



Univerza v Mariboru

Medicinska fakulteta

UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION

Predmet:	Izbrane vsebine in novosti v molekularni biologiji
Subject Title:	Selected topics and novelties in molecular biology

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Splošna medicina General medicine – EMŠP		1	2

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Labor work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
5	40				45	3

Nosilec predmeta / Lecturer:

red. prof. dr. Uroš Potočnik

Jeziki /

Languages:

Predavanja / Lecture: Slovenski/Slovene

Vaje / Tutorial:

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Vsebina:

DNA struktura in lastnosti, replikacija (prokarioti, eukarioti), rekombinacija DNA, DNA popravljalni mehanizmi, DNA mutacije, struktura in funkcija genov in kromosomov
RNA struktura in lastnosti, vrste RNA molekul in funkcije, transkripcija (prokarioti, eukarioti), posttranskripcijske modifikacije
Struktura proteinov, sinteza proteinov, posttranslacijske modifikacije proteinov, zvižanje proteinov, transport proteinov
Regulacija proteinske sinteze: regulacija ekspresije genov pri prokariotih, pri bakteriofagih, pri evkariotskih organizmih (enoceličnih, multicelularnih, povezava z embrionalnim razvojem), regulacija na ravni translacije in posttranslacijska regulacija, Embrionalni razvoj
Celični cikel, proliferacija, diferenciacija celic, apoptoza
Povezovanje celic v tkiva, komunikacija med celicami, signalne poti, receptorji, hormoni
Imunski sistem in avtoimunske bolezni
Virusi, HIV, SARS, DNA diagnostika pri infekcijskih boleznih
Molekularna patologija: molekularni mehanizmi vključeni v nastanek bolezni, od bolezni do gena
metode in eksperimentalne tehnike v molekularni biologiji: izolacija bioloških materialov (DNA, RNA, proteinov) iz kliničnih vzorcev (kri, biopsije, tkivo-resektati) in celičnih kultur, izolacija plazmidne DNA,

Content (Syllabus outline):

DNA structure and characteristics, replication (prokaryotes, eukaryotes), recombination, repair and mutations, structure and function of genes and chromosomes,
RNA structure characteristics: role of different types of RNA, transcription (prokaryotes, eukaryotes), post transcription modification
Protein structures, synthesis of proteins, translation, posttranslational modifications, protein folding, protein trafficking
Regulation of protein synthesis: transcriptional regulation of gene expression, regulation of translation, posttranslational regulation
Embryonic development
Cell division (meiosis, mitosis)
Cell cycle: proliferation, differentiation, apoptosis
Integration of cells into tissues, communication between cells, signal transduction, receptors, hormone signaling
Immune system
Viruses :HIV, SARS, Avian influence, DNA diagnostics and infection diseases
Molecular pathology: from disease to gene
Methods and experimental techniques in molecular biology: isolation of biological molecules (DNA, RNA, proteins) from clinical samples (blood, biopsy, tissue, resection specimens) and cell cultures; plasmid DNA isolation, Polymerase Chain Reaction (PCR), gene expression analysis using Real time PCR (Taqman);

gelska elektroforeza, pomnoževanje DNA z verižno reakcijo z encimom polimerazo (PCR), analiza genske ekspresije z metodo PCR v realnem času (Taqman), hibridizacija odtisa (southern, northern, western), konstrukcija cDNA in genomskih knjižnic, Rekombinantna DNA tehnologija, kloniranje človekovih genov
 Monogenske genetske bolezni, kompleksne genetske bolezni,
 Molekularna biologija raka: onkogeni, tumorsko zaviralni geni, dedne oblike, molekulska diagnostika in zdravljenje, biološka zdravila
 Vloga molekularne biologije v sodobni družba: etični, sociološki in ekonomski vidiki

hybridization and blotting (southern, western, northern);
 cDNA and genomic libraries
 Recombinant DNA technology, cloning of human genes
 Monogenic (Mendelian) and complex diseases
 Molecular biology of cancer: oncogenes, tumor suppressor genes, hereditary cancer, molecular diagnostics and treatment, biological drugs
 Molecular biology and society: ethical and economical aspects

Temeljna literatura in viri / Textbooks:

1. B. ALBERTS et al.: Molecular biology of the cell., 5th Ed., Garland Publish, Inc., New York, 2008
2. EPSTEIN RJ: Human molecular biology, An Introduction to the Molecular Basis of Health and Disease; Cambridge University Press, Cambridge, 2002
3. LODISH H., Baltimore D., Berk A., Zipursky S.L., Matsudaira P., Darnell J.: Molecular Cell Biology, 5th Ed., Scientific American Books, Freeman and Co., New York, 2004 STRACHAN T and READ AP: Human Molecular genetics, Garland Publish, Inc., New York, 3rd ed., 2004 Liciano J. (ed.): Pharmacogenomics, The Search for Individualized Therapies, John Wiley&Sons, 2002 R.J.M

Cilji:

Predmet bo nudil študentom poglobitev razumevanja bistvenih molekularnih in bioloških procesov v celici, tkivih, organih in celotnem organizmu. Poseben poudarek bo na razumevanju patoloških sprememb v molekularnih procesih pri nastanku, razvoju in zdravljenju bolezni. Predstavljene bodo osnovne metode in eksperimentalne tehnike v molekularni biologiji in molekularni patologiji ter njihova uporaba pri raziskavah in preiskavah molekularnih označevalcev v diagnostiki, prognozi, načrtovanju novih zdravil in individualiziranem zdravljenju

Objectives:

Student will have deep understanding of molecular and biological processes in cells, tissues, organs and whole human organism during health and disease. The focus will be on molecular mechanisms during disease development and treatment. Student will learn most important molecular biology and molecular pathology laboratory methods for diagnostics, biomarker discovery, novel drug development and individualized treatment based on patients genetic makeup.

Predvideni študijski rezultati:

Znanje in razumevanje:

- osnovnimi molekularnimi in biološkimi procesi v celici, tkivih, organih in celotnem organizmu v zdravju in bolezni

Prenesljive/ključne spretnosti in drugi atributi:
 laboratorijske metode in eksperimenti v biomedicini

Knowledge and Understanding:

- molecular and biological processes in cells, tissues, organs and whole human organism during health and disease

Transferable/Key Skills and other attributes:
 laboratory methods and experimental techniques in biomedicine

Metode poučevanja in učenja:

- Predavanje
- Seminar

Learning and teaching methods:

- Lectures
- seminar

Načini ocenjevanja:

Delež (v %) /
 Weight (in %)

Assessment:

Način (pisni izpit, ustno izpraševanje, naloge, projekt)
 seminar
 pisni izpit

40 %
60 %

Type (examination, oral, coursework, project):
 seminar
 written exam

ŠTUDIJSKE OBVEZNOSTI ŠTUDENTOV:

-študenti napišejo seminar na izbrano tematiko in ustno predstavijo seminar s kratkim predavanjem

ACADEMIC OBLIGATIONS OF STUDENTS:

-students should write an essay on selected topic and give oral presentation (seminar)

<p>-pisni izpit</p> <p>POGOJI ZA PRISTOP K POSAMEZNEMU PREVERJANJU ZNANJA:</p> <p>Opravljen seminar je pogoj za pristop k pisnemu izpitu.</p>		<p>-written exam</p> <p>REQUIREMENTS FOR ACCESS TO INDIVIDUAL KNOWLEDGE CHECKING:</p> <p>Students should complete seminar in order to approach to the written exam.</p>
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Reference nosilca / Lecturer's references:

JOSTINS, Luke, MITROVIČ, Mitja, POTOČNIK, Uroš, et al. Host-microbe interactions have shaped the genetic architecture of inflammatory bowel disease. *Nature*, ISSN 0028-0836, 2012, vol. 491, no. 7422, str. 119-124, doi: 10.1038/nature11582. [COBISS.SI-ID 512230968], [JCR, SNIP, WoS do 22. 10. 2014: št. citatov (TC): 354, čistih citatov (CI): 353, čistih citatov na avtorja (CIAu): 17.40, normirano št. čistih citatov (NC): 140, Scopus do 22. 10. 2014: št. citatov (TC): 395, čistih citatov (CI): 392, čistih citatov na avtorja (CIAu): 19.32, normirano št. čistih citatov (NC): 624. SCI impact factor=36.28

RIVAS, Manuel A, MITROVIČ, Mitja, POTOČNIK, Uroš, et al. Deep resequencing of GWAS loci identifies independent rare variants associated with inflammatory bowel disease. *Nature genetics*, ISSN 1061-4036, 2011, vol. 43, no. 11, str. 1066-1073, doi: 10.1038/ng.952. [COBISS.SI-ID 15421974], [JCR, SNIP, WoS do 14. 10. 2014: št. citatov (TC): 180, čistih citatov (CI): 180, čistih citatov na avtorja (CIAu): 8.14, normirano št. čistih citatov (NC): 50, Scopus do 22. 10. 2014: št. citatov (TC): 192, čistih citatov (CI): 191, čistih citatov na avtorja (CIAu): 8.63, normirano št. čistih citatov (NC): 53. SCI impact factor=35.53

LIU, Jimmy Z, MITROVIČ, Mitja, POTOČNIK, Uroš, et al. Dense genotyping of immune-related disease regions identifies nine new risk loci for primary sclerosing cholangitis. *Nature genetics*, ISSN 1061-4036, 79 str., ilustr. <http://www.nature.com/ng/journal/vaop/ncurrent/full/ng.2616.html>, doi: 10.1038/ng.2616. [COBISS.SI-ID 512280376], [JCR, SNIP, WoS do 18. 12. 2013: št. citatov (TC): 9, čistih citatov (CI): 9, normirano št. čistih citatov (NC): 2, Scopus do 1. 1. 2014: št. citatov (TC): 12, čistih citatov (CI): 12, normirano št. čistih citatov (NC): 3];SCI impact factor=35.53

BERCE, Vojko, PINTO KOZMUS, Carina, POTOČNIK, Uroš. Association among ORMDL3 gene expression, 17q21 polymorphism and response to treatment with inhaled corticosteroids in children with asthma. *Pharmacogenomics journal*, ISSN 1470-269X, Dec. 2013, vol. 13, iss. 6. <http://www.nature.com/tpj/journal/vaop/ncurrent/full/tpj201236a.html>, doi: 10.1038/tpj.2012.36. [COBISS.SI-ID 4406079], [JCR, SNIP, WoS do 23. 12. 2013: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 23. 10. 2013: št. citatov (TC): 3, čistih citatov (CI): 3, normirano št. čistih citatov (NC): 1];SCI impact factor=5.13

REPNIK, Katja, POTOČNIK, Uroš. Haplotype in the IBD5 region is associated with refractory Crohn's disease in Slovenian patients and modulates expression of the SLC22A5 gene. *Journal of gastroenterology*, ISSN 0944-1174, 2011, vol. 46, no. 9, str. 1081-1091, doi: 10.1007/s00535-011-0426-6. [COBISS.SI-ID 15110422], [JCR, SNIP, WoS do 5. 4. 2012: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 24. 11. 2011: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0];SCI impact factor=4.16