učinkovito.

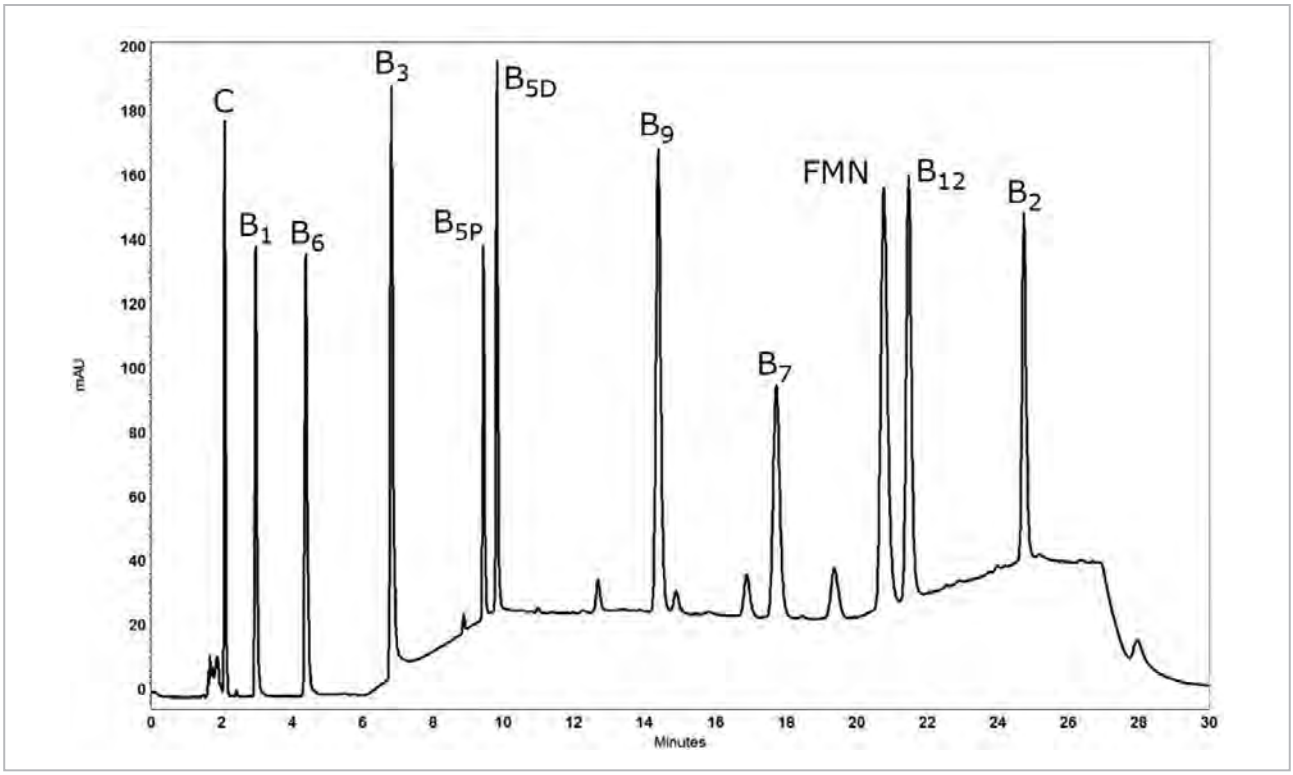


Slika 1: Analiza deleža bolnikov v remisiji glede na tercile zgodnjih koncentracij ustekinumaba

Članek 2: TEMOVA RAKUŠA, Žane, GROBIN, Andrej, ROŠKAR, Robert. A comprehensive approach for the simultaneous analysis of all main water-soluble vitamins in multivitamin preparations by a stability-indicating HPLC-DAD method. Food chemistry. [Print ed.]. 2021, vol. 337, str. 1-11.

HPLC-DAD metoda za sočasno vrednotenje vodotopnih vitaminov

Z objavljenim člankom v reviji Food Chemistry (IF 6,31) smo naredili velik napredek na področju vrednotenja vodotopnih vitaminov. V okviru predstavljene študije smo razvili stabilnostno indikativno analizno metodo HPLC-DAD za sočasno vrednotenje vseh devetih glavnih hidrofilnih vitaminov in dodatno dveh pogosto uporabljenih vitamerov. Predstavljena metoda je edinstvena in prednostna pred vsemi do sedaj objavljenimi metodami zaradi sočasnega vrednotenja vseh glavnih vodotopnih vitaminov, vključno z analitsko najbolj zahtevnimi vitamini, ki jih ostale analizne metode praviloma izključujejo. Dodatna prednost razvite analizne metode je njena primernost za sočasno vrednotenje stabilnosti vseh hidrofilnih vitaminov, kar smo potrdili z rezultati stresnih testov ter vrednotenjem čistosti kromatografskih vrhov in razmerja odzivov pri dveh valovnih dolžinah v vseh preizkušenih vzorcih. Razvito metodo smo v celoti ovrednotili v koncentracijskih območjih, ki smo jih prilagodili priporočenim dnevnim odmerkom vitaminov. Razvito metodologijo, ki vključuje tudi eno pripravo vzorca za sočasno analizo vseh vitaminov, smo uporabili za vrednotenje njihovih vsebnosti v 13 komercialnih multivitaminskih izdelkih. Določene vsebnosti vitaminov so bile v večini višje, kot so navedene na ovojnini izdelkov. Postavljena metoda je uporabna za vrednotenje stabilnosti, določanje roka uporabnosti multivitaminskih izdelkov in rutinsko analizo vseh hidrofilnih vitaminov v njihovih najpogostejših oblikah.



Slika 2: Reprezentativni kromatogram standardne raztopine enajstih vodotopnih vitaminov pri valovni dolžini 210 nm, ki prikazuje njihovo kromatografsko ločbo

THE BEST PUBLICATIONS OF THE DEPARTMENT OF BIOPHARMACEUTICS AND PHARMACOKINETICS IN 2020

Publication 1: HANŽEL, Jurij, ZDOVC, Jurij, KURENT, Tina, SEVER, Nejc, JAVORNIK, Katarina, TUTA, Katja, KOŽELJ, Matic, SMREKAR, Nataša, NOVAK, Gregor, ŠTABUC, Borut, DRESSEN, Erwin, THOMAS, Debby, VOVK, Tomaž, GRABNAR, Iztok, DROBNE, David. Peak concentrations of ustekinumab after intravenous induction therapy identify patients with Crohn's disease likely to achieve endoscopic and biochemical remission. Clinical gastroenterology and hepatology. 2021, vol. 19, iss. 1, str. 111-118

Topic: Exposure-response relationship of ustekinumab in Crohn's disease

In collaboration with the UMC Ljubljana, and KU Leuven, we have reported that the response of patients with Crohn's disease can be predicted based on the early measurement of the serum ustekinumab concentration, which is important for treatment individualization (Figure 1). The research was published in the Clinical Gastroenterology & Hepatology (IF 8.55). Ustekinumab is a monoclonal antibody which specifically binds to the p40 subunit of the interleukins 12 and 23. It is indicated in moderate to severe Crohn's disease, but approximately half of the patients do not respond or lose response to treatment. Previous studies have demonstrated the association between the trough concentration eight weeks after dosing and response. However, our study highlighted the association between the peak ustekinumab concentration as early as two hours after the induction dose, which enables early treatment optimization. This contributes to higher drug efficacy and cost-effectiveness.

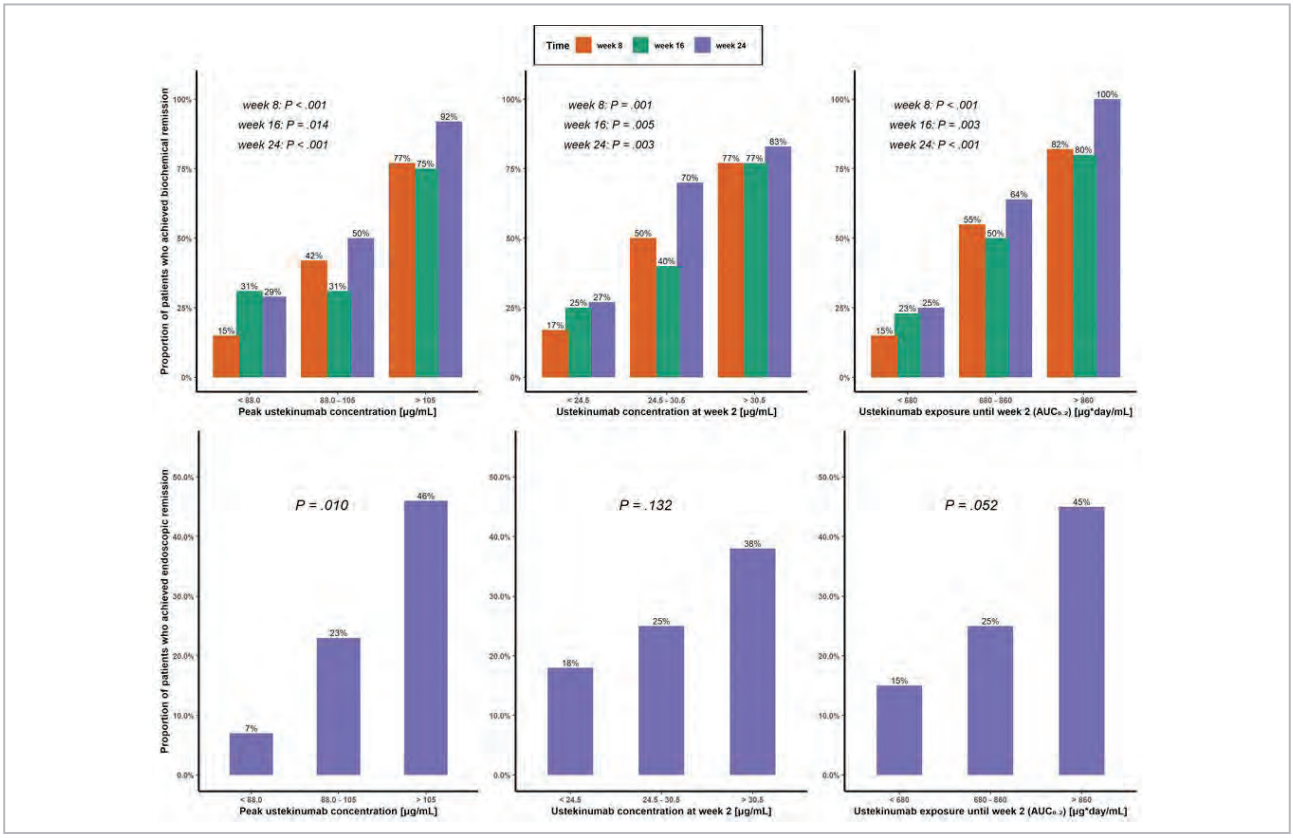


Figure 1: Analysis of the proportion of patients who achieved remission for different terciles of early ustekinumab concentration

Publication 2: TEMOVA RAKUŠA, Žane, GROBIN, Andrej, ROŠKAR, Robert. A comprehensive approach for the simultaneous analysis of all main water-soluble vitamins in multivitamin preparations by a stability-indicating HPLC-DAD method. Food chemistry. [Print ed.]. 2021, vol. 337, str. 1-11

Topic: HPLC-DAD method for simultaneous evaluation of the water-soluble vitamins

The manuscript, published in Food Chemistry (IF 6.31) represents great progress in the analytical evaluation of water-soluble vitamins. Within this study we have developed a stability-indicating HPLC-DAD method for the simultaneous determination of all nine main water-soluble vitamins, in addition to two commonly used vitamers. The presented method is unique and advantageous over the previously published methods because of the simultaneous evaluation of all major water-soluble vitamins, including the analytically most demanding vitamins, which are generally excluded by other analytical methods. An additional advantage of the developed method is its suitability for simultaneous stability evaluation of all hydrophilic vitamins, which was confirmed by the results of forced degradation studies and along with peak purity tests and response ratios at dual wavelengths in all tested samples. The developed method was fully validated in analytical ranges, adjusted to their recommended dietary allowance values. The complete developed methodology, including single sample preparation for the vitamins simultaneous analysis, was applied to their assay in 13 commercial multivitamin preparations, revealing mostly higher amounts than the label claims. The developed method is applicable for stability testing, multivitamin products shelf-life determination as well as routine assay analysis of all water-soluble vitamins in their most common forms.

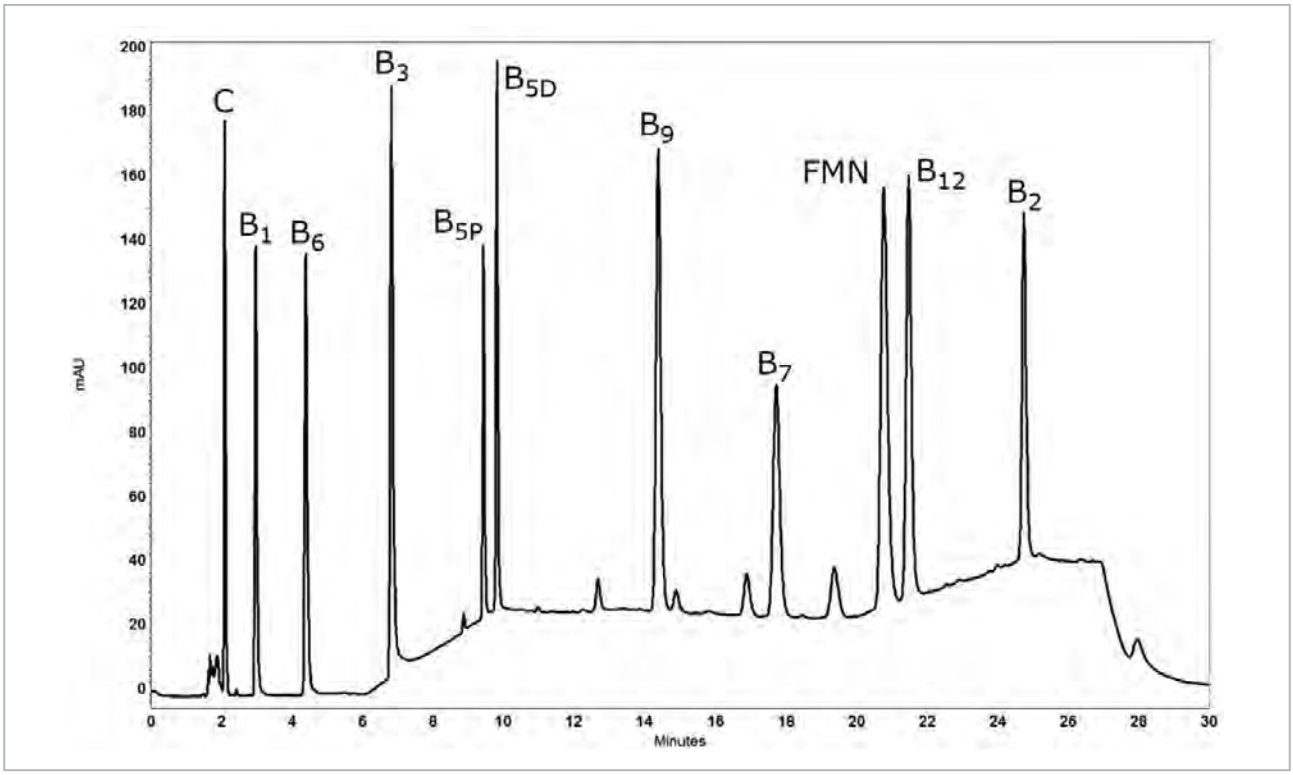


Figure 2: Chromatogram of a standard mixture of eleven water-soluble vitamins at 210 nm, representing their chromatographic separation

KATEDRA ZA SOCIALNO FARMACIJO
DEPARTMENT OF SOCIAL PHARMACY

Predstojnik Katedre /
Head of the Department:
prof. dr. Mitja Kos

Člani Katedre v letu 2020 / Members of the Department in 2020

- izr. prof. dr. Igor Locatelli
- doc. dr. Nejc Horvat, doc. dr. Lea Knez
- dr. Andreja Čufar, dr. Ana Kodrič, dr. Urška Nabergoj Makovec, dr. Nanča Čebron Lipovec, Marija Babnik Gatej, Janja Jazbar, Žana Voh, Špela Žerovnik

Slika: Katedra za socialno farmacijo / Photo: Department of Social Pharmacy

Na Katedri za socialno farmacijo proučujemo vpliv zdravil na sodobnega človeka in družbo v mednarodnem in domačem okolju. Ukvarjamo se z nadzorom zdravil po prihodu na trg oziroma v roke bolnika. Pri svojem delu prepletamo naravoslovne in družboslovne metode raziskovanja. V okviru farmakoepidemiologije spremljamo varnost in učinkovitost zdravil na ravni populacije, s farmakoekonomiko pa osvetlimo stroškovne vidike uporabe zdravil v relaciji do njihovih koristi. Zanima nas vrednotenje storitev farmacevta v lekarni, pri čemer posvečamo posebno pozornost raziskovanju vidika pacienta. S pomočjo rezultatov raziskav pripomoremo h gradnji farmacevtskih storitev. Raziskujemo tudi delovanje zdravstvenega sistema in vlogo pacienta v njem. V tem okviru gradimo in proučujemo storitve, ki jih prinaša sodoben način pristopa k pacientu v obliki eZdravja in mZdravja. Raziskujemo tudi značilnosti domače in mednarodne regulative, ki ureja področje zdravil in farmacevtske stroke. Pri tem tvorno prispevamo k nastajanju nove zakonodaje in uvajanju najvišjih standardov v vsakodnevno prakso.

The Department of Social Pharmacy studies the effects of medicines on a modern individual and society in the international and domestic setting. We mainly explore medicines after their arrival on the market - in other words, into the hands of the patients. We combine natural and social sciences research methods. With pharmacoepidemiology approaches we monitor the medicines' safety and effectiveness at the population level, while in pharmacoeconomics we address the cost aspect of the medicines' use in relation to their benefits. We are interested in the evaluation of pharmacy services with special attention to the patient's perspective. We also explore the operation of healthcare system and the patient's role in it. In this context we build and study the services provided by modern approach to the patient in the form of eHealth and mHealth. We also explore the properties of domestic and foreign regulations that cover the area of medicines and pharmaceutical profession. By doing so, we actively contribute to creating new legislation and implementation of the highest standards into everyday practice.

KLJUČNI DOSEŽKI V LETU 2020

Področje farmacevtskih kognitivnih storitev je bilo obravnavano v okviru več raziskav. Izpostavili bi objave obsega in značilnosti kognitivnih storitev v lekarniški dejavnosti v Evropi, ki so nastale v okviru mednarodnega projekta PRACTISE, skupaj s kolegi iz Švice in Portugalske (asist. dr. Urška Nabergoj Makovec, doc. dr. Nejc Horvat, prof. dr. Mitja Kos).

Področje farmacevtskih kognitivnih storitev je bilo obravnavano tudi v dveh doktorskih nalogah sodelavk Katedre. Ana Kodrič je doktorirala na temo sodelovanja pri zdravljenju z zdravili in Urška Nabergoj Makovec na temo koristi in implementacije storitev, osnovanih na pregledu zdravil. Obe sta za predstavitvi svojih raziskav prejeli nagrado za najboljši poster PCNE (Pharmaceutical Care Network Europe).

Zaključili smo mednarodni raziskavi na temo varnosti uporabe peroralnih zdravil z retinoidi in valproatom v času nosečnosti. Projekt poteka pod okriljem Evropske agencije za zdravila EMA (asist. dr. Nanča Čebron Lipovec, izr. prof. dr. Igor Locatelli, prof. dr. Mitja Kos).

Začeli smo tudi z novim mednarodnim projektom MINERVA na temo povezovanja zbirk zdravstvenih podatkov različnih držav z namenom spremljanja varnosti in učinkovitosti zdravil v klinični praksi (prof. dr. Mitja Kos, izr. prof. dr. Igor Locatelli, asist. Špela Žerovnik, asist. Janja Jazbar).

Z drugimi raziskovalnimi skupinami se povezujemo na temo sodelovanja pri zdravljenju z zdravili v okviru mednarodnega projekta COST Action ENABLE (asist. dr. Urška Nabergoj Makovec, asist. dr. Ana Kodrič, asist. Janja Jazbar, doc. dr. Lea Knez, prof. dr. Mitja Kos).

Na Katedri smo kredibilen partner naročnikom v več aplikativnih projektih s področja farmakoepidemiologije, farmakoenomike ter načrtovanja in vrednotenja kliničnih preskušanj.

Člani katedre smo bili med epidemijo COVID-19 proaktivni člen UL FFA pri zagotavljanju podpore pri prehodu v virtualno okolje, informiranju javnosti o možnostih zdravljenja z zdravili oz. cepljenju ter zagotavljanju varnega delovnega okolja.

Prof. dr. Mitja Kos in doc. dr. Nejc Horvat sta zaključila 6-letni mandat v izvršnem odboru evropske mreže raziskovalcev s področja farmacevtske skrbi, PCNE. V okviru mandata sta dve leti delovala kot predsednik in tajnik PCNE, vodila organizacijo vsakoletnih konferenc in delavnic, med drugim tudi zelo uspešno 10. delovno konferenco na Bledu, ki je bila organizirana s pomočjo vseh sodelavcev Katedre.

KEY ACHIEVEMENTS IN 2020

The field of pharmaceutical cognitive services has been addressed in several studies. We would like to highlight the publications on the scope and characteristics of cognitive pharmacy services in Europe, which resulted from the international project PRACTISE together with colleagues from Switzerland and Portugal (Assist. Dr. Urška Nabergoj Makovec, Assist. Prof. Dr. Nejc Horvat, Prof. Dr. Mitja Kos).

The field of pharmaceutical cognitive services was also addressed in two doctoral theses of the department's members. Ana Kodrič finished her PhD on medication adherence and Urška Nabergoj Makovec on the topic of benefits and implementation of medication review services. Both received the PCNE Best Poster Award for presenting their PhD research.

We have completed an international study on the safety of oral medicines with retinoids and valproate during pregnancy. The project is implemented on behalf of the European Medicines Agency EMA (Assist. Dr. Nanča Čebron Lipovec, Assoc. Prof. Dr. Igor Locatelli, Prof. Dr. Mitja Kos).

We have also started a new international MINERVA project on the topic of linking health databases from different countries for the purpose of monitoring the safety and effectiveness of medicines in clinical practice (Prof. Dr. Mitja Kos, Assoc. Prof. Dr. Igor Locatelli, Assist. Špela Žerovnik, Assist. Janja Jazbar).

We are networking with other research groups on the topic of medication adherence through the international COST Action ENABLE (Assist. Dr. Urška Nabergoj Makovec, Assist. Dr. Ana Kodrič, Assist. Janja Jazbar, Assist. Prof. Dr. Lea Knez, Prof. Dr. Mitja Kos).

Our department is a credible partner to clients in several applied projects in the area of pharmacoepidemiology, pharmacogenomics, and design and evaluation of clinical trials.

During the COVID-19 epidemic, the members of the department were proactive associates of the UL FFA by providing support in the transition to a virtual environment, informing the public about the possibilities of treatment with medicines or vaccination and ensuring a safe working environment.

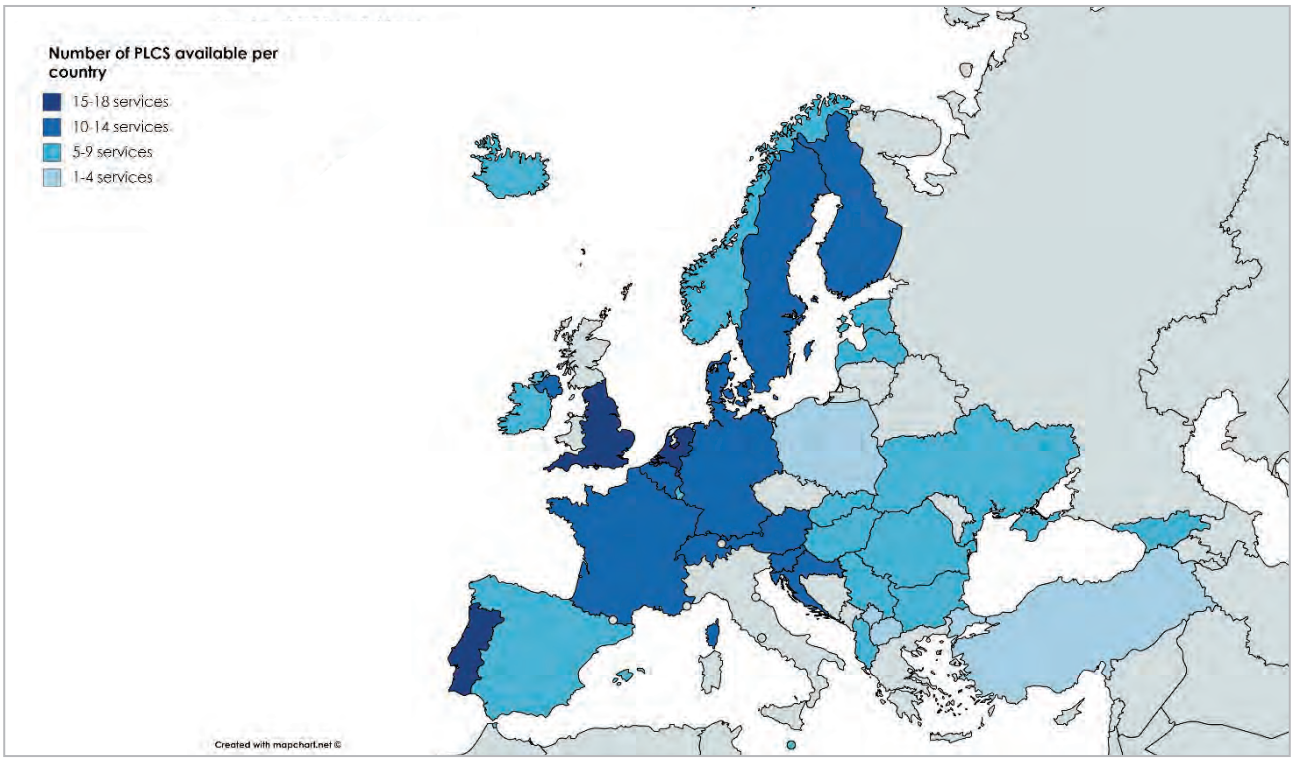
Prof. Dr. Mitja Kos and Assist. Prof. Dr. Nejc Horvat have completed their 6-year term in the board of the Pharmaceutical Care Network Europe, PCNE. As board members they also served as president and secretary of PCNE for two years, leading the organisation of annual conferences and workshops, including the very successful 10th Working Conference in Bled, which was organised with the help of all the department's members.

NAJBOLJŠE PUBLIKACIJE KATEDRE ZA SOCIALNO FARMACIJO V LETU 2020

Članek 1: IMFELD-ISENEGGER, Tamara Leila, SOARES, Inês Branco, NABERGOJ MAKOVEC, Urška, HORVAT, Nejc, KOS, Mitja, VAN MIL, Foppe, DA COSTA, Filipa Alves, HERSBERGER, Kurt E. Farmacevtske kognitivne storitve osnovane na pregledu zdravil v zunanjih lekarnah v Evropi: lastnosti, implementacija in remuneracija. ***Research in social & administrative pharmacy.*** **2020, vol. 16, iss. 8.**

Rezultate mednarodne presečne raziskave PRACTISE smo objavili v dveh originalnih znanstvenih člankih. Pripravili smo spletni vprašalnik in tako opredelili dostop, raven implementacije in načine financiranja (remuneracija) farmacevtskih kognitivnih storitev v Evropi s poudarkom na storitvah, osnovanih na pregledu zdravil (storitve MR) na primarnem nivoju zdravstvene dejavnosti. V večini sodelujočih držav (n = 34) najdemo osnovne storitve, kot so podajanje informacij o zdravilih (94,1 % sodelujočih držav), generična zamenjava (85,3 %), zagotavljanje nujne peroralne kontracepcije (70,6 %) in t. i. laboratorijskih testov ob pacientu (ang. point-of-care testing; 67,7 %). Nivo implementacije storitev sicer močno variira, polovica držav pa je poročala, da je najpogostejši model financiranja plačilo za storitev (ang. fee-for-service).

Med naprednimi storitvami se v 55,9 % državah izvaja vsaj ena storitev MR, v sedmih državah imajo le-te tudi visoko raven implementacije. V zunanjih lekarnah se najpogosteje izvajata tip 1 (n = 13) in tip 2a (n = 14), tip 3 pa se izvaja v šestih državah, med njimi v dveh v okviru zdravstvenih domov, saj storitev zahteva dostop do celotne medicinske dokumentacije pacienta. Večina storitev MR tipa 2 in 3 ima sicer postavljene vključitvene kriterije, vendar so ti precej ohlapni (npr. starejši od 65 let). Pri vseh tipih storitev so končne klinične odločitve v rokah zdravnikov.

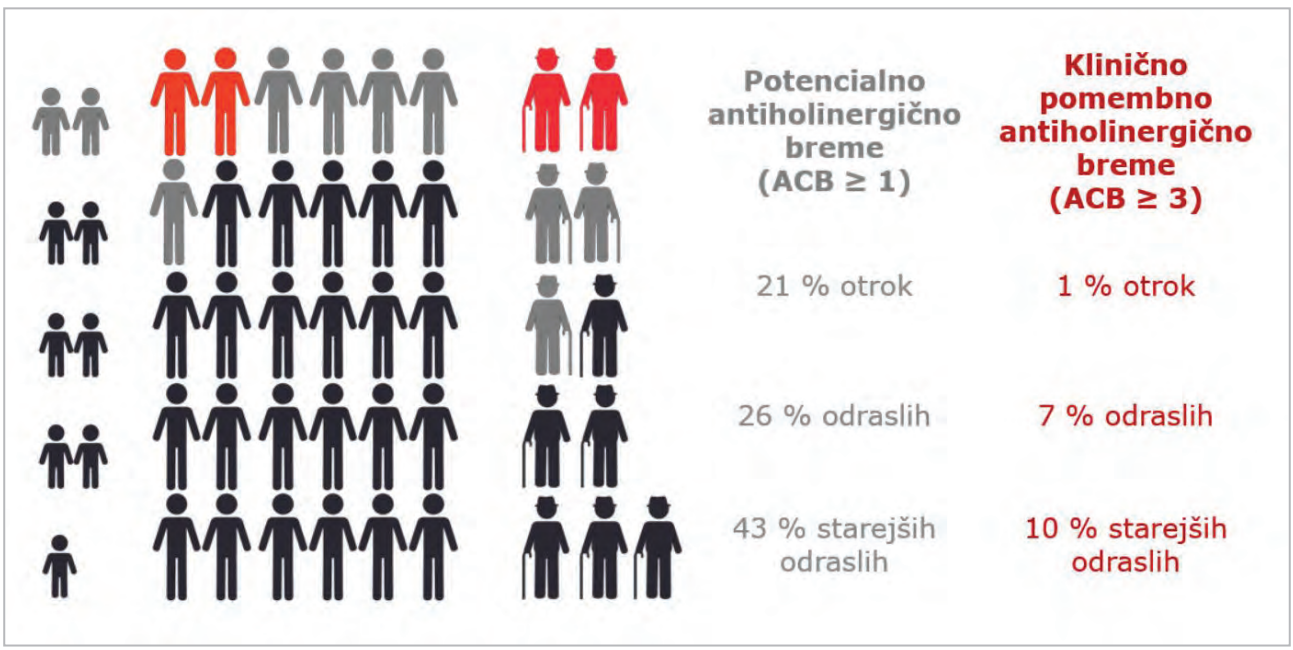


Slika 1: Število farmacevtskih kognitivnih storitev, ki so dostopne v posamezni državi

Članek 2: ČEBRON LIPOVEC, Nanča, JAZBAR, Janja, KOS, Mitja. Antiholinergično breme pri otrocih, odraslih in starejših odraslih: raziskava na celotni populaciji Slovenije. Nature Publishing Group; Scientific reports. 2020, vol. 10, iss. 1.

Zdravila z antiholinergično aktivnostjo so v raziskavah povezana z večjo verjetnostjo za kognitiven upad, demenco, padce in umrljivost. Raziskave antiholinergičnega bremena običajno vključujejo specifične populacije pacientov, prevalenca in značilnosti antiholinergičnega bremena v splošni populaciji pacientov pa so slabo raziskane. Namen naše raziskave na bazi podatkov je bil ovrednotiti predpisovanje zdravil z antiholinergično aktivnostjo na celotni populaciji Slovenije. Raziskava je temeljila na anonimizirani evidenci vseh ambulantno izdanih zdravil na recept v Sloveniji v letu 2018, ki smo jo pridobili od ZZZS. Antiholinergično breme smo ovrednotili s pomočjo lestvice *Anticholinergic Cognitive Burden scale.*

Zdravila z antiholinergično aktivnostjo so bila predpisana 29,8 % osebam v raziskavi; 7,6 % oseb je bilo izpostavljenih klinično pomembnemu antiholinergičnemu bremenu. Delež bolnikov z antiholinergičnim bremenom je bil največji med starejšimi odraslimi (43,2 %), sledijo odrasli (25,8 %) in otroci (20,7 %). Najpogosteje predpisane učinkovine z največjo antiholinergično aktivnostjo so bili antipsihotiki in zdravila za zdravljenje sečil, med učinkovinami s srednjo antiholinergično aktivnostjo pa predvsem antiepileptiki. Antiholinergično breme je torej najvišje med starejšimi odraslimi, vendar ni zanemarljivo niti med odraslimi in otroki, zato so potrebne nadaljnje raziskave o varnosti uporabe zdravil z antiholinergično aktivnostjo v vseh starostnih skupinah.



Slika 2: Antiholinergično breme glede na starostne skupine. (ACB: kumulativno antiholinergično breme pri posamezniku)

THE BEST PUBLICATIONS OF THE DEPARTMENT OF SOCIAL PHARMACY IN 2020

Publication 1: IMFELD-ISENEGGER, Tamara Leila, SOARES, Inês Branco, NABERGOJ MAKOVEC, Urška, HORVAT, Nejc, KOS, Mitja, VAN MIL, Foppe, DA COSTA, Filipa Alves, HERSBERGER, Kurt E. Community pharmacist-led medication review procedures across Europe: characterization, implementation and remuneration. Research in social & administrative pharmacy. 2020, vol. 16, iss. 8

Two original scientific papers were published as a result of the international cross-sectional study PRACTISE. An online survey was developed to characterize medication review (MR) procedures, level of implementation and third party remuneration in community pharmacies across Europe. Most of the countries participating in the study (n=34) reported implementation of basic pharmacy services such as provision of medicines' information (94.1 % of all countries), generic substitution (85.3 %), provision of emergency oral contraception (70.6 %), and point-of-care testing (67.7 %). Half of the participating countries mentioned remuneration models based predominantly on fee-for-service.

Overall, 55.9 % of countries provided at least one type of MR as an implemented service or project, with high implementation rate in seven countries. The most common types of MR in community pharmacies were type 1 (n=13 countries) and type 2a (n=14), while type 3 MR was available in six countries, two of which performed type 3 MR in healthcare centres, as this service requires patient's full medical documentation. Most countries reported the use of eligibility criteria for patient selection for Type 2 and 3 MR, however these criteria were usually broad (e.g. ≥ 65 years). For all types of services, it was reported that the general practitioner was responsible for final clinical decision-making.

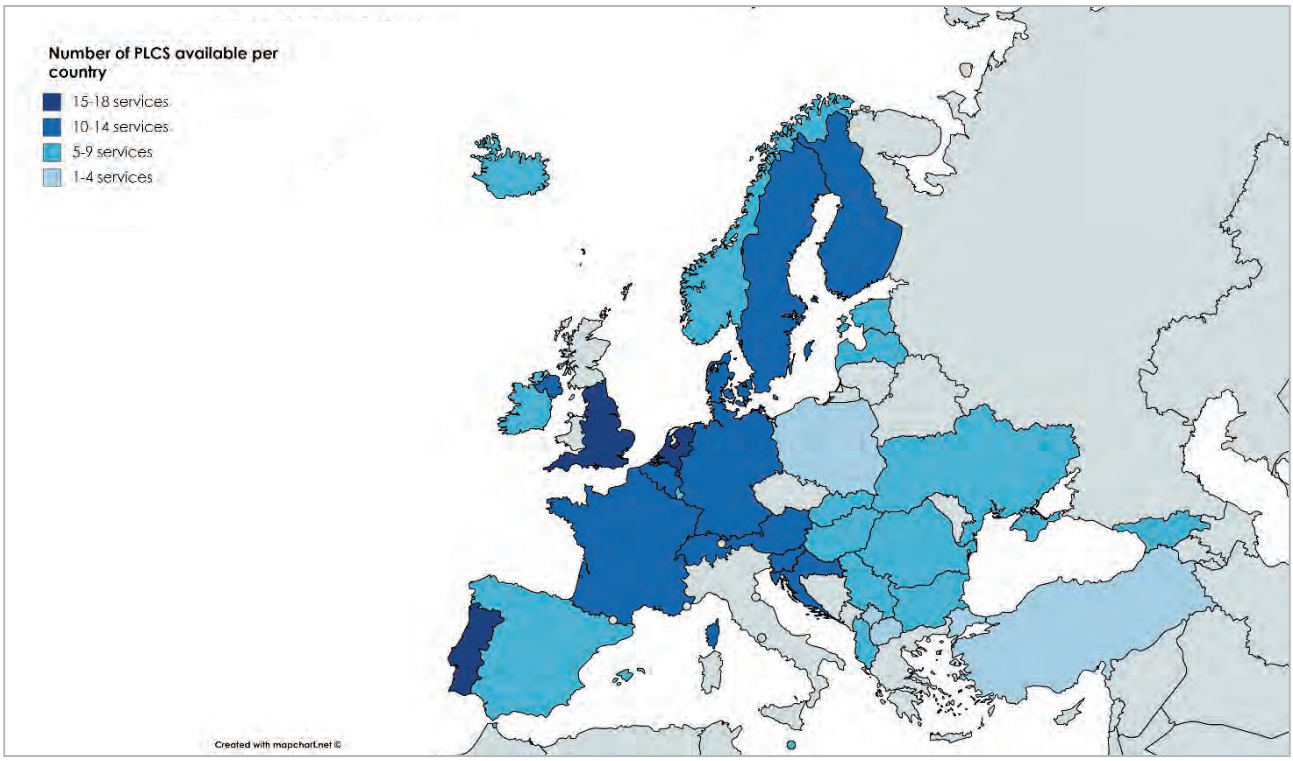


Figure 1: Number of pharmacist-led cognitive services (PLCS) available per country.

Publication 2: ČEBRON LIPOVEC, Nanča, JAZBAR, Janja, KOS, Mitja. Anticholinergic burden in children, adults and older adults in Slovenia: a nationwide database study. Nature Publishing Group; Scientific reports. 2020, vol. 10, iss. 1.

Medicines with anticholinergic activity have been associated with cognitive decline, dementia, falls and mortality. Anticholinergic burden has been widely studied in specific patient populations with specific conditions. However, the prevalence in the general population is poorly understood. This retrospective cross-sectional study was a nationwide database analysis of outpatient prescriptions of anticholinergic medications. The study was based on Slovenian health claims data of all outpatient prescriptions in 2018, obtained from Health Insurance Institute of Slovenia. Anticholinergic burden was evaluated using the Anticholinergic Cognitive Burden scale.

Anticholinergic medications were prescribed to 29.8 % of the participants; 7.6 % were exposed to a clinically significant anticholinergic burden. The proportion of patients exposed to anticholinergic burden was highest in older adults (43.2 %), followed by adults (25.8 %) and children (20.7 %). The most frequently prescribed medications with the highest anticholinergic activity were antipsychotics and medications for urinary diseases. Medicines with second highest activity were mostly antiepileptics. Anticholinergic burden is highest in older adults but is also considerable among adults and children. Further research is needed on safe use of these medications in all age groups.

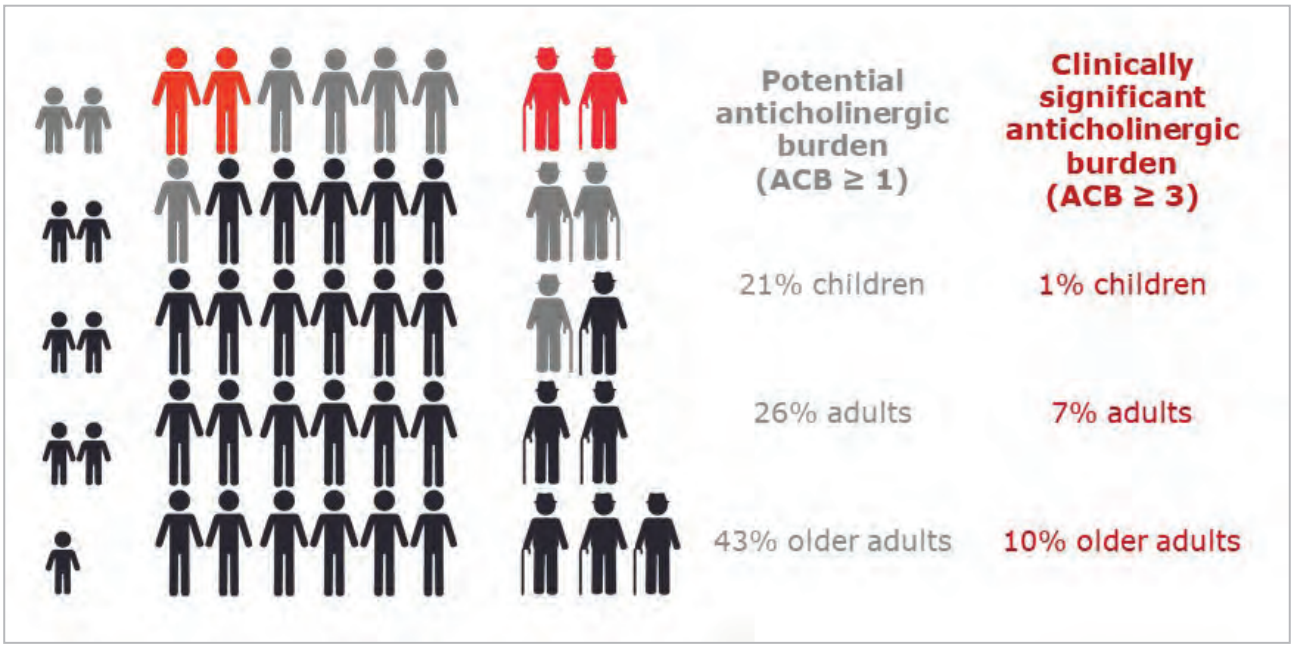


Figure 2: Anticholinergic burden according to different age groups. (ACB: individual's cumulative anticholinergic burden)

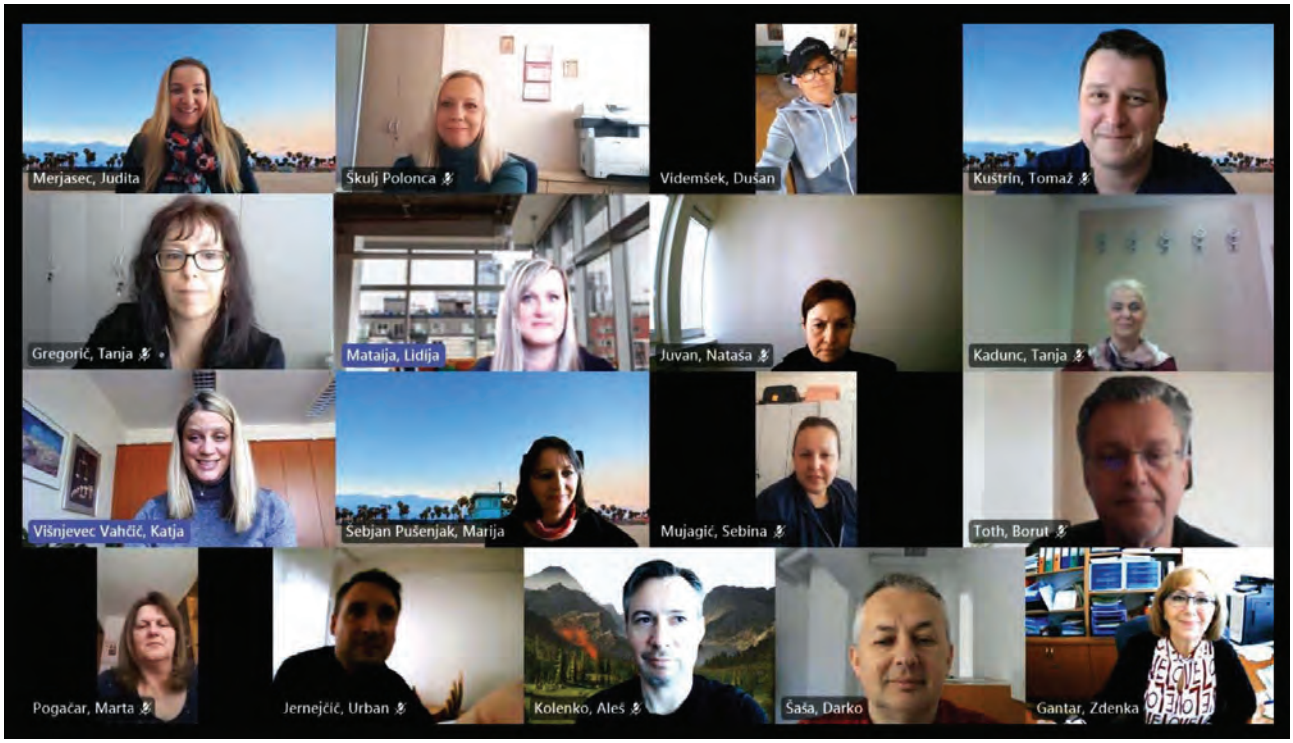
TAJNIŠTVO UL FFA
FACULTY SECRETARIAT UNIT

Tajnik fakultete /
Faculty Secretary
Katja Višnjevec Vahčič, univ. dipl. prav.

Člani Tajništva v letu 2020 / Members of the Faculty Secretariat unit in 2020

Strokovni sodelavci / Professional collaborators:

- Zdenka Gantar, Tanja Gregorič, Urban Jernejčič, Nataša Juvan, Tanja Kadunc, Aleš Kolenko, Tomaž Kuštrin, Lidija Mataija, Judita Merjasec, Sebina Mujagić, Nina Pesko, Marta Pogačar, Milenka Sojer, Darko Šaša, Marija Šebjan Pušenjak, Polonca Škulj, Darja Šviga, Mateja Terčič, Boris Terobšič, Borut Toth, Dušan Videmšek, Bernarda Žagar



Slika: Organizacijska enota Tajništvo / Photo: Faculty Secretariat unit

Tajništvo UL FFA je samostojna organizacijska enota, ki nudi kakovostno upravno administrativno podporo pri izvajanju pedagoške in znanstvenoraziskovalne dejavnosti, delavci v službi za tehnično vzdrževanje in recepcijo pa zagotavljajo varno, čisto in zdravo delovno okolje.

Tajništvo fakultete opravlja upravno administrativne in finančno gospodarske naloge v zvezi z izvajanjem tržne dejavnosti fakultete.

Del tajništva je tudi učitelj športne vzgoje, ki s svojim delom spodbuja študente - in nemalokrat tudi zaposlene - k zdravemu življenjskemu slogu.

Tajništvo sestavljajo podenote: tajništvo vodstva, kadrovska služba, raziskovalni referat, študentski referat, finančno računovodska služba, služba za informatiko, tehnično-vzdrževalna služba, knjižnica.

Tajništvo je v prehojenih 60 letih delovanja soprispevalo k rasti naše fakultete in ponosno podpira njen razvoj tudi v prihodnje.

The faculty secretariat unit is an independent organisational unit that provides quality administrative support for performing professional and scientific research activities. Employees in the technical maintenance and reception service, on the other hand, ensure a safe, clean and healthy working environment.

The secretariat unit also performs administrative and financial-economic tasks related to carrying out the faculty's marketing activities.

The physical education teacher is also a member of this organisational unit who encourages students - and often employees – to follow a healthy lifestyle.

The subunits of the secretariat unit: the secretary services, human personnel department, research department, student department, financial accounting services, IT department, technical-maintenance services, library.

In the past 60 years of operation, the faculty secretariat unit has contributed to the growth of our faculty and proudly supports its development in the future as well.

KLJUČNI DOSEŽKI V LETU 2020

Ga. Zdenka Gantar je v okviru Tedna Univerze prejela priznanje UL za izjemne rezultate pri delu. Ga. Gantar je vodja kadrovske službe in je na UL FFA zaposlena že več kot 30 let, kar si štejemo v posebno čast.

V začetku maja 2020 sta se na UL FFA organizirali dve skupini: sprejemna in nabavna služba. Za delo sodelavk omenjenih skupin, ki so in še vedno v teh težkih časih vestno in profesionalno opravljajo svoje delo, jim je Fakulteta podelila priznanje za izjemne rezultate pri delu. Ponosni smo, da je med njimi tudi naša sodelavka ga. Marta Pogačar, ki dela v recepciji fakultete že deset let.

Ponosni smo na vse sodelavce OE Tajništvo, ki so v letu, zaznamovanem z epidemijo, delali nadpovrečno ter se hitro in uspešno prilagajali novim razmeram, za kar se jim ob tej priložnosti zahvaljujemo.

KEY ACHIEVEMENTS IN 2020

Mrs. Zdenka Gantar received the UL Award for outstanding results at work as part of the University Week. Mrs. Gantar is the head of the human resources department and has been employed at UL FFA for more than 30 years, which we consider a special honour.

At the beginning of May 2020, two groups were organised at UL FFA: reception and purchasing service. For the work of the colleagues of the mentioned groups, who are and still are diligently and professionally performing their work in these difficult times, the Faculty awarded them recognition for exceptional work results. We are proud that among them is also Mrs. Pogačar, who has been working at the faculty reception for ten years.

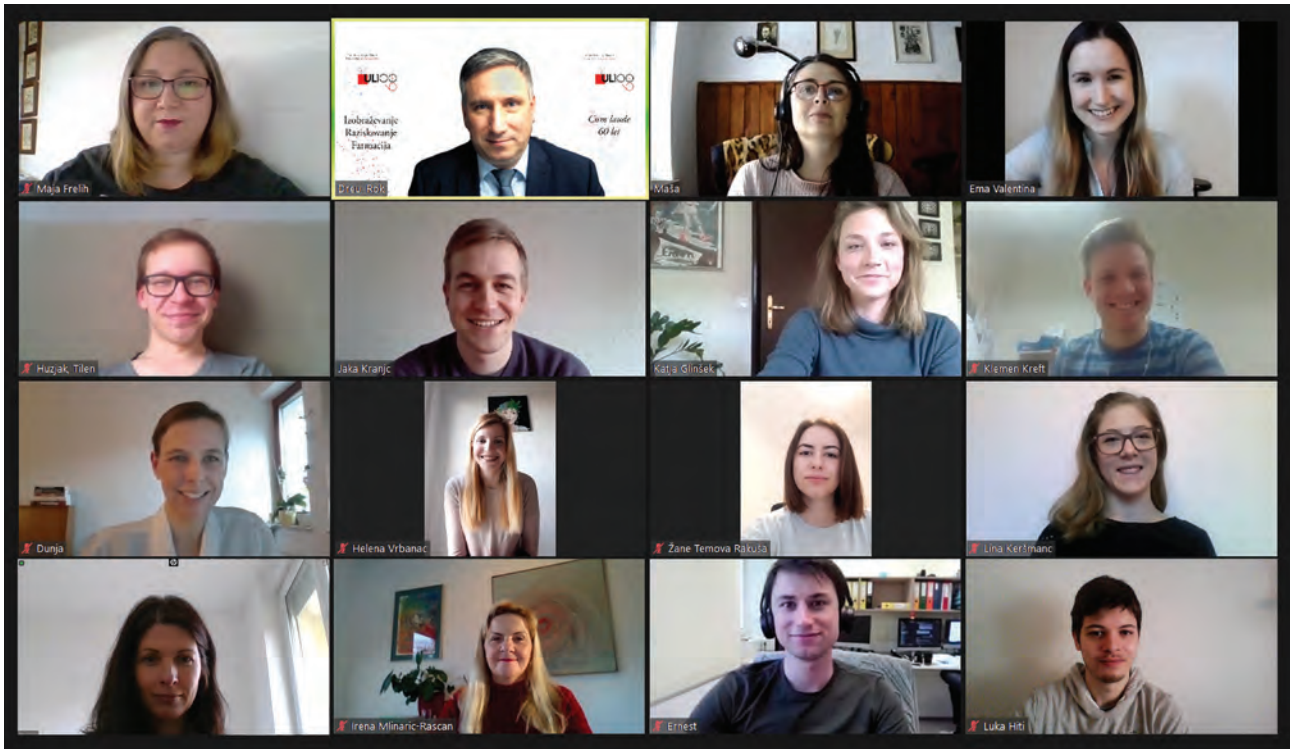
We are proud of all the employees of the Secretariat unit who worked above average and quickly and successfully adapting to the new situation during the year marked by the epidemic, for which we would like to take this opportunity to thank them.

INŠTITUT ZA FARMACIJO
INSTITUTE OF PHARMACY

Predstojnik Inštituta /
Head of Institute
izr. prof. dr. Rok Dreu

Člani Inštituta v letu 2020 / Members of Institute in 2020

- prof. dr. Irena Mlinarič-Raščan, prof. dr. Anamarija Zega
- dr. Tanja Gmeiner, dr. Maša Kandušer, dr. Dunja Urbančič, Ema Valentina Brovč, Maja Frelih, Katja Glinšek, Tilen Huzjak, Rebeka Jereb, Lina Keršmanc, Jaka Kranjc, Klemen Kreft, Lidija Kovač, Blaž Lebar, Ana Mihelčič, Ernest Šprager, Maša Vidmar Golja, Helena Vrbanac, Nina Žigart



Slika: Inštitut za farmacijo / Photo: Institute of Pharmacy

Na Fakulteti za farmacijo že od leta 2002 deluje organizacijska enota Inštitut za farmacijo, kjer izvajamo znanstveno-raziskovalne, razvojno-aplikativne in strokovne projekte ter mednarodne aktivnosti, ki presegajo aktivnosti posameznih kateder. Inštitut povezuje raziskovalce in tehnične sodelavce različnih kateder ter hkrati sodeluje s svojimi zaposlenimi sodelavci.

V okviru Inštituta delujeta dva infrastrukturna centra:

- Infrastrukturni center za analizo zdravil, ki deluje v sklopu Mreže raziskovalnih infrastrukturnih centrov Univerze v Ljubljani (MRIC UL), je namenjen podpori raziskovalnega in pedagoškega dela na področju farmacije.
- EATRIS – mednarodni infrastrukturni projekti (ESFRI), ki deluje v okviru nacionalnega vozlišča EATRIS Slovenija, katerega koordinatorja sta prof. dr. Irena Mlinarič-Raščan in izr. prof. dr. Žiga Jakopin.
- V letu 2020 so potekale aktivnosti v okviru operacije »Razvoj raziskovalne infrastrukture za mednarodno konkurenčnost slovenskega RRI prostora – RI-SI-EATRIS-TRI.si«. V konzorcijskem partnerstvu, kjer poleg UL FFA sodelujejo še Univerza v Mariboru, Medicinska fakulteta (UM MF) ter Kemijski inštitut (KI), smo v letu 2020 izvedli nakup več kosov raziskovalne opreme:
- integriran sistem konfokalnega Ramanskega mikroskopa in mikroskopa na atomsko silo XploRA PLUS-OmegaScope,
- zamrzovalnik za ultra nizke temperature/PHCbi,
- sistem za shranjevanje bioloških vzorcev v tekočem dušiku – posoda dewar ARPEGE 140,
- sekvenator naslednje generacije (NGS),
- fazna plošča za krio-elektronski mikroskop,
- masni spektrometer visoke resolucije (HRMS) sklopljen z nano HPLC kromatografom (nHPLC – HRMS).

The organisational unit Institute of Pharmacy has been operating at the Faculty of Pharmacy since 2002 and has been conducting scientific research projects, development, applied and professional projects, as well as international activities that go beyond the activities of individual Chairs. The institute connects researchers and technical associates from various Chairs and contributes with its own staff.

There are two infrastructure centres positioned within the Institute:

- The Infrastructure Centre for Analysis of Medicinal Products is a member of the University of Ljubljana Research Infrastructure Centres Network (MRIC UL) and is intended to support research and teaching activities in the field of pharmacy.
- EATRIS-International Infrastructure Projects (ESFRI), which operates within the national node EATRIS Slovenia and is coordinated by Prof. Dr. Irena Mlinarič-Raščan and Assoc. Prof. Dr. Žiga Jakopin.
- In 2020 the activities took place within the operation "Development of Research Infrastructure for the International Competitiveness of the Slovenian RRI Area - RI-SI-EATRIS-TRI.si". Within the consortium, which apart from the UL FFA involves also the University of Maribor, the Faculty of Medicine (UM MF) and National Chemical Institute (KI), several pieces of research equipment were purchased:
- Integrated system consisting of confocal Raman microscope and atomic force microscope XploRA PLUS-OmegaScope,
- Ultra-low temperature deep freezing storage cabinet/PHCbi,
- Cryogenic storage of biological samples - dewar vessel ARPEGE 140,
- Next generation sequencer (NGS),
- Phase plate for Cryo-EM,
- High resolution mass spectrometer (HRMS) coupled with nano HPLC chromatograph (nHPLC - HRMS).

KLJUČNI DOSEŽKI V LETU 2020

UL FFA je v sodelovanju z gospodarskimi družbami omogočila mladim strokovnjakom, da se v okviru doktorskega ali specialističnega podoktorskega izobraževanja vključujejo v aplikativne projekte na področju razvoja novih farmacevtskih izdelkov, analitskih metod, vrednotenja (geno)toksičnosti učinkovin, registracije novih zdravil in regulative. Tovrstno sodelovanje utrjuje in poglablja povezovanje akademske in gospodarske sfere.

V okviru ARRS razpisov za nakup raziskovalne opreme smo v letu 2020 nadgradili raziskovalno infrastrukturo z: Dvovijačno napravo za iztiskanje talin (HME, Hot melt extrusion) in kontinuirano vlažno granuliranje (TSG, Twin screw granulation) (Paket 17), Tekočinskim kromatografom z masnim detektorjem vrste trojni kvadrupol in UHPLC z DAD in CAD detektorjem (oba Paket 18).

KEY ACHIEVEMENTS IN 2020

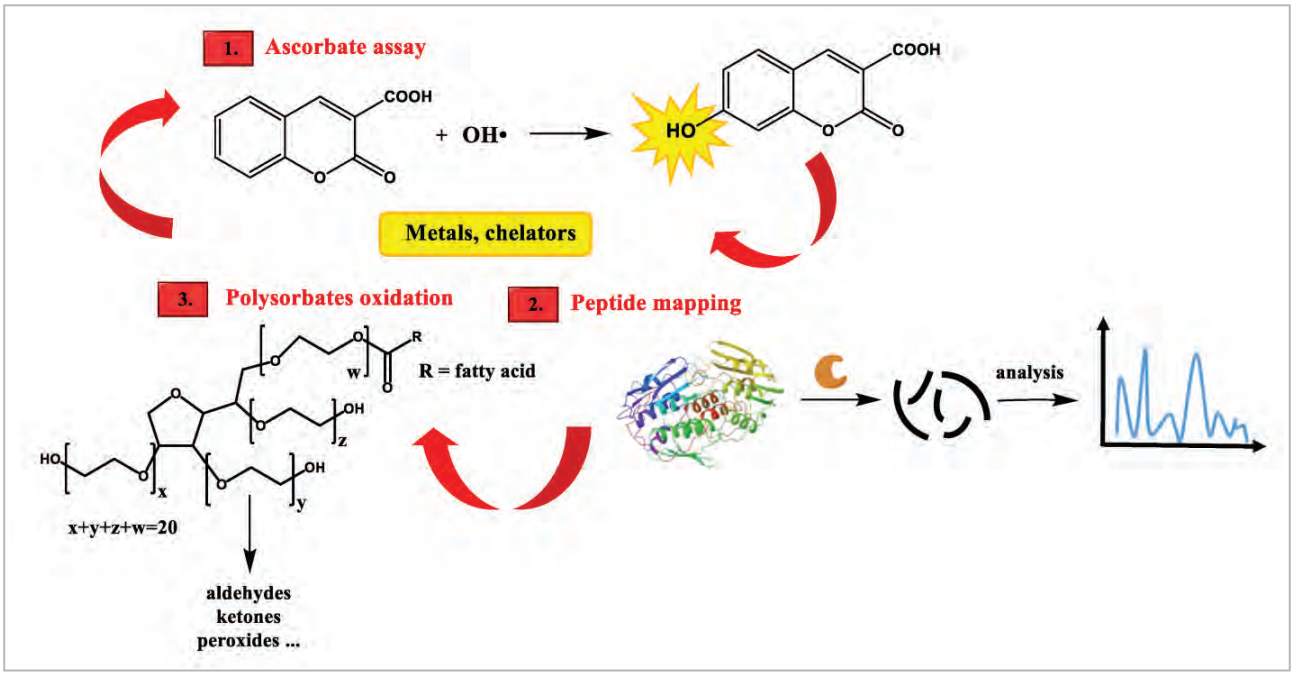
Within the framework of doctoral or specialist postdoctoral training and in collaboration with enterprises the UL FFA enabled young professionals to engage in applied projects in the field of new pharmaceutical product development, analytical methods, evaluation of (geno)toxicity of active ingredients, registration of new drugs and pharmaceutical regulation. Such cooperation strengthens and deepens the connection between the academic and economic spheres.

In 2020 we strengthened the research infrastructure with a help of the ARRS tender for Research Equipment. We acquired: Hot melt extrusion (HME) and Twin screw granulation (TSG) processing equipment (Package 17), Liquid chromatograph with triple quadrupole mass detector and UHPLC with DAD and CAD detector (both Package 18).

NAJBOLJŠE PUBLIKACIJE V LETU 2020

Članek 1: BROVČ, Ema Valentina, PAJK, Stane, ŠINK, Roman, MRAVLJAK, Janez. Formulacije s proteini, ki vsebujejo polisorbate: ali so kelatorji kovinskih ionov sploh potrebni? *Antioxidants*. Maj. 2020, vol. 9, iss. 5, str. 1-13.

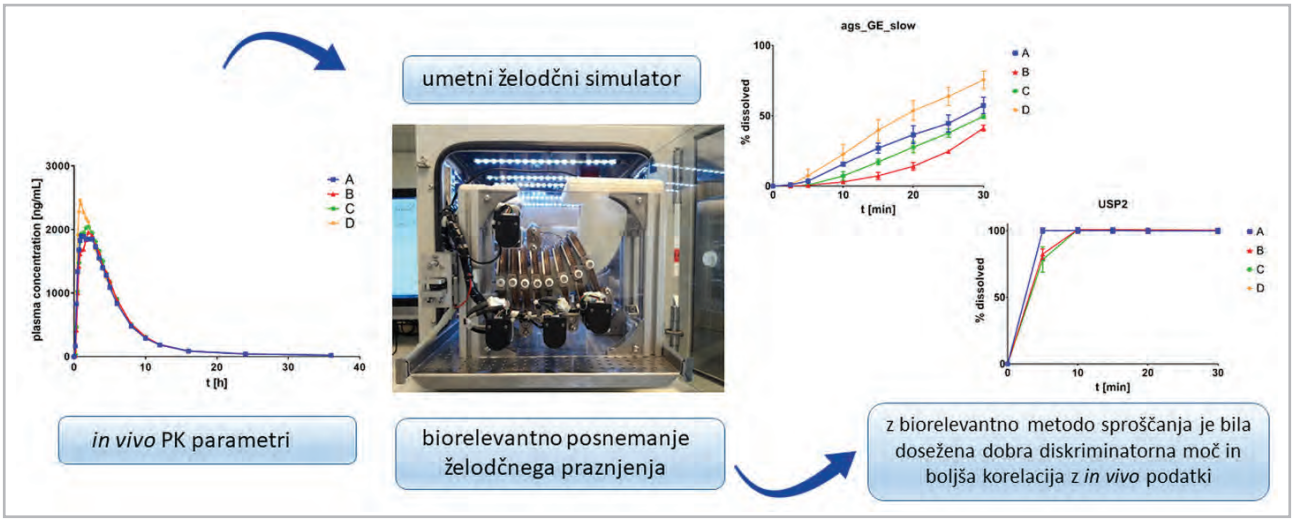
Proteini so na specifičnih mestih nagnjeni k post-translacijskim modifikacijam, ki lahko vplivajo na njihove fizikalno-kemijske lastnosti in posledično tudi na njihovo varnost in učinkovitost. Najpogostejši viri post-translacijskih modifikacij so kisik in reaktivne kisikove zvrsti. Katalitične količine Fe(II) ali Cu(I) lahko spodbujajo povečane aktivnosti reaktivnih kisikovih zvrsti in tako katalizirajo nastanek zelo reaktivnih hidroksilnih radikalov. Kadar so v biofarmacevtski industriji učinkovine dovzetne za oksidativne post-translacijske spremembe, je običajna praksa dodajanje kelatorjev v formulacije. Vendar pa so nastali kovinski kompleksi lahko še bolj škodljivi, kar so avtorji potrdili z askorbatnim testom in peptidnim mapiranjem. Dodatek EDTA je močno pospešil tvorbo hidroksilnih radikalov v sistemu železo-askorbat, dodatek DTPA pa ne. Ko so Fe(III) zamenjali s Cu(II), je dodatek EDTA skoraj ustavil nastajanje hidroksilnih radikalov, medtem ko so v primeru dodatka DTPA le-ti še vedno nastajali, vendar z zmanjšano hitrostjo. Poleg tega je EDTA pospešila s kovinskimi ioni katalizirano oksidacijo proteinov in jih ni uspela zaščititi pred oksidativnimi poškodbami, ki jih povzroča Fe. Ker je vsaka formulacija edinstvena, mora biti dodatek EDTA ali DTPA utemeljen z eksperimentalnimi podatki in ne sme biti posledica dodajanja iz običajne prakse.



Slika 1: V tej študiji so avtorji raziskali vpliv kovinskih ionov, kelatorjev in antioksidantov na hitrost Fentonove reakcije v formulaciji terapevtskega proteina z uporabo askorbatnega testa. Z uporabo peptidnega mapiranja so raziskali poškodbe proteina, povzročene z reaktivnimi kisikovimi zvrstmi. Poleg tega so derivatizirali produkte oksidativne razgradnje polisorbatov in jih analizirali s tekočinsko kromatografijo visoke ločljivosti, sklopljeno z masno spektrometrijo visoke ločljivosti (UHPLC-HRMS).

Članek 2: VRBANAC, Helena, TRONTELJ, Jurij, PETEK, Boštjan, BERGLEZ, Sandra, OPARA, Jerneja, JEREB, Rebeka, KRAJCAR, Dejan, LEGEN, Igor. Biorelevantnoposnemanje želodčnega praznjenja in njegov vpliv na kinetiko sproščanja in absorpcije modelne učinkovine/ The biorelevant simulation of gastric emptying and its impact on model drug dissolution and absorption kinetics *European Journal of Pharmaceutics & Biopharmaceutics.* Apr. 2020, vol. 149, str. 113-120.

Zelo spremenljivi fiziološki pogoji prebavnega trakta lahko povzročijo variabilno sproščanje zdravilne učinkovine in njene absorpcije iz zaužitih farmacevtskih oblik. Želodčno praznjenje je eden od ključnih fizioloških procesov, ki določa količino zdravilne učinkovine na voljo za absorpcijo. V okviru naše raziskave smo pripravili dva režima želodčnega praznjenja na umetnem želodčnem simulatorju s programsko vodeno »piloričnо« zaklopko. Režima sta bila zasnovana tako, da zajemata glavne ugotovitve *in vivo* MRI (magnetno resonančno slikanje, ang. »*magnetic resonance imaging*«) študij, izvedenih v pogojih na tešče v skladu s smernicami EMA in FDA za izvedbo bioekvivalenčnih študij in študij biološke uporabnosti. Uporabili smo 4 formulacije s takojšnjim sproščanjem, ki so vsebovale modelno učinkovino BCS III razreda. Primerjalne teste sproščanja smo izvedli tudi v napravi z vesli. *In vitro* pridobljene profile sproščanja smo primerjali z *in vivo* podatki ter tako ocenili pomembnost želodčnega praznjenja za sledečo absorpcijo zdravilne učinkovine iz testnih formulacij. Naš biorelevantni *in vitro* model za sproščanje je pokazal dobro diskriminatorno moč za vse štiri testne formulacije. Z napravo smo dosegli boljšo korelacijo z *in vivo* podatki v primerjavi s konvencialno metodo za testiranje sproščanja.



Slika 2: Uporabili smo 4 formulacije s takojšnjim sproščanjem, ki so bile predhodno vključene v bioekvivalenčne klinične študije in smo zanje imeli na voljo *in vivo* farmakokinetične podatke. Teste sproščanja modelne učinkovine smo izvedli na umetnem želodčnem simulatorju s posnemanjem želodčnega praznjenja ter v napravi z vesli. *In vitro* pridobljene profile sproščanja smo primerjali z *in vivo* podatki ter tako ocenili pomembnost želodčnega praznjenja za sledečo absorpcijo zdravilne učinkovine iz testnih formulacij.

THE BEST PUBLICATIONS OF THE INSTITUTE OF PHARMACY IN 2020

Publication 1: Protein Formulations Containing Polysorbates: Are Metal Chelators Needed at All? BROVČ, Ema Valentina, PAJK, Stane, ŠINK, Roman, MRAVLJAK, Janez

Antioxidants. Maj. 2020, vol. 9, iss. 5, str. 1-13

Proteins are prone to post-translational modifications at specific sites, which can affect their physicochemical properties, and consequently also their safety and efficacy. Sources of post-translational modifications include oxygen and reactive oxygen species. Additionally, catalytic amounts of Fe(II) or Cu(I) can promote increased activities of reactive oxygen species, and thus catalyse the production of particularly reactive hydroxyl radicals. When oxidative post-translational modifications are detected in the biopharmaceutical industry, it is common practice to add chelators to the formulation. However, the resultant complexes with metals can be even more damaging. Indeed, authors supported this using an ascorbate redox system assay and peptide mapping. Ethylenediaminetetraacetic acid (EDTA) addition strongly accelerated the formation of hydroxyl radicals in an iron-ascorbate system, while diethylenetriaminepentaacetic acid (DTPA) addition did not. When they substituted Fe(III) with Cu(II), EDTA addition almost stopped hydroxyl radical production, whereas DTPA addition showed continued production, but at a reduced rate. Further, EDTA accelerated metal-catalysed oxidation of proteins, and thus did not protect them from Fe-mediated oxidative damage. As every formulation is unique, justification for EDTA or DTPA addition should be based on experimental data and not on common practice.

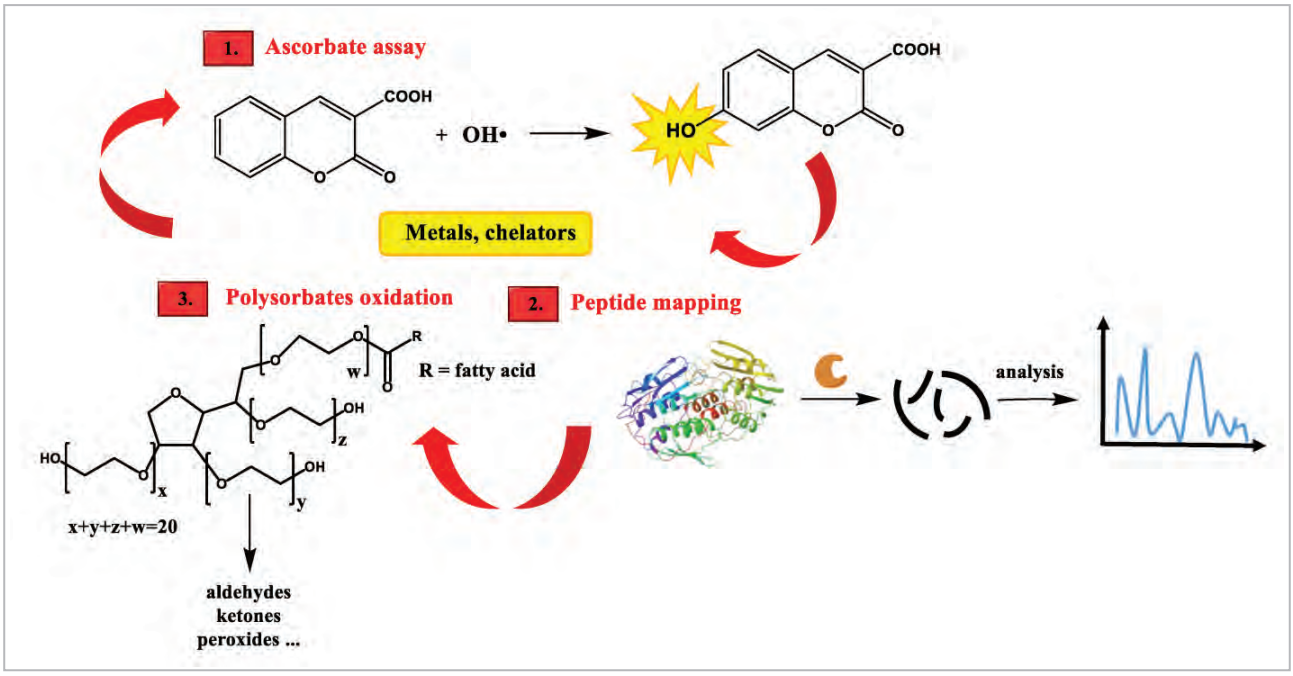


Figure 1. In the present study, authors investigated the influence of metal ions, chelating agents and antioxidants on the rate of the Fenton reaction in a formulation of a therapeutic protein using the ascorbate redox system assay. They have investigated damage to the protein by reactive oxygen species using peptide mapping. Furthermore, they have derivatised the products of oxidative degradation of the polysorbate and they have analysed them using ultrahigh performance liquid chromatography with high-resolution MS (UHPLC-HRMS).

Publication 2: The biorelevant simulation of gastric emptying and its impact on model drug dissolution and absorption kinetics VRBANAC Helena, TRONTELJ Jurij, PETEK Boštjan, BERGLEZ Sandra, OPARA Jerneja, JEREB Rebeka, KRAJCAR Dejan, LEGEN Igor European Journal of Pharmaceutics & Biopharmaceutics. Apr. 2020, vol. 149, str. 113-120

The highly variable physiological conditions within the gastrointestinal tract can cause variable drug release and absorption from the orally administrated dosage forms. The emptying of the gastric content is one of the most critical physiological processes, dictating the amount of the active ingredient available for absorption into the systemic circulation. In this study we prepared two gastric emptying regimes on advanced gastric simulator (AGS) with programmable "pyloric" valve. Gastric emptying regimes were designed so as to capture the main findings of the MRI (magnetic resonance imaging) *in vivo* studies, conducted under fasted conditions according to the EMA and FDA guidelines for bioavailability and bioequivalence studies. Four immediate release the formulations containing a model BCS class III drug were tested. Comparative dissolution tests were also performed with the USP2 apparatus. *In vitro* release profiles were compared to the *in vivo* data in order to evaluate the importance of gastric emptying for subsequent absorption of the active ingredient from the tested formulations. Our bio-relevant *in vitro* dissolution model showed good discriminatory power for all of the tested formulations. Moreover, a better correlation to *in vivo* data was achieved with AGS compared to the tested conventional dissolution method.

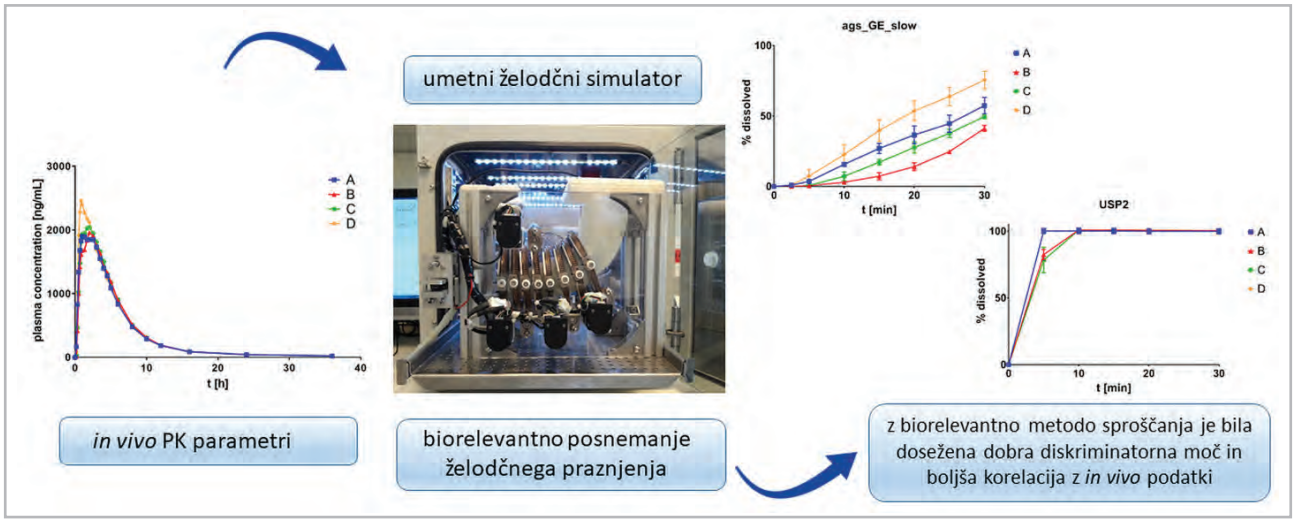


Figure 2. Four immediate release formulations were studied, previously included in bioequivalence clinical studies and for which in vivo pharmacokinetic data were therefore available. Dissolution tests were performed on advanced gastric simulator (AGS) and USP2 apparatus (paddle apparatus). *In vitro* release profiles were compared with *in vivo* data to assess the importance of gastric emptying for subsequent absorption of the model drug from the tested formulations.

ŠTUDENTSKI SVET FAKULTETE ZA FARMACIJO (ŠS FFA), ŠTUDENTSKA ORGANIZACIJA FAKULTETE ZA FARMACIJO (ŠOFFA), DRUŠTVO ŠTUDENTOV FARMACIJE SLOVENIJA (DŠFS)

Študentski svet Fakultete za farmacijo, Univerze v Ljubljani (ŠS FFA)

Študentski svet je organ fakultete, katerega člani so predstavniki letnikov, izvoljeni na letnih volitvah. ŠS FFA predstavlja študente UL FFA v organih fakultete (senat UL FFA, upravni odbor UL FFA in različne komisije) in v Študentskem svetu Univerze v Ljubljani (ŠS UL). ŠS FFA se ukvarja predvsem s študijem na UL FFA ter zagovarjanjem pravic študentov na vseh ravneh zastopanja.

Študentska organizacija Fakultete za farmacijo (ŠOFFA)

ŠOFFA je ena izmed podružnic družine Študentske organizacije Univerze v Ljubljani (ŠOU), kakršno ima vsaka fakulteta Univerze v Ljubljani. ŠOFFA organizira različne dogodke izobraževalnega in družabnega značaja, kot so božična ekskurzija, farmacevtski piknik, farmacevtsko smučanje in druge aktivnosti. Aktivnosti družabnega programa so potrebne za povezovanje mlajših in starejših študentov, kar omogoča izmenjavo znanj in izkušenj.

Društvo študentov farmacije Slovenije (DŠFS)

DŠFS in ŠSSFD delujeta kot ena organizacija z isto ekipo, ki vodi projekte in zastopa društvo na nacionalnem (DŠFS) in mednarodnem (ŠSSFD) nivoju. S pomočjo svojih članov pod vodstvom koordinatorjev izvajajo različne javne kampanje, humanitarne projekte, mednarodne izmenjave Twinnet in SEP, mednarodne poletne farmacevtske tabore (IPSC), strokovne večere. Trikrat letno izdaja študentsko glasilo Spatula.

STUDENTS' COUNCIL OF THE FACULTY OF PHARMACY (ŠS FFA), THE SLOVENIAN PHARMACY STUDENTS' SOCIETY (DŠFS) AND STUDENTS' SECTION OF THE SLOVENIAN PHARMACEUTICAL SOCIETY (ŠSSFD)

Students' Council of the Faculty of Pharmacy, University of Ljubljana (ŠS FFA)

The Students' Council is one of the governing bodies of the faculty. Its members, who are elected annually, are representatives of their respective programmes. ŠS FFA represents the students of the Faculty of Pharmacy at other governing bodies of the faculty (the Senate, the Managing Board and various committees), as well as in The Students' Council of the University of Ljubljana (ŠS UL). ŠS FFA's work mainly focuses on the study programmes at the Faculty of Pharmacy and defending students' rights at all levels of representation.

Student Organisation of the Faculty of Pharmacy (ŠOFFA)

ŠOFFA is one of ŠOU's (the University of Ljubljana Students' Organisation) branches, which exists at each faculty of the University of Ljubljana. ŠOFFA holds various educational and social events, such as the Christmas excursion, pharmaceutical picnic, pharmaceutical ski trip and other activities. Social activities are necessary to connect younger and older students, which in turn allow exchange of knowledge and experience.

Slovenian Pharmacy Students Society (DŠFS)

DŠFS and ŠSSFD function as a single organisation with the same team that leads projects and represents the society on national and international levels. With the help of its members and under the guidance of the coordinators the organisation carries out various public campaigns, humanitarian projects, Twinnet and SEP international exchanges, the International Pharmaceutical Summer Camp (IPSC) and professional training evenings. The organisation also publishes the student newsletter Spatula three times a year.

3 Poročilo o delu
Activity report

PREGLED POSLOVANJA

UL FFA je v letu 2020 poslovala uspešno, saj je kljub situaciji v zvezi z epidemijo COVID-19 realizirala najvišje prihodke od svojega obstoja v višini 11.173.168 EUR, kar glede na preteklo leto pomeni 5,8 % rast prihodkov. Odhodki so znašali 10.782.539 EUR in so glede na predhodno leto višji za 5,2 %. V okviru odhodkov so na njihovo povečanje najbolj vplivali višji stroški dela, ki so znašali 7.253.271 EUR in so se glede na preteklo leto povečali za kar 8,2 %. Na višje stroške dela so delno vplivali ukrepi na področju plač ter večje število zaposlenih, ki se je računano iz delovnih ur povečalo iz 168,8 delavca v letu 2019 na 176,3 delavca v letu 2020. Zaradi omejitev pri poslovanju zaradi COVID-19 nekatere druge skupine stroškov niso narasle kot načrtovano oziroma so celo upadle. Tako so stroški materiala, ki so znašali 1.048.951 EUR, višji le za 4,0 %, stroški storitev v višini 1.700.328 EUR pa so celo upadli za 7,7 %, predvsem zaradi nižjih stroškov izobraževanj in z njimi povezanih službenih potovanj.

UL FFA je posledično realizirala višji presežek prihodkov nad odhodki kot v letu 2019, ki je znašal 390.620 EUR pred obračunom davka od dohodkov pravnih oseb in 386.967 EUR po obračunanem DDPO, kar pomeni skoraj 22 % povečanje.

Zaradi epidemije COVID-19 je Fakulteta dosegla slabše rezultate na tržni dejavnosti, kjer so znašali realizirani prihodki 578.955 EUR, kar je približno 5 % delež celotne realizacije. Tržni prihodki so se znižali za 22,5 %, posledično pa je nižji tudi delež tržnega presežka prihodkov v celotnem presežku, ki je 95.701 EUR, kar pomeni 30,4 % padec glede na leto 2019.

Leto 2020 je bilo za Fakulteto pomembno in rekordno tudi pri investicijski dejavnosti, saj je fakulteta v osnovna sredstva vložila več kot 1,7 mio EUR. Poleg lastnih sredstev, ki jih je fakulteta vložila v nakupe, so bile investicijske aktivnosti financirane iz projekta EATRIS-TRI.si, ki je k nakupom prispeval 446.732 EUR in 237.090 EUR, pridobljenih preko razpisov ARRS.

BUSINESS OVERVIEW

In 2020 UL FFA was successful in its performance and despite the situation with COVID-19 epidemic, it managed to achieve the highest income since its existence in the amount of 11.173,168 EUR, which meant 5,8 % increase compared to the previous year. Expenditures amounted to 10.782,539 EUR and were 5,2 % higher. This increase was mostly due to 8.2 % higher labour costs in the amount of 7.253,271 EUR. Payroll expenses were mostly higher due to government increases in 2019 and 2020 and also due to more employees. Calculated from working hours the faculty had 168.8 employees in 2019 and 176.3 employees in 2020. Due to restrictions to contain the negative effects of COVID-19 other groups of expenses didn't increase as expected. Despite more employees and higher number of projects, costs of goods and material only increased by 4.0 % and amounted to 1.048,951 EUR. Costs of services in the amount of 1.700,328 EUR even decreased by 7.7 % mostly due to lower costs of training and education and travel expenses connected to these activities.

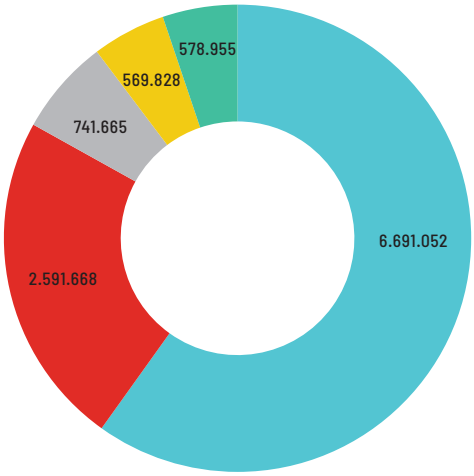
As a result, the UL FFA realized a 22-% higher surplus of revenues over expense compared to 2019 in the amount of 390.620 EUR before income tax (EBIT) and 386.967 EUR net income after tax.

Due to COVID-19 epidemic the revenues related to market activities in the amount of 578.955 EUR weren't as high as previous year. They fell by 22.5 % and their share in total income fell from 7 % in 2019 to 5 % in 2020. Net income after tax from marketing activities amounted 95.701 EUR which is 30.4 % lower than 2019.

2020 was important and record-breaking also for its investment activities, as the faculty invested more than 1.7 million EUR in fixed assets. In addition to using own funds to finance the investments, their main drive were the funds obtained from EATRIS-TRI.si project that contributed 446.732 EUR to the purchases and 237.090 EUR granted by the National Research Agency (ARRS).

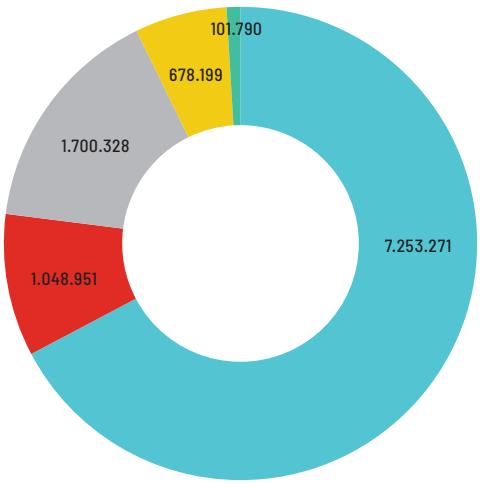
Prihodki v EUR/Revenues, EUR	2020	2019	Struktura 2020/ 2020 Structure	Indeks 20/19
Prihodki od MIZŠ / Ministry of Education, Science, and Sport	6.691.052	6.208.973	59,9 %	107,8
Prihodki od ARRS / Slovenian Research Agency	2.591.668	2.433.097	23,2 %	106,5
EU skladi in mednarodni projekti / EU funds and international projects	741.665	640.247	6,6 %	115,8
Druga javna služba / Other public services	569.828	536.081	5,1 %	106,3
Prodaja storitev na trgu / Market sales of services	578.955	746.466	5,2 %	77,6
Skupaj prihodki / Total revenues	11.173.168	10.564.864	100,0 %	105,8

STRUKTURA PRIHODKOV V 2020, PO VIRU FINANCIRANJA V EUR
REVENUE STRUCTURE IN 2020, EUR



- Prihodki od MIZŠ / Ministry of Education, Science and Sport
- Prihodki od ARRS / Slovenian Research Agency
- EU skladi in mednarodni projekti / EU funds and international projects
- Druga javna služba / Other public services
- Prodaja storitev na trgu / Market sales of services

STRUKTURA ODHODKOV V 2020, PO VRSTAH STROŠKOV V EUR
EXPENSE STRUCTURE IN 2020, EUR



- Delo / Labor
- Material / Goods
- Storitve / Services
- Amortizacija / Depreciation
- Drugi odhodki / Other Expenses

ŠTUDIJSKO PODROČJE / FIELD OF STUDY

PREDSTAVITEV ŠTUDIJSKIH PROGRAMOV / PRESENTATION OF ACADEMIC PROGRAMMES

ENOVITI MAGISTRSKI ŠTUDIJSKI PROGRAM DRUGE STOPNJE FARMACIJA (EM FAR)
UNIFORM MASTER STUDY PROGRAMME PHARMACY (SINGLE-CYCLE MASTER STUDY PROGRAMME PHARMACY) (EM FAR)

Slika: izr. prof. dr. Tomaž Vovk, skrbnik EM FAR
Photo: Assoc. Prof. Dr. Tomaž Vovk, Trustee of EM FAR

Enoviti magistrski študijski program druge stopnje Farmacija je interdisciplinaren študij, ki združuje farmacevtska, naravoslovna in medicinska znanja. Študij poteka pet let v obsegu 300 kreditnih točk, je usklajen z direktivo evropskega parlamenta in sveta 2005/36/ES in omogoča pridobitev strokovnega naslova magister oz. magistra farmacije, ki je priznan v vseh državah članicah Evropske unije. Fakulteta za farmacijo je edina v slovenskem prostoru, ki izobražuje bodoče farmacevte. Študij daje poudarek na pridobivanju praktičnih kompetenc, saj so v prvih štirih letih izobraževanja ure vaj uravnotežene s predavanji in seminarji. V petem letniku poteka izvajanje polletnega praktičnega usposabljanja v učnih zavodih (lekarnah) in izdelava magistrske naloge.

Praktično usposabljanje omogoča pridobivanje kompetenc za izvajanje lekarniške dejavnosti v

The uniform master study programme Pharmacy (Single-cycle master study programme Pharmacy) is an interdisciplinary study that combines knowledge of pharmaceutical, natural and medical sciences. The study lasts five years and consists of 300 ECTS credits. The pharmacy programme is in accordance with the European Directive 2006/36/ES and educates students for the regulated profession of pharmacist, through which they obtain the Master of Pharmacy degrees recognised by all EU member states. The Faculty of Pharmacy is the only one in Slovenia that educates future pharmacists. Practical competencies are one of the important goals of the study programme and therefore, practices are balanced with lectures and seminars in the first four years. In the fifth year a six-month practical training is carried out in educational institutions (pharmacies), followed by the preparation of the master's thesis.

Practical training enables students to acquire

okviru primarnih aktivnosti javnih (zunanjih) lekarn, bolnišničnih lekarn in drugih v zdravstvu sorodnih aktivnosti in se izvaja pod mentorstvom magistra farmacije, ki ima ustrezne delovne izkušnje in mentorske kompetence.

Študij usposobi študente za izvajanje strokovnih del in nalog na področju farmacije, vključujoč farmacevtsko skrb in strokovno svetovanje, izdajo zdravil, razvoj in raziskave, proizvodnjo, analizo ter nadzor kakovosti zdravil in delo v medicinskih laboratorijih. Po zaključku študija se diplomanti lahko zaposlijo v javnih in zasebnih lekarnah ali v bolnišnicah, farmacevtski industriji, v tujih predstavništvih farmacevtskih družb, veledrogerijah, šolstvu, inštitutih in kliničnobiokemičnih in drugih diagnostičnih laboratorijih. Študij nudi tudi odlično osnovo za nadaljevanje izobraževanja na doktorski stopnji in je odprt za vseživljenjsko strokovno usposabljanje.

V študijskem letu 2019/2020 je študij zaključilo 127 magistrantov.

competencies for performing pharmacy activities within the primary activities of public (external) pharmacies, hospital pharmacies and other health-related activities. It is carried out under the mentorship of a pharmacist, who has relevant work experience and mentoring competencies.

The programme gives the students the skills to carry out professional work and tasks in the field of pharmacy, including pharmaceutical care activities and professional advising, dispensing medicines, development and research, production, analysis and controlling the quality of medicines as well as work in medical laboratories. The graduates can be employed in public and private pharmacies or in hospitals, the pharmaceutical industry, foreign representative offices of pharmaceutical companies, wholesalers, education, institutes, clinical biochemical and other diagnostic laboratories. The study also provides an excellent basis for continuing education at the doctoral level and is open to continuing lifelong professional training.

In the 2019/2020 academic year, 127 graduates completed their study.

Število vseh vpisanih študentov na program EM FAR, od študijskega leta 2016/2017 do 2020/2021

Number of all students enrolled in the uniform master study programme Pharmacy (Single-cycle master study programme Pharmacy), from academic year 2016/2017 to 2020/2021

2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
856	874	879	865	921

PREDMETNIK ŠTUDIJSKEGA PROGRAMA EM FAR PO LETNIKIH

1. letnik
Matematika
Fizika
Splošna in anorganska kemija
Farmacevtska biologija z genetiko
Uvod v farmacijo
Anatomija in histologija
Mikrobiologija
Analizna kemija
Farmacevtska kemija I
Farmacevtska informatika

2. letnik
Organska kemija
Fizikalna kemija
Farmacevtska tehnologija I
Fiziologija
Farmacevtska biokemija
Farmacevtska kemija II
Fizikalna farmacija

3. letnik
Instrumentalna farmacevtska analiza
Socialna farmacija
Patološka fiziologija
Farmacevtska kemija III
Farmakognozija I
Farmakognozija II
Farmacevtska tehnologija II
Izbirni predmet

Izbirni predmeti
Bolnišnična farmacija
Farmacevtsko trženje in upravljanje
Farmakoekonomika
Imunologija
Kozmetologija
Prehranska dopolnila
Zdravila v alternativni medicini
Raziskovalne metode v socialni farmaciji
Instrumentalne analizne metode v farmaciji

PROGRAMME CURRICULUM (EM FAR) PER YEARS

First year
Mathematics
Physics
General and Inorganic Chemistry
Pharmaceutical Biology with Genetics
Introduction to Pharmacy
Anatomy and Histology
Microbiology
Analytical Chemistry
Pharmaceutical Chemistry I
Pharmaceutical Informatics

Second year
Organic Chemistry
Physical Chemistry
Pharmaceutical Technology I
Physiology
Pharmaceutical Biochemistry
Pharmaceutical Chemistry II
Physical Pharmacy

Third year
Instrumental Pharmaceutical Analysis
Social Pharmacy
Pathophysiology
Pharmaceutical Chemistry III
Pharmacognosy I
Pharmacognosy II
Pharmaceutical Technology II
Optional Course

Optional Courses
Hospital Pharmacy
Pharmaceutical Marketing and Management
Pharmacoeconomics
Immunology
Cosmetology
Nutritional Supplements
Medicinal Products of Alternative Medicine
Research Methods in Social Pharmacy
Instrumental Analytical Methods in Pharmacy

4. letnik
Farmacevtska biotehnologija
Farmakologija
Biofarmacija s farmakokinetiko
Stabilnost zdravil
Analiza in nadzor zdravil
Klinična kemija
Altern. predmet A1
Načrtovanje in sinteza učinkovin ali Toksikološka kemija
Altern. predmet A2
Industrijska farmacija ali Klinična farmacija
Izbirni predmet 2 x

Izbirni predmeti
Biofarmacevtsko vrednotenje farmacevtskih oblik
Biokemija nastanka in napredovanja raka
Eutomeri
Farmacevtske oblike s prirejenim sproščanjem
Farmacevtsko inženirstvo
Farmakogenomika in genska zdravila
Fitofarmaki
Izbrana poglavja iz farmacevtske biotehnologije
Izbrana poglavja iz klinične biokemije
Izbrane metode farmacevtske analize
Kakovost zdravil
Psihotropne snovi in zloraba zdravil
Uporaba genetskih in celičnih preiskav v biomedicini in farmaciji

5. letnik
Praktično usposabljanje
Individualno raziskovalno delo za mag. nalogo
Zagovor magistrske naloge

Fourth year
Pharmaceutical Biotechnology
Pharmacology
Biopharmaceutics with Pharmacokinetics
Stability of Medicinals
Analysis and Control of Medicinals
Clinical Chemistry
Alternative Courses A1
A1: Design and Synthesis of Active Substances or Toxicological Chemistry
Alternative Courses A2
A2: Industrial Pharmacy or Clinical Pharmacy
Optional Course 2x

Optional Courses
Biopharmaceutical Evaluation of Pharmaceutical Forms
Biochemistry of Development and Progression of Cancer
Eutomers
Modified Release Dosage Forms
Pharmaceutical Engineering
Pharmacogenomics and Genetic Medicines
Phytopharmaceuticals
Selected Topics in Pharmaceutical Biotechnology
Selected Topics in Clinical Biochemistry
Selected Methods of Pharmaceutical Analysis
Quality of Medicinal Products
Psychotropic Substances and Abuse of Medicinal Products
The Use of Genetic and Cellular Testing in Biomedicine and Pharmacy

Fifth year
Practical Training
Individual Research Work for the Master's Thesis
Master's Thesis Defence

UNIVERZITETNI ŠTUDIJSKI PROGRAM PRVE STOPNJE (S1 LBM) IN MAGISTRSKI ŠTUDIJSKI PROGRAM DRUGE STOPNJE (S2 LBM) LABORATORIJSKA BIOMEDICINA

THE ACADEMIC BACHELOR STUDY PROGRAMME LABORATORY BIOMEDICINE (S1 LBM) AND THE MASTER STUDY PROGRAMME LABORATORY BIOMEDICINE (S2 LBM)

Slika: izr. prof. dr. Barbara Ostanek, skrbnica S1 LBM
Photo: Assoc. Prof. Dr. Barbara Ostanek, Trustee of S1 LBM

Slika: izr. prof. dr. Nataša Karas Kuželički, skrbnica S2 LBM
Photo: Assoc. Prof. Dr. Nataša Karas Kuželički, Trustee of S2 LBM

Univerzitetni študijski program prve stopnje Laboratorijska biomedicina je relativno nov študij, čeprav njegovi začetki segajo v konec 70. let 20. stoletja, in sicer je bila klinična biokemija kot samostojni predmet z imenom Analizna farmacevtska biokemija uvedena v študij farmacije leta 1977, visokošolski študijski program Laboratorijska medicina pa je bil ustanovljen leta 1995. Z uvedbo bolonjskega sistema se je leta 2008 le-ta preoblikoval v prvostopenjski univerzitetni študijski program Laboratorijska biomedicina v obsegu 180 kreditnih točk, ki ga je že naslednje leto nadgradil drugostopenjski magistrski študijski program Laboratorijska biomedicina v obsegu 120 kreditnih točk.

Strokovni naslov, ki ga pridobijo diplomanti po zaključeni prvi stopnji, je diplomirani inženir/diplomirana inženirka laboratorijske biomedicine (UN), na drugi stopnji pa magister/magistrica laboratorijske biomedicine.

Temeljni cilj prvostopenjskega in drugostopenjskega študijskega programa Laboratorijska biomedicina je

Laboratory Biomedicine study programmes are relatively new, although their beginnings originate in 1977 when the field of clinical biochemistry was implemented into the university study programme of Pharmacy as a mandatory course entitled Analytical Pharmaceutical Biochemistry. Higher education Laboratory Biomedicine study programme was established in 1995. In 2008, with the emergence of Bologna system, this programme was transformed into the academic bachelor study programme Laboratory Biomedicine programme (S1 LBM), comprising 180 ECTS and was upgraded the following year by the implementation of the master's programme Laboratory Biomedicine (S2 LBM), comprising 120 ECTS.

The academic title awarded to students after the first cycle of study is Bachelor of Engineering in Laboratory Biomedicine. The academic title awarded to the students after the second cycle of study is Master of Laboratory Biomedicine.

The main objective of the first and second cycle Laboratory Biomedicine study programmes is to

izobraževanje visokousposobljenih strokovnjakov za delovna mesta analitike v medicinskih laboratorijih različnih ožjih področij v laboratorijski medicini, v raziskovalnih inštitucijah ter za delovna mesta v dejavnostih, ki so povezana z laboratorijsko medicino, kot so zastopništva, industrija, državni organi. Diplomanti in magistranti so sposobni samostojno spremljati novosti in jih uvajati na področju laboratorijske medicine ter se prilagajati potrebam laboratorijske diagnostike. Pridobijo tudi aplikativna znanja raziskovalnega dela in temelje vodenja, upravljanja in legislative ter predstavljajo visoko strokoven, fleksibilen in posledično iskan kader tako v medicinskih kot drugih analitskih laboratorijih, ki se je sposoben prilagajati izzivom sodobnega trga dela in zahtevam delodajalcev. Program daje osnove za nadaljevanje študija po obeh stopnjah in za vseživljenjsko strokovno usposabljanje.

V študijskem letu 2019/2020 je študij zaključilo 40 diplomantov in 29 magistrantov.

educate highly qualified experts for positions in medical laboratories in different fields of laboratory medicine, research institutions and for positions in activities related to laboratory medicine, such as agencies, industry and state authorities. Bachelors and masters of Laboratory Biomedicine are fully qualified to independently follow and implement the innovations in the field of laboratory medicine, thus adapting to the needs of laboratory diagnostics. Due to acquired applicative research skills, as well as basic management, leadership and legislative competences graduates represent highly professional, flexible and consequently sought-after staff in both medical and other analytical laboratories. They are able to adapt to the challenges of the contemporary labour market and employers' requirements. Both study programmes provide basis for further academic or specialisation studies and form the foundation for the lifelong professional training.

In the 2019/2020 academic year 40 graduates completed bachelor's programme and 29 graduates completed master's programme.

Število vseh vpisanih študentov na program S1 LBM od študijskega leta 2016/2017 do 2020/2021
Number of all students enrolled in the academic bachelor study programme Laboratory Biomedicine, from academic year 2016/2017 to 2020/2021

2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
126	123	140	146	151

PREDMETNIK ŠTUDIJSKEGA PROGRAMA S1 LBM PO LETNIKIH

1. letnik
Matematika s statistiko
Fizika
Anatomija in histologija
Delo z biološkimi vzorci
Uvod v biomedicinsko analitiko
Splošna in organska kemija
Analizna kemija
Celična biologija z genetiko
Strokovna angleščina
Biomedicinska informatika I

2. letnik
Fizikalna kemija
Biokemija
Klinična biokemija I
Fiziologija
Imunologija z imunokemijo
Mikrobiologija s parazitologijo
Biomedicinska analitika
Laboratorijske histopatološke metode

3. letnik
Klinična hematologija
Tehnike molekularne biologije v medicini
Klinična biokemija II
Osnove transfuzijske medicine in transplantacije
Laboratorijsko delo v praksi
Zakonodaja in etika v biomedicini
Izbirni predmeti 5 x

Izbirni predmeti
Hemostaza
Proteomika
Toksikologija
Celične in tkivne kulture
Biomedicinska genetika
Biomedicinska informatika II
Tehnike v diagnostični virologiji
Psihotropne snovi in zloraba zdravil
Urgentna laboratorijska diagnostika
Citogenetične in molekularno-biološke preiskave v hematologiji
Projektno delo

PROGRAMME CURRICULUM (S1 LBM) PER YEARS

First year
Mathematics with Statistics
Physics
Anatomy and Histology
Working with Biological Samples
Introduction to Biomedical Analytics
General and Organic Chemistry
Analytical Chemistry
Cell Biology with Genetics
English
Biomedical Informatics I

Second year
Physical Chemistry
Biochemistry
Clinical Biochemistry I
Physiology
Immunology with Immunochemistry
Microbiology with Parasitology
Biomedical Analytics
Laboratory Histopathological Methods

Third year
Clinical Haematology
Molecular Biology Techniques in Medicine
Clinical Biochemistry II
Basics of Transfusion Medicine and Transplantation
Laboratory Work in Practice
Legislation and Ethics in Biomedicine
Optional Courses I, II, III, IV, V

Optional Courses
Haemostasis
Proteomics
Toxicology
Cellular and Tissue Cultures
Biomedical Genetics
Biomedical Informatics II
Techniques in Diagnostic Virology
Psychotropic Drugs and Drug Abuse
Emergency Laboratory Diagnostics
Cytogenetic and Molecular Genetic Methods in Haematology
Project Work

Število vseh vpisanih študentov na program S2 LBM od študijskega leta 2016/2017 do 2020/2021
Number of all students enrolled in the master study programme Laboratory Biomedicine from academic year 2016/2017 to 2020/2021

2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
84	100	89	101	100

PREDMETNIK ŠTUDIJSKEGA PROGRAMA S2 LBM PO LETNIKIH:

1. letnik
Izbrana poglavja iz biokemije
Molekularna encimologija
Molekularna biofizika
Biomedicinska analitika
Izbrana poglavja iz biomedicinske informatike
Patološka fiziologija
Upravljanje in komunikacija v biomedicini
Načrtovanje in zagotavljanje kakovosti v medicinskih laboratorijih
Izbirni predmet I in II

2. letnik
Imunologija v laboratorijski diagnostiki
Klinično biokemijska diagnostika
Izbirni predmet III, IV in V
Individualno raziskovalno delo za magistrsko nalogo
Zagovor magistrskega dela

Izbirni predmeti I in V:
Zakonodaja in etika v biomedicini
Laboratorijska transfuzijska medicina in transplantacija
Načrtovanje, analiza in interpretacija raziskav
Osnove klinične farmakokinetike

Izbirni predmeti II, III in IV
Izbrana poglavja iz hematologije
Reaktivni kisikovi in dušikovi intermediati
Osnove slikovnih tehnik v biomedicini
Zdravila
Razvoj in vpeljava diagnostičnih metod
Toksikološka kemija

PROGRAMME CURRICULUM (S2 LBM) PER YEARS

First year
Selected topics in Biochemistry
Molecular Enzymology
Molecular Biophysics
Biomedical Analytics
Selected topics in Biomedical Informatics
Pathologic Physiology
Management and Communication in Biomedicine
Design and Quality Assurance in a Medical Laboratory
Optional Courses I and II

Second year
Immunology in Laboratory Diagnostics
Clinical Biochemical Diagnostics
Optional Courses III, IV and V
Individual research work for the master's thesis
Master's thesis defence

Optional Courses I and V
Legislation and Ethics in Biomedicine
Laboratory Transfusion Medicine and Transplantation
Research Design, Analysis and Interpretation
Basics of Clinical Pharmacokinetics

Optional Courses II, III and IV
Haematology - Selected Topics
Reactive Oxygen and Nitrogen Intermediates
Basics of Imaging Techniques in Biomedicine
Medicinal Products
Development and Implementation of Diagnostic Methods
Toxicological Chemistry

UNIVERZITETNI ŠTUDIJSKI PROGRAM PRVE STOPNJE KOZMETOLOGIJA (S1 KOZ)
THE ACADEMIC BACHELOR STUDY PROGRAMME COSMETOLOGY (S1 KOZ)

Slika: Izr. prof. dr. Alenka Zvonar Pobirk, skrbnica S1 KOZ
Photo: Assoc. Prof. Dr. Alenka Zvonar Pobirk, Trustee of S1 KOZ

Univerzitetni študijski program prve stopnje Kozmetologija traja 6 semestrov (3 leta), obsega 20 obveznih ter 3 izbirne predmete in se zaključi z izdelavo in zagovorom diplomske naloge. Po končanem študiju diplomanti pridobijo strokovni naslov diplomirani kozmetolog/diplomirana kozmetologinja (UN). V okviru študija Kozmetologije študenti pridobijo osnovna znanja naravoslovnih usmeritev ter poglobljena znanja s strokovnega področja kozmetologije. Študenti tako podrobno spoznajo različne kozmetične izdelke in mesto njihovega delovanja, tj. kožo, sluznice, lase in nohte. Osredotočajo se na naravne in sintezne materiale kot sestavine kozmetičnih izdelkov in kozmetično aktivne sestavine ter njihove želene, škodljive in toksične učinke. Pridobijo tudi znanja o različnih vrstah kozmetičnih izdelkov ter njihovem načrtovanju, oblikovanju, izdelavi ter pristopih vrednotenja stabilnosti, varnosti in učinkovitosti, pri čemer sta nujna poznavanje in uporaba ustreznih analiznih metod. Dobro poznavanje kozmetične regulative jim da tudi znanja o nadzoru, trženju in oglaševanju kozmetičnih izdelkov. Program z ustrezno zastopanostjo kozmetoloških, tehnoloških, naravoslovnih, medicinskih in drugih vsebin tako usposobi študenta za izvajanje strokovnih del in

The academic bachelor study programme Cosmetology lasts 6 semesters (3 years), and consists of 20 compulsory and 3 elective courses. It ends with the individual research work and defence of a diploma thesis. The academic title awarded to the students is "diplomirani kozmetolog" (Bachelor of Cosmetology - UN). During their study, students obtain basic knowledge of natural sciences and in-depth knowledge in the professional field of cosmetology, from cosmetic products to biological bases of the skin, mucous membranes, hair and nails as their targeting areas. The programme focuses on natural and synthetic materials as ingredients of cosmetic products as well as cosmetically active ingredients in relation to their desired, harmful and potential toxic effects. In addition to composition, students obtain knowledge on different types of cosmetic products as well as their production and control of quality, safety and efficiency combined with understanding of appropriate analytical methods. The study programme further supports students with the knowledge on regulations relating to the cosmetic product supervision, marketing and advertising. By combining courses from the field of cosmetology, technology, science, medicine and others we thus aim to train skilled professionals for jobs in cosmetic

nalog kjerkoli na področju kozmetologije (kozmetična industrija, predstavništva, regulativa in inšpekcijske službe, svetovanje in trženje kozmetičnih izdelkov, izobraževalne ustanove), delno tudi farmacije, kjer se ne zahteva z evropsko direktivo usklajen 5-letni študij farmacije. Program Kozmetologija hkrati daje dobro osnovo za nadaljevanje študija na drugi stopnji (npr. Industrijska farmacija na UL FFA) in je odprt za vseživljenjsko strokovno usposabljanje.

V študijskem letu 2019/20 je študij zaključilo 33 diplomantov.

industry, regulation and inspection services, research institutions, representative offices with cosmetic products, and in cosmetic product consultation and marketing within different institutions. Our graduates are able to independently follow scientific achievements in the field of cosmetology and adjust them to the needs in their professional and research areas. At the same time, the programme provides good foundations for further studies at master's and/or specialist level (e.g. Industrial Pharmacy at UL FFA) and is open to lifelong technical and scientific training.

In the academic year 2019/20, 33 graduates completed their study.

Število vseh vpisanih študentov na program S1 KOZ od študijskega leta 2016/2017 do 2020/2021

Number of all students enrolled in the academic bachelor study programme Cosmetology from academic year 2016/2017 to 2020/2021:

2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
126	126	126	116	130

PREDMETNIK ŠTUDIJSKEGA PROGRAMA S1 KOZ PO LETNIKIH

1. letnik
Matematika s statistiko
Fizika
Splošna in organska kemija
Uvod v kozmetologijo
Kozmetični izdelki I
Celična biologija z genetiko
Anatomija in histologija

2. letnik
Biokemija
Toksikologija
Osnove dermatologije
Kozmetični izdelki II
Kozmetične sestavine naravnega izvora
Embalaža in stabilnost
Imunologija kože z imunokemijo
Informatika v kozmetologiji
Instrumentalna analiza v kozmetiki
Izbirni predmet I

3. letnik
Nanotehnologija v kozmetologiji
Vrednotenje kozmetičnih izdelkov
Biotehnologija v kozmetologiji
Pojavi na mejnih površinah
Izbirni predmet 2 x
Individualno projektno delo
Zagovor diplomske naloge

Izbirni predmeti
Fiziologija
Mikrobiologija
Prehranska dopolnila
Celične in tkivne kulture
Strokovna angleščina
Koža in presnovne motnje
Toksikologija kozmetičnih sestavin
Reaktivni intermediati v koži in antioksidanti
Kozmetološka kemija
Nutrikozmetika rastlinskega izvora
Podjetništvo v kozmetologiji
Uvod v zdravila

PROGRAMME CURRICULUM (S1 KOZ) PER YEARS

First year
Mathematics with Statistics
Physics
General and Organic Chemistry
Introduction to Cosmetology
Cosmetic Products I
Cellular Biology and Genetics
Anatomy and Histology

Second year
Biochemistry
Toxicology
Basics of Dermatology
Cosmetic Products II
Natural Cosmetic Ingredients
Packaging and Stability
Skin Immunology with Immunochemistry
Informatics in Cosmetology
Instrumental Analysis in Cosmetology
Optional Course I

Third year
Nanotechnology in Cosmetology
Evaluation of Cosmetic Products
Biotechnology in Cosmetology
Phenomena on Border Surfaces
Optional Course II and III
Individual Project Work
Thesis Defence

Optional Courses
Physiology
Microbiology
Nutritional Supplements
Cellular and Tissue Cultures
Field-Specific English
Skin and Metabolic Disorders
Toxicology of Cosmetic Ingredients
Reactive Intermediates in the Skin and Antioxidants
Cosmetic Chemistry
Nutricosmetics of Plant Origin
Entrepreneurship in Cosmetology
Introduction to Drugs

MAGISTRSKI ŠTUDIJSKI PROGRAM DRUGE STOPNJE INDUSTRIJSKA FARMACIJA (S2 INF)
THE MASTER STUDY PROGRAMME INDUSTRIAL PHARMACY (S2 INF)

Slika: prof. dr. Odon Planinšek, skrbnik S2 INF
Photo: Prof. Dr. Odon Planinšek, Trustee of S2 INF

Magistrski študijski program druge stopnje Industrijska farmacija zajema vse vidike farmacevtske znanosti v industrijskem okolju. Študijski program traja dve leti in obsega 120 kreditnih točk, strokovni naslov, ki ga pridobijo magistranti, je magister/magistrica industrijske farmacije.

Študijski program z uporabo transdisciplinarnega pristopa omogoča upoštevanje vrste perspektiv z različnih področij in jih združuje z industrijskimi izkušnjami, študijami primerov, dejanskimi projekti in samostojnimi študijami, ki diplomantom nudijo razumevanje najsodobnejših konceptov, pa tudi osnovne in napredne znanstvene tehnologije za pretvorbo znanstvenih raziskav v industrijsko prakso. Pomemben sestavni del študija je pridobivanje praktičnih izkušenj za delo v farmacevtski industriji. Študijski program pripravlja študente na različne karierne možnosti v farmacevtski industriji in na sorodnih področjih. Magistranti se lahko zaposlijo na področju raziskav in razvoja, proizvodnje, nadzora kakovosti, zagotavljanja in upravljanja kakovosti, regulativnih zadev in skrbništva opreme v farmacevtski industriji in njenih dobaviteljih, vendar ne v okviru reguliranega poklica farmacevta.

The master study programme Industrial Pharmacy covers all aspects of pharmaceutical science in an industrial environment. The course uses a transdisciplinary approach to take into account a range of perspectives from different fields and combines them with industry experience, case studies, actual projects and independent studies that offer graduates an understanding of cutting-edge concepts, as well as basic and advanced scientific technologies for transforming scientific research into industrial practice. An important component of the study is gaining practical experience for working in the pharmaceutical industry. The master's programme prepares students for a variety of career opportunities in the pharmaceutical industry and related fields. Graduates can be employed in research and development, manufacturing, quality control, quality assurance and management, regulatory matters and equipment stewardship in the pharmaceutical industry and its suppliers. The study lasts 2 years and enables work in the pharmaceutical-industrial environment, but not within the regulated profession of pharmacist. The professional title obtained by the graduate is a master's degree in industrial pharmacy.

Zadnja leta je v povezavi z zainteresiranimi deležniki, predvsem s sodelovanjem predstavnikov slovenske industrije, potekala razprava o prenovi magistrskega študijskega programa Industrijska farmacija. Na podlagi ugotovitev, kako izboljšati študijski proces za doseganje želenih kompetenc magistrov/magistric industrijske farmacije, smo pripravili spremembe predmetnika študijskega programa, katerega cilj je dobra zaposljivost magistrantov industrijske farmacije in ga bomo prvič začeli izvajati v študijskem letu 2021/2022.

V študijskem letu 2019/2020 je študij zaključilo 35 magistrantov.

In recent years, in connection with interested stakeholders, especially with the participation of representatives of the Slovenian industry, a discussion was held on the renewal of the master study programme Industrial Pharmacy. Based on the findings on how to improve the study process to achieve the desired competences of masters of industrial pharmacy and learning outcomes, we have prepared changes to the curriculum of the study programme, which aims to achieve good employability of industrial pharmacists and will be implemented for the first time in 2021/2022.

In the 2019/2020 academic year 35 graduates completed their study.

Število vseh vpisanih študentov na program S2 INF od študijskega leta 2016/2017 do 2020/2021
Number of all students enrolled in master study programme Industrial Pharmacy from academic year 2016/2017 to 2020/2021:

2016/2017	2017/2018	2018/2019	2019/202	2020/2021
95	108	110	110	116

PREDMETNIK ŠTUDIJSKEGA PROGRAMA S2 INF PO LETNIKIH

1. letnik
Farmacevtska tehnologija
Farmacevtska kemija
Izbirni predmet I
Izbirni predmet II
Biofarmacija s farmakokinetiko
Farmacevtska biotehnologija I
Farmacevtska nanotehnologija I
Analiza zdravil
Izbirni predmet I

Izbirni predmeti – 1. semester
Načrtovanje novih učinkovin
Biološke in toksikološke lastnosti farmacevtskih materialov
Farmacevtska ovojnina
Spektroskopske in separacijske analizne metode
Načrtovanje lastnosti delcev

PROGRAMME CURRICULUM (S2 INF) PER YEARS

First year
Pharmaceutical Technology
Pharmaceutical chemistry
Optional Course I
Optional Course II
Biopharmaceutics and Pharmacokinetics
Pharmaceutical biotechnology
Pharmaceutical Nanotechnology I
Analysis of Medicinals
Optional Course I

Optional Courses – I. semester
Design of New Active Substances
Biological and Toxicological Properties of Pharmaceutical Materials
Pharmaceutical Packaging
Spectroscopic and Separation Analytical Methods
Design of Particle Properties

Izbirni predmet I – 2. semester
Analiza učinkovin in metabolitov v bioloških materialih
Obvladovanje kakovosti v farmacevtski proizvodnji
Biofarmacevtsko vrednotenje farmacevtskih oblik
Predklinične študije
Kozmetologija in kozmetični izdelki
Farmacevtsko tehnološka analitika
Metode vrednotenja bioloških molekul
Farmacevtska biotehnologija II

2. letnik
Industrijski razvoj zdravil
Intelektualna lastnina, legislativa in regulative
Farmacevtsko inženirstvo
Izbirni predmet I in II

Izbirni predmeti I in II – 3. semester
Stabilnost zdravil
Farmakokinetične in klinične študije
Farmacevtska nanotehnologija II
Mikrobiološka kakovost farmacevtskih izdelkov
Farmacevtske oblike s prirejenim sproščanjem
Industrijski mediji in vzdrževanje industrijskega okolja
Farmacevtsko trženje
Fitofarmaki
Vodenje in upravljanje v farmacevtski industriji
Procesno analizne tehnologije
Farmacevtkso procesna oprema

Optional Courses –II. semester
Analysis of Drugs and Metabolites in Biomaterials
Quality Management in Pharmaceutical Production
Biopharmaceutical evaluation of dosage forms
Preclinical studies
Cosmetology and Cosmetic Products
Pharmaceutical-Technological Analysis
Methods for evaluation of biological molecules
Pharmaceutical biotechnology II

Second year
Industrial Development of Medicinals
Intellectual Property, Legislation and Regulations
Pharmaceutical Engineering
Optional Courses I and II

Optional Courses I and II - III. semester
Stability of Medicinals
Pharmacokinetic and clinical studies
Pharmaceutical nanotechnology II
Microbiological Quality of Pharmaceutical Products
Prolonged Release Pharmaceutical Forms
Industrial media and industrial environment maintenance
Pharmaceutical Marketing
Phytopharmaceuticals
Pharmaceutical Industry Administration and Management
Pharmaceutical technological analytics
Pharmaceutical Processing Equipment

DOKTORSKI ŠTUDIJSKI PROGRAM TRETJE STOPNJE BIOMEDICINA (S3 BM)
THE INTERDISCIPLINARY DOCTORAL PROGRAMME IN BIOMEDICINE (S3 BM)

Interdisciplinarni doktorski študijski program Biomedicina traja štiri leta, obsega 240 kreditnih točk. Organizirane oblike študija predstavljajo 60 kreditnih točk, preostalih 180 kreditnih točk pa je namenjenih individualnemu raziskovalnemu delu za doktorsko disertacijo.

Program omogoča pridobitev znanstvenega naslova doktor/doktorica znanosti na naslednjih znanstvenih področjih:

- Biokemija in molekularna biologija
- Farmacija
- Genetika
- Javno zdravje
- Klinična biokemija in laboratorijska biomedicina
- Medicina – klinična usmeritev
- Medicina – temeljna usmeritev
- Medicinska mikrobiologija – vpisani pred študijskim letom 2021/2022 Mikrobiologija
- Nevroznanost
- Toksikologija
- Veterinarska medicina

Program organizira in izvaja pet članic Univerze v Ljubljani in trije raziskovalni inštituti, ki v program vključujejo habilitirane učitelje in znanstvene sodelavce. Sodelujejo pri organiziranih oblikah pouka in mentorstvih ter nudijo raziskovalno infrastrukturo kandidatom za izdelavo doktorskega dela.

Osnovna ideja interdisciplinarnega doktorskega študija Biomedicina, ki se izvaja na več članicah UL, je v veliki izbirnosti, ki bodočim doktorjem znanosti omogoča študij po meri in pridobivanje specifičnih kompetenc, ki jih težko pokriva le ena članicaUL.

UL FFA na študijskem programu izvaja tri znanstvena področja: Farmacija, Klinična biokemija in laboratorijska biomedicina ter Toksikologija.

The duration of the Interdisciplinary Doctoral Programme in Biomedicine is four years (240 ECTS credits). The programme consists of organised classes (60 credits) and individual research work for the doctoral thesis, public presentation of the results, writing of the scientific articles and public dissertation and public defence (180 credits). The direct inclusion of programme components in an international exchange with universities from other countries using the ECTS system is rendered possible.

The programme leads to the degree of doctor/doktorica znanosti in the following fields:

- Basic Medicine
- Biochemistry and Molecular Biology
- Clinical Biochemistry and Laboratory Biomedicine
- Clinical Medicine
- Genetics
- Medical Microbiology
- Neuroscience
- Pharmacy
- Public Health
- Toxicology
- Veterinary Medicine

The programme is organised by the University of Ljubljana through its 5 faculties ((BF, FFA, FKKT, MF in VF) and three Slovene research institutes (IJS, KI, NIB) which contribute teachers who take part in organised courses, mentors and the research infrastructure for executing the experimental part of doctoral work.

The primary emphasis of doctoral study is on research, interdisciplinarity and collaboration between internationally renowned local and foreign experts. One of the essential advantages of the programme is its great selectivity which enables the doctoral students to design individual study programmes by selecting courses from core and both types of elective course pools and thus acquiring the specific competences which could be hardy archived by only one faculty.

Znanstveno področje **Farmacija** poglablja razumevanje teoretskih in metodoloških konceptov na področjih molekularne farmacevtske kemije (struktura, lastnosti, tarče, interakcije in metode načrtovanja učinkovin), farmacevtske biologije (biomolekule kot tarče za diagnostiko in terapijo, biološka, genska in zdravila rastlinskega izvora), farmacevtske tehnologije in nanotehnologije (farmacevtsko tehnološke operacije, dostavni sistemi, nanozdravila), biofarmacije in farmakokinetike s farmakokinetično-farmakodinamično analizo ter socialne farmacije, zdravstvene ekonomike in farmakoepidemiologije. Doktorande usposablja za samostojno kreiranje novega znanja, reševanje najzahtevnejših strokovnih in znanstvenih problemov z interdisciplinarnim pristopom, razvijanje kritične refleksije, razvoj raziskovalnih metod in prenos znanja v prakso. Pridobljeni doktorat znanosti s področja farmacije tako omogoča zaposlitev na najzahtevnejših in najodgovornejših delovnih mestih na širšem področju farmacije in z njo povezanih dejavnosti.

Znanstveno področje **Klinična biokemija in laboratorijska biomedicina** je namenjeno znanstvenemu študiju na področju laboratoratorijske medicine. Doktorandi usmerjajo svoje doktorske naloge v iskanje in/ali vrednotenje novih prognostičnih in diagnostičnih kazalcev. Ne glede na medicinsko-diagnostično področje, ki ga bodo raziskovali, bodo pri tem večinoma izhajali iz novih pristopov personalizirane diagnostike in terapije ter zaključke osnovali na rezultatih naprednih tehnologij genomike, transkriptomike, epigenomike, proteomike in/ali metabolomike. V teoretičnem delu se bodo s stopenjskim pristopom v laboratorijski diagnostiki naučili identificirati vprašanja, izbirati preiskave in oceniti izid za bolnika na modelnih aktualnih področjih, kot so npr. s staranjem povezane bolezni, pogoste bolezni z genetsko osnovo, imunske bolezni, maligne bolezni, itd. Prav tako bodo lahko izbrali teoretične sklope, ki jim bodo omogočili razumevanje različnih pristopov pri pripravi celičnih in kompleksnih tkivnih kultur, namenjenih tako naprednemu zdravljenju kot testnim sistemom za preskušanje delovanja učinkovin

Faculty of Pharmacy is responsible for the organization of three scientific fields: Pharmacy, Clinical Biochemistry and Laboratory Biomedicine and Toxicology.

Scientific field pharmacy deals with scientific principles and methodological approaches in fields of medicinal chemistry (structure, properties, targets and interactions of drugs, drug design methodologies), pharmaceutical biology (biomolecules as targets for diagnosis and therapy, biological, gene and herbal medical products), pharmaceutical technology and nanotechnology (pharmaceutical manufacturing processes, delivery systems, nanotechnology and nanomedicines), biopharmacy and pharmacokinetics including pharmacokinetic-pharmacodynamic analysis, social pharmacy, health economics, and pharmacoepidemiology. The graduates will be highly educated for performing creative and independent scientific research work, solving scientific problems with an interdisciplinary approach, critically assessing research results, developing new research methods and transferring knowledge into practice. Obtained title doctor of pharmacy science will enable employment of highly qualified experts on the most demanding and responsible job positions in the broad field of pharmacy and related discipline.

The doctoral study programme of Clinical Biochemistry and Laboratory Biomedicine focuses on the scientific field of laboratory medicine. The PhD candidates work on discovery and evaluation of new prognostic and diagnostic markers. Independently of the chosen medical-diagnostic field, the candidates will base their research on the novel principles of personalized diagnostics and therapy by applying the advanced genomic, transcriptomic, epigenomic, proteomic and/or metabolomics techniques. The candidates will learn a systematic, tiered approach to laboratory diagnostics and learn to identify the key questions, choose the appropriate laboratory analyses and evaluate the patients' outcome, working on currently actual model fields, such as aging related diseases, common genetic disorders, immune disorders, malignant disorders etc. These candidates will also be able to choose the theoretical topics, which will help them in the best

in snovi *in vitro*. Potrebne veščine in znanja za doktorsko nalogo bodo doktorandi dodatno pridobili z ustreznim naborom individualno raziskovalnih izbirnih predmetov, ki jih izbirajo iz velikega nabora izbirnih vsebin v celotnem doktorskem programu Biomedicina. Na ta način omogoča ta znanstvena smer doseganje kompetenc za kritično razmišljujočega strokovnjaka, ki bo sposoben najti ključne dokaze za prave strokovne odločitve ter oblikovati prihodnji razvoj kvalitetne laboratorijske diagnostike ter klinične biokemije in laboratorijske biomedicine.

Vsebine znanstvenega področja **Toksikologija** vključujejo najnovejše raziskave na področju toksikologije. Doktorandi pridobijo znanja o mehanizmih delovanja spojin, ki so vzrok za toksične učinke. Pri tem spoznajo najsodobnejše tehnike za spremljanje in določanje teh učinkov, vključno z *in silico* metodami napovedovanja toksičnosti snovi, kar jim služi za oceno tveganja za uporabo snovi. Prav tako študij vključuje najnovejša spoznanja in metode, uporabljene na področju ekotoksikologije. Ta znanja dajejo doktorandom široke kompetence dela na področju toksikologije.

Značilnosti študija na UL FFA so visoka motiviranost študentov, velika interdisciplinarnost programov, raznolikost študijskih pristopov in dobra povezanost s potencialnimi delodajalci tako v gospodarstvu (farmacevtska industrija, veledrogerije, predstavništva) kot v javnem sektorju (lekarne, bolnišnice, medicinski laboratoriji).

V študijskem letu 2019/2020 je študij zaključilo 19 doktorandov.

possible way to understand the different approaches to cell culturing and complex tissue culture preparation, developed for both advanced medical therapies as well as for testing the effects of different drugs and compounds *in vitro*. The necessary skills for the preparation of the doctoral project and thesis will also be obtained through the selection of appropriate individual-research courses out of a wide range of courses available through the Biomedicine doctoral programme. In this way, the candidates achieve all the competences and strategies for critical thinking of a laboratory medicine expert, able to find key evidence for the right professional decisions and shape the future development of quality laboratory diagnostics and clinical biochemistry and laboratory biomedicine.

Thus, the content of the toxicology science area includes the latest research in the field of toxicology. Doctoral students acquire knowledge about the mechanisms of action of substances that cause toxic effects. In doing so, the students learn state-of-the-art techniques for monitoring and determining these effects, including *in silico* methods for predicting the toxicity of substances, all of which are used to assess the risk associated with the use of the substance. The course also covers the latest findings and methods in ecotoxicology. This knowledge provides PhD students with broad skills for working in different field of toxicology.

The characteristics of studying at UL FFA are high student motivation, high interdisciplinarity of the programmes, diversity of study approaches and good connections with potential employers in the real sector (pharmaceutical industry, wholesalers, representative offices) and in the public sector (pharmacies, hospitals, medical laboratories).

In the 2019/2020 academic year 19 graduates completed their study.

Število vseh vpisanih študentov na program S3 Biomedicina od študijskega leta 2016/2017 do 2020/2021
Number of all students enrolled in the interdisciplinary doctoral study programmes of Biomedicine from academic 2016/2017 to 2020/2021:

2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
70	78	90	93	102

ŠTUDENTI IN DIPLOMANTI 2019/2020

ŠTEVILO ŠTUDENTOV

V študijskem letu 2019/2020 je bilo na vseh programih dodiplomskega in podiplomskega študija UL FFA vpisanih 1454 študentov.

V študijskem letu 2019/2020 je zaključilo študij:

- 264 diplomantov na 1. in 2. stopnji (127 EM FAR, 33 S1 KOZ, 40 S1 LBM, 35 S2 INF, 29 S2 LBM),
- 19 doktorandov na 3. stopnji.

STUDENTS AND GRADUATES IN 2019/2020

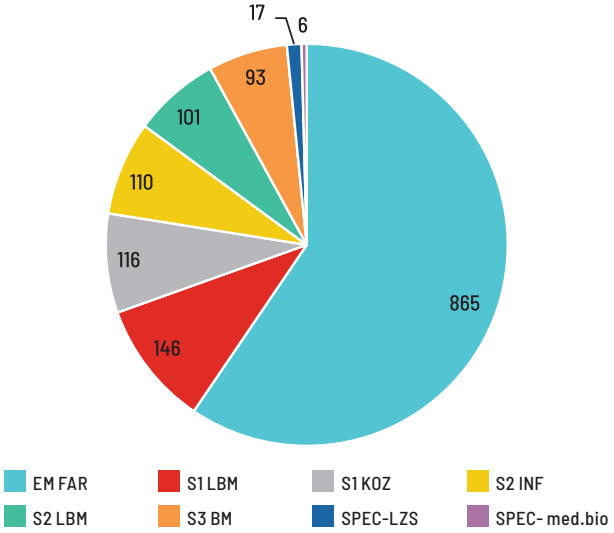
NUMBER OF STUDENTS

In the academic year 2019/2020, 1454 students were enrolled in the undergraduate and graduate programmes at the University of Ljubljana's Faculty of Pharmacy.

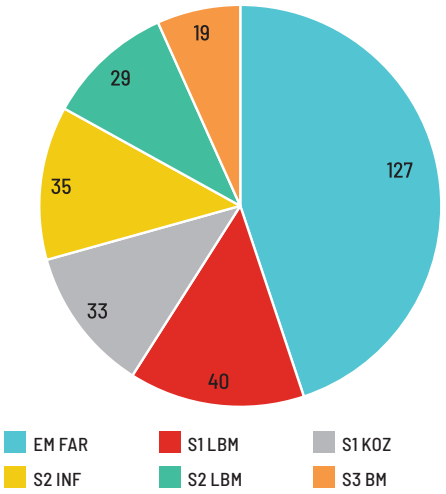
In the academic year 2019/2020 there were:

- 264 graduates in cycles 1 and 2 (127 EM FAR, 33 S1 KOZ, 40 S1 LBM, 35 S2 INF, 29 S2 LBM), and
- 19 graduates in cycle 3.

ŠTUDENTI PO ŠTUDIJSKIH PROGRAMIH V 2019/2020
STUDENTS BY PROGRAMME, 2019/2020



DIPLOMANTI PO ŠTUDIJSKIH PROGRAMIH V 2019/2020
GRADUATES BY PROGRAMME, 2019/2020



EM FAR - enoviti magistrski študijski program Farmacija)/Pharmacy (uniform master study programme Pharmacy); **S1 LBM - Univerzitetni študijski program Laboratorijska biomedicina (1. stopnja)/**Laboratory Biomedicine (the academic bachelor study programme); **S1 KOZ - Univerzitetni študijski program Kozmetologija (1. stopnja)/**Cosmetology (the academic bachelor study programme); **S2 INF - Magistrski študijski program Industrijska farmacija (2. stopnja)/**Industrial Pharmacy (the master study programme); **S2 LBM - Magistrski študijski program Laboratorijska biomedicina (2. stopnja)/**Laboratory Biomedicine (the master study programme); **S3 BM - Biomedicina (3. stopnja): področja Farmacija, Klinična biokemija in laboratorijska biomedicine ter Toksikologija/**Biomedicine (doctorate) in Pharmacy, Clinical Biochemistry and Laboratory Biomedicine and Toxicology; **SPEC - Specializacija v sodelovanju z Lekarniško zbornico Slovenije za področja: Klinična farmacija, Lekarniška farmacija, Oblikovanje zdravil, Preizkušanje zdravil in Farmakognozija ter v sodelovanju z Zbornico laboratorijske medicine Slovenije za področje Medicinske biokemije/**Certificate in collaboration with the Pharmacy Chamber of Slovenia in clinical pharmacy, community pharmacy, medicinal design, medicinal testing, and pharmacognosy, and in collaboration with the Laboratory Medicine Chamber of Slovenia in medical biochemistry

ZNANSTVENA, RAZISKOVALNA IN STROKOVNA DEJAVNOST

V letu 2020 se je UL FFA kot matična izobraževalna in raziskovalna ustanova na področjih farmacije, klinične kemije in laboratorijske biomedicine, intenzivno odzvala na izziv pandemije COVID-19, s katero se sooča naša družba in svet. Pri tem je identificirala potencialno pomembna raziskovalna področja in preusmerila del lastnih bazičnih in aplikativnih raziskav. V ta namen smo s prijavami usmerjenih raziskav programskih skupin fakultete pri ARRS uspeli zagotoviti dodatno financiranje tovrstnih raziskav v obsegu 3,5 FTE. Nekateri predlogi projektov, usmerjenih v obvladovanje pandemije COVID-19, so bili v 2020 z ustreznimi komplementarnimi partnerji pripravljeni in jih bomo prijavljali na nacionalne in mednarodne raziskovalne razpise v 2021. Pričakujemo, da bomo s tem pristopom prispevali sorazmeren del v nastajajočem mozaiku znanja na področju okužb s SARS-CoV-2.

V letu 2020 je UL FFA na področju raziskav in razvoja dosegla naslednje vidne uspehe:

- V sodelovanju z raziskovalno skupino IJS je objavila rezultate aktualne in strateško pomembne raziskave o vstopu SARS-CoV-2 in drugih korona virusov v celice in pri virusni replikaciji.
- Na podlagi kontinuiranih naporov v raziskovalnem delu zadnjih let in kulture prijavljanja raziskovalnih projektov je UL FFA glede na 2019 v 2020 uspela povečati obseg tovrstnega financiranja raziskovalnega dela za 4,2 FTE.
- Raziskovalna skupina UL FFA je v 2020 uspešno zaključila raziskovalno delo v okviru prestižnega mednarodnega projekta ENABLE – European Gram Negative AntiBacterial Engine (IMI), ki se je pričelo konec leta 2018.
- Zaposleni UL FFA so v 2020 prejeli vidna priznanja:
  - članstvo v Evropski akademiji znanosti in umetnosti (EASA),

RESEARCH AND PROFESSIONAL ACTIVITIES

In 2020 the UL FFA, being native educational and research institution in the fields of pharmacy, clinical chemistry and laboratory biomedicine, intensively responded to the challenge of the COVID-19 pandemic, that is burdening our society and the world. Researchers of the faculty have identified potentially important research areas and redirected part of their basic and applied research. By applying to specific calls at the ARRS, faculty programme groups managed to secure additional funding for identified research areas in the amount of 3.5 FTE. Some project proposals, aimed at managing the COVID-19 pandemic, have been prepared in 2020 together with relevant complementary research partners and will be submitted to national and international research calls in 2021. It is expected that this approach will contribute to the emerging knowledge mosaic in the field of Sars-CoV-2 infections.

In 2020 the UL FFA accomplished several excellent achievements in the field of research and development:

- In collaboration with the IJS research group, the researchers of the UL FFA published the results of a current and strategically important study on the entry of Sars-CoV-2 and other coronaviruses into cells and within the viral replication path.
- Based on continuous research efforts in recent years and on the culture of applying for research projects, the UL FFA managed to increase the extent of the research funding by 4.2 FTE in 2020 compared to 2019.
- In 2020 the UL FFA research group successfully completed research activities within the prestigious international project ENABLE - European Gram Negative AntiBacterial Engine (IMI), which began in 2018.
- In 2020 the employees of the UL FFA received visible recognitions:
  - membership of the European Academy of Sciences and Arts (EASA),

- globalno Novartisovo nagrado »VIVA Leading Science Award«,
- ekipa zaposlenih UL FFA je osvojila 2. mesto na razpisu rektorjeve nagrade za naj inovacijo Univerze v Ljubljani 2020.

Raziskovalne dosežke je UL FFA (oz. njeni sodelavci) objavljala v prestižnih publikacijah s področja naravoslovja in medicine, s katerimi je dosegala znatno družbeno odmevnost. Kljub oviram epidemije je UL FFA v 2020 ohranila sodelovanje s ključnimi gospodarskimi subjekti na področju farmacije doma in v tujini. Ključni kazalci uspešnosti raziskovalnega dela (število objav, število citatov in količina FTE) so pokazali, da je UL FFA tudi v letu 2020 glede na predhodno leto beležila znatno pozitivno rast, kar potrjuje trend konstantne rasti raziskovalnih dosežkov UL FFA v zadnjem štiriletnem obdobju.

OBJAVE IN CITIRANOST DEL V LETU 2020

Raziskovalci UL FFA so v letu 2020 objavili 190 znanstvenih člankov, od tega 162 v revijah s faktorjem vpliva (SCI), kar je največ po letu 2011. V revijah s SCI je bilo objavljenih 135 izvirnih in 26 preglednih znanstvenih člankov ter 1 kratek znanstveni prispevek.

V letu 2020 so objavljena dela UL FFA prejela 5252 čistih citatov, kar predstavlja konstantno rast (za 13 % več kot leto prej).

Preglednica spodaj ponazarja vire financiranja raziskovalne dejavnosti in razmerje znanstvenih člankov glede na FTE, financiranih iz virov ARRS in EU. Faktor učinkovitosti števila znanstvenih objav s SCI glede na FTE (ARRS in EU) je v letu 2020 znašal 3,0 članke s SCI/FTE.

- Global Novartis Award "VIVA Leading Science Award",
- the team of UL FFA employees won the second prize in the 2020 call for Chancellor's Prize for Innovation of the University of Ljubljana.

Research achievements in the field of natural sciences and medicine were published in prestigious journals with high impact factors. Through citations, publications have gained visible recognition of scientific community. Despite the obstacles of the epidemic, UL FFA maintained the collaboration in 2020 with distinguished industrial partners in the field of pharmacy, home and abroad. All key indicators of successful research work (number of announcements, number of citations and amount of FTE) continued to grow in 2020, which confirms continuous growth of the UL FFA research achievements in the last four years.

PUBLICATIONS AND CITATION OF WORKS IN 2020

In 2020 the researchers at the Faculty of Pharmacy published 190 research articles, of which 162 were in journals listed in the Science Citation Index (SCI), the highest output since 2011. Altogether, 135 original articles, 26 review articles and 1 short research article were published in SCI journals.

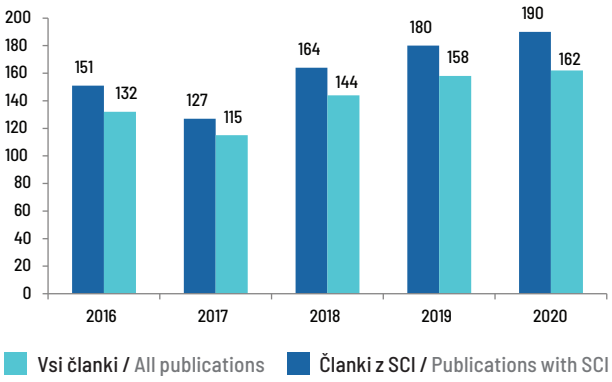
In 2020 the published works of the Faculty of Pharmacy received 5.252 pure citations, which represents a constant growth over the years (e.g. 13 % more than the previous year).

Table illustrates the sources of funding for research activities and the ratio of research articles in terms of FTE, financed from ARRS and EU sources. In 2020 the effectiveness of the number of research publications with SCI per 1 FTE (ARRS and EU) was 3.0.

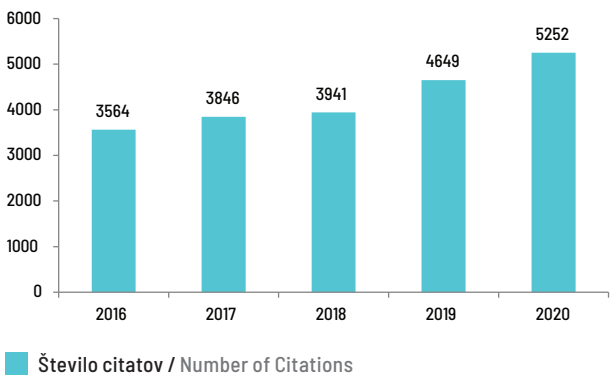
Razmerje objavljenih znanstvenih člankov raziskovalcev in višina financiranja iz virov ARRS in EU
Ratio between research articles and FTE researchers financed by EU/ARRS

Leto	Sredstva za raziskovalce (FTE)/ Founds for researchers (FTE)				Število vseh znanstvenih člankov/FTE/ Number of all research publications/FTE	Število člankov v revijah s SCI/FTE/ Number of publications with SCI/FTE
	ARRS Projekti in programi/ Projects and programmes	MR	EU	Skupaj/Total		
2011	15.42	19.60	6.33	41.35	3.9	3.4
2012	17.55	20.30	4.95	42.80	4.0	3.0
2013	17.96	18.28	8.20	44.44	3.4	3.0
2014	19.80	16.80	8.20	44.8	3.2	2.7
2015	19.06	13.80	5.50	38.36	4.0	3.5
2016	23.22	16.83	2.24	42.29	3.6	2.9
2017	21.49	15.10	1.00	37.59	3.4	3.1
2018	24.31	16.6	2.3	43.21	3.8	3.3
2019	26.20	17.25	2.00	45.45	4.0	3.5
2020	32.31	19.65	2.50	54.46	3.5	3.0

ŠTEVILO ZNANSTVENIH OBJAV
NUMBER OF SCIENTIFIC PUBLICATIONS



ŠTEVILO CITATOV
NUMBER OF CITATIONS



PROJEKTI IN PROGRAMI

Raziskovalno delo na UL FFA je potekalo pod okriljem štirih programskih skupin ter v okviru številnih projektov. V letu 2020 so bili nacionalni raziskovalni programi ARRS financirani v obsegu 16,02 FTE. UL FFA je izvajala še 37 raziskovalnih projektov, večje število razvojno-raziskovalnih projektov z gospodarstvom, druge nacionalne in evropske projekte ter več drugih mednarodnih in bilateralnih projektov. V letu 2020 smo pridobili 6 novih mladih raziskovalcev.

Z uspešnimi prijavami na razpise ARRS smo v 2020 uspeli povečati obseg financiranja.

NACIONALNI PROGRAMI IN PROJEKTI

RAZISKOVALNI PROGRAMI UL FFA

- Farmacevtska tehnologija: od dostavnih sistemov učinkovin do terapijskih izidov zdravil pri otrocih in starostnikih P1-0189
  (vodja prof. dr. Albin Kristl, obseg 3,93 FTE)
- Farmacevtska kemija: načrtovanje, sinteza in vrednotenje učinkovin P1-0208
  (vodja prof. dr. Stanislav Gobec, obseg: 7,97 FTE)
- Farmacevtska biotehnologija: znanost za zdravje P4-0127
  (vodja prof. dr. Janko Kos, obseg na UL FFA: 1,93 FTE)
- Klinična biokemija: geni, hormonske in osebnostne spremembe pri metabolnih motnjah P3-0298
  (vodja prof. dr. Andrej Janež, UKC Ljubljana; koordinatorica na UL FFA prof. dr. Janja Marc, obseg na UL FFA: 2,19 FTE)

RAZISKOVALNI PROJEKTI UL FFA

<u>Temeljni raziskovalni projekti ARRS</u>

- J4-8227 – Preprečevanje rezistence tumorskih celic na antiproteazno terapijo z inhibitorji katepsina X.
  (nosilec: prof. dr. Janko Kos)

PROJECTS AND PROGRAMMES

The faculty's research work was carried out under the auspices of four programme groups and in the framework of multitude of projects. In 2020 the ARRS's national research programmes were financed to the extent of 16.02 FTE. The Faculty of Pharmacy also carried out 37 research projects, a large number of research development projects in cooperation with industry, other national and European projects, and several other international and bilateral projects. In 2020 we acquired six new junior researchers.

With successful applications to the ARRS programme and project calls, we managed to increase the extent of financing.

NATIONAL-PROGRAMMES AND PROJECTS

FACULTY OF PHARMACY RESEARCH-PROGRAMMES

- Pharmaceutical technology: From delivery systems for active ingredients to drugs' therapeutic results in children and older people - P1-0189
  (PI: Prof. Dr. Albin Kristl; extent: 3. 93 FTE)
- Pharmaceutical chemistry: Planning, synthesis and evaluation of active ingredients - P1-0208
  (PI: Prof. Dr. Stanislav Gobec; extent: 7.97 FTE)
- Pharmaceutical biotechnology: Science for health - P4-0127
  (PI: Janko Kos; extent: 1.93 FTE)
- Genes, hormonal and personality changes in metabolic disorders - P3-0298
  (PI: Andrej Janež from the Ljubljana University Medical Centre; coordinator at the Faculty of Pharmacy: Janja Marc; extent at UL FFA: 2.19 FTE)

FACULTY OF PHARMACY RESEARCH PROJECTS

<u>ARRS basic research projects</u>

- J4-8227 - Cathepsin X inhibitors impair the resistance of tumor cells to antiprotease therapy
  (PI: Prof. Dr. Janko Kos)

- J1-8140 – Endokrini in genotoksični potencial inhibitorjev proteinskih kinaz: pomen za tveganje za okolje in zdravje ljudi
  (koordinatorica na UL FFA: prof. dr. Marija Sollner Dolenc, nosilka: prof. dr. Metka Filipič, NIB)
- J3-8207 – Novi izzivi folatne terapije v porodništvu in ginekologiji
  (koordinatorica na UL FFA: prof. dr. Irena Mlinarič-Raščan, nosilka: prof. dr. Ksenija Geršak, UKC LJ)
- J1-8145 – Dinamični vidik vezave ligandov na proteine
  (koordinator na UL FFA: prof. dr. Stanislav Gobec, nosilka: prof. dr. Simona Golič Grdadolnik, KI)
- J1-8152 – Inhibicija prenove celične stene Staphylococus aureus
  (koordinator na UL FFA: prof. dr. Marko Anderluh, nosilec: prof. dr. Dušan Turk, IJS)
- J3-8210 – Potencial nizkih, sub-terapevtskih odmerkov statinov in sartanov v primarni in sekundarni preventivi srčno-žilnih bolezni
  (koordinatorica na UL FFA: prof. dr. Janja Marc, nosilka: prof. dr. Mirza Šabovič, UKC LJ)
- J3-9256 – Razvoj agonistov receptorja NOD2 ter dualnih NOD2/TLR7 agonističnih konjugatov kot novih adjuvansov za cepiva
  (nosilec: izr. prof. dr. Žiga Jakopin)
- J1-9192 – Nove protitumorne učinkovine napetostno odvisnih kalijevih kanalov hEag1 in njihova validacija v limfomih
  (nosilka: prof. dr. Lucija Peterlin Mašič)
- J1-9194 – Nanozdravila z antibiotiki in probiotiki za lokalno zdravljenje parodontalne bolezni
  (nosilka: prof. dr. Julijana Kristl)
- J3-9267 – Zaviranje aktivnosti katepsina X kot nov pristop za zdravljenje Parkinsonove bolezni
  (nosilka: doc. dr. Anja Pišlar)
- J4-9327 – Ciljanje, slikanje in zdravljenje kolorektalnega raka z varnimi teranostičnimi bakterijami
  (koordinator na UL FFA: prof. dr. Janko Kos, nosilec: prof. dr. Aleš Berlec, IJS)

- J1-8140 - Endocrine and genotoxic potential of inhibitors of protein kinases: Significance for environmental and human health risks
  (coordinator at the Faculty of Pharmacy: Prof. Dr. Marija Sollner Dolenc; PI: Prof. Dr. Metka Filipič, National Institute of Biology)
- J3-8207 - New frontiers in folate supplementation in obstetrics and gynaecology (NFFS OB-GYN)
  (coordinator at the Faculty of Pharmacy: Prof. Dr. Irena Mlinarič-Raščan; PI: Prof. Dr. Ksenija Geršak, Ljubljana University Medical Centre)
- J1-8145 - Dynamic aspect of ligand-protein binding
  (coordinator at the Faculty of Pharmacy: Prof. Dr. Stanko Gobec; PI: Prof. Dr. Simona Golič Grdadolnik, National Institute of Chemistry)
- J1-8152 - Inhibition of cell wall regeneration in Staphylococcus aureus
  (coordinator at the Faculty of Pharmacy: Prof. Dr. Marko Anderluh; PI: Prof. Dr. Dušan Turk, Jožef Stefan Institute)
- J3-8210 - Potential of low, sub-therapeutic doses of statins and sartans in the primary and secondary prevention of cardiovascular diseases
  (coordinator at the Faculty of Pharmacy:
  Prof. Dr. Janja Marc; PI: Prof. Dr. Mirza Šabovič, Ljubljana University Medical Centre)
- J3-9256 - Development of NOD2 agonists and dual NOD2/TLR7 agonistic conjugates as novel vaccine adjuvants
  (PI: Assoc. Prof. Dr. Žiga Jakopin)
- J1-9192 - New anticancer leads for emerging cancer target potassium ion channels hEag1 and its validation in lymphoma tumors
  (PI: Prof. Dr. Lucija Peterlin Mašič)
- J1-9194 - Nanomedicines with antibiotics and probiotics for local treatment of periodontal disease
  (PI: Prof. Dr. Julijana Kristl)

  J3-9267 - Inhibition of cathepsin X activity as a novel strategy for the treatment of Parkinson's disease
  (PI: Assist. Prof. Dr. Anja Pišlar)
- J4-9327 - Targeting, imaging, and treating of colorectal cancer with safe theranostic bacteria
  (coordinator at the Faculty of Pharmacy: Prof. Dr. Janko

- J3-1749 – Mezenhimske matične celice – nosilci endogene regenerativne sposobnosti tkiv v boju proti staranju mišično-skeletnega sistema (nosilka: doc. dr. Janja Zupan)
- J1-1717 – Razvoj novih zaviralcev Hsp90 s protitumornim delovanjem (nosilec: izr. prof. dr. Tihomir Tomašič)
- J3-1759 – Celostna karakterizacija zadetkov analiz GWAS – pot do novih terapevtskih tarč za anabolno zdravljenje osteoporoze (GWASforAna) (nosilka: prof. dr. Janja Marc)
- J3-1745 – Vloga imunoproteasoma v oblikovanju imunskega odziva, posredovanega s trombociti (nosilka: doc. dr. Martina Gobec)
- J4-1776 – Izboljšanje imunoterapevtske vrednosti NK celic z modulacijo cistatina F (koordinator na UL FFA: prof. dr. Janko Kos, nosilec: prof. dr. Janko Kos, IJS)
- J4-1778 – Uporaba malega proteina bakteriofaga v boju proti razvoju odpornosti proti antibiotikom pri bakteriji Staphylococcus aureus (koordinator na UL FFA: prof. dr. Stanislav Gobec, nosilec: doc. dr. Matej Butala, UL BF)
- J1-1715 – Atlas proteinskih interakcij za napovedovanje genskih variacij, povezanih z interakcijami z zdravili in razvojem bolezni (koordinator na UL FFA: prof. dr. Stanislav Gobec, nosilka: prof. dr. Dušanka Janežič, UP FAMNIT)
- J1-1709 – Strukturni vpogled v mehanizem tvorbe površine bakterije Clostridium difficile (koordinator na UL FFA: izr. prof. dr. Janez Mravljak, nosilec: prof. dr. Dušan Turk, IJS)
- J4-1767 – Selektivna ekstrakcija molekul z visoko vrednostjo za sektor specialnih kemikalij iz ostankov predelave lesa (koordinator na UL FFA: prof. dr. Samo Kreft, nosilka: dr. Andreja Kutnar, InnoRenew CoE)
- J1-2485 – Poljub smrti glavnim dejavnikom apoptoze: razvoj razgrajevalcev proteinov BCL-2 in BAX (nosilec: doc. dr. Izidor Sosič)

Kos, PI: Prof. Dr. Aleš Berlec, Jožef Stefan Institute)
- J3-1749 - Mesenchymal stem cells-the keepers of tissue endogenous regenerative capacity facing up to aging of the musculoskeletal system (PI: Assist. Prof. Dr. Janja Zupan)
- J1-1717 - Development of novel Hsp90 inhibitors with anticancer activity (PI: Assoc. Prof. Dr. Tihomir Tomašič)
- J3-1759 - Comprehensive characterization of GWAS hits - pipeline to novel drug targets for anabolic treatment of osteoporosis (GWASforAna) (PI: Prof. Dr. Janja Marc)
- J3-1745 - Elucidating the role of immunoproteasome in platelet-driven immune response (PI: Assist. Prof. Dr. Martina Gobec)
- J4-1776 - Improvement of immunotherapeutic potential of NK cells through modulation of cystatin F (coordinator at the Faculty of Pharmacy: Prof. Dr. Janko Kos, PI: Prof. Dr. Janko Kos, Jožef Stefan Institute)
- J4-1778 - Exploitation of a virus-borne small protein to combat antibiotic resistance in Staphylococcus aureus (coordinator at the Faculty of Pharmacy: Prof. Dr. Stanislav Gobec, PI: Assist. Prof. Dr. Matej Butala, University of Ljubljana, Biotechnical faculty)
- J1-1715 - Protein interaction atlas for prediction of genetic variations involved in drug interactions and disease development (coordinator at the Faculty of Pharmacy: Prof. Dr. Stanislav Gobec, PI: Prof. Dr. Dušanka Janežič, University of Primorska, FAMNIT)
- J1-1709 - Structural insight into the mechanism of Clostridium difficile surface formation (coordinator at the Faculty of Pharmacy: Assoc. Prof. Dr. Janez Mravljak, PI: Prof. Dr. Dušan Turk, Jožef Stefan Institute)
- J4-1767 - Selective extraction of high value molecules from forest products processing residues in thespeciality chemicals sector (coordinator at the Faculty of Pharmacy: Prof. Dr. Samo Kreft, PI: Dr. Andreja Kutnar, InnoRenew CoE)
- J1-2485 - Development of antibacterial compounds targeting validated enzymes in peptidoglycan biosynthesis (PI: Assist. Prof. Dr. Izidor Sosič)

- J1-2483 – Radiofarmaki z antagonističnim delovanjem na CCK2R
  (nosilec: prof. dr. Marko Anderluh)
- J3-2517 – Razvoj himernih multiplih agonistov receptorjev prirojene imunosti kot učinkovitih adjuvansov za cepiva
  (nosilec: izr. prof. dr. Žiga Jakopin)
- J1-2484 – Razvoj protibakteriskih učinkovin z delovanjem na validirane tarče v biosintezi peptidoglikana
  (nosilec: prof. dr. Stanislav Gobec)
- J3-2518 – Proteini APOBEC in onkogeneza virusov HPV
  (koordinatorica na UL FFA: doc. dr. Marija Nika Lovšin, nosilka: doc. dr. Martina Bergant Marušič, UNG)
- J3-2521 – Vnetni procesi pri intersticijskem cistitisu in ovrednotenje delovanja agonistov kanabinoidnih receptorjev sečnega mehurja
  (koordinatorica na UL FFA: izr. prof. dr. Mojca Kerec Kos, nosilec: prof. dr. Peter Veranič, UL MF)
- J7-2603 – Učinkovitost bakteriofagov za zdravljenje ekstracelularnih in intracelularnih bakterijskih okužb implantatov
  (koordinatorica na UL FFA: doc. dr. Janja Zupan, nosilec: izr. prof. dr. Aleš Podgornik, UL FKKT)

Aplikativni raziskovalni projekti ARRS

- L1-8157 – Razvoj multifunkcionalnih učinkovin za zdravljenje Alzheimerjeve bolezni
  (nosilec: prof. dr. Stanislav Gobec)

Ciljni raziskovalni programi

- V1-1914 – Izbor in priprava dosjeja potencialno nevrotoksične kemikalije z uporabo *in silico* metod za namen izvajanja evropske kemijske zakonodaje REACH
  (koordinatorica na UL FFA: prof. dr. Marija Sollner Dolenc, nosilec: doc. dr. Marjan Vračko Grobelšek, KI)

- J1-2483 - Radiopharmaceuticals with antagonistic activity on CCK2R
  (PI: Prof. Dr. Marko Anderluh)
- J3-2517 - Development of innate immune receptor-targeting chimeras as custom-tailored vaccine adjuvants
  (PI: Assoc. Prof. Dr. Žiga Jakopin)
- J1-2484 - Development of antibacterial compounds targeting validated enzymes in peptidoglycan biosynthesis
  (PI: Prof. Dr. Stanislav Gobec)
- J3-2518 - Role of APOBEC proteins in the oncogenesis of HPV viruses
  (coordinator at the Faculty of Pharmacy: Assist. Prof. Dr. Marija Nika Lovšin, PI: Assist. Prof. Dr. Martina Bergant Marušič, University of Nova Gorica)
- J3-2521 - Inflammatory process in interstitial cystitis and evaluation of the influence of cannabinoid receptor agonists in urinary bladder - from cells to patients
  (coordinator at the Faculty of Pharmacy: Assoc. Prof. Dr. Mojca Kerec Kos, PI: Prof. Dr. Peter Veranič, University of Ljubljana, Medicine faculty)
- J7-2603 - Efficacy of bacteriophages for treatment of extracellular and intracellular bacterial infections of implantants
  (coordinator at the Faculty of Pharmacy: Assist. Prof. Dr. Janja Zupan, PI: Assoc. Prof. Dr. Aleš Podgornik, University of Ljubljana, Chemistry and Chemical Technology faculty)

ARRS's applied research projects

- L1-8157 - Development of multifunctional compounds for treatment of Alzheimer's disease
  (PI: Prof. Dr. Stanislav Gobec)

Target research programmes

- V1-1914 - Selection and preparation of a dossier potentially neurotoxic chemical using *in silico* methods for the purpose of implementing the European chemical legislation REACH
  (coordinator at the Faculty of Pharmacy: Prof. Dr. Marija Sollner Dolenc; PI: Assist. Prof. Dr. Marjan Vračko Grobelšek, National Institute of Chemistry)

- V4-2038 – DNK cepiva in peptidni inhibitorji proti SARS-CoV-2
  (koordinator na UL FFA: prof. dr. Borut Štrukelj, nosilec: prof. dr. Roman Jerala, KI)

Podoktorski raziskovalni projekti

- Z1-9195 – Zaviralci butirilholin-esteraze za lajšanje simptomov Alzheimerjeve bolezni
  (nosilec: asist. dr. Urban Košak)
- Z1-1859 – Kovalentni zaviralci: zaviranje monoamin oksidaze preko nekatalitskih aminokislinskih ostankov
  (nosilec: doc. dr. Damijan Knez)
- Z1-2635 – Modularna asimetrična totalna sinteza biološko aktivnih naravnih produktov z več kiralnimi centri
  (nosilec: asist. dr. Andrej Emanuel Cotman)

DRUGI NACIONALNI PROJEKTI

- NC-0009 – Razvoj novih karbamatnih sond za holinestereze
  (nosilec: prof. dr. Stanislav Gobec)
- N1-0068 – Identifikacija nepeptidnih inhibitorjev imunoproteasoma z metodami razvoja učinkovin na osnovi fragmentov
  (nosilec: prof. dr. Stanislav Gobec)
- N1-0098 – Odkrivanje in mehanizem delovanja novih spojin vodnic hEag1 kalijevih kanalov s protirakavim delovanjem
  (nosilec: prof. dr. Lucija Peterlin Mašič)
- Raziskovalci na začetku kariere 2.0
  (Validacija imunoproteasoma kot terapevtske tarče in razvoj inhibitorjev, prijaviteljica: dr. Eva Ogorevc)
- Raziskovalci na začetku kariere 2.1
  (Razvoj in vpeljava naprednih analitskih pristopov, ki temeljijo na kvantitativni uporabi masne spektrometrije med razvojem biofarmacevtskih učinkovin, prijaviteljica: dr. Eva Kranjc)
- Raziskovalci na začetku kariere 2.1
  (Strukturna karakterizacija proteinov v trdnih farmacevtskih oblikah, prijavitelj: dr. Aljoša Bolje)

- V4-2038 - DNA vaccine and peptide inhibitors against Sars-CoV-2
  (coordinator at the Faculty of Pharmacy: Prof. Dr. Borut Štrukelj, PI: Prof. Dr. Roman Jerala, National Institute of Chemistry)

Post-doctoral research projects

- Z1-9195 - Butyrylcholinesterase inhibitors for alleviating symptoms of Alzheimer's disease
  (PI: Assist. Dr. Urban Košak)
- Z1-1859 - Targeted covalent inhibitors: inhibiting monoamine oxidase through non-catalytic amino-acid residues
  (PI: Assist. Prof. Dr. Damijan Knez)
- Z1-2635 - Modular asymmetric total synthesis of bioactive multi-chiral natural products
  (PI: Assist. Dr. Andrej Emanuel Cotman)

OTHER NATIONAL PROJECTS

- NC-0009 - Development of new carbamate-based imaging probes for cholinesterases
  (PI: Prof. Dr. Stanislav Gobec)
- N1-0068 - Identification of non-peptidic inhibitors of the immunoproteasome using fragment based drug discovery methods
  (PI: Prof. Dr. Stanislav Gobec)
- N1-0098 - Discovery and mechanism of action of novel hEag1 potassium channel lead molecules with anti-cancer activity
  (PI: Prof. Dr. Lucija Peterlin Mašič)
- Researchers at the beginning of career 2.0
  (Validation of immunoproteasome as a therapeutic target and development of inhibitors; applicant: Dr. Eva Ogorevc)
- Researchers at the beginning of career 2.1
  (Development and introduction of advanced analytical approaches based on quantitative mass spectroscopy into development of biopharmaceutical active compounds; applicant: Dr. Eva Kranjc)
- Researchers at the beginning of career 2.1
  (Structural characterization of proteins formulated into solid dosage forms; applicant: Dr. Aljoša Bolje)

MEDNARODNI RAZISKOVALNI PROJEKTI V 2020

EU PROJEKTI

PhD4GlycoDrug

UL FFA je v okviru programa Obzorje 2020, Marie Skłodowska-Curie Innovative Training Networks, pridobila štiriletni projekt European Joint Doctorate z akronimom PhD4GlycoDrug. PhD4GlycoDrug projekt je skupni evropski doktorski program na področju odkrivanja in razvoja spojin vodnic na osnovi ogljikovih hidratov z delovanjem na lektinske receptorje in encime, ki vežejo in procesirajo ogljikove hidrate. Skupni izobraževalni in raziskovalni program konzorcija PhD4GlycoDrug vključuje vse faze razvoja do spojine vodnice, od identifikacije in karakterizacije novih tarč, odkrivanja novih bioaktivnih spojin, njihove optimizacije in biokemijskega vrednotenja v sistemih *in vitro* ter *in vivo.* Koordinator projekta na UL FFA je prof. dr. Marko Anderluh.

Evropska noč raziskovalcev 2020

V okviru programa Obzorje 2020, Marie Skłodowska-Curie Actions, je na UL FFA potekala Evropska noč raziskovalcev z naslovom »Humanistika, to si ti!« s poudarkom na vedah o ljudeh.

Sodelavci UL FFA so izvajali različne aktivnosti, in sicer v sklopu 16 delavnic in predavanj: destilacija aromatičnih rastlin, predavanje o diabetesu, izdelava naravne kozmetike (kopalne krogle), izolacija DNA, delavnica o tem, kako nastane tableta, predavanje o krvnih celicah in krvnih skupinah, predstavitev računalniških metod kot alternativi testiranja na živalih, seminar o sijoči koži in zdravih zobkih za širok nasmeh, izdelava slončkove zobne kreme, srebrovega zrcala in svetleče lave, predstavitev zdravil prihodnosti, seminar o vitaminih in mineralih (»Jejmo mavrico.«), predstavitev »Moj poklic – farmacevt« in virtualni ogled Lekarne Mirje.

INTERNATIONAL RESEARCH PROJECTS IN 2020

EU projects

PhD4GlycoDrug

In the context of Horizon 2020 Marie Skłodowska-Curie Innovative TRAINING NETWORKS, the UL FFA acquired a four-year European Joint Doctorate with acronym PhD4GlycoDrug. PhD4GlycoDrug project is a common European doctoral programme in the field of discovery and development of lead compounds based on carbohydrate structure, with the action on lectin receptors and enzymes that bind and process carbohydrates. The joint education and research programme of the consortium PhD4GlycoDrug includes all stages of development till the lead compound, from the identification and characterization of new targets, discovery of new bioactive compounds, their optimization and biochemical evaluations in *in vitro* and *in vivo* systems. Project coordinator at the Faculty of Pharmacy is Prof. Dr. Marko Anderluh.

European Researchers Night

In the context of Horizon 2020 Marie Skłodowska-Curie Actions, the European Researchers' Night was held at the UL FFA, entitled "Humanities Rock!", with a focus on human sciences.

The UL FFA staff carried out various activities, namely in 16 workshops and lectures. They made distillation of aromatic plants, a lecture on diabetes, making natural cosmetics (bath balls), DNA isolation, a workshop on how to make a tablet, a lecture on blood cells and blood groups, presentation of computer methods as alternative approach to animal testing, seminar on shiny skin and healthy teeth for a wide smile, making elephant toothpaste, silver mirror and shining lava, presentation of medicines of the future, seminar on vitamins and minerals ("let's eat the rainbow"), presentation "My profession - pharmacist" and a virtual tour of the Mirje pharmacy.

EATRIS-PLUS

V okviru programa Obzorje 2020 je evropski infrastrukturni center za translacijsko medicino EATRIS pridobil financiranje Evropske komisije za vodilni projekt EATRIS-plus. Ta je namenjen krepitvi zmogljivosti in zagotavljanju inovativnih znanstvenih orodij za doseganje trajnosti programa EATRIS na področju personalizirane medicine. Specifični cilji projekta vključujejo: utrjevanje zmogljivosti centra EATRIS na področju personalizirane medicine za boljše delovanje akademskih institucij in industrije ter povečanje povezovanja centra EATRIS z velikimi farmacevtskimi podjetji; okrepitev trajnostnega finančnega modela EATRIS; spodbujanje deležnikov k aktivnemu vključevanju v infrastrukturno delovanje in razširitev strateškega partnerstva z raziskovalno infrastrukturo. EATRIS-plus bo prispeval k združevanju in izkoriščanju translacijske infrastrukturne zmogljivosti akademskih institucij na področju različnih tehnologij omik ter priskrbel dostop do podatkov, pridobljenih s tovrstnimi sodobnimi tehnologijami. Projekt bo s tem omogočil lažje reševanje globalnih znanstvenih in družbenih izzivov na področju personalizirane medicine. Koordinatorica na UL FFA je prof. dr. Irena Mlinarič-Raščan.

Erasmus+ ADVANCE

Projekt Erasmus+ ADVANCE je evropski izobraževalni projekt. Osnovan je na tristopenjskem učnem programu s področja naprednih zdravil (ATMP) in bo vseboval: 1) spletne tečaje, 2) spletne seminarje ter 3) praktični enotedenski delavnici. UL FFA je z italijanskim Inštitutom za zdravje (Istituto Superiore di Sanita – ISS) zadolžena za sodelovanje pri pripravi učnega načrta ter izvedbo delavnic. Vsaka delavnica bo sprejela do 30 slušateljev. Udeleženci programa bodo med izobraževanjem prejemali potrdila, s pomočjo katerih bodo dokazovali ekspertizo s področja ATMP. Program je namenjen študentom in znanstvenikom s širšega področja biomedicine, ki bi na začetku svoje kariere želeli pridobiti specifična znanja in kompetence spopasti se z izzivi pri razvoju, izdelavi, trženju in uporabi ATMP. Koordinator projekta je EATRIS ERIC, Nizozemska, kot partnerji pa poleg UL FFA sodelujejo

EATRIS-PLUS

In the context of Horizon 2020 the European infrastructure centre for translational medicine EATRIS gained funding from the European Commission for the leading project EATRIS-Plus. The project is designed to strengthen the capacity and provide innovative scientific tools to achieve the sustainability of the EATRIS programme in the field of personalized medicine. The specific objectives of the project include: consolidating the capacity of the EATRIS centre in the field of personalized medicine to improve the functioning of academic institutions and industry and to enhance the integration of the EATRIS centre with large pharmaceutical companies; to strengthen the sustainable EATRIS financial model; to encourage stakeholders to actively integrate into infrastructure operations; and to extend the strategic partnership with research infrastructure. EATRIS-Plus will contribute to combining and exploiting the translational infrastructure capacity of academic institutions in the field of different "omic technologies" and provide access to data obtained through such modern technologies. The project will facilitate the resolution of global scientific and societal challenges in the field of personalized medicine. The coordinator at the University of Ljubljana, Faculty of Pharmacy is Prof. Dr. Irena Mlinarič-Raščan.

Erasmus+ ADVANCE

The Erasmus + ADVANCE project is an example of the implementation of the good practice of complex learning. It is based on a three-stage learning programme in the field of ATMP and will encompass: 1) online courses, 2) webinars and 3) a practical one-week workshop. Together with the Italian Health Institute (Istituto Superiore di Sanita - ISS), The Faculty of Pharmacy at the University of Ljubljana is responsible for participating in the preparation of the curriculum and the implementation of both practical workshops. Each workshop will accept up to 30 listeners. Programme participants will receive certificates or badges during the individual stages of education, with the help of which they will prove an expertise in the field of ATMP. Programme is aimed at scientists from the broader area of biomedicine, who would like to acquire specific knowledge and competences at the start of their career to meet the challenges of development,

še: Istituto Superiore di Sanita, Italija; Universite Libre de Bruxelles, Belgija; Elevate, Nizozemska; KU Leuven, Belgija in Takis SRL, Italija. Koordinatorica na UL FFA je prof. dr. Irena Mlinarič-Raščan.

Erasmus+ OEMONOM

»Open access Educational Materials on Naturally Occurring Molecules – sources, biological activity and use« je projekt Erasmus+. Glavni cilj projekta je pripraviti gradiva o pozitivnih in negativnih učinkih naravnih spojin oz. rastlin, v katerih se nahajajo in ki se uporabljajo za več različnih indikacij (okužbe, menopavza in ginekološke težave, benigna hiperplazija prostate, kašelj, bolezni srca in ožilja, centralnega živčnega sistema ter kože in motnje prebavil), v skladu z najnovejšimi znanstvenimi dokazi. Pripravljena gradiva bodo na voljo za delo v spletnih učilnicah za študente, prav tako pa bodo objavljena v strokovnih in laičnih revijah. Koordinator projekta je izr. prof. dr. Přemysl Mladěnka, Fakulteta za farmacijo na Univerzi Charles, Hradec Králové. Koordinatorica projekta na UL FFA je prof. dr. Marija Sollner Dolenc.

INTERREG boDEREC-CE

Glavni cilj projekta »Board for Detection and Assessment of Pharmaceutical Drug Residues in Drinking Water – Capacity building for Water Management in CE« (boDEREC-CE) je priprava sistema celostnega upravljanja vodovodov, s katerim naj bi zagotovili višjo kakovost pitne vode. Projekt poteka v okviru programa Interreg CENTRAL EUROPE, pri katerem sodeluje 12 partnerjev iz 7 držav in spodbuja ter podpira sodelovanje pri skupnih regionalnih izzivih. Aktivnosti partnerjev predvidevajo razvoj podrobnega načrta spremljanja farmacevtskih izdelkov in sredstev za osebno nego (PPCP) v pitni vodi, oblikovanje orodja, ki omogoča optimizacijo postopka čiščenja vode kot tudi pripravo priporočil za zakonodajne spremembe v zvezi s standardi pitne vode in priporočili za inženirske rešitve. Vodilni partner projekta je Hrvatski Geološki

manufacturing, marketing and use of ATMP. The project coordinator is EATRIS ERIC, Netherlands. As partners of the project and in addition to the Faculty of Pharmacy at the University of Ljubljana, the following also participate: Istituto Superiore di Sanita, Italy; Universite Libre de Bruxelles, Belgium; Elevate, Netherlands; KU Leuven, Belgium and Takis SRL, Italy. The coordinator at the Faculty of Pharmacy is Prof. Dr. Irena Mlinarič-Raščan.

Erasmus+ OEMONOM

"Open access Educational Materials on Naturally Occurring Molecules - sources, biological activity and use" is an Erasmus+ project. The main goal of this project is to prepare materials on the positive and negative effects of natural compounds or plants in which they are located and used for several different indications (infections, menopause and gynaecological problems, benign prostatic hyperplasia, cough, cardiovascular disease, central nervous system and skin and gastrointestinal disorders), according to the latest scientific evidence. The prepared materials will be available as e-learning material for students in Moodle platform as well as published in professional journals and literature for laypersons. The project coordinator is Assoc. Prof. Dr. Přemysl Mladěnka, Faculty of Pharmacy in Hradec Králové, Charles University. The coordinator at the Faculty of Pharmacy is Prof. Dr. Marija Sollner Dolenc.

INTERREG boDEREC-CE

The main goal of the project "Board for Detection and Assessment of Pharmaceutical Drug Residues in Drinking Water - Capacity building for Water Management in CE" (boDEREC-CE) is to set up a system for integrated water supply management to ensure higher quality of drinking water. The project is a part of the Interreg CENTRAL EUROPE programme, where 12 partners from 7 countries participate together. It encourages and supports the participation in common regional challenges. The partners' activities include the development of a detailed monitoring plan for pharmaceuticals and personal care products (PPCP) in drinking water, the development of tools to optimize the water purification process, as well as the preparation of recommendations for legislative changes regarding the drinking water standards and recommendations for engineering solutions. The leading

Institut, v imenu Univerze v Ljubljani sta izvajalki projekta članici UL NTF in UL FFA. Vodja projekta na UL FFA je doc. dr. Jurij Trontelj.

INTERREG ARTE

Namen projekta »Advanced Regenerative Therapies Ecosystem« (ARTE) je razviti lokalni ekosistem za inovativne terapije in regenerativno medicino ter tako narediti privlačno okolje za naložbe v sektor Zdravje, ki je eden od ključnih sektorjev pametnih specializacij S3. To bomo dosegli z razvojem čezmejnega sodelovanja med italijanskimi in slovenskimi subjekti: Fakulteta za farmacijo (UL FFA), Ortopedska bolnišnica Valdoltra, Bolnišnica Videm, podjetje VivaBioCell, Tehnološki park Biovalley in Tehnološki park Ljubljana. Projekt je zelo inovativen, saj uvaja nove metodologije v personalizirano in regenerativno medicino, ima ogromen tržni potencial in bo z inovativnimi, učinkovitimi in varnimi terapijami izboljšal kakovost življenja pacientov. ARTE je sofinanciran iz programa sodelovanja INTERREG V-A Italija-Slovenija 2014–2020. Vodja projekta na UL FFA je prof. dr. Janja Marc.

IMI – ENABLE

UL FFA je partner na projektu IMI– ENABLE, pri katerem sodelujejo štiri mednarodne farmacevtske družbe (AstraZeneca, Basilea, Evotec in GlaxoSmithKline) ter 24 univerz, raziskovalnih institucij, javnih ustanov in 15 majhnih in srednje velikih podjetij. Projekt spada v okvir IMI programa New Drugs for Bad Bugs (ND4BB). Namen projekta ENABLE je predklinični in zgodnji klinični razvoj novih potencialnih učinkovin z delovanjem proti Gram negativnim bakterijam, ki zaradi pogoste rezistence na obstoječe protibakterijske učinkovine predstavljajo velik terapevtski problem in izziv. Cilj projekta, ki je bil v decembru 2019 podaljšan do konca maja 2020, je bil razviti tri spojine vodnice in dva klinična kandidata ter najmanj z eno spojino začeti prvo fazo kliničnih testiranj. Vodja projekta na UL FFA je prof. dr. Danijel Kikelj.

partner of the project is the Croatian Geological Institute, the project contractors are members of UL NTF and UL FFA, on behalf of the University of Ljubljana. The project leader at UL FFA is Assist. Prof. Jurij Trontelj.

INTERREG ARTE

The project Advanced Regenerative Therapies Ecosystem (ARTE) aims to develop a local ecosystem for innovative therapies and regenerative medicine and thus make an attractive environment for investments in the health sector, one of the key sectors of the smart specialization of S3. This will be achieved through the development of cross-border cooperation between Italian and Slovenian entities: Faculty of Pharmacy, Orthopedic hospital Valdoltra, hospital Videm, enterprise VivaBioCell, Technology Park Biovalley and Technology Park Ljubljana. The project is very innovative as it introduces new methodologies in personalised and regenerative medicine; it has enormous market potential and will improve the quality of life of patients with innovative, efficient and safe therapies. ARTE is co-financed by the INTERREG V-A cooperation programme Italy-Slovenia 2014-2020. The Head of the project at the Faculty of Pharmacy is Prof. Dr. Janja Marc.

IMI - ENABLE

The UL FFA is a partner in the IMI-ENABLE project, involving Four International Pharmaceutical companies (AstraZeneca, Basilea, Evotec and GlaxoSmithKline) and 24 universities, research institutions, public institutions and 15 small and medium-sized enterprises. The project falls within the IMI framework of the New Drugs for Bad Bugs (ND4BB). The aim of the ENABLE project is the pre-clinical and early clinical development of new potential active substances acting against anti-Gram-negative bacteria, which due to frequent resistance to existing antibacterial agents, constitute a major therapeutic problem and challenge. The goal of the project, which was in extended in December 2019 till the end of May 2020, was to develop three lead compounds and two clinical candidates and to identify at least one compound in order to start the first phase of clinical tests. The Head of the project at UL FFA is Prof. Dr. Danijel Kikelj.

CELSA

Znanstveni cilj predlaganega projekta je priprava novih protirakavih spojin vodnic in validacija ter modulacija rakave tarče hEag1 s potencialom za zdravljenje ne-Hodgkinovega limfoma. Predlagani projekt pokriva celoten cikel zgodnjega odkrivanja novih učinkovin: molekulsko modeliranje, sintezo, testiranje na ionskih kanalih ter platformo za protitumorno vrednotenje novih učinkovin. Koordinator projekta je prof. dr. Jan Tytgat, KU Leuven, Pharmaceutical and Pharmacological Sciences, Toxicology and Pharmacology. Vodja projekta na UL FFA je prof. dr. Lucija Peterlin Mašič.

S proteinom G sklopljeni receptorji so dobro validirane tarče, saj nanje deluje ena tretjina vseh zdravil na tržišču. CCR7 je primer takšnega receptorja, ki pa je slabo raziskan kljub udeleženosti v številnih človeških boleznih (npr. rak, vnetne in imunske bolezni). V projektu bomo s pomočjo vrednotenja kemijske knjižnice, virtualnega rešetanja in optimizacije že znanih neselektivnih ligandov skušali odkriti selektivni ligand za receptor CCR7. Modulacijo delovanja receptorja bomo potrdili z različnimi *in vitro* biološkimi testi. Vodja projekta na UL FFA je prof. dr. Stanislav Gobec

Cilj projekta »Generation of nanobodies against immunomodulating checkpoint receptors in glioblastoma tumor cells« je pridobiti nanotelesa proti najpogosteje izraženim imunomodulackijskim receptorjem kontrolnih točk v tumorskih celicah glioblastoma. Raziskovalna skupina z UL (MF in FFA) bo obogatila, izolirala in okarakterizirala nova nanotelesa. Vodja projekta na UL FFA je prof. dr. Robert Roškar, na UL MF dr. Ivana Jovčevska.

DRUGI MEDNARODNI PROJEKTI

Ameriški projekt »RNA targets of SNORD116« (Foundation for Prader-Willi Research)

Prader-Willijev sindrom je genetska bolezen, katere etiologija je slabo pojasnjena. Njen osrednji vzrok je delecija genov skupine nekodirajočih RNA (SNORD116), ki so izražene pretežno v možganih in katerih funkcija

CELSA

The Head of the project at the Faculty of Pharmacy is Prof. Dr. Lucija Peterlin Mašič. The scientific objective of the proposed project is the preparation of new antibacterial compounds and validation and modulation of the cancer target hEag1 with the potential for treatment of non-Hodgkin lymphoma. The proposed project covers the full cycle of early discovery of new active substances: molecular modelling, synthesis, ion channel testing, and a platform for the antitumor action evaluation of new compounds. The project coordinator: Prof. Dr. Jan Tytgat, KU Leuven, Pharmaceutical and Pharmacological Sciences, Toxicology and Pharmacology.

The Head of the project at the Faculty of Pharmacy is Prof. Dr. Stanislav Gobec. Protein G coupled receptors are well-validated targets targeted by one third of all medicinal products on the market. CCR7 is an example of such a receptor, although it is poorly studied despite being involved in many human diseases (e.g. cancer, inflammatory and immunodeficiency diseases). In the project the discovery of selective ligand for the CCR7 receptor will be attempted through the use of the chemical library, virtual screening and optimization of the already known non-selective ligands. Modulation of the receptor action will be confirmed by various *in vitro* biological tests.

The Head of the project at the Faculty of Pharmacy is Prof. Dr. Robert Roškar, at the Faculty of Medicine is Dr. Ivana Jovčevska: the goal of the project "Generation of nanobodies against immunomodulating checkpoint receptors in glioblastoma tumor cells" is to obtain nanobodies against the most commonly expressed immunomodulatory receptor checkpoints in glioblastoma tumor cells. The research team from UL (MF and FFA) will enrich, isolate and characterize the new nanobodies.

OTHER INTERNATIONAL PROJECTS

USA project "RNA targets of SNORD116" (Foundation for Prader-Willi Research)

Prader-Willie's syndrome is a genetic disease whose etiology is poorly explained. Its central cause is delecium of genes of the non-coding RNA Group (SNORD116), which are expressed predominantly in the brain and whose

ni pojasnjena. V okviru projekta bomo za identifikacijo RNA-vezavnih partnerjev SNORD116 uporabili novo tehniko, imenovano hiCLIP, ki jo je razvil prof. Ule s sodelavci. Bistvo pristopa je imunoprecipitacija proteinov, ki vežejo SNORD116 (skupaj z njenimi tarčnimi RNA) v celičnem jedru, ligacija obeh molekul RNA (tj. tvorba hibridnih molekul RNA) in sekvenciranje hibridov. Identifikacija tarčnih RNA SNORD116 bo ponudila vpogled v etiologijo PWS in bo osnova za načrtovanje novih terapevtskih strategij. Koordinator projekta na UL FFA je izr. prof. dr. Tomaž Bratkovič.

BILATERALNI PROJEKTI

UL FFA je imela v letu 2020 vzpostavljenih 14 bilateralnih projektov, kjer sodeluje z akademskimi institucijami v naslednjih državah: Črna gora, Francija, Hrvaška, Litva, Madžarska, Nemčija, Rusija in ZDA.

COST PROJEKTI: UL FFA sodeluje v 13 COST projektih.

Projekti ESS, ESRR

Gostujoči tuji strokovnjaki Univerze v Ljubljani (GTS)

Krajša in daljša gostovanja tujih strokovnjakov in visokošolskih učiteljev na slovenskih visokošolskih zavodih 2019–2022 (Dr. Wozniak, gostovanje: 24. 2. 2020–4. 3. 2020)

Po kreativni poti do znanja 2017–2020 (PKP)

- Uvedba testiranja na mestu oskrbe in samotestiranja (UTMOST). Partnerja pri projektu: Inštitut za metagenomiko in mikrobne tehnologije, d. o. o. in Javni zavod Lekarna Ljubljana. Koordinatorica na UL FFA: doc. dr. Nataša Karas Kuželički.
- Razvoj algoritmov za prepoznavanje motilcev endokrinega sistema v okviru toksikološke ocene snovi (AL-MES). Partner na projektu: BiSafe, d. o. o., koordinatorica na UL FFA: prof. dr. Marija Sollner Dolenc.

LAKTIKA

Spodbujanje izvajanja raziskovalno-razvojnih projektov (TRL 3-6): Ekstrakcija in oplemenitenje sirotkinih proteinov ter izraba preostanka za oblikovanje novih funkcionalnih živil in prehranskih dopolnil »LAKTIKA«.

function is not clarified. In the context of the project, we will use a new technique called hiCLIP, developed by Prof. Ule and colleagues in order to identify the RNA binding partners SNORD116. The essence of the approach is the immunoprecipitation of proteins that bind SNORD116 (along with its target RNA) in the cellular nucleus, formation of hybrid molecules of RNA and sequencing of hybrids. Identification of the target RNA SNORD116 will offer insight into the etiology of PWS and will be the basis for designing new therapeutic strategies. Coordinator of the project at the UL FFA: Assoc. Prof. Dr. Tomaž Bratkovič.

BILATERAL PROJECTS

In 2020 the Faculty of Pharmacy was involved in fourteen bilateral projects. We cooperated with academic institutions from Croatia, France, Germany, Hungary, Lithuania, Montenegro, Russia and United States of America.

COST projects - UL FFA is cooperating in thirteen projects.

ESS, ESRR projects

Visiting foreign experts of the University of Ljubljana

Shorter and longer visits of foreign experts and higher education teachers to Slovenian higher education institutions 2019-2022 (Dr. Wozniak, visit: 24 February 2020-4 March 2020)

A creative path to knowledge 2017-2020

- Point-of-care and self-testing in the pharmacy setting. Project partners: Institute of Metagenomics and Microbial Technologies, d. o. o. and Public Institution Pharmacy Ljubljana. The coordinator at the Faculty of Pharmacy: Assist. Prof. Dr. Nataša Karas Kuželički.
- Development of algorithms for the identification of endocrine disruptors in the context of the toxicological assessment of substances. Project partner: BiSafe, d. o. o. The coordinator at the Faculty of Pharmacy: Prof. Dr. Marija Sollner Dolenc.

LAKTIKA

Promoting research and development projects (TRL 3-6): Extraction and enrichment of whey proteins and the use of the residuals for the design of new functional foods and dietary supplements (LAKTIKA).

Koordinator projekta je ARHEL d. o. o., koordinator projekta na UL FFA je prof. dr. Albin Kristl, sodelujeta Katedra za biofarmacijo in farmakokinetiko ter Katedra za farmacevtsko tehnologijo.

EATRIS-TRI.si

Razvoj raziskovalne infrastrukture za mednarodno konkurenčnost slovenskega RRI prostora – RI-SI-EATRIS-TRI.si. V projekt sta pod koordinatorstvom vodilnega partnerja UL FFA vključena še dva konzorcijska partnerja: Kemijski inštitut in Univerza v Mariboru (Medicinska fakulteta). Koordinatorica na UL FFA je prof. dr. Irena Mlinarič-Raščan.

The PI of the project is ARHEL d. o. o., the coordinator at the Faculty of Pharmacy is Prof. Dr. Albin Kristl, and the participating chairs are the Chair of Biopharmaceutics and Pharmacokinetics and the Chair of Pharmaceutical Technology.

EATRIS-TRI.si

Development of the research infrastructure for international competitiveness of Slovenian RRI space - RI-SI-EATRIS-TRI.si (coordinated by the leading partner the Faculty of Pharmacy at the University of Ljubljana in collaboration with consortium partners: National institute of Chemistry and University of Maribor (Faculty of Medicine); the coordinator at the University of Pharmacy is Prof. Dr. Irena Mlinarič-Raščan.

PRENOS ZNANJA IN SODELOVANJE Z OKOLJEM

Inovator.si? – znanje za komercializacijo

Pisarna za prenos znanja Univerze v Ljubljani je s pomočjo Fakultete za farmacijo, infrastrukturnega centra EATRIS in odličnega strokovnjaka dr. Mohammeda Shahida izvedla serijo mentorskih delavnic Inovator.si?, na katerih so raziskovalci pridobili praktične nasvete za komercializacijo njihovih izumov s področja ved o življenju.

Na delavnicah »Inovator.si?« je sodelovalo pet ekip, raziskovalci pa so prihajali s treh različnih fakultet: Fakultete za farmacijo, Biotehniške fakultete in Veterinarske fakultete. Na spletnih srečanjih z dr. Shahidom so spoznali postopek komercializacije ter kaj je pri tem ključnega pomena, kot npr. kdo je vključen v postopek in kako pravno zavarovati intelektualno lastnino. Ugotovili so, da je dobrodošel, če ne celo nujen, prototip, saj na področju farmacije podjetja zanimajo izumi z višjo stopnjo tehnološke pripravljenosti. Ni pa vse v stopnji razvitosti tehnologije. Pomembna je tudi izpiljena in učinkovita

KNOWLEDGE TRANSFER AND COOPERATION WITH THE ENVIRONMENT

Inovator.si? - knowledge for commercialization

The Knowledge Transfer Office at the University of Ljubljana has with the help of the Faculty of Pharmacy, the EATRIS infrastructure centre and the excellent expert Dr. Mohammed Shahid conducted a series of mentoring workshops Inovator.si?, where researchers obtained practical advices for the commercialization of their inventions in the field of life sciences.

Five teams participated in "Inovator.si?" workshops. Researchers came from three different faculties; Faculty of Pharmacy, Biotechnical Faculty and Faculty of Veterinary Medicine. In online meetings with Dr. Shahid they learned about the process of commercialization and what is crucial: such as who is involved in the process and how to legally protect intellectual property. They found that a prototype was welcome, if not necessary, as companies in the field of pharmacy were interested in inventions with a higher level of technological readiness. However, the state of technology is not everything. It is also important to have a well-honed and effective presentation of the team and

predstavitev ekipe in izuma ter njegovih prednosti pred konkurenco. Le na tak način bo izum dovolj zanimiv za poslovne partnerje.

Spletni festival UNI.MINDS

V okviru festivala UNI.MINDS, ki je od 5. do 24. 11. 2020 potekal na daljavo, so aktivno sodelovali naslednji sodelavci UL FFA:

- prof. dr. Uroš Urleb v okviru sekcije Prihodnost partnerstva med industrijo in akademskim okoljem,
- prof. dr. Mitja Kos v okviru sekcije Zdrava prihodnost – IKT,
- asist. dr. Urban Košak, prof. dr. Janko Kos, prof. dr. Lucija Peterlin Mašič, izr. prof. dr. Mojca Lunder in Samo Guzelj v sekciji Zdrava prihodnost – razvoj novih zdravil,
- doc. dr. Stane Pajk, izr. prof. dr. Janez Mravljak, prof. dr. Borut Štrukelj, prof. dr. Uroš Urleb in Ema Valentina Brovč v okviru 2. dneva raziskovalcev, Novartis Slovenija.

Prejemniki sredstev prvega razpisa Inovacijskega sklada UL 2020

Pomemben pogoj za uspešno komercializacijo izumov so dolgoročna partnerstva z gospodarstvom in sposobnost preverjanja delovanja idej znotraj univerze. Namen razpisa Inovacijskega sklada UL 2020 je podpreti obetavne projekte in jim pomagati doseči višjo stopnjo tehnološke pripravljenosti (TRL) in s tem povečati privlačnost tehnologij za potencialne kupce.

Rektor UL prof. dr. Igor Papič je v okviru festivala UNI. MINDS javno razglasil prejemnike sredstev prvega razpisa Inovacijskega sklada UL 2020. Ocenjevalna komisija je za sofinanciranje izbrala štiri projekte, med njimi kar dva projekta Fakultete za farmacijo:

- »Boj proti bakterijski odpornosti: nove protibakterijske učinkovine proti odpornim bakterijam«, ki ga razvija ekipa UL FFA pod vodstvom prof. dr. Lucije Peterlin Mašič.
- »Robustne stacionarne faze za afinitetno čiščenje in imobilizacijo protiteles«, ki ga razvija ekipa UL FFA pod vodstvom izr. prof. dr. Tomaža Bratkoviča.

the invention and its advantages over the competition. Only in this way the invention will be interesting enough for the business partners.

UNI.MINDS online festival

Within the UNI.MINDS festival, which took place online from 5th to 24th November 2020, the following UL FFA employees have actively participated:

- Prof. Dr. Uroš Urleb within the section The Future of Industry-Academia Partnerships,
- Prof. Dr. Mitja Kos within the section HEALTHY FUTURE Health & ICT,
- Assist. Dr. Urban Košak, Prof. Dr. Janko Kos, Prof. Dr. Lucija Peterlin Mašič, Assoc. Prof. Dr. Mojca Lunder and Samo Guzelj in the section HEALTHY FUTURE Drug Discovery,
- Assist. Prof. Dr. Stane Pajk, Assoc. Prof. Dr. Janez Mravljak, Prof. Dr. Borut Štrukelj, Prof. Dr. Uroš Urleb and Ema Valentina Brovč as a part of The Second Researchers Day, Novartis Slovenia.

Recipients of funds from the first tender of The UL Innovation Fund in 2020

An important condition for the successful commercialization of inventions are long-term partnerships with the enterprises and the ability to test the operation of ideas within the University. The purpose of The UL Innovation Fund Call in 2020 is to support promising projects and to help them achieve a higher level of technological readiness (TRL), and thus increase the attractiveness of technologies for potential customers.

The Rector of the UL Prof. Dr. Igor Papič has publicly announced the recipients of the first tender of The UL Innovation Fund in 2020 at the UNI.MINDS festival. The evaluation commission selected four projects for co-financing, including two projects from the Faculty of Pharmacy:

- The project entitled "Fight against bacterial resistance: new antibacterial agents against resistant bacteria", developed by the team of the Faculty of Pharmacy under the leadership of Prof. Dr. Lucija Peterlin Mašič.

Obe ekipi bosta sodelovali s Pisarno za prenos znanja UL in Ljubljanskim univerzitetnim inkubatorjem pri aktivnostih, povezanih z razvojem in približevanjem rešitev trgu in industrijskim partnerjem.

Rektorjeva nagrada za naj inovacijo Univerze v Ljubljani za leto 2020 – 2. mesto inovacija doc. dr. Martine Hrast in prof. dr. Marka Anderluha

Raziskovalca Katedre za farmacevtsko kemijo, doc. dr. Martina Hrast in prof. dr. Marko Anderluh, sta v sodelovanju z dr. Anjo Kolarič in dr. Nikolo Minovskim dosegla 2. mesto na natečaju rektorjeve nagrade za naj inovacijo Univerze v Ljubljani 2020, in sicer za inovacijo z naslovom »Protibakterijske učinkovine na osnovi monocikličnih fragmentov, pripetih na naftiridinsko ogrodje (Drugs4Badbugs)«. Izum se nanaša na nove zaviralce DNA giraze in topoizomeraze IV, s selektivnim delovanjem na bakterijske encime v primerjavi s podobnimi človeškimi encimi. Nove spojine zavirajo rast širokega spektra bakterij in zavirajo tako po Gramu pozitivne kot po Gramu negativne bakterije, mikobakterije (povzročitelje tuberkuloze), problematične veterinarske seve in multirezistentne bakterijske seve. Inovativne spojine zelo učinkovito zavirajo rast na meticilin odpornih Staphylococcus aureus (MRSA), ki so glavni povzročitelji bolnišničnih okužb.

- The project entitled "Robust stationary phases for affinity based purification and immobilization of antibodies". The project is being developed by the team of the Faculty of Pharmacy under the leadership of Assoc. Prof. Dr. Tomaž Bratkovič.

Both teams will cooperate with the Knowledge Transfer Office of the University of Ljubljana and the Ljubljana University Incubator in activities related to the development and bringing solutions closer to the market and industrial partners.

Rector's Award for the best innovation of the University of Ljubljana 2020 call - 2nd place for the innovation of Assist. Dr. Martina Hrast, Prof. Dr. Marko Anderluh

Researchers of the Cahir of Pharmaceutical Chemistry, Assist. Dr. Martina Hrast and Prof. Dr. Marko Anderluh have, in collaboration with Dr. Anja Kolarič and Dr. Nikola Minovski, ranked second in the Rector's Award for the best innovation of the University of Ljubljana 2020, i.e. for the innovation entitled "Antibacterial agents based on monocyclic fragments attached to the naphthyridine framework (Drugs4Badbugs)". The innovation relates to novel DNA gyrase and topoisomerase IV inhibitors, with selective action on bacterial enzymes compared to similar human enzymes. The new compounds inhibit the growth of a wide range of bacteria and inhibit both Gram-positive and Gram-negative bacteria, mycobacteria (tuberculosis agents), problematic veterinary strains and multidrug-resistant bacterial strains. Innovative compounds are very effective in inhibiting the growth of methicillin-resistant Staphylococcus aureus (MRSA), which are the main causes of hospital-acquired infections.

IZUMI IN INOVACIJE

Prispevek raziskovalcev UL FFA v Journal of Medicinal Chemistry in podeljen evropski patent

Sodelavci UL FFA s Katedre za farmacevtsko kemijo so v sodelovanju s člani Katedre za biofarmacijo in farmakokinetiko in Katedre za farmacevtsko biologijo ter znanstveniki s Kemijskega inštituta in iz tujine (University of Pavia, Italija; University of Buenos Aires, Argentina) v začetku leta 2020 objavili rezultate raziskave v ugledni reviji s področja farmacevtske kemije Journal of Medicinal Chemistry (faktor vpliva 6,054). **Za rezultate raziskave so člani Katedre za farmacevtsko kemijo, doc. dr. Damijan Knez, izr. prof. dr. Matej Sova in prof. dr. Stanislav Gobec, dobili tudi podeljen evropski patent [Knez et al. EP3426634(B1)].** V raziskavi so raziskovalci razložili, kako lahko s pomočjo cis in trans izomerov 1-propargil-4-stirilpiperidina dosežejo selektivno zaviranje MAO-A ali MAO-B izooblike encima. Medtem ko so cis izomeri selektivni zaviralci MAO-A, trans analogi selektivno zavirajo samo MAO-B. Zaviranje encima so proučili s kinetično analizo, z analizo UV-VIS spektrov FAD kofaktorja encima in rentgensko kristalografijo. Selektivno zaviranje MAO-A in MAO-B so potrdili »ex vivo« na homogenatih mišjih možganih, *in vivo* študije na miših pa so pokazale terapevtski potencial za zdravljenje motenj centralnega živčnega sistema. Študija predstavlja edinstven primer stereoselektivne aktivnosti cis/trans izomerov, ki lahko razlikujejo med strukturno sorodnimi encimi.

INNOVATIONS AND INVENTIONS

Contribution of UL FFA researchers to the Journal of Medicinal Chemistry and granted a European patent

In 2020 researchers from the Chair of Pharmaceutical Chemistry at the UL FFA have, in collaboration with members of the Chair of Biopharmacy and Pharmacokinetics and the Chair of Pharmaceutical Biology, as well as with scientists from the Institute of Chemistry and from abroad (University of Pavia, Italy; University of Buenos Aires, Argentina), published the results of a study in the prestigious Journal of Medicinal Chemistry (impact factor 6.054). **Based on results of the research, the members of the Chair of Pharmaceutical Chemistry, Assist. Prof. Dr. Damijan Knez, Assoc. Prof. Dr. Matej Sova and Prof. Dr. Stanislav Gobec, have also received a European patent [Knez et al. EP3426634 (B1)].**

In the study, the researchers explained how the cis and trans isomers of 1-propargyl-4-styrylpiperidine can achieve selective inhibition of the MAO-A or MAO-B isoform of the enzyme. While cis isomers are selective MAO-A inhibitors, trans analogs selectively inhibit only MAO-B. Enzyme inhibition was studied by kinetic analysis, UV-VIS spectra analysis of the enzyme FAD cofactor, and X-ray crystallography. Selective inhibition of MAO-A and MAO-B has been confirmed "ex vivo" in homogenized mouse brains samples. *In vivo* studies in mice have shown therapeutic potential for the treatment of central nervous system disorders. The study presents a unique example of the stereoselective activity of cis/trans isomers that may differentiate between structurally related enzymes.

INFORMIRANJE STROKOVNE IN SPLOŠNE JAVNOSTI

Ustanovitev delovne skupine UL FFA – COVID-19

Zaradi izrednega zanimanja strokovne in splošne javnosti glede informacij, povezanih s pandemijo COVID-19, smo v skrbi za zdravje in dobrobit pacientov marca 2020 na UL FFA ustanovili delovno skupino, ki spremlja novosti na področju terapije COVID-19 oziroma razvoja protivirusnih zdravil SARS-CoV-2. Skupina v sestavi: prof. dr. Borut Štrukelj, prof. dr. Marko Anderluh, izr. prof. dr. Tomaž Bratkovič, izr. prof. dr. Mojca Lunder, izr. prof. dr. Igor Locatelli in doc. dr. Lea Knez ažurno pripravlja obvestila, ki temeljijo na neodvisnih, znanstvenih in kliničnih rezultatih. Novosti so posredovane strokovni javnosti (Lekarniška zbornica Slovenije, Slovensko farmacevtsko društvo, JAZMP), pa tudi medijem (STA). Delovna komisija je v 2020 pripravila 12 prispevkov za strokovno javnost in 12 prispevkov za splošno javnost.

Delovanje Skupine UL FFA za spremljanje in obveščanje o novostih na področju farmakoloških metod proti virusu SARS-CoV-2

Vse od začetka epidemije COVID-19 (od februarja 2020) skupina natančno in znanstveno kritično spremlja novosti na področju zdravljenja in preprečevanja epidemije COVID-19, oziroma spremlja razvoj protivirusnih zdravil proti virusu SARS-CoV-2. Svoja dognanja oblikuje v prispevke, ki so namenjeni bodisi obveščanju strokovne bodisi splošne javnosti. Poročila oziroma prispevki temeljijo na neodvisnih znanstvenih in kliničnih rezultatih. Objavljena so na spletni stani fakultete (http://www.ffa.uni-lj.si/obvestila-in-informacije/COVID-19-aktualne-informacije). Skupina pa jih posreduje tudi neposredno na Lekarniško zbornico Slovenije, ki jih sporoča farmacevtom v lekarnah. Posreduje jih tudi na JAZMP ter na STA, če so namenjena splošni javnosti. Strokovna javnost je z navdušenjem pozdravila delovanje te skupine in ji posredovala dodatna vprašanja in izpostavljala

INFORMING THE PROFESSIONAL AND GENERAL PUBLIC

Establishment of the UL FFA - COVID-19 working group

Due to the increased interest of the professional and general public regarding the information related to the COVID-19, we have established a working group at the UL FFA in March 2020 to monitor innovations in the field of COVID-19 therapy and the development of SARS-CoV-2 antiviral drugs. Group consisting of: Prof. Dr. Borut Štrukelj, Prof. Dr. Marko Anderluh, Assoc. Prof. Dr. Tomaž Bratkovič, Assoc. Prof. Dr. Mojca Lunder, Assoc. Prof. Dr. Igor Locatelli and Assist. Prof. Dr. Lea Knez is preparing up-to-date reports based on independent, scientific and clinical results. The novelties are communicated to the professional public (Slovene Chamber of Pharmacy, Slovenian Pharmaceutical Society, JAZMP) and also to the media (STA). In 2020 the working group prepared 12 articles for the professional public and 12 articles for the general public.

Activities of the UL FFA working group for monitoring and informing about innovations in the field of pharmacological methods against Sars-CoV-2

Since the beginning of the COVID-19 epidemic (in February 2020), the group has been closely and scientifically critically monitoring innovations in the field of treatment and prevention of the COVID-19 and monitoring the development of antiviral drugs against the SARS-CoV-2. The findings were formulated into contributions that are intended for either informing the professional or general public. Reports and contributions are based on independent, scientific and clinical results. They are published on the faculty's website (http://www.ffa.uni-lj.si/obvestila-in-informacije/COVID-19-aktualne-informacije). The group forwards the reports directly to the Slovene Chamber of Pharmacy, which dispatches them to pharmacies. The reports are forwarded also to JAZMP, and to STA if they are intended for the general public. The professional public appreciatively welcomed the work of this group, delivered additional questions and highlighted the topics

tematike, ki so se pojavljale v lekarnah in bolnišnicah ob stikih s pacienti. Pozitivne odzive smo dobili tudi s strani laične javnosti, ki je delo skupine spremljala v medijih ali na spletni strani UL FFA. Delovna skupina je vsa poročila posredovala tudi neposredno ministru za zdravje, Tomažu Gantarju, dr. med., s katerim je v času pandemije COVID-19 prof. dr. Borut Štrukelj neformalno sodeloval kot svetovalec za zdravila. Člani skupine, predvsem prof. dr. Borut Štrukelj in izr. prof. dr. Tomaž Bratkovič, so bili v vsem tem času redni sogovorniki vladnih konferenc o cepivih in zdravilih za COVID-19, gostje informativnih radijskih in televizijskih oddaj ter avtorji prispevkov v različnih medijih, predvsem na temo razvoja cepiv pri COVID-19.

Člani skupine so sodelovali kot odgovorni urednik (prof. dr. Borut Štrukelj) in avtorji prispevkov (prof. dr. Borut Štrukelj, izr. prof. dr. Tomaž Bratkovič, izr. prof. dr. Mojca Lunder, prof. dr. Marko Anderluh, izr. prof. dr. Žiga Jakopin, doc. dr. Lea Knez in izr. prof. dr. Igor Locatelli) pri izidu posebne številke Farmacevtskega vestnika. V njem so zbrani strokovni članki, povezani s COVID-19 in SARS-CoV-2; namenjena je informiranju strokovne javnosti, predvsem farmacevtov v lekarnah, ki se vsakodnevno srečujejo z vprašanji, povezanimi s to tematiko. Po statistikah spletne strani ResearchGate so izjemno brani.

Člani skupine (prof. dr. Borut Štrukelj, izr. prof. dr. Tomaž Bratkovič, doc. dr. Lea Knez in izr. prof. dr. Igor Locatelli) so sodelovali tudi pri Strokovnem izpopolnjevanju s področja farmacije, ki ga organizira UL FFA in je v letu 2020 predstavljalo aktualno tematiko COVID-19: preventiva, diagnostika in terapija. Izobraževanje je potekalo v treh terminih septembra 2020, in sicer v kombinirani obliki, delno v predavalnici, delno pa na daljavo s prenosom v živo.

Člani skupine v boju proti COVID-19 delujejo tudi na znanstveno raziskovalnem področju ter sodelujejo pri različnih projektih, katerih cilj je bodisi razvoj učinkovitega cepiva ali razvoj učinkovitih protivirusnih učinkovin.

V situaciji ogrožajoče pandemije smo se soočili z mnogimi strokovnimi izzivi in izrednim zanimanjem tako stroke kot tudi širše javnosti za informacije.

that arose in pharmacies and hospitals in situations with patients. We also received positive responses from the general public, which followed the work of the group through the media or the UL FFA website. The working group also forwarded all reports directly to the Minister of Health, Tomaž Gantar, dr. med., with whom during the COVID-19 pandemic Prof. Dr. Borut Štrukelj participated informally as a consultant for medicines. During all this time members of the group, especially Prof. Dr. Borut Štrukelj and Assoc. Prof. Dr. Tomaž Bratkovič, were regular speakers at government conferences on vaccines and medicines for COVID-19, were guests of informative radio and television broadcasts, and authors of articles in various media, especially on the development of COVID-19 vaccines.

The members of the group participated as the editor-in-chief (Prof. Dr. Borut Štrukelj) and the authors of the articles (Prof. Dr. Borut Štrukelj, Assoc. Prof. Dr. Tomaž Bratkovič, Assoc. Prof. Dr. Mojca Lunder, Prof. Dr. Marko Anderluh, Assoc. Prof. Dr. Žiga Jakopin, Assist. Prof. Dr. Lea Knez and Assoc. Prof. Dr. Igor Locatelli) in the special issue publication of journal Farmacevtski vestnik. It contains expert articles related to COVID-19 and Sars-CoV-2; it is intended to inform the professional public, especially pharmacists, who encounter issues related to this topic on a daily basis. According to the statistics of the ResearchGate website, they are reaching a great number of reads. Members of the group (Prof. Dr. Borut Štrukelj, Assoc. Prof. Dr. Tomaž Bratkovič, Assist. Prof. Dr. Lea Knez and Assoc. Prof. Dr. Igor Locatelli) also participated as lecturers in the Professional training in the field of pharmacy, organised by UL FFA. In 2020 the training presented the important topic of COVID-19: prevention, diagnostics and therapy. The training took place in three terms in September 2020, namely in combined form, partly in the lecture hall and partly remotely via live broadcast.

In the fight against COVID-19, the members of the group also work in the field of scientific research and participate in various projects aimed at either the development of an effective vaccine or the development of effective antiviral agents.

Skupina na UL FFA je izjemno predana obveščanju farmacevtov v lekarnah, bolnišnicah in drugje ter osveščanju splošne javnosti (po različnih medijih) o razvoju in varnosti cepiv in zdravil, o rezultatih testiranj zdravil ter o sredstvih za preventivo pri okužbi. Pri tem velja poudariti njihovo visoko strokovnost in hkrati sposobnost osvetljevanja tudi najbolj zapletenih tematik na poljuden način.

Skupina je prispevala in še prispeva k informiranosti stroke, javnosti ter preko tega dobrobiti pacientov, hkrati pa kot znanstveniki sodelujejo in vodijo projekte, ki obetajo nove učinkovine in pristope pri zdravljenju COVID-19. Za poseben doprinos pri ozaveščanju o zdravilih, cepivih, prehranskih dopolnilih in zaščitnih sredstvih proti virusu SARS-CoV-2 je prof. dr. Borut Štrukelj s strani Slovenske znanstvene fundacije prejel priznanje »Prometej znanosti za odličnost v komuniciranju za leto 2020«, UL FFA pa je še utrdila svoj strokovni in znanstveni položaj kot osrednja visokošolska institucija na področju farmakoloških pristopov pri obvladovanju pandemije COVID-19.

In the situation of a threatening pandemic, we have faced many professional challenges and special interest of both the professional and the general public. The group at UL FFA is extremely committed to informing pharmacists in pharmacies, hospitals and elsewhere and to raising awareness among the general public (through various media) about the state of development and safety of vaccines and medicines, the results of recent clinical trials and means of infection prevention. It is worth emphasizing their high professionalism and at the same time the ability to illuminate even the most complex topics in a way comprehensible to general public.

The group has contributed and continues to contribute to informing the professional and general public and, in this way to the well-being of patients. At the same time, members as scientists, participate and lead the projects that promise new active ingredients and approaches in the treatment of COVID-19. For his special contribution to raising the awareness about medicines, vaccines, food supplements and protective agents against the SARS-CoV-2, Prof. Dr. Borut Štrukelj received the award "Prometheus of Science for Excellence in Communication for 2020" from the Slovenian Science Foundation, and the UL FFA consolidated its professional and scientific position as a central higher education institution in the field of pharmacological approaches in managing the COVID-19 pandemic.

Bliskovit razvoj cepiv proti novemu koronavirusu SARS-CoV-2

V okviru projekta Znanost na cesti je v sklopu aktivnosti Znanost med knjigami izr. prof. dr. Tomaž Bratkovič s Katedre za farmacevtsko biologijo pojasnjeval razvoj cepiv. Na poljuden način je predstavil splošen potek razvoja in odobritve cepiv ter inovativne rešitve, na katerih slonijo kandidatna cepiva proti virusu SARS-CoV-2. Spregovoril je tudi o tem, ali je mogoče do učinkovitega in varnega cepiva priti že v manj kot letu dni od identifikacije povzročitelja bolezni.

Rapid development of vaccines against the new coronavirus SARS-CoV-2

As part of the project Science on the Street, more specifically within activities Science Among the Books, Assoc. Prof. Dr. Tomaž Bratkovič from the Chair of Pharmaceutical Biology, explained the development of vaccines. In lay terms, he presented the general course of development and approval of vaccines and innovative solutions, on which candidate vaccines against Sars-CoV-2 are based. He also spoke about whether an effective and safe vaccine can be obtained in less than a year from the identification of the pathogen.

Prof. dr. Borut Štrukelj je sodeloval v številnih spletnih dogodkih, tudi v odmevnem spletnem pogovoru o pomenu vakcinacije

V organizaciji STA kluba je 23. 4. 2020 potekal spletni pogovor o precepljenosti in pomenu kolektivne imunosti ter razvoju vakcin, namenjen laični javnosti. V pogovoru ob tednu imunizacije so sodelovali prof. dr. Borut Štrukelj z UL FFA, asist. dr. Matjaž Homšak iz Združenja za pediatrijo in dr. Marta Grgič Vitek z Nacionalnega inštituta za varovanje zdravja. Zanimivi in strokovni sogovorniki so tematiko osvetlili iz različnih zornih kotov, poudarili so pomen vseživljenjskega cepljenja ter se dotaknili tudi razvoja cepiva proti novemu koronavirusu.

Prof. Dr. Borut Štrukelj participated in numerous online events, among others in an attention-grabbing online conversation about the importance of vaccination

Organised by the STA, an online discussion for the general public was held on vaccination, the importance of collective immunity and the development of vaccines on 23 April 2020. The event took place during the week of immunisation and was co-hosted by Prof. Dr. Borut Štrukelj from UL FFA, Assist. Matjaž Homšak from the Association for Pediatrics and Dr. Marta Grgič Vitek from the National Institute of Public Health. Interesting and professional panellists highlighted the topic from different angles, emphasized the importance of lifelong vaccination and also discussed the development of a vaccine against the new coronavirus.

MEDNARODNA DEJAVNOST

UL FFA je mednarodno odprta institucija, ki deli svoja raziskovalna in pedagoška prizadevanja s slovensko in svetovno zakladnico znanja. Tako prenaša znanje med domačimi kot tudi mednarodnimi študenti. Z vidika internacionalizacije smo tudi v letu 2019/2020, navkljub neugodnim razmeram, ki so se začele s pandemijo COVID-19, spodbujali in ohranjali visoko število študentskih izmenjav na vseh študijskih programih. Zaradi razmer se je zmanjšalo število izmenjav učiteljev, raziskovalcev in administrativnih sodelavcev. V študijskem letu 2019/2020 so se številne aktivnosti na področju internacionalizacije izvajale nekoliko drugače. Skladno s tem je naš glavni cilj, da po prekinitvi zaradi pandemije ponovno vzpostavimo intenzivne izmenjave predavateljev in raziskovalcev z namenom ohranjanja in obnavljanja strateških partnerstev. Mobilnost študentov ima na UL FFA dobro podporo in je tudi v teh neugodnih razmerah aktivna. Želimo doseči uravnotežen interes za izmenjave na UL FFA iz različnih partnerskih univerz po vsej Evropi in ustvariti še boljše pogoje študija za mednarodne

INTERNATIONAL ACTIVITY

UL FFA is an internationally open institution that shares its research and teaching efforts with the Slovenian and world treasury of knowledge. Thereby it transfers knowledge among domestic as well as international students. From the aspect of internationalization, in 2019/2020 we encouraged and maintained a high number of student exchanges in all study programmes despite the unfavourable conditions that began with the COVID-19 pandemic. The number of staff exchanges has decreased due to the conditions. In the 2019/2020 academic year, many activities in the field of internationalization were carried out somewhat differently. Accordingly, our main goal in order to maintain and restore strategic partnerships is to re-establish intensive exchanges of teachers, researchers and administrative staff after the break due to the pandemic. UL FFA provides strong support for student mobility, which remains active even in these unfavourable circumstances. Our goal is to achieve a balanced interest in the exchanges at UL FFA from different partner universities across Europe and create even better study conditions for international

študente. Čim večjemu številu študentov UL FFA želimo omogočiti kakovostno mobilnost in tako prispevati k nadgradnji njihovih kompetenc, kar bo povečalo njihovo konkurenčnost na trgu dela. Izboljšati želimo tudi možnosti za študijske in praktične izmenjave na programih S1 KOZ ter S1 LBM in S2 LBM.

PROGRAMI MOBILNOSTI

V okviru programa Erasmus+ imamo na UL FFA sklenjenih 67 medinstitucionalnih sporazumov, kar predstavlja približno 160 mest za mobilnost študentov ter 75 za mobilnost učiteljev. V okviru srednjeevropskega programa za mobilnost študentov in profesorjev – CEEPUS sodelujemo v dveh mrežah. UL FFA je partner v CEEPUS mreži CIII-RS-1113-00-2021 (Central European Knowledge Alliance for Teaching, Learning & Research in Pharmaceutical Technology). Kontakt je prof. dr. Stanko Srčič. UL FFA je koordinator CEEPUS mreže CIII-SI-0611-10-2021 (Novel diagnostic and therapeutic approaches to complex genetic disorders). Koordinatorica je prof. dr. Janja Marc. Pri tem smo posebej ponosni, da je mreža že tretje leto dosegla najvišje ocene med slovenskimi mrežami v programu CEEPUS.

Študentje opravljajo izmenjave pogosto tudi v okviru programa Evropske zveze študentov farmacije (EPSA) in programa Mednarodne zveze študentov farmacije (IPSF). Izmenjave študentov in zaposlenih potekajo tudi z drugimi mehanizmi spodbujanja in financiranja.

MOBILNOST V ŠTEVILKAH

Naši študenti na mednarodnih inštitucijah

49 študentov se je udeležilo mednarodne mobilnosti v okviru programa Erasmus+ (31 za namen študija, 18 za namen praktičnega usposabljanja). Nekaj študentov se je zaradi izjemnih razmer v povezavi z virusom SARS-Cov-2 predčasno vrnilo in so študij nadaljevali na domači fakulteti. Največ (13) študentov je bilo na izmenjavi v Nemčiji. Izmenjave so potekale tudi na Finskem (6), Češkem (5), v Slovaški, Španiji (4),

students. We strive to provide quality mobilities to as many UL FFA students as possible and thus contribute to the upgrade of their competencies, which will increase their competitiveness on the job market. Particularly we strive to improve mobilities for study and practice on the S1 KOZ and S1 LBM and S2 LBM programmes.

MOBILITY PROGRAMMES

Under the Erasmus+ programme 67 interinstitutional agreements are signed at the UL FFA to provide approximately 160 places for student mobility, and 75 for staff mobility. Within the Central European Exchange Programme for University Studies - CEEPUS, we participate in two networks. UL FFA is a partner in the CEEPUS network CIII-RS-1113-00-2021 (Central European Knowledge Alliance for Teaching, Learning & Research in Pharmaceutical Technology). Contact person is Prof. Dr. Stanko Srčič. UL FFA is the coordinator of the CEEPUS network CIII-SI-0611-10-2021 (Novel diagnostic and therapeutic approaches to complex genetic disorders). The coordinator and the contact person is Prof. Dr. Janja Marc. We are especially proud of the fact that for the third year in a row the network has achieved the highest marks among Slovenian networks in the CEEPUS programme.

Students also conduct mobilities under the European Pharmacy Students Association (EPSA) programme and the International Pharmacy Students Association (IPSF) programme. Student and staff exchanges also take place through other initiatives and funding mechanisms.

MOBILITY IN NUMBERS

Our students at international institutions

49 students took part in international mobility under the Erasmus + programme, 31 for the purpose of study, 18 for the purpose of practical training. Some students returned early due to the Sars-CoV-2 virus-related emergency situation and continued their studies at home faculty. Most (13) exchange students were in Germany. Mobilities also took place in Finland (6), the Czech Republic (5), Slovakia, Spain (4), Croatia and

na Hrvaškem in v Portugalski (3), v Belgiji, Švedski, Združenem kraljestvu (2) ter Avstriji, Belgiji, Estoniji, Franciji in Norveški (1). Raziskovalno delo in delo v lekarnah v dolžini do 1 meseca v okviru SEP praks se zaradi razmer ni izvajalo.

Gostujoči študenti na UL FFA

60 mednarodnih študentov je opravilo del svojih študijskih obveznosti na UL FFA v okviru programa Erasmus+ (35 jih je opravljalo predmete, 5 poleg predmetov še magistrsko nalogo, 12 samo raziskovalno delo za magistrsko nalogo in 8 raziskovalno delo v laboratoriju). 8 študentov je predčasno odšlo domov, vendar jih je večina študijske obveznosti opravljala na daljavo in tudi uspešno zaključila. 2 študentki sta se udeležili mobilnosti na UL FFA v okviru programa CEEPUS (1 je opravljala raziskovalno delo, 1 predmete). Mednarodna poletna šola mreže CEEPUS CIII-SI-0611 v letu 2020 zaradi razmer v povezavi z virusom SARS-CoV-2 ni bila izvedena.

Izmenjave učiteljev, raziskovalcev in administrativnih sodelavcev

Zaradi epidemije in izrednih razmer se je število mobilnosti učiteljev, raziskovalcev in administrativnih sodelavcev v letu 2019/2020 zelo zmanjšalo. V študijskem letu 2019/2020 so na UL FFA gostovali 3 mednarodni znanstveni delavci ali raziskovalni sodelavci, ki so sodelovali v pedagoškem procesu (vsi trije za obdobje do 1 meseca), 6 mednarodnih znanstvenih delavcev in raziskovalnih sodelavcev, ki so sodelovali v znanstvenoraziskovalnem procesu (2 za obdobje do 1 meseca, 1 za obdobje od 1 do 3 mesecev in 3 za obdobje nad 6 mesecev). 1 visokošolski učitelj/sodelavec UL FFA je bil v študijskem letu 2019/2020 na izmenjavi v tujini za obdobje od 1 do 3 mesecev, kjer je sodeloval pri pedagoškem in znanstvenoraziskovalnem procesu. 2 raziskovalca UL FFA sta bila na izmenjavi v tujini (oba za obdobje 3 do 6 mesecev) in sta sodelovala v pedagoškem ali znanstvenoraziskovalnem delu na gostujočem visokošolskem zavodu.

Portugal (3), Belgium, Sweden, the United Kingdom (2) and Austria, Belgium, Estonia, France and Norway (1). Due to the situation, research work and work in pharmacies for up to 1 month within the framework of SEP practices was not carried out.

Visiting students at UL FFA

60 international students completed part of their study obligations at the UL FFA within the Erasmus+ programme (35 of them took courses, 5 research work master's thesis in addition to courses, 12 research work for master's thesis and 8 research work in a laboratory). 8 students left home early, but most of them successfully completed their study obligations online. 2 students participated in the mobility at UL FFA within the CEEPUS programme (1 for research work, 1 for courses). Due to the situation related to the SARS-CoV-2 virus, the CEEPUS CIII-SI-0611 International Summer School was not conducted in 2020.

Exchanges of teachers, researchers and administrative staff

Due to the epidemic and the emergency situation, the number of mobilities of teachers, researchers and administrative staff in 2019/2020 greatly decreased. In the 2019/2020 academic year, UL FFA hosted 3 international researchers or research associates who participated in the teaching process (all three for a period of up to 1 month), 6 international researchers and research associates who participated in the scientific research process (2 for a period of up to 1 month, 1 for a period of 1 to 3 months and 3 for a period of more than 6 months). 1 higher education teacher/associate of the UL FFA was on an exchange abroad in the 2019/2020 academic year for a period of 1 to 3 months, where he participated in the teaching and scientific research process. 2 UL FFA researchers were on an exchange abroad (both for a period of 3 to 6 months) and participated in teaching or scientific research work at the visiting higher education institution.

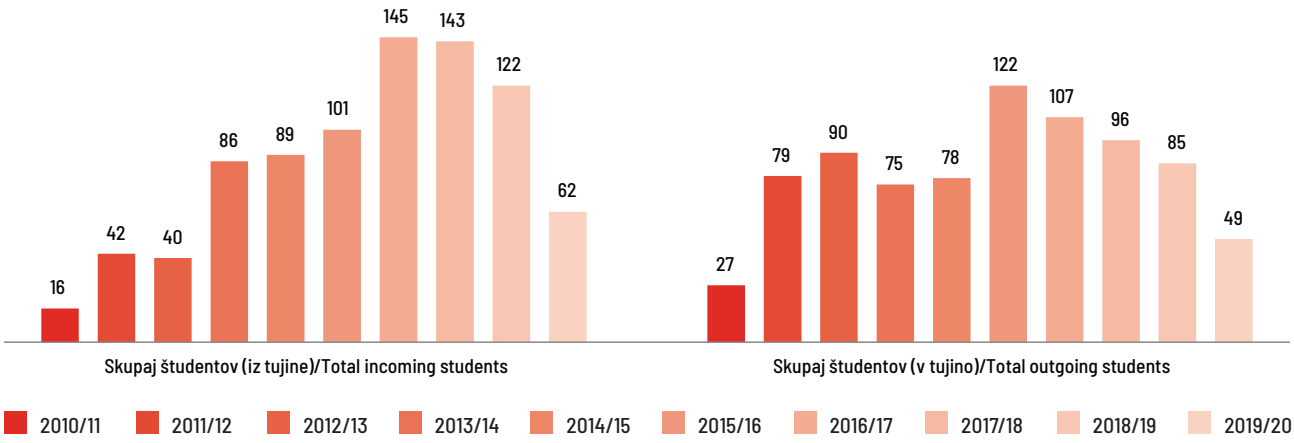
KLJUČNI DOSEŽKI V LETU 2020

V letu 2019/2020 in 2020/2021 se je število učnih enot v angleškem jeziku povečalo za štiri. Sedaj je mednarodnim študentom na voljo 15 učnih enot v angleškem jeziku. Dogodke, s katerimi smo obveščali domače študente o možnostih izmenjav, in dogodke, preko katerih smo obveščali mednarodne študente, smo uspešno nadomestili z virtualnimi oblikami. V sodelovanju s ŠS FFA smo prevetrili merila za izbor študentov na razpisih za Erasmus izmenjave. Sklenili smo dva nova medinstitucionalna sporazuma, ki povečujeta priložnosti izmenjav za zaposlene in študente

KEY ACHIEVEMENTS 2020

In 2019/2020 and 2020/2021 the number of courses lectured in English language increased by four. Overall we offer 15 courses lectured in English to international students. We successfully replaced the informative events for our students and international students with online events. In cooperation with ŠS FFA, we reviewed the criteria for the selection of students in calls for application for Erasmus+ programmes. We signed two new inter-institutional agreements that increase exchange opportunities for staff and students.

MOBILNOST ŠTUDENTOV / STUDENT MOBILITY



Število študentov UL FFA na izmenjavi v tujini in število mednarodnih študentov na izmenjavi na UL FFA (zadnjih deset študijskih let).
The number of faculty students in the exchange programme abroad, and the number of foreign students in the exchange programme at the faculty (data for the last ten years).

OBŠTUDIJSKA DEJAVNOST

Študentska organiziranost na UL FFA je specifična in študentom omogoča velik spekter delovanja tako na strokovnih področjih kot obštudijskem delovanju in mednarodnem udejstvovanju. Študentski svet UL FFA (ŠS FFA) zelo uspešno deluje. V teh letih se je uveljavil kot zelo konstruktiven sogovornik pri vprašanjih, vezanih na študijski proces in kakovost UL FFA. Ustvarja mnenje o pedagoških delavcih ter jim tako omogoča izvolitev v zahtevane nazive. Je uradni zastopnik študentov UL FFA na vseh organizacijskih nivojih in uspešno sodeluje v drugih organih fakultete (Senat, Upravni odbor, Komisija za študijsko področje, Akademski zbor, Komisija za kakovost). Svoje študente prav tako zastopa v okviru univerze na sejah ŠS UL.

Na UL FFA delujejo Društvo študentov farmacije Slovenije (DŠFS), Društvo študentov farmacevtskih ved (DŠFV) in Študentska sekcija Slovenskega farmacevtskega društva (ŠSSFD), preko slednjega študenti tudi zelo uspešno in aktivno sodelujejo v svetovnem in evropskem okolju. Skupaj s ŠS FFA in ŠOFFA so zelo uspešno sodelovali pri organizaciji naslednjih strokovnih in družabnih projektov: Inkubator inovativnosti, Humanitarni Stand-up, 1. ŠSSFD kongres, strokovni večeri in okrogle mize.

Študentska organizacija Fakultete za farmacijo (ŠOFFA), ki je ena izmed podružnic ŠOU v Ljubljani, je tudi v letu 2020 organizirala različne dogodke, ki pomagajo študentom v svojem prostem času bolje spoznati svoje sošolce in druge študente UL FFA in ostalih članic UL.

EXTRACURRICULAR ACTIVITIES

The extracurricular opportunities at the Faculty of Pharmacy at the University in Ljubljana are specific and enable students a wide spectrum of work, both in professional areas and also extracurricular activities and international engagements. The Students' Council of the Faculty of Pharmacy (ŠS FFA) is very successful at its work. Through the years it has proved to be very constructive contributor when it came to questions regarding the study process and other wider qualities of the faculty. It's tasked with producing objective opinions about the work of the teaching staff and therefore enabling them the possibility of election into the desired titles. It is the official representative of the faculty's students at all organisational levels and it successfully collaborates in other bodies of the faculty (Senate, Management Board, Commission of Study Affairs, Academic Assembly, Commission of Quality). It also represents its students on the university level at the sessions of the Student's Council of the University of Ljubljana (ŠS UL).

During 2020 we had a lot of other student entities at the faculty that also continued their work. These included The Slovenian Pharmacy Students' Society (DŠFS), The Society of Pharmaceutical Studies students (DŠFV) and The Students' Section of the Slovenian Pharmaceutical Society (ŠSSFD). The latter enables our students to be successfully and actively involved in European and worldwide projects. Working together with ŠS FFA and ŠOFFA, they were very successful at organising many professional work related and social projects. These included The Incubator of Innovations, Humanitarian Stand Up evening, The First ŠSSFD Congress and discussion panels.

The Students' Organisation of the Faculty of Pharmacy (ŠOFFA) is one of the many subsidiaries of The Students' Organisation of the University of Ljubljana (ŠOU). In 2020 they organised many events which helped our students to get to know each other better in their free time.

Spatula

Spatula je glasilo Študentske sekcije Slovenskega farmacevtskega društva, s katerim se študente UL FFA seznanja o aktualnih obštudijskih dogodkih in novostih v svetu farmacije. Je periodična publikacija, ki prispevke objavlja v slovenskem jeziku, razen člankov tujih avtorjev, ki so objavljeni v angleškem jeziku.

7. simpozij Študentske sekcije Slovenskega farmacevtskega društva: Rezistenca bakterij

28. 2. 2020 se je na 7. simpoziju ŠSSFD zvrstilo 5 predavanj strokovnjakov z različnih področij farmacije, medicine in mikrobiologije, ki so predavali o antimikrobni rezistenci (AMR). Udeležencev je bilo okoli 300, največ študentov UL FFA ter UL MF, nekaj pa tudi študentov ostalih naravoslovnih fakultet.

Inkubator inovativnosti

Inkubator inovativnosti 2020 je bil organiziran po spletu v novembru 2020 pod okriljem podjetja Lek in MSD. Ekipe so predstavile svoje rešitve zastavljenega problema iz sfere farmacevtskega marketinga.

Strokovni večer: Preiskave drog v bioloških vzorcih

Strokovni večer se je odvijal po spletu. Na izbrano tematiko sta predavala dva strokovnjaka, s katerima so študentje spoznali najpogostejše droge v bioloških vzorcih in načine ugotavljanja prisotnosti in kvantifikacije psihoaktivnih snovi v post mortem vzorcih.

Javne kampanje

Študenti so v letu 2020 organizirali naslednje javne kampanje: EPSA Javna kampanja: Boj proti raku; Javna kampanja: InterAKCIJA in Javna kampanja študentov kozmetologije.

Spatula

Spatula is the newsletter of the Students' section of the Slovenian Pharmaceutical Society, through which the students of Faculty of Pharmacy are being informed about various extracurricular activities taking place and on the latest developments in the field of pharmacy. New issues are being published periodically, with the majority of content being written in Slovenian, except for the articles of foreign authors, which are written in English.

7th Symposium of The Students' section of Slovenian Pharmaceutical Society: Antimicrobial resistance

On the 28 February 2020 five lectures of acclaimed professionals at the top of their respective fields of Pharmacy, Medicine and Microbiology comprised the programme of the 7th Symposium of ŠSSFD. The aim of this event was to present the emerging problem of antimicrobial resistance (AMR). More than 300 students took part in it, the majority of them being students of either the Faculty of Pharmacy or Faculty of Medicine, as well as some students from other life-science faculties.

Incubator of Innovations

The Incubator of Innovations this year was held in November of 2020 with the help of pharmaceutical firms Lek and MSD. Participants competed in teams, each one of them trying to launch their idea of a solution to a certain problem in the field of pharmaceutical marketing.

Professional evening: Detecting drugs in biological samples

Professional evenings were carried out in an online format. A topic was presented by two professionals, who offered a deeper insight into the most abundantly present drugs in biological samples, as well as means of detection and quantification of psychoactive substances in post-mortem samples.

Public campaigns

In 2020 the students organised the following public campaigns: EPSA Public campaign: Fighting cancer, Public campaign: InterACTION and a public campaign, prepared by our cosmetic science students.

Študentska izmenjava – Twinnet

V letu 2020 smo Twinnet izvedli s študenti iz Turčije. Prvi del je potekal pri nas med 16. 2. in 22. 2. 2020, drugi del je potekal v Istanbulu od 3. 3. do 9. 3. 2020.

Informativni dnevi, Informativa in Karierni sejem MOM

Študenti UL FFA smo predstavljali fakulteto, študijske programe in obštudijske aktivnosti na vsakoletnih informativnih dogodkih.

Twinnet Student Exchange Programme

As a part of the Twinnet Student Exchange Programme, students from Slovenia participated in an exchange project with students from Turkey. The first part of the exchange took place in Slovenia from 16 to 22 February 2020, whereas the second part was carried out in Istanbul from 3 to 9 March 2020.

Information days, Informativa, MOM Career fair

Students of our faculty were actively involved in many presentations of the faculty, it's study programmes and extracurricular activities. These presentations took place at our annual informative events.

ŠPORT NA UL FFA

ORGANIZACIJA ŠPORTNE VZGOJE NA UL FFA V ČASU PANDEMIJE COVID-19

Na UL FFA smo bili med prvimi fakultetami UL, ki smo začeli upoštevati vsa navodila in priporočila Nacionalnega inštituta za javno zdravje (NIJZ) za preprečitev širjenja virusa SARS-CoV-2. Pri športni vzgoji smo vsebine športne vadbe prilagodili vladnim ukrepom. Organizirane vadbe v športnih dvoranah, telovadnicah, bazenih in fitnesih smo odpovedali ter uvedli individualne aktivnosti v domačem kraju, doma in v naravi.

Študentke in študenti, zaposleni na UL FFA, so sprotno dobivali navodila in vsebine vadb v času pandemije (treningi doma in v naravi, pomen športnih vadb v času samoizolacije, pravila in navodila za izvajanje vadb, nasveti glede uravnotežene prehrane, tedenska motivacijska pisma).

Športna vzgoja se je iz športnih dvoran preselila v naravo. Vse dejavnosti v naravi (pohodništvo, planinski izleti, funkcionalna vadba) so se izvajale v skladu z navodili vlade in v skrbi za zdravje in varnost udeležencev.

Z zaprtjem občinskih meja smo organizirano vadbo prekinili in nadaljevali z on-line vadbami (aerobika in

SPORT AT UL FFA

ORGANISATION OF SPORTS EDUCATION AT UL FFA DURING THE COVID-19 PANDEMIC

At the UL Faculty of Pharmacy (FFA) we were among the first UL faculties to start following all the instructions and recommendations of the National Institute of Public Health (NIJZ) to prevent the spread of the COVID-19. We adjusted the contents of physical activities to government measures. We cancelled organised exercises in sports halls, gymnasiums, swimming pools and gyms, and introduced individual activities in our hometown, at home and in nature.

Students and employees at the UL FFA regularly received strategies and instructions for exercising during the pandemic (trainings at home and in nature, the importance of physical activity during self-isolation, exercise guidelines and instructions, advice on a balanced diet, weekly motivational letters).

Physical education moved from gyms to nature. All activities in nature (hiking, mountain excursion, functional exercises) were carried out in accordance with government regulations, keeping the participants healthy and safe.

With the closing of municipal borders, we stopped the organised physical activities and continued with online

joga po Zoomu, vodena vadba preko spletnih aplikacij, izvajanje treningov doma in v naravi).

Študentke in študenti UL FFA so v času pandemije ob vodenih on-line vadbah izvajali različne športne dejavnosti (pohodništvo, planinske izlete, kolesarjenje, rolkanje, plezanje, tenis, joga, aerobika, plavanje, izrazne plese, funkcionalno vadbo, namizni tenis, badminton ...). Športna dejavnost naših študentov se ni zmanjšala, kar dokazuje tudi število udeleženih študentk in študentov pri športni vzgoji.

Zaposleni ter študentke in študenti na UL FFA se zavedamo koristi ukvarjanja s športno dejavnostjo, uravnotežene prehrane in zdravega življenjskega sloga nasploh. Motivacije nam ne primanjkuje, v tem trenutku nam manjka predvsem socialna komponenta oziroma druženje, kar študenti najbolj pogrešajo.

ŠPORTNI DOSEŽKI V ŠTUDIJSKEM LETU 2019/2020 NA UL FFA

UNIVERZITETNA LIGAŠKA TEKMOVANJA

Univerzitetna ligaška tekmovanja so bila v mesecu marcu odpovedana zaradi COVID-19.

ZNANSTVENORAZISKOVALNO IN STROKOVNO DELO NA PODROČJU ŠPORTA UL FFA

ČLANKI IN DRUGI SESTAVNI DELI

Strokovni članek

ŠUŠTARŠIČ, Ana, VIDEMŠEK, Dušan, VIDEMŠEK, Tasja. Telesna vadba v času karantene. Šport: revija za teoretična in praktična vprašanja športa. 2020, letn. 68, št. 3/4, str. 26-32, ilustr. ISSN 0353-7455. [COBISS.SI-ID 40584707]

ŠUŠTARŠIČ, Ana, VIDEMŠEK, Mateja, VIDEMŠEK, Dušan. Športna vadba v času karantene: vadba na prostem. Univerzitetni šport: strokovna revija za vprašanja slovenskega univerzitetnega športa. dec. 2020, let. 13, št. 13, str. 59-64, barvne fotogr. ISSN 1855-0983. [COBISS.SI-ID 48537859]

workouts (aerobics and yoga via zoom, guided workout via online applications, trainings at home and in nature).

During the pandemic, in addition to online guided workouts, the UL FFA students performed other various sports activities (hiking, mountain exercises, cycling, skateboarding, climbing, tennis, yoga, aerobics, swimming, expressive dance, functional exercise, table tennis, badminton, ...). Physical activity levels of our students have not decreased, which is also proven by the number of participating students in physical education.

The employees and students of the UL FFA are aware of the benefits of engaging in sports activities, a balanced diet and a healthy lifestyle in general. We do not lack motivation; rather we lack the social component and socializing, which at the moment students miss the most.

SPORTS ACHIEVEMENTS IN THE ACADEMIC YEAR 2019/2020 AT UL FFA

UNIVERSITY LEAGUE COMPETITIONS

University league competitions were cancelled in March due to COVID-19.

SCIENTIFIC RESEARCH AND PROFESSIONAL WORK IN THE FIELD OF SPORT UL FFA

ARTICLES AND OTHER PUBLICATIONS

Professional article

ŠUŠTARŠIČ, Ana, VIDEMŠEK, Dušan, VIDEMŠEK, Tasja. Telesna vadba v času karantene. Šport: revija za teoretična in praktična vprašanja športa. 2020, letn. 68, št. 3/4, str. 26-32, ilustr. ISSN 0353-7455. [COBISS.SI-ID 40584707]

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Samostojni znanstveni sestavek ali poglavje v monografski publikaciji

VIDEMŠEK, Naja, VIDEMŠEK, Mateja, KARPLJUK, Damir, MEŠKO, Maja, VIDEMŠEK, Dušan, ŠUŠTARŠIČ, Ana. Življenjski slog študentov – stres. V: KHALIL, Marie Therese (ur.) et al. Življenjski slog mladostnikov in odraslih: primer Slovenije in Libanona. Ljubljana: Fakulteta za šport, Inštitut za šport, 2020. Str. 49-79, ilustr. ISBN 978-961-7095-01-2. [COBISS.SI-ID 5672113]

Polemika, diskusijski prispevek, komentar

VIDEMŠEK, Mateja, VIDEMŠEK, Dušan. Prvi koraki v svet kolesarjenja. SLOfit nasvet. 31. mar. 2020, ilustr. ISSN 2591-2410. http://www.slofit.org/slofit-nasvet/ArticleID/197/Prvi-koraki-v-svet-kolesarjenja, http://www.slofit.org/slofit-nasvet. [COBISS.SI-ID 5673649]

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Chapter in a scientific publication

VIDEMŠEK, Naja, VIDEMŠEK, Mateja, KARPLJUK, Damir, MEŠKO, Maja, VIDEMŠEK, Dušan, ŠUŠTARŠIČ, Ana. Življenjski slog študentov - stres. V: KHALIL, Marie Therese (ur.), et al. Življenjski slog mladostnikov in odraslih: primer Slovenije in Libanona. Ljubljana: Fakulteta za šport, Inštitut za šport, 2020. Str. 49-79, ilustr. ISBN 978-961-7095-01-2. [COBISS.SI-ID 5672113]

Discussion article

VIDEMŠEK, Mateja, VIDEMŠEK, Dušan. Prvi koraki v svet kolesarjenja. SLOfit nasvet. 31. mar. 2020, ilustr. ISSN 2591-2410. http://www.slofit.org/slofit-nasvet/ArticleID/197/Prvi-koraki-v-svet-kolesarjenja, http://www.slofit.org/slofit-nasvet. [COBISS.SI-ID 5673649]

Co-mentor at Master's Thesis

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4 Ponosni smo – priznanja in nagrade
We are proud of – awards and prizes

SLAVIMO ZNANOST – RAZISKOVALNI DAN UL FFA

V okviru Tedna Univerze je bil 2. 12. 2020 po spletni platformi Zoom organiziran Raziskovalni dan UL FFA. Dogodek je namenjen osvetlitvi in počastitvi izjemnih dosežkov fakultete. Na njem so dekanovi nagrajenci predstavili svoje članke, nato je sledila podelitev nagrad, priznanj in pohval UL FFA, ki jih fakulteta podeljuje izstopajočim posameznikom, katerih delo pomembno zaznamuje znanstveni prostor ali vpliva na ugled in kakovost fakultete.

Priznanje UL FFA za življenjsko delo je prejel prof. dr. Danijel Kikelj

Prof. dr. Kikelj je leta 2005 prejel Zoisovo priznanje za pomembne znanstvene dosežke, v letu 2006 pa je bil nominiran za nagrado European Inventor of the Year v kategoriji novih držav članic EU za delo na področju razvoja novih derivatov muramil dipeptida z izraženim imunostimulatornim in protitumornim delovanjem. Od leta 2007 je aktivni član Mednarodnega sveta European Federation of Medicinal Chemistry in član strateškega telesa za vpliv na evropsko znanstveno politiko. Njegova mednarodna vpetost se odraža tudi v iniciaciji in vodenju številnih bilateralnih sodelovanj. Na številnih uglednih mednarodnih konferencah in tujih univerzah je bil večkrat vabljen kot predavatelj in član znanstvenih odborov. Leta 2015 je s svojim prispevkom Naravne spojine morskega izvora, kot vir in navdih za razvoj novih zdravil, sodeloval na prireditvi Odlični v znanosti 2015. Leta 2016 je prejel Minařikovo odličje in leta 2017 Zlato plaketo Univerze v Ljubljani za odlične dosežke. V več kot štiridesetih letih delovanja je profesor Danijel Kikelj kot visokošolski učitelj, znanstvenik in prodekan Fakultete za farmacijo pomembno prispeval k njenemu uspešnemu razvoju in razcvetu.

WE CELEBRATE SCIENCE - FACULTY OF PHARMACY RESEARCH DAY

On 2 December 2020 the UL FFA Research Day was organised on the online platform Zoom, as a part of the University of Ljubljana Week. The event is intended to highlight and honour the outstanding achievements of the Faculty of Pharmacy. The recipients of Dean's award presented their awarded articles, which was followed by awards, recognitions and praises of the Faculty of Pharmacy ceremony, where the faculty awards were presented to outstanding individuals, whose work significantly characterizes the scientific area or affects the reputation and the quality of the faculty.

Faculty of Pharmacy Lifetime Achievement Award presented to Prof. Dr. Danijel Kikelj

In 2005, Prof. Dr. Kikelj received the Zois Award for outstanding scientific achievements, and in 2006 he was nominated for the European Inventor of the Year Award in the category of new EU Member States for his work on the development of new muramyl dipeptide derivatives with pronounced immunostimulatory and antitumor activity. Since 2007 he has been an active member of the International Council of the European Federation of Medicinal Chemistry and a member of the strategic body for influencing European science policy. His international involvement is also reflected in the initiation and management of many bilateral cooperation. He has been invited several times as a lecturer and was a member of several scientific committees at many prestigious international conferences and at foreign universities. In 2015 he participated in the event Excellent in Science 2015 with his contribution Natural compounds of marine origin, as a source and inspiration for the development of new medicines. In 2016, he received the Minařik Medal and in 2017 the Gold Plaque of the University of Ljubljana for excellent achievements. In more than forty years of his work, Prof. Dr. Danijel Kikelj has significantly contributed to successful development and prosperity of Faculty of Pharmacy, as its higher education teacher, scientist and vice dean.

Nagrajenec prof. dr. Danijel Kikelj / Photo: Prof. Dr. Danijel Kikelj

Priznanje fakultete za izjemne rezultate pri delu so prejeli zaposleni v sprejemni službi in v nabavni službi UL FFA

V začetku maja 2020 sta se na UL FFA organizirali dve skupini: sprejemna in nabavna služba UL FFA. Skupina sprejemne službe fakultete, pod vodstvom Mihaele Kolarev in sodelavk: Tatjane Hrovatič, Mojce Keržan, Valerije Garb, Manje Cedilnik, Petre Ferkov, Majde Sirnik, Maje Frelih, Katje Perc, Grete Cof, Nevenke Lilik, Mateje Matjaž, Marije Babnik Gatej, Martine Tekavec in Marte Pogačar, je na vhodih v prostore fakultete skrbela za evidentiranje prihajajočih oseb, za merjenje njihove telesne temperature in dosledno uporabo zaščitne opreme. Njihova dejavnost je bila pomembna v času ponovnega vzpostavljanja pedagoškega dela, ko so nadzorovale in skrbele za ustrezen sprejem večjih skupin študentov. Skupina nabavne službe fakultete, v sestavi asist. Janja Jazbar, Greta Cof in Mojca Keržan, je ob začetku sproščanja ukrepov po prvem valu COVID-19 skrbela za racionalno nabavo zaščitne opreme, distribucijo razkužil po fakulteti in

Faculty of Pharmacy Award for outstanding work achievement presented to UL FFA employees of the reception service and the purchasing service

At the beginning of May 2020 two groups were organised at the UL FFA: the reception and purchasing service of the UL FFA. The reception service group, led by Mihaela Kolarev and colleagues: Tatjana Hrovatič, Mojca Keržan, Valerija Garb, Manja Cedilnik, Petra Ferkov, Majda Sirnik, Maja Frelih, Katja Perc, Greta Cof, Nevenka Lilik, Mateja Matjaž, Marija Babnik Gatej, Martina Tevec and Marta Pogačar, took care of recording of incoming persons, measuring their body temperature and consistent usage of protective equipment, being stationed at the entrances to the faculty premises. Their activity was important at the time of the re-establishment of pedagogical work, when they supervised and took care of the proper reception of larger groups of students. Purchasing service group: Assist. Janja Jazbar, Greta Cof and Mojca Keržan, have after the release of precautionary measures of the first wave of COVID-19 epidemic taken care of the rational purchase of protective equipment, distribution

Slika: Podeljeno priznanje Fakultete za izjemne rezultate pri delu zaposlenim v sprejemni in v nabavni službi /
Photo: Award for outstanding work achievement presented to the UL FFA employees of the reception and the purchasing service

Podeljeno priznanje študentom za izjemne dosežke / Photo: Award for outstanding student achievement

za delitev zaščitnih mask zaposlenim ter študentom. Za delo sodelavk, ki so in še vedno v teh težkih časih vestno in profesionalno opravljajo delo, jim je fakulteta podelila priznanje za izjemne rezultate pri delu.

Priznanje študentom za izjemne dosežke so prejeli Študentski svet UL FFA (ŠS FFA), organizatorji akcije Farmakrog, organizatorji Uvodnega dneva za bruce in številni posamezniki, ki so pomagali pri uvedbi IKT tehnologije

V zadnjem študijskem letu se je celoten pedagoški proces soočil z izzivom kot še nikoli prej. Predavanja in vaje so bila v marcu 2020 v hipu prestavljeni na splet, študijski proces je nekaj dni stagniral. Ključnega pomena je postalo obveščanje vseh študentov o ukrepanju fakultete, saj so spremembe sledile iz dneva v dan. Za izvedbo spletnega načina predavanj, seminarjev in vaj so bili ključni predstavniki študentov, ki so hitro in točno obveščali svoje kolege. Za njihovo veliko zavzetost pri delu so prejeli priznanje. Priznanje so prejeli tudi študenti, ki so se organizirali v skupino Farmakrog. Skupina je skrbela za organizacijo prostovoljnega dela študentov vseh študijskih smeri, ki so sodelovali v številnih segmentih dela za blaženje posledic epidemije COVID-19. Priznanje je bilo podeljeno še organizatorjem Uvodnega dne za bruce UL FFA, ki so pred začetkom študijskega leta 2020/2021 organizirali, izvedli in logistično podprli prijeten prihod nove generacije študentov prvostopenjskih študijskih programov na fakulteto in s tem prispevali k pozitivni podobi UL FFA.

of disinfectants throughout the faculty and distribution of protective masks to employees and students. For the work of colleagues who were performing and still perform their work diligently and professionally in these difficult times, the faculty awarded them recognition for exceptional results at work.

Faculty of Pharmacy Award for outstanding student achievement presented to the Student council UL FFA, the organisers of the Farmakrog campaign, the organisers of the Introductory Day for freshmen and many individuals who helped in introduction of ICT technology

In the last academic year the whole pedagogical process confronted a challenge like never before. In March 2020 lectures and tutorials were instantly transferred to online environment, and the study process stagnated for several days. Informing all students about the actions of the faculty became crucial, as changes were introduced on a daily basis. For the implementation of the online mode of lectures, seminars and exercises, the key representatives were students who informed their colleagues quickly and accurately. They received recognition for their great commitment to work. The award was also given to students who organised themselves into the Farmakrog group. The group took care of the organisation of voluntary work of students of all faculty fields of study, who participated in many segments of work to mitigate the consequences of the COVID-19. Finally, recognition was given to the organisers of the Introductory Day for the UL FFA freshmen, who organised, implemented and logistically supported the pleasant arrival of a new student generation of first-cycle programmes at the faculty before the start of the 2020/2021 academic year and thus contributed to the pleasant image of the UL FFA.

Priznanje UL strokovni delavki ge. Zdenki Gantar

V okviru Tedna Univerze so bile na slovesnosti UL izpostavljene navdihujoče posameznice in posamezniki, ki so pomembno prispevali k uspešnemu delu univerze. Priznanje UL za izjemne rezultate pri delu je prejela strokovna delavka Zdenka Gantar, vodja kadrovske službe UL FFA

Ga. Zdenka Gantar je kot vodja kadrovske službe na UL FFA zaposlena več kot 30 let. Od vsega začetka je znala prisluhniti slehernemu zaposlenemu in mu dala vedeti, da bo zanj s kadrovskega vidika vedno poskrbljeno. Obseg njenega dela se je z leti večal, saj se je večalo število zaposlenih, spreminjali so se predpisi, postajali obsežnejši in zahtevnejši, pa vendar je ga. Zdenka Gantar s požrtvovalnostjo, vestnostjo in marljivostjo sledila spremembam in kadrovsko službo skozi čas krmarila mirno in dosledno ter pri delu vedno ostala natančna in hitra. Sodelavci cenijo njeno delo in njen odnos do ljudi, spoštujejo in občudujejo njeno potrpežljivost in mirnost, prisluhnejo njenemu mnenju in nasvetom, računajo na njeno pomoč in pripravljenost sodelovati tudi pri novih nalogah. Ga. Gantar je pustila neizbrisen pečat v desetletjih dela na UL FFA.

University of Ljubljana Award for the Associates Mrs. Zdenka Gantar

As a part of the University of Ljubljana Week, inspiring individuals, who made an important contribution to the successful work of the University of Ljubljana, were highlighted at the UL ceremony. University of Ljubljana Award for outstanding work achievements was presented to Mrs. Zdenka Gantar, Head of the Human Resources Department at UL FFA.

Mrs. Zdenka Gantar has been working as a Head of the Human Resources Department at the UL FFA for more than 30 years. From the very beginning, she knew how to listen to every employee and let him know that he would always be taken care of from the personnel point of view. The scope of her work has increased over the years as the number of employees has decreased, regulations have changed, and they have become more extensive and demanding. Nonetheless, with sacrifice, conscientiousness and diligence, Mrs. Zdenka Gantar followed the changes, steered the personnel department calmly and consistently over time, always remaining accurate and fast at work. Employees appreciate her work and her attitude towards people, respect her patience and calmness, listen to her opinion and advice, and count on her help and readiness to participate in new tasks. Mrs. Gantar has left an indelible mark in this sense in her decades of work at UL FFA.

NOVOIZVOLJENI REDNI PROFESORJI UL FFA V LETU 2020

Prof. dr. JANEZ ILAŠ

Rodil se je leta 1980 v Novem mestu. Leta 2003 je zaključil univerzitetni študij farmacije na Univerzi v Ljubljani, nadaljeval z doktorskim študijem Biomedicine in leta 2008 uspešno zagovarjal doktorsko disertacijo.

Med podiplomskim študijem je bil na 10-mesečnem strokovnem usposabljanju na Madžarski akademiji znanosti v Budimpešti.

Po diplomi leta 2003 se je zaposlil na UL FFA, najprej kot mladi raziskovalec, danes kot visokošolski učitelj na Katedri za farmacevtsko kemijo.

Dr. Janez Ilaš ima preverjeno pedagoško aktivnost. V preteklem obdobju je sodeloval v pedagoškem procesu na UL FFA kot predavatelj in asistent pri številnih predmetih na prvostopenjskih in drugostopenjskih študijskih programih. Je nosilec predmetov Analiza in nadzor zdravil na enovitem magistrskem študiju Farmacije, Analiza zdravil na magistrskem študiju programa Industrijska farmacija na 2. stopnji in nosilec predmeta Instrumentalna analiza v kozmetiki univerzitetnega študijskega programa Kozmetologija na 1. stopnji.

NEWLY APPOINTED FULL PROFESSORS AT UL FFA IN 2020

Prof. Dr. JANEZ ILAŠ

He was born in 1980 in Novo mesto. In 2003 he completed his University studies of Pharmacy at the University of Ljubljana (UL FFA), continued his doctoral studies in Biomedicine and in 2008 successfully defended his doctoral dissertation.

During his postgraduate studies, he spent 10 months at the Hungarian Academy of Sciences in Budapest.

After graduating in 2003, he got employed at the UL FFA, first as a young researcher, today as a university professor at the Department of Pharmaceutical Chemistry.

Dr. Janez Ilaš has proven pedagogical experience. In the past he participated in the pedagogical process of the UL FFA as a lecturer and an assistant in several subjects in bachelor and master study programmes. He is the lecturer of Analysis and Control of Medicinals in the uniform master study programme Pharmacy (Single-cycle master study programme Pharmacy), Analysis of Medicines in the master study programme Industrial Pharmacy and the lecturer of Instrumental Analysis in Cosmetics at the academic bachelor study programme Cosmetology

Bil je mentor in somentor pri 3 zaključenih doktoratih in pri 25 zaključnih delih, ki se vrednotijo kot magistrske naloge ter mentor pri enem znanstvenem magisteriju. Kot gostujoči raziskovalec je v letu 2016 tri mesece neprekinjeno deloval na tuji inštituciji na Raziskovalnem centru za naravoslovne vede Madžarske akademije znanosti v Budimpešti, kjer se je ukvarjal s proučevanjem termodinamskih parametrov pri vezavi ligandov na makromolekule.

Strokovno dejavnost je prof. dr. Janez Ilaš predstavljal s članstvom v gradbenem odboru Fakultete za farmacijo, članstvom v kadrovski komisiji za nove zaposlitve, organizaciji mednarodne poletne šole in članstvom organizacijskega odbora »Srečanja slovenskih farmacevtskih kemikov«.

Osrednja vsebina njegovega raziskovalnega dela so načrtovanje protimikrobnih in protirakavih učinkovin, uvedba novih biofizikalnih metod za vrednotenje učinkovin v *in vitro* sistemih in uporaba HPLC – MS v farmacevtski kemiji.

Svojo ekspertizo izkazuje z bibliografijo, s predavanji na domačih in mednarodnih strokovnih ter znanstvenih srečanjih in z vodenjem projektov.

Znanstveno delo prof. dr. Janeza Ilaša je obsežno, kar potrjujejo tudi številni članki, objavljeni v uglednih tujih znanstvenih revijah.

Rezultati dosedanjega raziskovalnega dela so bili objavljeni v 66 člankih v mednarodnih revijah s SCI faktorjem vpliva. Pri delih, objavljenih v revijah s SCI faktorjem, je bil izr. prof. dr. Janez Ilaš 7-krat prvi avtor in 7 krat vodilni avtor. Večina omenjenih člankov je bila objavljena v revijah, ki sodijo v prvi ali drugi kvartil revij na področjih farmacevtske kemije ali drugih področjih kemije. Njegova dela imajo po Sicrisu 624 čistih citatov.

Dr. Janez Ilaš je bil na Univerzi v Ljubljani prvič izvoljen v naziv asistenta leta 2005, nato v docenta leta 2009 in izrednega profesorja leta 2014. Senat UL ga je septembra 2020 izvolil v naziv rednega profesorja za področje farmacevtske kemije.

He has been the mentor and co-mentor of 3 completed doctorates and 25 master's theses and the mentor for one scientific master's thesis. As a visiting researcher in 2016, he worked continuously for 3 months at a foreign institution at the Research Centre for Natural Sciences, Hungarian Academy of Sciences in Budapest, where he studied thermodynamic parameters in the binding of ligands to macromolecules.

The professional activity of prof. dr. Janez Ilaš is represented by his membership in the personnel commission for new employment, by the organization of the international summer school, by his membership in the organizing committee of the "Annual Meeting of Slovenian Pharmaceutical Chemists", and by his membership in the building committee of the Faculty of Pharmacy.

The focus of his research work is the design of antimicrobial and anticancer agents, the introduction of new biophysical methods for the evaluation of active compounds in *in vitro* systems and the use of HPLC - MS in pharmaceutical chemistry.

He demonstrates his expertise through bibliography, lectures at domestic, international professional and scientific meetings and project management.

The scientific work of prof. dr. Janez Ilaš is extensive, which is also confirmed by numerous articles published in reputable foreign scientific journals.

The results of previous research work have been published in 66 articles in international journals with SCI impact factor. As Assoc. Prof., dr. Janez Ilaš was 7 times the first author and 7 times the leading author in these works. Most of the articles have been published in journals belonging to the first or second quartile of journals in the fields of pharmaceutical chemistry or other fields of chemistry. His works, according to Sicris, have 624 pure quotations.

Dr. Janez Ilaš was first elected for an assistant at the University of Ljubljana in 2005, then for an assistant professor in 2009 and an associate professor in 2014. In September 2020 the UL Senate elected him a full professor of Pharmaceutical Chemistry.

Prof. dr. ROBERT ROŠKAR

Rodil se je leta 1975 na Ptuju. Po končanem univerzitetnem študiju farmacije na Univerzi v Ljubljani se je vpisal na doktorski študij Biomedicina in leta 2005 zagovarjal doktorsko disertacijo.

Leta 2000 se je zaposlil na UL FFA, najprej kot stažist asistent, po doktoratu je bil 6 let raziskovalec, od leta 2011 pa je visokošolski učitelj na Katedri za biofarmacijo in farmakokinetiko. V vmesnem času je tri mesece deloval na tuji instituciji v raziskovalnem centru RPCE v Gradcu v Avstriji.

Prof. dr. Robert Roškar ima preverjeno pedagoško aktivnost. Je nosilec in izvajalec predavanj in vaj pri predmetu Stabilnost zdravil, sonosilec pri predmetu Embalaža in stabilnost, sodeluje pri predmetu Industrijski razvoj zdravil ter pri izbirnem predmetu Biofarmacevtsko vrednotenje farmacevtskih oblik.

Izkazuje mentorstvo pri dveh zaključenih doktoratih ter mentorstvo oziroma somentorstvo pri več kot 60 diplomskih in magistrskih nalogah na različnih študijskih programih UL FFA. V zadnjih 5 letih je bil mentor pri šestih fakultetnih Prešernovih nagradah in šestih Krkinih nagradah.

Njegovo raziskovanje je tesno povezano z razvojem in uporabo analitike na področju stabilnosti in kakovosti zdravil. Raziskave so usmerjene tudi v razvoj bio-analiznih metod in okoljske analitike. Njegova bibliografija v okviru raziskovalne dejavnosti obsega več kot 50 znanstvenih člankov, od katerih je več kot polovica s prvim ali vodilnim avtorstvom.

Svojo ekspertizo na področju analitike izkazuje z vodenjem številnih raziskovalnih projektov za farmacevtsko industrijo. Prav tako je bil vključen v oba projekta razvoj kadrov FFA-Lek. Aktivno sodeluje pri potekajočem TRL 3-6 projektu Laktika, sodeloval pa je bil tudi pri EU projektu PharmDegrade.

Prof. dr. Robert Roškar je bil prvič izvoljen v naziv asistenta leta 2000, nato v docenta leta 2009 in izrednega profesorja leta 2014. Septembra 2020 ga je Senat UL izvolil v naziv rednega profesorja za področje farmacevtske tehnologije in biofarmacije.

Prof. Dr. ROBERT ROŠKAR

He was born in 1975 in Ptuj. After completing the university study of Pharmacy at the Faculty of Pharmacy, University of Ljubljana, he enrolled in the doctoral study of Biomedicine and in 2005 defended his doctoral dissertation.

Since 2000 he has been employed at the UL FFA, first as an intern assistant. After successful completion of the doctorate, he continued to work as a researcher for 6 years. Since 2011 he has been a professor at the Chair of Biopharmacy and Pharmacokinetics. In the meantime, he worked for three months at a foreign institution - RPCE Research Centre in Graz, Austria.

Prof. dr. Robert Roškar has a proven pedagogical activity. He is a lecturer in the course Stability of Medicines, co-lecturer in the course Packaging and Stability, participates in the course Industrial Development of Medicines and in the elective course Biopharmaceutical Evaluation of Pharmaceutical Forms.

He was a mentor in two completed doctorates and mentor or co-mentor in more than 60 diploma and master's theses in various study programmes at the UL FFA. In the last 5 years, he has been a mentor of awarded students: six faculty Prešeren Awards and six Krka Awards.

His research is closely linked to the development and application of analytics in the field of drug stability and quality control. His research is also focused on the bio-analytical methods and environmental analytics. His bibliography includes more than 50 scientific articles, more than half of which are with his first or leading authorship.

He demonstrates his expertise in the field of analytics by leading numerous research projects for the pharmaceutical industry. He was also involved in both UL FFA - Lek projects. He actively participates in the ongoing TRL 3-6 project Laktika, and has also participated in the EU project PharmDegrade.

Prof. dr. Robert Roškar was first elected as an assistant in 2000, then assistant professor in 2009 and associate professor in 2014. In September 2020 the UL Senate elected him a full professor for Pharmaceutical Technology and Biopharmacy.

Prof. dr. ANAMARIJA ZEGA

Po končanem univerzitetnem študiju farmacije na Univerzi v Ljubljani se je leta 1997 vpisala na doktorski študij Biomedicina in leta 2002 pod mentorstvom prof. dr. Uroša Urleba zagovarjala doktorsko disertacijo z naslovom *Načrtovanje in sinteza trombinskih inhibitorjev z azapeptidnim skeletom.*

V letih 2007 in 2008 je bila šest mesecev na strokovnem usposabljanju na Centre de Recherche des Cordeliers, INSERM UPMC UPD, na Univerzi Pierre et Marie Curie v Parizu v skupini dr. Michela Arthurja.

Od leta 1998 je zaposlena na UL FFA, najprej kot asistentka, danes kot visokošolska učiteljica na katedri za Farmacevtsko kemijo. Je predavateljica na vseh prvo- in drugostopenjskih programih UL FFA in koordinatorica več predmetov. Sodeluje tudi pri izvedbi doktorskega študijskega programa Biomedicina kot izvajalka in kot koordinatorica enega od modulov temeljnega predmeta Farmacevtske znanosti. Skupaj s sodelavci je sodelovala pri oblikovanju več novih predmetov na dodiplomskih in podiplomskih študijskih programih Fakultete za farmacijo.

Bila je mentorica oz. somentorica pri 4 zaključenih doktoratih, 15 univerzitetnih diplomah, 6 bolonjskih magisterijih in mentorica pri 1 diplomskem delu bolonjskega študija 1. stopnje.

Od leta 2014 je vodja Infrastrukturnega centra za analizo zdravil.

Prof. Dr. ANAMARIJA ZEGA

After completing her university studies in Pharmacy at the University of Ljubljana, Dr. Zega enrolled in the doctoral study of Biomedicine in 1997 and in 2002 under the mentorship of prof. dr. Uroš Urleb she defended her doctoral dissertation entitled *Design and synthesis of thrombin inhibitors with the azapeptide scaffold.*

In 2007 and 2008 she did her postdoctoral research in Dr. Michel Arthur's group at Laboratoire de Recherche Moléculaire sur les Antibiotiques, Centre de Recherche des Cordeliers, Inserm, University Pierreet Marie Curie in Paris.

Dr. Zega is a member of the Chair of Pharmaceutical Chemistry at the Faculty of Pharmacy, UL. She is a lecturer in all first and second level programmes of the UL FFA and a coordinator of several subjects. Together with her colleagues, she has been involved in the design of several new subjects in the undergraduate and postgraduate study programmes of the Faculty of Pharmacy. She is also a lecturer at Interdisciplinary Doctoral Programme in Biomedicine and a coordinator of one module.

Dr. Zega has been a mentor or co-mentor for 4 doctorates, 15 university diplomas and 6 Bologna master's degrees.

Since 2014 she has been the Head of the Infrastructure Centre for Drug Analysis.

Raziskovalno se ukvarja z načrtovanjem in sintezo protibakterijskih učinkovin (zaviralcev DNA giraze/ Topoizomeraze IV) ter protirakavih učinkovin (zaviralcev napetostno odvisnih kalijevih kanalov), z biofizikalnimi metodami in preučevanjem fenomena lažno pozitivnih rezultatov pri načrtovanju učinkovin.

Svojo ekspertizo izkazuje z bibliografijo, s predavanji na domačih in mednarodnih strokovnih ter znanstvenih srečanjih.

Bila je vodja pri 4 uspešno zaključenih projektih, sodelovala je pri dveh evropskih projektih EUR FP6 INTAFAR (2005-2010) in IMI ENABLE (2019-2020). Rezultate raziskav objavlja v člankih v revijah s faktorjem vpliva. Njena dela imajo po WoS 612 čistih citatov, h-indeks = 14. Je soavtorica dveh patentov in ene patentne prijave.

Dr. Zega je bila leta 1997 prvič izvoljena v naziv asistentke, nato v naziv docentke leta 2005 in izredne profesorice leta 2013. Senat UL jo je v septembru 2020 izvolil v naziv redne profesorice za področje farmacevtske kemije.

Her research focus at present is on design and synthesis of antibacterial agents (DNA gyrase/ Topoisomerase IV inhibitors) and anticancer agents (voltage-gated potassium ion channel modulators), biophysical methods and the study of the phenomenon of false-positive results in drug design.

She demonstrates her expertise with bibliography, holding lectures at domestic and international professional and scientific meetings.

She was the leader in 4 successfully completed projects, she participated in two European projects EUR FP6 INTAFAR (2005-2010) and IMI ENABLE (2019-2020). According to WoS, her peer-reviewed publications have 612 citations, h-index = 14. She is the co-author of two patents and one patent application.

Dr. Anamarija Zega was first elected assistant in 1997, then assistant professor in 2005 and associate professor in 2013. In September 2020 the UL Senate elected her a full professor of Pharmaceutical Chemistry.

PREJEMNIKI DEKANOVIH NAGRAD

V okviru Raziskovalnega dne UL FFA so bile podeljene dekanove nagrade. Nagrade se podelijo študentom, raziskovalcem ali doktorandom UL FFA, ki so v preteklem obdobju kot prvi ali vodilni avtor objavili delo v reviji z visokim faktorjem vpliva ali v reviji, ki sodi v zgornjih deset odstotkov revij s posameznega področja, in so s tem prispevali k razvoju farmacevtske znanosti in stroke. V letu 2020 so prejeli dekanove nagrade Univerze v Ljubljani Fakultete za farmacijo naslednji sodelavci:

Asist. dr. Klemen Čamernik za znanstveni članek z naslovom: »Primerjava lastnosti mezenhimskih matičnih celic subhondralne kosti bolnikov s primarno in displastično osteoartrozo«, ki je bil objavljen v reviji Stem cell reviews and reports.
Mentorica: prof. dr. Janja Marc in somentorica: doc. dr. Janja Zupan.

Asist. dr. Tanja Jakoš za znanstveni članek: »Vloga cisteinskih katepsinov pri interakcijah MDSC s tumorskimi celicami«, ki je bil objavljen v reviji Cancer immunology and immunotherapy.
Mentor: prof. dr. Janko Kos in somentorica doc. dr. Anja Pišlar.

Asist. Maša Kenda za znanstveni članek: »Učinki izbranih konzervansov na jedrne receptorje«, ki je bil objavljen v reviji Environmental health perspectives.
Mentorica: doc. dr. Nataša Karas Kuželički in somentorica: prof. dr. Marija Sollner Dolenc.

Asist. Anže Meden za znanstveni članek z naslovom: »V iskanju spojin vodnic pri Alzheimerjevi bolezni: Novi butirilholinesterazni zaviralci s triptofanskim skeletom«, ki je bil objavljen v reviji Chemical communications.
Mentor: prof. dr. Stanislav Gobec.

RECIPIENTS OF DEAN'S AWARDS

The Dean's Awards were presented at the UL FFA Research Day award ceremony. The Dean's Awards are presented to students of the Faculty of Pharmacy that have recently published work, as the first or leading author, in a journal with a high impact factor or in a journal that belongs to the top ten percent of journals in a particular field, thereby contributing to the development of pharmaceutical sciences and profession. In 2020 the Dean's Awards of the Faculty of Pharmacy, University of Ljubljana, were received by the following co-workers:

Assist. Dr. Klemen Čamernik for a scientific article entitled: "Comprehensive analysis of skeletal muscle- and bone-derived mesenchymal stem/stromal cells in patients with osteoarthritis and femoral neck fracture", which was published in the journal Stem cells reviews and reports.
Mentor: Prof. Dr. Janja Marc and Co-mentor: Assist. Prof. Dr. Janja Zupan.

Assist. Dr. Tanja Jakoš for a scientific article entitled: "Cysteine cathepsins L and X differentially modulate interactions between myeloid-derived suppressor cells and tumor cells", which was published in the journal Cancer immunology and immunotherapy.
Mentor: Prof. Dr. Janko Kos and Co-mentor: Assist. Prof. Dr. Anja Pišlar.

Assist. Maša Kenda for a scientific article entitled: "Triclocarban, triclosan, bromochlorophene, chlorophene, and climbazole effects on nuclear receptors: an *in silico* and *in vitro* study", which was published in the journal Environmental health perspectives.
Mentor: Assist. Prof. Dr. Nataša Karas Kuželički and Co-mentor: Prof. Dr. Marija Sollner Dolenc.

Assist. Anže Meden for a scientific article entitled: "Structure-activity relationship study of tryptophan-based butyrylcholinesterase inhibitors", which was published in the journal Chemical communications.
Mentor: Prof. Dr. Stanislav Gobec.

Asist. Žane Temova Rakuša za znanstveni članek z naslovom: »Celovit analitski pristop za sočasno vrednotenje vseh glavnih vodotopnih vitaminov v multivitaminskih izdelkih s stabilnostno-indikativno HPLC-DAD metodo«, ki je bil objavljen v reviji Food chemistry.
Mentor: prof. dr. Robert Roškar in somentor: prof. dr. Albin Kristl.

Asist. Jurij Zdovc za znanstveni članek z naslovom: »Optimizacija zdravljenja z ustekinumabom pri Crohnovi bolezni: je farmakometrika lahko koristna?«, ki je bil objavljen v reviji Clinical gastroenterology and hepatology.
Mentor: prof. dr. Iztok Grabnar.

PREJEMNIKI FAKULTETNIH PREŠERNOVIH NAGRAD

Nina Krištofelc: Ocena učinkovitosti hidrodinamske kavitacije za odstranjevanje bisfenolov iz odpadnih vod
Mentor: Prof. dr. Marija Sollner Dolenc,
somentorica: prof. dr. Ester Heath

Špela Kalčič: Vpliv sestavin hrane in različnih mehanskih obremenitev na sproščanje učinkovine iz hidrofilnih ogrodnih tablet
Mentor: doc. dr. Jurij Trontelj,
somentor: dr. Igor Legen

Urša Čerček: Vpliv hladne atmosferske tlačne plazme na tvorbo stresnih granul v izbrani stabilni celični liniji
Mentor: prof. dr. Boris Rogelj,
somentorica: doc. dr. Helena Motaln

Petja Škufca: Ugotavljanje vsebnosti in stabilnosti vitamina A in njegovih derivatov v kozmetičnih izdelkih
Mentor: izr. prof. dr. Robert Roškar,
somentorica: asist. Žane Temova Rakuša

Špela Bohinec: Sinteza kalijevih aciltrifluoroboratov kot sinteznih prekurzorjev v farmacevtski kemiji
Mentor: prof. dr. Zdenko Časar,
somentor: asist. Andrej Šterman

Assist. Žane Temova Rakuša for a scientific article entitled: "A comprehensive approach for the simultaneous analysis of all main water-soluble vitamins in multivitamin preparations by a stability-indicating HPLC-DAD method", which was published in the journal Food chemistry.
Mentor: Prof. Dr. Robert Roškar and Co-mentor: Prof. Dr. Albin Kristl.

Assist. Jurij Zdovc for a scientific article entitled: "Peak concentrations of ustekinumab after intravenous induction therapy identify patients with Crohn's disease likely to achieve endoscopic and biochemical remission", which was published in the journal Clinical gastroenterology and hepatology.
Mentor: Prof. Dr. Iztok Grabnar.

RECIPIENTS OF PREŠEREN AWARDS

Nina Krištofelc: Effectiveness assessment of hydrodynamic cavitation for bisphenols removal from wastewater
Supervisor: Prof. Dr. Marija Sollner Dolenc,
Co-supervisor: Prof. Dr. Ester Heath

Špela Kalčič: The influence of food components and various mechanical stresses on the drug release from hydrophilic matrix tablets
Supervisor: Assist. Prof. Dr. Jurij Trontelj,
Co-supervisor: Dr. Igor Legen

Urša Čerček: Effect of cold atmospheric pressure plasma on formation of stress granules in the selected stable cell line
Supervisor: Prof. Dr. Boris Rogelj,
Co-supervisor: Assist. Prof. Dr. Helena Motaln

Petja Škufca: Determination of content and stability of vitamin A and its derivatives in cosmetic products
Supervisor: Assoc. Prof. Dr. Robert Roškar,
Co-supervisor: Assist. Žane Temova Rakuša

Špela Bohinec: Synthesis of potassium acyltrifluoroborates as synthesis precursors in pharmaceutical chemistry
Supervisor: Prof. Dr. Zdenko Časar,
Co-supervisor: Assist. Andrej Šterman

PRIZNANJA FAKULTETE

Priznanja fakultete prejmejo absolventi, ki so v času študija tekoče napredovali (niso pavzirali ali ponavljali letnika) ter pri vseh študijskih obveznostih (razen diplome), opravljenih najpozneje v obdobju enega leta od vpisa absolventskega staža, dosegli povprečno oceno 9,00 ali več.

Enoviti magistrski študijski program Farmacija/ Uniform master study programme Pharmacy (Single-cycle master study programme Pharmacy):

Bajželj Matija
Baumgartner Ana
Cirar Matjaž
Dernovšek Jaka
Drame Katarina
Gradišek Aljoša
Güntner Rebeka
Ivanovski Filip
Jakob Ana
Ključevšek Tim
Lombergar Leon
Mihelčič Anja
Prelesnik Sara
Raščan Primož
Rotman Primec Jaka
Trčko Mojca
Vörös Tajda
Žagar Tjaša

Magistrski študijski program Industrijska farmacija/ The master study programme Industrial Pharmacy:

Dolhar David
Hudina Anita
Kolenc Matej
Lazić Valerija
Peršolja Peter
Pikl Katja
Pokovec Simona
Porenta Ema
Tekavec Sara
Virant Urška

FACULTY OF PHARMACY RECOGNITIONS

Faculty recognitions are given to graduates who have progressively progressed during their studies (did not pause or repeat the year) and achieved an average grade of 9.00 or more in all study obligations (except for a diploma) completed no later than one year after enrolling in the graduate internship.

Magistrski študijski program Laboratorijska biomedicina/ The master study programme Laboratory Biomedicine:

Ambruš Ana
Kopač Urša
Mrhar Liza
Nenadić Martina
Pucko Sara
Puščenik Lara
Sluga Nastja
Smrdel Lara

Univerzitetni študijski program Kozmetologija/ The academic bachelor study programme Cosmetology:

Berglez Pia
Bohinc Klara
Gošek Teja
Ličen Marta
Repar Lara
Vetrih Manca

Univerzitetni študijski program Laboratorijska biomedicina/ The academic bachelor study programme Laboratory Biomedicine

Baš Nina
Breznik Nika
Čurič Sara
Klinar Katarina
Mertelj Polona
Potisk Katja
Remic Anamarija
Slabe Saša
Snoj Lara
Trstenjak Ana
Vrevc Žlajpah Jaka

5 Seznam diplomantov
List of graduates

DIPLOMANTI NA FAKULTETI ZA FARMACIJO V LETU 2020
2020 GRADUATES AT THE FACULTY OF PHARMACY

UNIVERZITETNI ŠTUDIJSKI PROGRAM KOZMETOLOGIJA

THE ACADEMIC BACHELOR STUDY PROGRAMME COSMETOLOGY

Ahlin Anamarija
Artnjak Diana
Bevk Ana
Bohinc Klara
Bohnec Klara
Colja Eva
Fekonja Vesna
Gošek Teja
Horvat Nuša
Jašovič Vita
Jevnikar Lana
Kladnik Katja
Kozar Laura
Lenarčič Kaja
Ličen Marta
Mravlje Manca
Mužina Karolina
Oberstar Urša
Pokorn Nika
Potočnik Neja
Prodanović Maja
Ramšak Urška
Rašić Una
Sluga Selestina
Šibal Klara
Štefanec Eva
Tavčar Klara
Topler Eva
Zavrnik Karin
Žabota Urška
Žuraj Jerica

ENOVITI MAGISTRSKI ŠTUDIJSKI PROGRAM FARMACIJA

UNIFORM MASTER STUDY PROGRAMME PHARMACY (SINGLE-CYCLE MASTER STUDY PROGRAMME PHARMACY)

Abe Aljaž
Ahec Tjaša
Bajc Enia
Bajuk Anita
Bajželj Matija
Baumgartner Ana
Beganović Amela
Blažič Manja
Bohinec Špela
Bohte Iva
Bolčina Lara
Božič Anže
Breška Andraž
Bukovac Manca
Cerar Anita
Cirar Matjaž
Černjavič Tjaša
Činč Ćurić Laura
Demšar Lucija
Dernovšek Jaka
Doblekar Zala
Drobnič Eva
Duraković Aida
Erjavec Martina
Faganelj Meta
Fajt Patricija
Fartelj David
Firer Monika
Fleisinger Črtomir
Flisar Alja
Fotivec Manca
Gavranić Tanja
Grilc Nina Katarina
Gruban Jasna
Handanagić Bilka
Hauko Saša
Hiti Luka
Horvat Patricija
Hrastnik Julija
Hribar Uroš
Huzjak Tilen
Ivanovski Filip

Jakob Ana
Jalševac Florijan
Jokan Janja
Keršmanc Lina
Klančič Veronika
Ključevšek Tim
Klobučar Ema
Kobold Andrej
Kogovšek Eva
Kotnik Maja
Kovačič Mateja
Krajnc Simona
Kralj Jan
Kraljič Karmen
Kreslin Anja
Krivic Katja
Kršinar Anamarija
Krulec Jona
Kumar Jan
Lačen Mojca
Lah Vid
Legan Katja
Lužnik Barbara
Makše Matej
Mićić Nina
Mihelčič Anja
Mlačnik Ana
Mlinarič Larisa
Mravljak Krajner Anita
Muš Jasmina
Nahtigal Nastja
Nemec Alja
Novak Mojca
Novak Mateja
Obrul Karin
Okretič Maja
Osredkar Simona
Pavlič Maša
Pavlič Lea
Perger Zala
Permanšek Tjaša
Pestotnik Tamara
Petek Marko
Petrač Mirjam
Petrovič Timoteja
Pirnovar Eva
Plešnik Helena
Pogorelec Aljaž
Poljanšek Bitenc Eva
Pongrac Marko
Porovne Černe Nina
Presinger Ana
Puntar Nataša
Rahne Tim
Ristić Slađana
Rozman Sebastjan
Simonič Karmen
Smontara Tjaša
Starc Andreja
Šribar Anja
Tomažin Katja
Toplak Anja
Toplek Jaša
Torkar Katarina
Trčko Mojca
Trefalt Lucija
Udovič Maja
Veber Katja
Verbič Drago
Vindiš Sašo
Vodir Nejc
Vöröš Tajda
Vrčon Maruša
Vrečič Urška
Weikhard Jerca
Zelenik Patricija
Zupan Gorazd
Zupan Manca
Zupančič Urban
Žankar Manca
Žižek Petra

MAGISTRSKI ŠTUDIJSKI PROGRAM INDUSTRIJSKA FARMACIJA

THE MASTER STUDY PROGRAMME INDUSTRIAL PHARMACY

Bevec Renata
Bukovac Nina
Bukovec Mateja
Čerček Urša
Dolhar David
Hrvatin Katarina
Hudina Anita
Jus Amadeja
Kalčič Špela
Kolenc Blažka
Kožuh Eva
Kramer Nataša
Kranjc Jaka
Kuret Klara
Lazić Valerija
Lunar Nastja
Mihelčič Kristina
Minova Jasmina
Mrgole Kristjan
Oblak Blaž
Ocepek Maša
Petrijan Rok
Pišek Špela
Pokovec Simona
Ponikvar Jasmina
Rozina Edita
Schoss Katja
Seljak Lea
Simčič Monika
Tandara Patricia
Tekavec Sara
Turk Maja
Vidrih Žan
Virant Matej
Zemljak Jaka

MAGISTRSKI ŠTUDIJSKI PROGRAM LABORATORIJSKA BIOMEDICINA

THE MASTER STUDY PROGRAMME LABORATORY BIOMEDICINE

Bahun Nina
Camloh Eva
ČrepinšekKlementina
Draškovič Tina
Družeta Ivona
Gomboc Tjaša
Hudovernik Janja
Ivanko Anamaria
Krivec Mojca
Kuhanec Danaja
Lozić Nirmela
MedvešekTatjana
Nenadić Martina
PlavecJana
Plesničar Tjaša
Primc Alja
Pucko Sara
Puščenik Lara
Pušnik Mojca
Rojko Barbara
Rozman Tjaša
Sluga Nastja
Smrdel Lara
StritarJera
Šketelj Blaž
Tahirović Aneja
Terlep Nika
Varga Franjo
VedernjakBlažka
Vidic Veronika
Vintar Staša
Žavbi Marko

6 Znanstvene in strokovne publikacije
Scientific and professional publications

RAZISKOVALNA ORGANIZACIJA / RESEARCH ORGANISATION

Univerza v Ljubljani, Fakulteta za farmacijo l. 2020 / University of Ljubljana, Faculty of Pharmacy, 2020

ZNANSTVENI ČLANKI / SCIENTIFIC ARTICLES

ALEKSIĆ, Ivana, GERMAN ILIĆ, Ilija, CVIJIĆ, Sandra, PAROJČIĆ, Jelena. An investigation into the influence of process parameters and formulation variables on compaction properties of liquisolid systems. AAPS PharmSciTech, 2020, vol. 21, iss. 7, str. 1-11, [COBISS.SI-ID 26888195]

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ČAMERNIK, Klemen, MIHELIČ, Anže, MIHALIČ, Rene, HARING, Gregor, HERMAN, Simon, MAROLT, Darja, JANEŽ, Andrej, TREBŠE, Rihard, MARC, Janja, ZUPAN, Janja. Comprehensive analysis of skeletal muscle- and bone-derived mesenchymal stem/ stromal cells in patients with osteoarthritis and femoral neck fracture. Stem cell research & therapy, 2020, vol. 11, iss. 1, str. 1-14, [COBISS.SI-ID 34763993]

ČAMERNIK, Klemen, MIHELIČ, Anže, MIHALIČ, Rene, MAROLT, Darja, JANEŽ, Andrej, TREBŠE, Rihard, MARC, Janja, ZUPAN, Janja. Increased exhaustion of the subchondral bone-derived mesenchymal stem/ stromal cells in primary versus dysplastic osteoarthritis. Stem cell reviews and reports, 2020, vol. 16, iss. 4, str. 742-754, [COBISS.SI-ID 34745561]

ČEBRON LIPOVEC, Nanča, JAZBAR, Janja, KOS, Mitja. Anticholinergic burden in children, adults and older adults in Slovenia: a nationwide database study. Scientific reports, 2020, vol. 10, iss. 1, art. no. 9337, str. 1-8, [COBISS.SI-ID 18700291]

DEBEVEC, Veronika, STANIĆ LJUBIN, T., JERAJ, Žiga, ROZMAN PETERKA, Tanja, BRATUŽ, Borut, GAŠPERLIN, Dušan, SRČIČ, Stanko, HORVAT, Matej. Step-wise approach to developing a scale-independent design space for functional tablet coating process. Drug development and industrial pharmacy, 2020, vol. 46, iss. 4, str. 566-575, [COBISS.SI-ID 28473859]

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FABJAN, Teja, VRTAČNIK-BOKAL, Eda, VIRANT-KLUN, Irma, BEDENK, Jure, KUMER, Kristina, OSREDKAR, Joško. Antimüllerian hormone and oxidative stress biomarkers as predictors of successful pregnancy in polycystic ovary syndrome, endometriosis and tubal infertility factor. Acta chimica slovenica, 2020, vol. 67, no. 3, str. 885-895, [COBISS.SI- ID 24855811]

FOIS, Benedetta, SKOK, Žiga, TOMAŠIČ, Tihomir, ILAŠ, Janez, ZIDAR, Nace, ZEGA, Anamarija, PETERLIN-MAŠIČ, Lucija, SZILI, Petra, DRASKOVITS, Gábor, NYERGES JÓZSEF, Ákos, PÁL, Csaba, KIKELJ, Danijel. Dual Escherichia coli DNA gyrase A and B inhibitors with antibacterial activity. ChemMedChem, 7, 2020, vol. 15, iss. 3, str. 265-269, [COBISS.SI-ID 4865393]

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GORNIK, Tjaša, VOŽIČ, Anja, HEATH, Ester, TRONTELJ, Jurij, ROŠKAR, Robert, ŽIGON, Dušan, VIONE, Davide, KOSJEK, Tina. Determination and photodegradation of sertraline residues in aqueous environment. Environmental pollution, 2020, vol. 256, str. 1-8, [COBISS.SI-ID 32802343]

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GRILC, Blaž, ZDOVC, Jurij, PLANINŠEK, Odon. Advanced flow cell design for *in vitro* release testing of mucoadhesive buccal films. Acta pharmaceutica, 2020, vol. 70, iss. 3, str. 359-371, [COBISS.SI-ID 4872049]

GUZELJ, Samo, GOBEC, Martina, URBANČIČ, Dunja, MLINARIČ-RAŠČAN, Irena, CORSINI, Emanuela, JAKOPIN, Žiga. Structural features and functional activities of benzimidazoles as NOD2 antagonists. European Journal of Medicinal Chemistry, 2020, vol. 190, str. 1-15, [COBISS.SI-ID 4874097]

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HABJANIČ, Nina, KEREC KOS, Mojca, KRISTAN, Katja. Sensitivity of different *in vitro* performance tests and their *in vivo* relevance for calcipotriol/betamethasone ointment. Pharmaceutical research, 2020, vol. 37, issue 3, str. 1-11, [COBISS.SI-ID 1549150]

HAMILTON, David J., ÁBRÁNYI-BALOGH, Péter, KEELEY, Aaron, PETRI, László, HRAST, Martina, IMRE, Tímea, WIJTMANS, Maikel, GOBEC, Stanislav, DE ESCH, Iwan J. P., KESERÜ M., György. Bromo-cyclobutenaminones as new covalent UDP-N-acetylglucosamine enolpyruvyl transferase (murA) inhibitors. Pharmaceuticals, 2020, vol. 13, iss. 11, str. 1-14, [COBISS.SI-ID 46907907]

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HASA, Dritan, ŽAKELJ, Simon, GRABNAR, Iztok, CILURZO, Francesco, DALL'ACQUA, Stefano, RIVA, Antonella, PERISSUTTI, Beatrice, VOINOVICH, Dario. Echinacea angustifolia DC. Lipophilic extract patch for skin application: preparation *In vitro* and *In vivo* studies. Pharmaceutics, 2020, vol. 12, iss. 11, str. 1-11, [COBISS.SI-ID 37568515]

HENDRICKX, Louise Antonia, DOBRIČIĆ, Vladimir, TOPLAK, Žan, PEIGNEUR, Steve, PETERLIN-MAŠIČ, Lucija, TOMAŠIČ, Tihomir, TYTGAT, Jan. Design and characterization of a novel structural class of Kv1.3 inhibitors. Bioorganic chemistry, 2020, vol. 98, str. 1-9, [COBISS.SI-ID 4895857]

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HRIBAR, Maša, HRISTOV, Hristo, GREGORIČ, Matej, BLAZNIK, Urška, ZALETEL, Katja, OBLAK, Adrijana, OSREDKAR, Joško, KUŠAR, Anita, ŽMITEK, Katja, ROGELJ, Irena, PRAVST, Igor. Nutrihealth study: seasonal variation in vitamin D status among the Slovenian adult and elderly population. Nutrients, 2020, vol. 12, iss. 6, str. 1-16, [COBISS.SI-ID 20485635]

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