Opis raziskovalnega dela *(Research work description*)

1. Članica UL (*UL member)*:

Univerza v Ljubljani, Medicinska fakulteta

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Rok Blagus, rok.blagus@mf.uni-lj.si

3. Raziskovalno področje (*Research field*):

Statistika, biostatistika, modeliranje visokorazsežnih podatkov

4. Opis raziskovalnega dela *(Research work description*):
Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce *(It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.)*.

Slov.: Raziskovalno delo bo usmerjeno v razvoj statistične metodologije za analizo koreliranih visokorazsežnih podatkov, s poudarkom na obdelavi bioinformacijskih omičnih podatkov. Raziskava bo vključevala razvoj penalizacijskih pristopov za linearne in posplošene mešane modele ter preverjanje lastnosti metod s simulacijskimi študijami v programskem jeziku R. Posebna pozornost bo namenjena razvoju učinkovitih postopkov za izbiro stopnje regularizacije za mešane modele na visokorazsežnih podatkih. Metodologija bo dodatno ovrednotena na realnih bioinformacijskih podatkih, s čimer bo prikazana njena uporabna vrednost v analizi kompleksnih podatkov.

Eng.: Research work will be focused on the development of statistical methodology for the analysis of correlated high-dimensional data, with an emphasis on the processing of bioinformatics omics data. The research will include the development of penalization approaches for linear and generalized mixed models, as well as the evaluation of the properties of the methods through simulation studies in the R programming language. Special attention will be devoted to the development of efficient procedures for selecting the degree of regularization for mixed models in high-dimensional data settings. The methodology will be further evaluated on real bioinformatics data, thereby demonstrating its practical value in the analysis of complex data.

5. Priloge, ki jih je treba priložiti ob prijavi *(Documents required to be submitted with the application)*:

☒ **potrdilo o doseženi izobrazbi *(proof of completed education)***
− kandidat z zaključenim magistrskim študijskim programom (2. bolonjska stopnja) *(candidate who has completed a Master's degree (2nd Bologna level)):*
o diplomska listina / potrdilo o zaključku študijskega programa *(diploma certificate / certificate of completion of the study programme)*
o priloga k diplomi / potrdilo o opravljenih obveznostih *(diploma supplement / official transcript of records containing all grades obtained in the study programme)*
− kandidat, ki še ni zaključil študija na 2. stopnji *(candidate who has not yet completed a Master's degree):*

- potrdilo o do sedaj opravljenih obveznostih z ocenami magistrskega študijskega programa, s katerim se bo kandidat prijavil na doktorski študij
  (official transcript of records listing all courses and grades obtained so far in the Master's degree programme on the basis of which the candidate will apply for enrollment in a doctoral degree programme.)

☐ **nagrade –** univerzitetna Prešernova nagrada ali Prešernova nagrada članice Univerze v Ljubljani oz. druga enakovredna nagrada *(awards, e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award))*

☒ **bibliografija** *(bibliography)*

☒ **življenjepis** *(CV)*

☒ **motivacijsko pismo** *(motivation letter)*

☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** *(description of the candidate's research work)*

☒ **osnutek idejne zasnove raziskovalnega dela** *(preliminary research proposal)*

☒ **priporočilno pismo** *(letter of recommendation)*

☐ **druge priloge** *(other attachments):*

Opis raziskovalnega dela *(Research work description*)

1. Članica UL (*UL member)*:

Univerza v Ljubljani, Medicinska fakulteta

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Emanuela Boštjančič, emanuela.bostjancic@mf.uni-lj.si

3. Raziskovalno področje (*Research field*):

3. Medicina: 3.04 Onkologija, 3.01 Mikrobiologija in imunologija

4. Opis raziskovalnega dela *(Research work description*):
Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce *(It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.)*.

Slov.: *Mladi/a raziskovalec/ka bo vključen/a v programsko skupino P3-0054 Patologija in molekularna genetika, delo pa bo potekalo na Inštitutu za patologijo Medicinske fakultete Univerze v Ljubljani. V okviru raziskovalnega dela bo možno del raziskav opraviti tudi v sodelovanju z drugimi Inštituti Medicinske fakultete Univerze v Ljubljani ter drugimi ustanovami v Sloveniji. Kandidat/ka mora biti pripravljen/a tudi na morebitno izpopolnjevanje v tujini ali v drugih laboratorijih. V okviru svojega dela bo kandidat/ka moral/a opraviti doktorski študijski program Biomedicina na Univerzi v Ljubljani.* *Delo bo usmerjeno predvsem v preučevanje patogenih mehanizmov za razvoj predrakavih in rakavih obolenj, kot je ploščatocelični karcinom glave in vratu (SCC), ter diagnostičnih in prognostičnih dejavnikov bolezni. SCC glave in vratu je heterogena skupina SCC: nastane na različnih anatomskih mestih (orofrainks, grlo, nazofarinks, idr.) in ima različno etiologijo. Človeški papiloma virus (HPV) je glavni vzrok večine SCC orofarinksa, kjer je močno povezan z izboljšanim preživetjem. HPV se veliko redkeje odkrije pri SCC, ki nastane na mestih, ki niso orofarinks (npr. grla in hipofarinksa). Medtem ko je pomen okužbe s HPV in njegove prognoze pri inavazivnem SCC dobro poznan za orofarinks, je malo podatkov za HPV-pozitivne SCC na drugih lokacijah (npr. SCC grla). Nadalje, kljub napredku v diagnostiki in zdravljenju so SCC glave in vratu pogosto diagnosticirani pozno in so še vedno povezani s slabo napovedjo in visoko umrljivostjo, ki se v zadnjih desetletjih ni bistveno spremenila. Ugodno napoved imajo bolniki, pri katerih je bolezen diagnosticirana zgodaj, na stopnji predrakavih sprememb ali zgodnjega karcinoma. Kljub obsežnim raziskavam pa poznamo zelo malo uporabnih bioloških označevalcev predrakavih sprememb in označevalcev napredovanja le-teh v karcinom. Prav tako še niso poznani mehanizmi zasevanja invazivnih SCC glave in vratu, ki imajo slabo prognozo.* *Od kandidata/ke pričakujemo veliko motiviranost za raziskovalno delo, pripravljenost za timsko delo, delavnost, natančnost, samostojnost in iznajdljivost. Delo bo zahtevalo podrobno poznavanje in obvladovanje različnih molekularnih metod, vključno s postopki izolacije iz različnih bioloških vzorcev, delom s tkivi fiksiranimi v formalinu in določanjem števila kopij genov, analize izražanja kodirajočih in nekodirajočih RNA, analize metilacijskega in mutacijskega statusa izbranih protein-kodirajočih in nekodirajočih genov. Zaželeno je tudi osnovno znanje bioinformatike in pripravljenost za delo z živalskimi modeli in celičnimi kulturami. Obvezno je znanje angleškega jezika.*

Eng.: The young researcher will be included in the program group P3-0054 Pathology and molecular genetics, and the work will take place at the Institute of Pathology, Faculty of Medicine, University of Ljubljana. As part of the research work, it will be possible to carry out part of the research in cooperation with other Institutes of the Faculty of Medicine of the University of Ljubljana and other institutions in Slovenia. The candidate must also be prepared for possible training abroad or in other laboratories. As part of his work, the candidate will have to complete a doctoral study program in Biomedicine at the University of Ljubljana.

The work will be focused primarily on the study of pathogenic mechanisms for the development of precancerous and cancerous diseases, such as squamous cell carcinoma of the head and neck (SCC), as well as diagnostic and prognostic factors of disease. Head and neck SCC is a heterogeneous group of SCC: it arises in different anatomical sites (oropharynx, larynx, nasopharynx, etc.) and has different etiologies. Human papillomavirus (HPV) is the main cause of most SCC of the oropharynx, where it is strongly associated with improved survival. HPV is much less frequently detected in SCC arising in sites other than the oropharynx (eg, larynx and hypopharynx). The importance of HPV infection and its prognosis in HPV-positive SCC of other locations (eg, larynx) is less understood. Furthermore, despite advances in the diagnosis and treatment of head and neck SCC, these carcinomas are still associated with a poor prognosis and high mortality, which has not changed significantly in recent decades. Despite extensive research, we know very few useful biological markers of precancerous changes and markers of their progression to carcinoma, which would significantly improve patients outcome. Furthermore, mechanisms for metastasing of head and neck SCC, which has poor prognosis, are not yet understood.

We expect from the candidate great motivation for research work, readiness for teamwork, diligence, precision, independence and ingenuity. The work will require detailed knowledge and mastery of various molecular methods, including isolation procedures from various biological samples, work with tissues fixed in formalin and determination of the number of gene copies, analysis of the expression of coding and non-coding RNAs, analysis of the methylation and mutational status of selected protein-coding and non-coding genes. Basic knowledge of bioinformatics and willingness to work with animal models and cell cultures is also desirable. Knowledge of the English language is mandatory.

5. Priloge, ki jih je treba priložiti ob prijavi *(Documents required to be submitted with the application)*:

☒ **potrdilo o doseženi izobrazbi *(proof of completed education)***

- kandidat z zaključenim magistrskim študijskim programom (2. bolonjska stopnja)
  (candidate who has completed a Master's degree (2nd Bologna level)):
  - diplomska listina / potrdilo o zaključku študijskega programa
    (diploma certificate / certificate of completion of the study programme)
  - priloga k diplomi / potrdilo o opravljenih obveznostih
    (diploma supplement / official transcript of records containing all grades obtained in the study programme)
- kandidat, ki še ni zaključil študija na 2. stopnji
  (candidate who has not yet completed a Master's degree):
  - potrdilo o do sedaj opravljenih obveznostih z ocenami magistrskega študijskega programa, s katerim se bo kandidat prijavil na doktorski študij
    (official transcript of records listing all courses and grades obtained so far in the Master's degree programme on the basis of which the candidate will apply for enrollment in a doctoral degree programme.)

☐ **nagrade –** univerzitetna Prešernova nagrada ali Prešernova nagrada članice Univerze v Ljubljani oz. druga enakovredna nagrada *(awards, e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award)*

☒ **bibliografija** *(bibliography)*

☒ **življenjepis** *(CV)*

☒ **motivacijsko pismo** *(motivation letter)*

☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** *(description of the candidate's research work)*

☒ **osnutek idejne zasnove raziskovalnega dela** *(preliminary research proposal)*

☐ **priporočilno pismo** *(letter of recommendation)*

☐ **druge priloge** *(other attachments):*

Opis raziskovalnega dela *(Research work description*)

1. Članica UL (*UL member)*:

Medicinska fakulteta

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Helena H. Chowdhury helena.chowdhury@mf.uni-lj.si

3. Raziskovalno področje (*Research field*):

Celična fiziologija

4. Opis raziskovalnega dela *(Research work description*):
Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce *(It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.)*.

Slov.: Raziskovalno delo mlade(ga) raziskovalke(ca) bo potekalo v Laboratoriju za nevroendokrinologijo-molekulska celična fiziologija, na Inštitutu za patološko fiziologijo Medicinske fakultete v Ljubljani. Začetek raziskovalnega dela je predviden v jeseni 2026. Kandidate(ke), ki bodo do predvidenega roka septembra 2026 zaključili magistrski študij na 2. stopnji naravoslovnih smeri, kot so biologija, biokemija, medicina, biotehnologija, mikrobiologija, farmacija, laboratorijska biomedicina, kemija in so motivirani za znanstveno raziskovanje vabimo, da se prijavijo prek spletne aplikacije ter pošljejo življenjepis ter spodaj navedene priloge na naslov: helena.chowdhury@mf.uni-lj.si in robert.zorec@mf.uni-lj.si. Prednost pri izbiri bodo imeli kandidati(ke) z visoko povprečno oceno študija in z izkušnjami z delom v celični biologiji/fiziologiji in biokemiji/molekularni biologiji/vedenjskih poskusih/razvoju zdravil za napredno zdravljenje.

Vsebina raziskovalnega dela: Uravnavanje celične fuzije z električnimi in kemičnimi dražljaji

Fuzija membran je vključena v številne procese v evkariontski celici in je bistvena za delovanje organizma. Ključni procesi, kjer prihaja do fuzije membran, se odvijajo med različnimi znotrajceličnimi predelki, med znotrajceličnimi predelki in plazemsko membrano ter med plazemskimi membranami posameznih celic. Ti biološki procesi fuzije membran so tako vključeni v širše kontekste na celični ravni, kot so znotrajcelični transport, sproščanje nevrotransmiterjev v sinapsah, hormonov, citokinov in presnova celičnih odpadnih produktov ter izgradnjo membrane, pa tudi na ravni organizma, kot je fuzija membran sperme in jajčeca med oploditvijo, zlitje citotrofoblastnih celic v sinciciotrofoblastno pregrado med materino in fetalno krvjo med fetalnim razvojem in zlitje mioblastov v večjedrno mišično vlakno pri razvoju skeletnih mišic. Fuzijo membran lahko tudi induciramo v eksperimentalnih pogojih, saj gre za pomemben pristop pri številnih biotehnoloških procesih, kot so proizvodnja monoklonskih protiteles, vzgoja različnih rastlinskih vrst, pa tudi novi terapevtski pristopi za dostavo zdravil, pomoč pri oploditvi, v regenerativni medicini pri nadomeščanju ali obnavljanju tkiv ter pri pripravi hibridnih celic za napredne terapije.

Membransko fuzijo v pogojih in vitro pogosto induciramo kemično ali električno. Čeprav je spontana fuzija celic poznana, je inducirana fuzija z električnimi in kemičnimi dražljaji na celični in molekulski ravni še vedno slabo opredeljena. Prav tako ni znano, kako različne signalne molekule, kot so agonisti z G-beljakovinami sklopljenih receptorjev, prispevajo k učinkovitosti fuzije. Projekt se bo osredotočal na raziskovanje mehanizmov električne in kemične indukcije celične fuzije, na optimizacijo parametrov fuzije za izboljšanje večjedrnih struktur in funkcionalnosti nastalih večjedrnih celic. Pri tem bomo preverjali in optimizirali pogoje električno in kemično inducirane celične fuzije, post-fuzijsko usodo zlitih celic, ekspresijo ključnih beljakovin v izbranih celičnih tipih, ter spremljali subcelične strukture v zlitih celicah, na primer preoblikovanje citoskeleta, lizosomov, mitohondrijev. Razumevanje, kako različni pogoji fuzije vplivajo na učinkovitost fuzije celic, dinamiko membran, in različni celični regulatorji usklajujejo inducirano fuzijo, prispeva k boljšemu razumevanju učinkov na ta proces v patoloških stanjih in kot tudi k izboljšani učinkovitosti v novih terapevtskih strategij na temelju zlitih celic.

Metode dela

Mladi(a) raziskovalec(ka) bo aseptično vzpostavljal(a) in optimiziral(a) pogoje primarne in trajne celične kulture različnih tipov evkariontskih celic, izvajal(a) in optimiziral(a) električno in kemično inducirano fuzijo celic, določil vplive nekaterih molekul, ki lahko prispevajo k uravnavanju inducirane fuzije ter spremljal(a) učinkovitost s kvantifikacijskimi in slikovnimi tehnikami z uporabo označevalcev in napredne kvantitavne konfokalne mikroskopije. Na molekulski ravni bo spremljanje funkcionalne učinkovitosti zlitih celic potekalo s pomočjo molekulskih metod (npr. qPCR, Western blot, imunofluorescenca, RNA-sekveniranje, lasersko podprto ločevanje celic). Za opredelitev vključenih mehanizmov v posamezne procese fuzije bodo uporabljene tehnike za analizo

citoskeleta (npr. barvanje s faloidinom, sledenje mikrotubulov, študije inhibitorjev) ter analizo funkcionalnih testov (npr. meritve kalcija, testi integritete membrane).

Eng.: The research work of the young researcher will take place in the Laboratory of Neuroendocrinology-Molecular Cell Physiology, at the Institute of Pathological Physiology, Faculty of Medicine, Ljubljana. The start of the research work is planned for autumn 2026. Candidates who will have completed their master's degree studies at the 2nd level in natural science fields such as biology, biochemistry, medicine, biotechnology, microbiology, pharmacy, laboratory biomedicine, chemistry by the planned deadline of September 2026 and are motivated for research are invited to apply via the online application and send their CV and the attachments listed below to the following addresses: helena.chowdhury@mf.uni-lj.si and robert.zorec@mf.uni-lj.si. Preference will be given to candidates with a high average grade and experience working in cell biology/physiology and biochemistry/molecular biology/behavioral experiments/drug development.

Research content: Regulation of cell fusion by electrical and chemical stimuli

Membrane fusion is involved in numerous processes in the cell and is essential for the functioning of the organism. Key membrane fusion processes occur between different intracellular compartments, between intracellular compartments and the plasma membrane, and between plasma membranes of individual cells. These biological processes of membrane fusion are thus involved in broader contexts at the cellular level, such as intracellular transport, release of neurotransmitters in synapses, hormones, cytokines and cellular waste products, and membrane construction, as well as at the level of an organism, such as the fusion of sperm and egg membranes during fertilization, the fusion of cytotrophoblast cells into the syncytiotrophoblast barrier between maternal and fetal blood during fetal development, and the fusion of myoblasts into multinucleated muscle fibers in skeletal muscle development.

Membrane fusion can also be induced under experimental conditions, as it is an important approach in many biotechnological processes, such as the production of monoclonal antibodies, the breeding of various plant species, as well as new therapeutic approaches for drug delivery, assisted fertilization, in regenerative medicine for tissue replacement or repair, and in the preparation of hybrid cells for advanced therapies. Membrane fusion in vitro is often induced chemically or electrically. Although spontaneous cell fusion is well described, induced fusion by electrical and chemical stimuli at the cellular and molecular levels is still poorly defined. It is also unknown how different signaling molecules, such as agonists of G-protein-coupled receptors, contribute to the efficiency of fusion. The project will focus on investigating the cellular mechanisms of electrical and chemical induction of cell fusion, on optimizing fusion parameters to improve multinucleated structures and functionality of the resulting multinucleated cells. We will examine and optimize the conditions of electrically and chemically induced cell fusion, the post-fusion fate of fused cells, the expression of key proteins in selected cell types, and monitor subcellular structures in fused cells, such as cytoskeleton, lysosomal, and mitochondrial remodeling. Understanding how different fusion conditions affect cell fusion efficiency, membrane dynamics, and how different cellular regulators coordinate induced fusion contributes to a better understanding of the effects on this process in pathological conditions as well as to improved efficacy in fused cell-based therapeutic strategies.

Methods: The young researcher will establish and optimize the conditions of primary cell culture and cell lines of various eukaryotic cell types, perform and optimize electrically and chemically induced cell fusion, determine the effects of some molecules that may contribute to the regulation of induced fusion, and monitor the efficiency with quantification and imaging techniques using markers and confocal microscopy. At the molecular level, the functional efficiency of fused cells will be monitored using molecular methods (e.g. qPCR, Western blot, immunofluorescence, RNA-sequencing). To define the mechanisms involved in individual fusion processes, cytoskeletal analysis techniques (e.g. phalloidin staining, microtubule tracking, inhibitor studies) and functional assay analysis (e.g. calcium measurements, membrane integrity tests) will be used.

5. Priloge, ki jih je treba priložiti ob prijavi *(Documents required to be submitted with the application)*:

☒ **potrdilo o doseženi izobrazbi *(proof of completed education)***

- kandidat z zaključenim magistrskim študijskim programom (2. bolonjska stopnja)
  (candidate who has completed a Master's degree (2nd Bologna level)):
  - diplomska listina / potrdilo o zaključku študijskega programa
    (diploma certificate / certificate of completion of the study programme)
  - priloga k diplomi / potrdilo o opravljenih obveznostih
    (diploma supplement / official transcript of records containing all grades obtained in the study programme)
- kandidat, ki še ni zaključil študija na 2. stopnji
  (candidate who has not yet completed a Master's degree):
  - potrdilo o do sedaj opravljenih obveznostih z ocenami magistrskega študijskega programa, s katerim se bo kandidat prijavil na doktorski študij

(official transcript of records listing all courses and grades obtained so far in the Master's degree programme on the basis of which the candidate will apply for enrollment in a doctoral degree programme.)

☒ **nagrade –** univerzitetna Prešernova nagrada ali Prešernova nagrada članice Univerze v Ljubljani oz. druga enakovredna nagrada *(awards, e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award))*

☒ **bibliografija** *(bibliography)*

☒ **življenjepis** *(CV)*

☒ **motivacijsko pismo** *(motivation letter)*

☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** *(description of the candidate's research work)*

☒ **osnutek idejne zasnove raziskovalnega dela** *(preliminary research proposal)*

☒ **priporočilno pismo** *(letter of recommendation)*

☐ **druge priloge** *(other attachments):*

Opis raziskovalnega dela *(Research work description*)

1. Članica UL (*UL member)*:

Univerza v Ljubljani, Medicinska fakulteta

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Petra Hudler, petra.hudler@mf.uni-lj.si

3. Raziskovalno področje (*Research field*):

Biokemija in molekularna genetika, Temeljna medicina

4. Opis raziskovalnega dela *(Research work description*):
Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce *(It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.)*.

Slov.: Raki glave in vratu (zlasti ploščatocelični karcinomi ustne votline) so heterogena skupina malignomov, pri katerih sta izid zdravljenja in kakovost življenja močno odvisna od zgodnjega odkritja ter pravočasnega prilagajanja terapije. Ker so tkivne biopsije invazivne, so v porastu pristopi “tekoče biopsije”. Molekule mikroRNA (miRNA) so stabilne v bioloških tekočinah in lahko odražajo stanje tumorskih celic.

Mladi raziskovalec bo nadgradil dosedanje delo spremljanja izražanja izbranih molekul miRNA v plazmi bolnikov v različnih časovnih točkah med zdravljenjem in spremljanjem. V nadaljevanju bo razširil nabor preučevanih miRNA (npr. z visokozmogljivim profiliranjem in bioinformacijskimi analizami) ter izvedel validacijo ključnih miRNA-podpisov z uveljavljenimi molekularnimi metodami. Cilj bo opredeliti miRNA, povezane s klinično-patološkimi značilnostmi (stadij, zasevki, odziv na (kemo)radioterapijo, ponovitve/sekundarni tumorji) in oceniti njihov diagnostični/prognostični potencial.

Za izbrane molekule miRNA bo dodatno preučil biološki pomen z integracijo napovedi tarč, analizo signalnih poti ter, kjer bo izvedljivo, s funkcijskimi poskusi v ustreznih celičnih modelih (npr. vpliv na proliferacijo, invazivnost in odpornost na zdravljenje).

Eng.: Head and neck cancers (particularly oral squamous cell carcinoma) represent a heterogeneous group of malignancies where outcome and quality of life strongly depend on early detection and timely treatment adaptation. Because tissue biopsies are invasive, “liquid biopsy” approaches are gaining momentum. Among the most promising analytes are microRNAs (miRNAs) as they are stable in body fluids and may reflect tumour biology and tumour–host interactions.

The young researcher will build on prior work monitoring selected miRNAs in patients’ plasma at multiple time points during treatment and follow-up. The project will expand the investigated miRNA landscape (e.g., through high-throughput profiling combined with bioinformatic prioritisation) and then validate key miRNA signatures using established molecular assays. The main objective is to identify miRNA patterns associated with clinicopathological features (stage, nodal disease, response to (chemo)radiotherapy, recurrence/second primary tumours) and to assess their diagnostic/prognostic performance.

For the most promising candidates, the young researcher will further explore biological relevance by integrating target prediction, pathway analyses and—where feasible—functional experiments in appropriate cellular models (e.g., effects on proliferation, invasion, and treatment resistance).

5. Priloge, ki jih je treba priložiti ob prijavi *(Documents required to be submitted with the application)*:

☒ **potrdilo o doseženi izobrazbi *(proof of completed education)***

- kandidat z zaključenim magistrskim študijskim programom (2. bolonjska stopnja)
  (candidate who has completed a Master's degree (2nd Bologna level)):
  - diplomska listina / potrdilo o zaključku študijskega programa
    (diploma certificate / certificate of completion of the study programme)
  - priloga k diplomi / potrdilo o opravljenih obveznostih
    (diploma supplement / official transcript of records containing all grades obtained in the study programme)
- kandidat, ki še ni zaključil študija na 2. stopnji
  (candidate who has not yet completed a Master's degree):
  - potrdilo o do sedaj opravljenih obveznostih z ocenami magistrskega študijskega programa, s katerim se bo kandidat prijavil na doktorski študij
    (official transcript of records listing all courses and grades obtained so far in the Master's degree programme on the basis of which the candidate will apply for enrollment in a doctoral degree programme.)

☒ **nagrade –** univerzitetna Prešernova nagrada ali Prešernova nagrada članice Univerze v Ljubljani oz. druga enakovredna nagrada *(awards, e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award))*

☒ **bibliografija** *(bibliography)*

☒ **življenjepis** *(CV)*

☒ **motivacijsko pismo** *(motivation letter)*

☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** *(description of the candidate's research work)*

☒ **osnutek idejne zasnove raziskovalnega dela** *(preliminary research proposal)*

☒ **priporočilno pismo** *(letter of recommendation)*

☐ **druge priloge** *(other attachments):*

Opis raziskovalnega dela *(Research work description*)

1. Članica UL (*UL member)*:

Univeza v Ljubljani, Medicinska fakulteta

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Mitja Lainščak, mitja.lainscak@mf.uni-lj.si

3. Raziskovalno področje (*Research field*):

LS7 Prevention, Diagnosis and Treatment of Human Diseases: Cardiovascular diseases; 3.06 Srce in ožilje

4. Opis raziskovalnega dela *(Research work description*):
Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce *(It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.)*.

Slov.: Raziskovalno delo bo usmerjeno v aktualne izzive obravnave srčnožilnih bolezni, tako skozi nove opazovalne ali intervencijske raziskave kot tudi z analizo obstoječih baz podatko zaključenih raziskav. Možna je tudi metaanaliza individualnih bolnikovih podatkov in poglobljena primerjalna analiza rezultatov raziskav.

Eng.: Research will primarily focus on novel challenges in cardiovascular medicine, including observational and interventional studies as well as database analysiis of completed trials. Particular emphasis can be given to individual participant data meta analysis and in-depth comparative analysis of study findings.

5. Priloge, ki jih je treba priložiti ob prijavi *(Documents required to be submitted with the application)*:

☒ **potrdilo o doseženi izobrazbi *(proof of completed education)***

- kandidat z zaključenim magistrskim študijskim programom (2. bolonjska stopnja)
  (candidate who has completed a Master's degree (2nd Bologna level)):
  - diplomska listina / potrdilo o zaključku študijskega programa
    (diploma certificate / certificate of completion of the study programme)
  - priloga k diplomi / potrdilo o opravljenih obveznostih
    (diploma supplement / official transcript of records containing all grades obtained in the study programme)
- kandidat, ki še ni zaključil študija na 2. stopnji
  (candidate who has not yet completed a Master's degree):
  - potrdilo o do sedaj opravljenih obveznostih z ocenami magistrskega študijskega programa, s katerim se bo kandidat prijavil na doktorski študij
    (official transcript of records listing all courses and grades obtained so far in the Master's degree programme on the basis of which the candidate will apply for enrollment in a doctoral degree programme.)

☐ **nagrade –** univerzitetna Prešernova nagrada ali Prešernova nagrada članice Univerze v Ljubljani oz. druga enakovredna nagrada *(awards, e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award))*

☒ **bibliografija** *(bibliography)*

☒ **življenjepis** *(CV)*

☒ **motivacijsko pismo** *(motivation letter)*

☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** *(description of the candidate's research work)*

☒ **osnutek idejne zasnove raziskovalnega dela** *(preliminary research proposal)*

☒ **priporočilno pismo** *(letter of recommendation)*

☐ **druge priloge** *(other attachments):*

Opis raziskovalnega dela *(Research work description*)

1. Članica UL (*UL member)*:

Medicinska fakulteta

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Tea Lanišnik Rižner, tea.lanisnik-rizner@mf.uni-lj.si

3. Raziskovalno področje (*Research field*):

3.05. Reprodukcija človeka

4. Opis raziskovalnega dela *(Research work description*):
Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce *(It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.)*.

Slov.:

Izhodišče raziskovalne naloge MR: Endometrioza je kompleksna ginekološka bolezen, za katero je značilna prisotnost endometriju podobnega tkiva zunaj maternične votline. Prizadene približno 190 milijonov žensk v rodni dobi po vsem svetu. Simptomi endometrioze so nespecifični in vključujejo hude bolečine in neplodnost. Bolezen je heterogena in vključuje ovarijsko, peritonealno in globoko endometriozo, ki predstavljajo različne entitete z različno patogenezo. Medtem ko lahko ovarijsko in globoko endometriozo diagnosticirajo s slikovnimi tehnikami, najpogostejšo obliko - peritonealno endometriozo - diagnosticirajo le invazivno z laparoskopijo. Zaradi nespecifičnih simptomov in invazivnega diagnostičnega postopka lahko do postavitve diagnoze mine tudi do 10 let. Posledično endometrioza bistveno vpliva na kakovost življenja bolnic. Trenutno v klinični praksi ni zanesljivih biooznačevalcev, ki bi napovedali prisotnost endometrioze, zato potrebujemo zanesljive biooznačevalce, ki bodo nadomestili diagnostične operacije ali omogočali triažo bolnic, ki operacijo dejansko potrebujejo.
V okviru raziskovalne naloge se bomo osredotočili na omske pristope za odkrivanje novih biooznačevalcev za diagnostiko endometrioze. V soglasju s Komisijo RS za medicinsko etiko bomo zbrali vzorce krvi bolnic s peritonealno in globoko infiltrativno endometriozo in vzorce krvi kontrolne skupine. S transkriptomskimi in proteomskimi pristopi bomo v vzorcih krvi opredelili nove transkripte in prroteine, povezane z endometriozo, ter tako odkrili motene molekularne procese. Raziskava bo potekala v sodelovanju z Ginekološko kliniko Univerzitetnega kliničnega centra Ljubljana, Medicinsko univerzo in Avstrijskim inštitutom za tehnologijo na Dunaju, Medicinsko univerzo v Varšavi in KTH Stockholm.
Delovni hipotezi: Bolnice z endometriozo se od oseb kontrolne skupine razlikujejo v naboru transkriptov in proteinov, ki so vpleteni v patofiziološke procese in predstavljajo možne diagnostične označevalce. Večomski pristop povezovanja transkriptomskih, proteomskih in kliničnih podatkov omogoča postavitev diagnostičnih modelov z dobrimi karakteristikami.
Metode: Zastavljeni hipotezi bomo preverili z izvedbo netarčne transkriptomske in tarčne proteomske študije odkrivanja biooznačevalcev v velikem naboru vzorcev krvi bolnic z endometriozo in oseb kontrolne skupine. Uporabili bomo najsodobnejši pristop tarčne proteomike Olink tehnologije (študija odkrivanja) in Luminex ali ELISA (študija validacije) ter netarčno in tarčno transkriptomiko z uporabo sekvenciranja RNA kodirajočega dela genoma (študija odkrivanja) in mrež nizke gostote (LDA) ali qPCR (študija validacije). Diagnostične modele bomo postavili z različnimi najsodobnejšimi pristopi strojnega učenja. Transkriptomske in proteomske podatke bomo analizirali tudi z orodji, ki omogočajo opredelitev poti povezanih s patogenezo bolezni.
Cilji: V okviru raziskovalne naloge bomo odkrili in validirali nove možne biooznačevalce, postavili diagnostične modele, ki bodo vključevali transkriptomske, proteomske in klinične podatke, prispevali k razvoju novih diagnostičnih pristopov, pa tudi k razumevanju patofiziologije in dolgoročno k razvoju novih možnosti personaliziranega zdravljenja endometrioze.

Eng.:

Background of the research project: Endometriosis is a complex gynaecological disease characterised by the presence of endometrial-like tissue outside the uterine cavity. It affects approximately 190 million women of reproductive age worldwide. Symptoms of endometriosis are non-specific and include severe pain and infertility. The disease is heterogeneous and includes ovarian, peritoneal, and deep endometriosis, which represent distinct entities with different pathogeneses. While ovarian and deep endometriosis can be diagnosed using imaging techniques, the most common form – peritoneal endometriosis – can only be diagnosed invasively by laparoscopy. Due to the non-specific symptoms and the invasive diagnostic procedure, it can take up to 10 years to establish a diagnosis. As a result, endometriosis significantly affects patients' quality of life. Currently, there are no reliable

biomarkers in clinical use that can predict the presence of endometriosis, so reliable biomarkers are needed to replace diagnostic surgeries or enable the triage of patients who actually require surgery.
As part of this research, we will focus on omic approaches to discover new biomarkers for the diagnosis of endometriosis. With the approval of the Medical Ethics Committee of the Republic of Slovenia, we will collect blood samples from patients with peritoneal and deep infiltrative endometriosis, as well as from a control group. Using transcriptomic and proteomic approaches, we will identify new transcripts and proteins related to endometriosis in blood samples and thereby uncover disrupted molecular processes. The research will be conducted in collaboration with the Gynaecology Clinic of the University Medical Centre Ljubljana, the Medical University and the Austrian Institute of Technology in Vienna, Austria, the Medical University of Warsaw, Poland, and KTH Stockholm, Sweden.
Working hypotheses: Patients with endometriosis differ from control subjects in the set of transcripts and proteins involved in pathophysiological processes, which may serve as diagnostic markers. The multiomic approach, combining transcriptomic and proteomic data with clinical information, enables the development of diagnostic models with strong performance.
Methods: We will test the hypothesis by conducting non-targeted transcriptomic and targeted proteomic studies for biomarker discovery in a large set of blood samples from endometriosis patients and control subjects. We will use the state-of-the-art targeted proteomics approach of Olink technology for the discovery study and Luminex or ELISA for the validation study, as well as non-targeted and targeted transcriptomics using RNA sequencing of the coding genome for the discovery study and low-density arrays (LDA) or qPCR for the validation study. We will build diagnostic models using various advanced machine learning approaches. Transcriptomic and proteomic data will also be analysed with tools that enable identification of pathways related to disease pathogenesis.
Objectives: In this research, we will discover and validate new potential biomarkers, establish diagnostic models that incorporate transcriptomic, proteomic, and clinical data, contribute to the development of new diagnostic approaches, enhance understanding of pathophysiology, and, in the long term, support the development of new options for personalised treatment of endometriosis.

5. Priloge, ki jih je treba priložiti ob prijavi *(Documents required to be submitted with the application)*:

☒ **potrdilo o doseženi izobrazbi *(proof of completed education)***

- kandidat z zaključenim magistrskim študijskim programom (2. bolonjska stopnja)
  (candidate who has completed a Master's degree (2nd Bologna level)):
  - diplomska listina / potrdilo o zaključku študijskega programa
    (diploma certificate / certificate of completion of the study programme)
  - priloga k diplomi / potrdilo o opravljenih obveznostih
    (diploma supplement / official transcript of records containing all grades obtained in the study programme)
- kandidat, ki še ni zaključil študija na 2. stopnji
  (candidate who has not yet completed a Master's degree):
  - potrdilo o do sedaj opravljenih obveznostih z ocenami magistrskega študijskega programa, s katerim se bo kandidat prijavil na doktorski študij
    (official transcript of records listing all courses and grades obtained so far in the Master's degree programme on the basis of which the candidate will apply for enrollment in a doctoral degree programme.)

☐ **nagrade –** univerzitetna Prešernova nagrada ali Prešernova nagrada članice Univerze v Ljubljani oz. druga enakovredna nagrada *(awards, e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award))*

☐ **bibliografija** *(bibliography)*

☒ **življenjepis** *(CV)*

☒ **motivacijsko pismo** *(motivation letter)*

☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** *(description of the candidate's research work)*

☐ **osnutek idejne zasnove raziskovalnega dela** *(preliminary research proposal)*

☒ **priporočilno pismo** *(letter of recommendation)*

☐ **druge priloge** *(other attachments):*

Opis raziskovalnega dela *(Research work description*)

1. Članica UL (*UL member)*:

Medicinska fakulteta

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Metka Lenassi, metka.lenassi@mf.uni-lj.si

3. Raziskovalno področje (*Research field*):

Zunajcelični vezikli kot mediatorji nevropatogeneze HIV-1

4. Opis raziskovalnega dela *(Research work description*):
Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce *(It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.)*.

Slov.: Okužba z virusom humane imunske pomanjkljivosti tipa 1 (HIV-1) se je zaradi učinkovite protiretrovirusne terapije spremenila iz smrtne bolezni spremenila v kronično obolenje. Kljub učinkoviti supresiji virusnega pomnoževanja pa imajo okuženi posmezniki še vedno nesorazmerno visoko tveganje za razvoj nevroloških motenj (HAND) drugih pridruženih kroničnih bolezni, ki pomembno vplivajo na kakovost življenja. HAND v blagi ali zmerni obliki prizadene približno polovico okuženih posameznikov, v hujših primerih pa lahko vodi tudi v demenco. *Mehanizmi nevrodegeneracije v kontekstu HAND ostajajo razmeroma slabo raziskani. Mikroglije, makrofagi centralnega živčnega sistema, predstavljajo glavni rezervoar HIV-1 v možganih. Večina provirusov v rezervoarjih je poškodovanih in nesposobnih tvorbe novih virusnih delcev, lahko kljub temu izražajo virusni protein Nef in druge virusne molekule.* *Nef ima ključno vlogo v patogenezi okužbe s HIV-1, prisoten pa je tudi v telesnih tekočinah učinkovito zdravljenih, aviremičnih posameznikov. Nef spodbuja lastno izločanje iz okuženih celic v zunajceličnih veziklih (ZV). ZV so z lipidnim dvoslojem obdane strukture, ki jih izločajo vse celice in ki, podobno kot starševska celica, vsebujejo raznolik nabor proteinov, nukleinskih kislin, lipidov in metabolitov. Predstavljajo pomemben in splošno prisoten mehanizem medcelične komunikacije, tudi v patoloških procesih, kot je okužba s HIV.* *V okviru doktorske raziskave bomo preučevali mehanizem Nef-ZV- posredovane patogeneze, ki prispeva k HAND. V ta namen bomo uporabili sodobne biokemijske, molekularne in celične pristope ter sodelovali z vrhunskimi strokovnjaki doma in v tujini. Naš dolgoročni cilj je identifikacija ključnih molekulskih tarč, ki bi jih bilo mogoče izkoristiti za razvoj novih terapevtskih pristopov, ali pa molekulskih označevalcev za spremljanje učinkovitosti zdravljenja pri aviremičnih posameznikih, okuženih s HIV.*

Eng.: Due to the introduction of effective antiretroviral therapy, infection with human immunodeficiency virus type 1 (HIV-1) has transformed from a fatal disease into a chronic condition. Despite effective suppression of viral replication, infected individuals have a disproportionately high risk of developing HIV-associated neurocognitive disorders (HAND), as well as other chronic diseases that significantly impact quality of life. HAND affects approximately half of HIV-infected individuals in its mild to moderate forms and, in more severe cases, can progress to dementia. *The underlying mechanisms of neurodegeneration in the context of HAND remain poorly understood. Microglia, the resident macrophages of the central nervous system, represent the principal reservoir of HIV-1 in the brain.*

Although the majority of proviruses within these reservoirs are defective and incapable of producing new infectious viral particles, they may nonetheless express the viral protein Nef and other viral molecules.
Nef plays a key role in HIV-1 pathogenesis and is detectable in the body fluids of effectively treated, aviremic individuals. Nef promotes its own release from infected cells via extracellular vesicles (EVs). EVs are lipid bilayer–enclosed structures secreted by all cell types and, similarly to their cells of origin, contain a diverse repertoire of proteins, nucleic acids, lipids, and metabolites. They represent an important and ubiquitous mechanism of intercellular communication, including in pathological processes such as HIV infection.
Within the scope of the doctoral research, we will investigate the mechanisms of Nef–EV-mediated pathogenesis that contribute to the development of HAND. To this end, we will employ state-of-the-art biochemical, molecular, and cellular approaches and collaborate with leading experts both nationally and internationally. Our long-term goal is to identify key molecular targets that could be exploited for the development of novel therapeutic strategies, as well as molecular biomarkers for monitoring treatment efficacy in aviremic individuals living with HIV.

5. Priloge, ki jih je treba priložiti ob prijavi *(Documents required to be submitted with the application)*:

☒ **potrdilo o doseženi izobrazbi *(proof of completed education)***

- kandidat z zaključenim magistrskim študijskim programom (2. bolonjska stopnja)
  (candidate who has completed a Master's degree (2nd Bologna level)):
  - diplomska listina / potrdilo o zaključku študijskega programa
    (diploma certificate / certificate of completion of the study programme)
  - priloga k diplomi / potrdilo o opravljenih obveznostih
    (diploma supplement / official transcript of records containing all grades obtained in the study programme)
- kandidat, ki še ni zaključil študija na 2. stopnji
  (candidate who has not yet completed a Master's degree):
  - potrdilo o do sedaj opravljenih obveznostih z ocenami magistrskega študijskega programa, s katerim se bo kandidat prijavil na doktorski študij
    (official transcript of records listing all courses and grades obtained so far in the Master's degree programme on the basis of which the candidate will apply for enrollment in a doctoral degree programme.)

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☒ **bibliografija** *(bibliography)*

☒ **življenjepis** *(CV)*

☒ **motivacijsko pismo** *(motivation letter)*

☐ **opis dosedanjega sodelovanja pri raziskovalnem delu** *(description of the candidate's research work)*

☐ **osnutek idejne zasnove raziskovalnega dela** *(preliminary research proposal)*

☒ **priporočilno pismo** *(letter of recommendation)*

☐ **druge priloge** *(other attachments):*

Opis raziskovalnega dela *(Research work description*)

1. Članica UL (*UL member)*:

Medicinska fakulteta (Faculty of Medicine)

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Sergej Pirkmajer, sergej.pirkmajer@mf.uni-lj.si

3. Raziskovalno področje (*Research field*):

LS4 – Fiziologija v zdravju, bolezni in staranju (LS4 – Physiology in Health, Disease and Ageing)

4. Opis raziskovalnega dela *(Research work description*):
Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce *(It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.)*.

Slov.: Mladi raziskovalec bo preučeval molekularne mehanizme uravnavanja in delovanja presnove v skeletni mišici. Skeletne mišice, ki po svoji masi predstavljajo največje tkivo v telesu, so ključnega pomena za ohranjanje presnovnega zdravja. Presnovne motnje na ravni skeletnih mišic pomembno prispevajo k razvoju bolezni in/ali z njimi povezanih bolezenskih stanj, kot so debelost, sladkorna bolezen tipa 2, starostna sarkopenija in kaheksija pri rakastih in drugih obolenjih. Preučevanje molekularnih mehanizmov, ki so podlaga motenega delovanja presnove, bi lahko vodile k novim oblikam zdravljenja ali diagnostike teh bolezni in bolezenskih stanj. Pri preučevanju molekularnih mehanizmov, ki uravnavajo presnovo v skeletni mišici bo mladi raziskovalec med drugim uporabljal kulture skeletnomišičnih celic, model oživčenja mišičnih celic in vitro, odtis western, qPCR, gensko utišanje z interferenčno RNA, ELISA, MAGPIX, pretočno citometrijo, teste za oceno celične presnove, merjenje porabe kisika z aparatom Seahorse idr. Za usposabljanje mladega raziskovalca je pomembno poznavanje temeljev biokemije, molekularne biologije, celične biologije in aktivno znanje angleškega jezika.

Eng.: The young researcher will investigate the molecular mechanisms regulating metabolism and its function in skeletal muscle. By mass, skeletal muscle is the largest tissue in the body and is essential for maintaining metabolic health. Metabolic disturbances in skeletal muscle significantly contribute to the development of diseases and conditions such as obesity, type 2 diabetes, age-related sarcopenia, and cachexia in cancer and other diseases. Investigation of the molecular mechanisms underlying impaired metabolic function may lead to new approaches for the treatment or diagnosis of these diseases and conditions. In examining the molecular mechanisms that regulate skeletal muscle metabolism, the researcher will use, among other methods, skeletal muscle cell cultures, an in vitro model of muscle cell innervation, Western blotting, qPCR, gene silencing with interfering RNA, ELISA, MAGPIX, flow cytometry, assays for assessing cellular metabolism, measurement of oxygen consumption using a Seahorse analyser, and other techniques. For the training of the young researcher, a solid background in biochemistry, molecular biology, and cell biology, as well as active proficiency in English, is essential.

5. Priloge, ki jih je treba priložiti ob prijavi *(Documents required to be submitted with the application)*:

☒ **potrdilo o doseženi izobrazbi *(proof of completed education)***   − kandidat z zaključenim magistrskim študijskim programom (2. bolonjska stopnja)

(candidate who has completed a Master's degree (2nd Bologna level)):

- diplomska listina / potrdilo o zaključku študijskega programa
  (diploma certificate / certificate of completion of the study programme)

- priloga k diplomi / potrdilo o opravljenih obveznostih
  (diploma supplement / official transcript of records containing all grades obtained in the study programme)

- kandidat, ki še ni zaključil študija na 2. stopnji
  (candidate who has not yet completed a Master's degree):

  - potrdilo o do sedaj opravljenih obveznostih z ocenami magistrskega študijskega programa, s katerim se bo kandidat prijavil na doktorski študij
    (official transcript of records listing all courses and grades obtained so far in the Master's degree programme on the basis of which the candidate will apply for enrollment in a doctoral degree programme.)

☒ **nagrade –** univerzitetna Prešernova nagrada ali Prešernova nagrada članice Univerze v Ljubljani oz. druga enakovredna nagrada *(awards, e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award))*

☒ **bibliografija** *(bibliography)*

☒ **življenjepis** *(CV)*

☒ **motivacijsko pismo** *(motivation letter)*

☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** *(description of the candidate's research work)*

☐ **osnutek idejne zasnove raziskovalnega dela** *(preliminary research proposal)*

☒ **priporočilno pismo** *(letter of recommendation)*

☐ **druge priloge** *(other attachments):*

Opis raziskovalnega dela *(Research work description*)

1. Članica UL (*UL member)*:

Univerza v Ljubljani, Medicinska fakulteta

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

prof. dr. Mario Poljak, dr. med. (mario.poljak@mf.uni-lj.si)

3. Raziskovalno področje (*Research field*):

3.01 Mikrobiologija in imunologija

4. Opis raziskovalnega dela *(Research work description*):
Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce *(It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.)*.

Slov.: Mladi raziskovalec/raziskovalka bo delo opravljal/a v Laboratoriju za molekularno mikrobiologijo na Inštitutu za mikrobiologijo in imunologijo Medicinske fakultete Univerze v Ljubljani. V okviru svojega dela bo moral/a opraviti podiplomski znanstveni študijski program Biomedicine oz. doktorski študijski program Biomedicina, znanstveno področje medicinska mikrobiologija. Delo mlade/ga raziskovalke/ca bo usmerjeno predvsem v molekularno opredelitev kandidatnih izolatov za nove genotipe človeških papilomavirusov (HPV) in razvoj hitrih, občutljivih in specifičnih molekularnih mikrobioloških diagnostičnih metod za različne papilomaviruse. V številnih predhodnih raziskavah je namreč naša raziskovalna skupina v različnih vzorcih odkrila več možnih kandidatov za nove genotipe HPV, ki jih je treba dokončno opredeliti. Zaradi večplastnosti problema bomo za opredelitev uporabili več različnih molekularnih pristopov. Delo bo zahtevalo podrobno poznavanje in obvladovanje vrste sodobnih molekularnih mikrobioloških tehnik, vključno s kloniranjem ter številnih računalniških programov za analizo nukleotidnih zaporedij.

Eng.: The young researcher will be a part of the research group of the Laboratory for Molecular Microbiology at the Institute of Microbiology and Immunology, Faculty of Medicine, University of Ljubljana. The candidate will have to complete a doctoral degree program in Biomedicine, presumably in the scientific field of Medical Microbiology, at the University of Ljubljana. The work of a young researcher will primarily focus on the molecular characterization of candidate isolates for novel types of human papillomaviruses (HPV) and the development of rapid, sensitive and specific molecular diagnostic methods, enabling detection of different papillomaviruses. Namely, in a number of previous studies, our research group has identified several possible candidates for novel HPV types, in different clinical samples, that are yet to be completely characterized. Due to the multiplicity of the research objective, several different molecular techniques will be used by the doctoral candidate. The work will require detailed knowledge and management of modern molecular techniques, including cloning and numerous computer programs for the analysis of nucleotide sequences.

5. Priloge, ki jih je treba priložiti ob prijavi *(Documents required to be submitted with the application)*:

☒ **potrdilo o doseženi izobrazbi *(proof of completed education)*** – kandidat z zaključenim magistrskim študijskim programom (2. bolonjska stopnja)

(candidate who has completed a Master's degree (2nd Bologna level)):

- diplomska listina / potrdilo o zaključku študijskega programa
  (diploma certificate / certificate of completion of the study programme)

- priloga k diplomi / potrdilo o opravljenih obveznostih
  (diploma supplement / official transcript of records containing all grades obtained in the study programme)

- kandidat, ki še ni zaključil študija na 2. stopnji
  (candidate who has not yet completed a Master's degree):

  - potrdilo o do sedaj opravljenih obveznostih z ocenami magistrskega študijskega programa, s katerim se bo kandidat prijavil na doktorski študij
    (official transcript of records listing all courses and grades obtained so far in the Master's degree programme on the basis of which the candidate will apply for enrollment in a doctoral degree programme.)

☒ **nagrade –** univerzitetna Prešernova nagrada ali Prešernova nagrada članice Univerze v Ljubljani oz. druga enakovredna nagrada *(awards, e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award))*

☒ **bibliografija** *(bibliography)*

☒ **življenjepis** *(CV)*

☒ **motivacijsko pismo** *(motivation letter)*

☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** *(description of the candidate's research work)*

☐ **osnutek idejne zasnove raziskovalnega dela** *(preliminary research proposal)*

☒ **priporočilno pismo** *(letter of recommendation)*

☐ **druge priloge** *(other attachments):*

Opis raziskovalnega dela *(Research work description*)

1. Članica UL (*UL member)*:

Medicinska fakulteta

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Andrej Vovk, andrej.vovk@mf.uni-lj.si

3. Raziskovalno področje (*Research field*):

3.03 – Nevrobiologija

4. Opis raziskovalnega dela *(Research work description*):
Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce *(It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.)*.

Slov.: *Raziskovalno delo bo osredotočeno na proučevanje strukturnih in funkcionalnih sprememb v možganih z uporabo naprednih metod magnetnoresonančnega slikanja (MRI). V našem laboratoriju raziskujemo kako specifične nevrološke motnje (npr. nevrodegeneracija ali razvojne motnje) vplivajo na integriteto bele možganovine in dinamiko funkcijskih omrežij.* *Vsebina dela vključuje:* *- Načrtovanje in optimizacijo MRI protokolov (strukturni MRI, fMRI v mirovanju, difuzijsko tenzorsko slikanje - DTI).* *- Napredno procesiranje nevroslikovnih podatkov in statistično modeliranje.* *- Korelacijo slikovnih biomarkerjev s kliničnimi parametri in kognitivnimi testi.* *Nudimo priložnost za delo v interdisciplinarnem okolju, ki povezuje nevrobiologijo, fiziko in medicino, z namenom razvoja neinvazivnih metod za zgodnjo diagnostiko bolezni.* *Poleg splošnih pogojev razpisa morajo kandidati izpolnjevati še naslednje specifične zahteve:* *- Tehnične veščine: Osnovno znanje programiranja (npr. Python, MATLAB ali R) za avtomatizacijo obdelave slikovnih podatkov.* *- Poznavanje programskih orodij: Prednost imajo kandidati, ki poznajo specializirano programsko opremo za nevroslikanje (npr. AFNI, FSL, FreeSurfer, SPM ali MRtrix).* *- Matematično-analitična znanja: Močan interes za področje statistike in analize kompleksnih podatkovnih nizov.* *- Komunikacijske kompetence: Sposobnost dela s pacienti in prostovoljci v kliničnem okolju ter odlično pisno izražanje v angleškem jeziku za pripravo znanstvenih objav.*

Eng.: *The research work will focus on studying structural and functional changes in the brain using advanced magnetic resonance imaging (MRI) methods. In our laboratory, we investigate how specific neurological disorders (e.g. neurodegeneration or developmental disorders) affect the integrity of white matter and the dynamics of functional networks.* *The content of the work includes:*

- Design and optimization of MRI protocols (structural MRI, resting-state fMRI, diffusion tensor imaging - DTI).
- Advanced neuroimaging data processing and statistical modeling.
- Correlation of imaging biomarkers with clinical parameters and cognitive tests.
We offer the opportunity to work in an interdisciplinary environment that connects neurobiology, physics and medicine, with the aim of developing non-invasive methods for early disease diagnosis.

In addition to the general conditions of the call, candidates must also meet the following specific requirements:
- Technical skills: Basic programming knowledge (e.g. Python, MATLAB or R) for automating image data processing.
- Knowledge of software tools: Candidates with knowledge of specialized neuroimaging software (e.g. AFNI, FSL, FreeSurfer, SPM or MRtrix) are preferred.
- Mathematical-analytical skills: Strong interest in the field of statistics and analysis of complex data sets.
- Communication skills: Ability to work with patients and volunteers in a clinical setting and excellent written expression in English for the preparation of scientific publications.

5. Priloge, ki jih je treba priložiti ob prijavi *(Documents required to be submitted with the application)*:

☒ **potrdilo o doseženi izobrazbi *(proof of completed education)***

- kandidat z zaključenim magistrskim študijskim programom (2. bolonjska stopnja)
  (candidate who has completed a Master's degree (2nd Bologna level)):
  - *o* diplomska listina / potrdilo o zaključku študijskega programa
    (diploma certificate / certificate of completion of the study programme)
  - **o** priloga k diplomi / potrdilo o opravljenih obveznostih
    (diploma supplement / official transcript of records containing all grades obtained in the study programme)
- kandidat, ki še ni zaključil študija na 2. stopnji
  (candidate who has not yet completed a Master's degree):
  - *o* potrdilo o do sedaj opravljenih obveznostih z ocenami magistrskega študijskega programa, s katerim se bo kandidat prijavil na doktorski študij
    (official transcript of records listing all courses and grades obtained so far in the Master's degree programme on the basis of which the candidate will apply for enrollment in a doctoral degree programme.)

☒ **nagrade –** univerzitetna Prešernova nagrada ali Prešernova nagrada članice Univerze v Ljubljani oz. druga enakovredna nagrada *(awards, e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award))*

☒ **bibliografija** *(bibliography)*

☒ **življenjepis** *(CV)*

☒ **motivacijsko pismo** *(motivation letter)*

☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** *(description of the candidate's research work)*

☐ **osnutek idejne zasnove raziskovalnega dela** *(preliminary research proposal)*

☐ **priporočilno pismo** *(letter of recommendation)*

☐ **druge priloge** *(other attachments):*

Opis raziskovalnega dela *(Research work description*)

1. Članica UL (*UL member)*:

Medicinska fakulteta

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Robert ZOREC robert.zorec@mf.uni-lj.si

3. Raziskovalno področje (*Research field*):

Celična fiziologija - nevrobiologija

4. Opis raziskovalnega dela *(Research work description*):
Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce *(It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.)*.

Slov.: Raziskovalno delo mlade(ga) raziskovalke(ca) bo potekalo v Laboratoriju za nevroendokrinologijo-molekulska celična fiziologija, na Inštitutu za patološko fiziologijo Medicinske fakultete v Ljubljani. Začetek raziskovalnega dela je predviden v jeseni 2026. Kandidate(ke), ki bodo do predvidenega roka septembra 2026 zaključili magistrski študij na 2. stopnji naravoslovnih smeri, kot so biologija, biokemija, medicina, biotehnologija, mikrobiologija, farmacija, fizika, kemija in so motivirani za znanstveno raziskovanje vabimo, da se prijavijo prek spletne aplikacije ter pošljejo življenjepis ter spodaj navedene priloge na naslov: robert.zorec@mf.uni-lj.si in marko.kreft@mf.uni-lj.si . Prednost pri izbiri bodo imeli kandidati(ke) z visoko povprečno oceno študija in z izkušnjami z delom v celični biologiji/fiziologiji/biofiziki in biokemiji/molekularni biologiji/vedenjskih poskusih/razvoju zdravil za napredno zdravljenje.

Vsebina raziskovalnega dela: Vloga receptorja GPR27 v delovanju celice

Z G-proteini sklopljeni receptorji (GPCR) so transmembranski proteini med katere spada več kot 800 receptorjev. Pri ljudeh je ena tretjina le-teh tarča odobrenih zdravil. Predmet doktorskega dela bo študij vloge GPR27, ki sodi v družino super ohranjenih receptorjev, izraženih v možganih, z neznano funkcijo. Torej gre za GPCR siroto. V literaturi, ki trenutno sestoji iz manj kot 37 publikacij, stoji, da je vloga GPR27 verjetno povezana z uravnavanjem presnove celice na ravni glikolize in mitohondrijskih procesov. Znano je tudi, da prekomerno izražanje tega gena pri človeku podaljša mediano preživetje. Zato bo predmet raziskav potekal v smer določitve finkcije in možnih enogenih ligandov tega receptorja, kar bo odprlo možnosti za razvoj novih zdravil.

Metode dela: Mladi(a) raziskovalec(ka) bo aseptično vzpostavljal(a) in optimiziral(a) pogoje primarne in trajne celične kulture različnih tipov evkariontskih celic, ki izražajo GPR27 in takih, kjer ta gen celice ne izražajo. Izvajal(a) in optimiziral(a) bo meritve meritve presnovkov (laktat, glukoza in citrat) ter sekundarnih prenašalcev (kalcij, ciklični AMP) na ravni posamezne celice. Poleg optofizioloških metod bo uporabil(a) elektrofiziološke (meritve kapacitivnosti) in druge biofizikalne metode (npr. mikroskopija na atomsko silo) za določitev homeostaze celične površine (meritve kapacitete in fuzije lizosomov) in mehanskih lastnosti celic z in brez izraženega gena za GPR27. Pri optofizioloških metodah bo uporabljal kvantitativno konfokalno mikroskopijo z nanosenzorji za citosolni L-laktat, D-glukozo, citrat, kakor tusi za sekundarne prenašalce (kalcij, cAMP)…), superločljivostno mirkoskopijo SIM in STED za subcelično lokalizacijo struktur. Sodeloval(a) bo tudi v vedenjskih poskusih na transgeni miški divjega tipa in tistih z izbitim genom za GPR27.

Eng.: The young researcher's work will take place in the Laboratory of Neuroendocrinology – Molecular Cellular Physiology at the Institute of Pathological Physiology, Faculty of Medicine, University of Ljubljana. The research is expected to begin in autumn 2026. Candidates who will have completed a second-cycle (Master's level) degree in natural sciences by the anticipated deadline of September 2026—such as biology, biochemistry, medicine, biotechnology, microbiology, pharmacy, physics, or chemistry—and who are motivated to pursue scientific research are invited to apply via the online application system and to send their CV and the required attachments to: robert.zorec@mf.uni-lj.si and marko.kreft@mf.uni-lj.si.

Preference will be given to candidates with a high academic average and experience in cell biology, physiology, biophysics, biochemistry, molecular biology, behavioural experiments, or advanced therapeutic drug development.

Research Outline: The Role of the GPR27 Receptor in Cellular Function

G protein–coupled receptors (GPCRs) are transmembrane proteins comprising more than 800 receptors. In humans, approximately one-third of these are targets of approved drugs. The focus of this doctoral project will be the study of GPR27, a member of the super-conserved receptor family expressed in the brain, whose function

remains unknown. GPR27 is therefore considered an orphan GPCR. The current literature—comprising fewer than 37 publications—suggests that GPR27 may regulate cellular metabolism, particularly glycolysis and mitochondrial processes. It has also been reported that overexpression of this gene in humans is associated with prolonged median survival. The research will therefore aim to determine the function of GPR27 and to identify potential endogenous ligands of this receptor, paving the ground for drug discovery.

Methods: The young researcher will aseptically establish and optimise primary and permanent cell cultures of various eukaryotic cell types, including those expressing GPR27 and those that do not. They will perform and optimise measurements of metabolites (lactate, glucose, citrate) and second messengers (calcium, cyclic AMP) at the single-cell level. In addition to optophysiological methods, electrophysiological techniques (e.g., capacitance measurements) and other biophysical methods (e.g., atomic force microscopy, mechanosensitivity measurements) will be used to assess plasma membrane homeostasis (including capacitance measurements and lysosome fusion) and the mechanical properties of cells with and without GPR27 expression. Optophysiological methods will include quantitative confocal microscopy using nanosensors for cytosolic L-lactate, D-glucose, citrate, and second messengers (calcium, cAMP), as well as super-resolution microscopy techniques such as SIM and STED for subcellular localisation studies. The researcher will also participate in behavioural experiments using transgenic mice, including wild-type animals and those with GPR27 gene knockout.

5. Priloge, ki jih je treba priložiti ob prijavi *(Documents required to be submitted with the application)*:

☒ **potrdilo o doseženi izobrazbi *(proof of completed education)***

- kandidat z zaključenim magistrskim študijskim programom (2. bolonjska stopnja)
  (candidate who has completed a Master's degree (2nd Bologna level)):
  - diplomska listina / potrdilo o zaključku študijskega programa
    (diploma certificate / certificate of completion of the study programme)
  - priloga k diplomi / potrdilo o opravljenih obveznostih
    (diploma supplement / official transcript of records containing all grades obtained in the study programme)
- kandidat, ki še ni zaključil študija na 2. stopnji
  (candidate who has not yet completed a Master's degree):
  - potrdilo o do sedaj opravljenih obveznostih z ocenami magistrskega študijskega programa, s katerim se bo kandidat prijavil na doktorski študij
    (official transcript of records listing all courses and grades obtained so far in the Master's degree programme on the basis of which the candidate will apply for enrollment in a doctoral degree programme.)

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☒ **bibliografija** *(bibliography)*

☒ **življenjepis** *(CV)*

☒ **motivacijsko pismo** *(motivation letter)*

☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** *(description of the candidate's research work)*

☒ **osnutek idejne zasnove raziskovalnega dela** *(preliminary research proposal)*

☒ **priporočilno pismo** *(letter of recommendation)*

☐ **druge priloge** *(other attachments):*