BIOKEMIJA RAKA

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Biokemija raka
Course title:	BIOCHEMISTRY OF CANCER
Članica nosilka/UL Member:	UL FKKT

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Biokemija, druga stopnja, magistrski (od študijskega leta 2023/2024 dalje)	Ni členitve (študijski program)	1. letnik, 2. letnik		izbirni

Univerzitetna koda predmeta/University course code:	0100720
Koda učne enote na članici/UL Member course code:	BI2I04

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
30	15	30 LV			75	5

Nosilec predmeta/Lecturer:	doc. dr. Barbara Breznik
Vrsta predmeta/Course type:	izbirni strokovni/Elective Professional

Jeziki/Languages:		
	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Študent oz. kandidat mora imeti predmet opredeljen kot študijsko obveznost.	The course has to be assigned to the student.

Vsebina:	**Content (Syllabus outline):**
Sklopi predavanj: 1. Uvod 2. Razvoj malignih obolenj (kancerogeneza, celični cikel, apoptoza) 3. Genetske osnove bolezni 4. Virusi, onkogeni in tumorski supresorski gen 5. Prenos signalov, eksperimentalne metode v onkologiji 6-a. Napredovanje tumorjev I (interakcije tumorjev z okoljem, invazija) 6-b. Napredovanje tumorjev II (Angiogeneza metastaziranje) 7. Tumorska proteoliza 8. Protitumorski imunski odziv 9. Epidemiologija, tumorski kazalci, diagnoza, prognoza	1. Introduction to cancer biology and biochemistry 2. Malignat disease initiation (carcinogenese, cell cycle and apoptosis) anad experimental methods in cancer research. 3. Molecular basis of carcinogenesis 4. Viruses and tumour supressor genes. 5. Oncogenes and signal transduction 6. Tumour progression: microenvironment and invasion, proteolysis 7. Tumour progression: metastases and angiogenesis 8. Stem cells in tumor progression 9. Anti-tumour immune response 10. Epidemiology, tumour biomarkers 11. Therapeutic approaches in cancer

10. Terapija rakavih obolenj (kemoterapija, radioterapija, genska terapija, biofarmacevtiki v terapiji raka, dostavni sistemi)	

Temeljna literatura in viri/Readings:

-Weinberg, RA: The Biology of Cancer, druga izdaja, W. W. Norton & Company (2014), ISBN-10: 0815345299 - izbrana poglavja
-Tannock IF, Hill RP, Bristow RG, Harrington L: The Basic Science of Oncology, peta izdaja, McGraw-Hill (2013), ISBN-10: 0071745203
-Pregledni članki /Reviews iz Nature Cancer Reviews in Cancer Research

- ČEMAŽAR, Maja, SERŠA, Gregor, MOTALN, Helena, VERBOVŠEK, Urška, TODOROVIĆ, Vesna, LAH TURNŠEK, Tamara. Biologija raka : navodila za vaje. Ljubljana: [s. n.], 2013. 42 str., ilustr. [COBISS.SI-ID 2919503]

Cilji in kompetence:	**Objectives and competences:**
Študent spozna osnove biologije tumorjev in eksperimentalne onkologije v luči uporabe v biomedicini. Osvoji znanja o molekularnih spremembah, ki so odgovorne za nastanek maligno transformirane celic in specifičnih bioloških lastnostih tumorskih celic. Spozna biološke osnove nastanka in napredovanja tumorjev ter spozna osnovne principe zdravljenja v onkologiji. Študent pridobi tudi osnovna znanja o epidemiologiji in spozna najnovejša dognanja v diagnostiki in novih ciljanih bioloških terapijah raka. Pridobljena teoretična in praktična znanja dajejo študentom osnovo za delo v različnih biomedicinskih laboratorijih, tako diagnostičnih kot raziskovalnih.	- The goal of study subject is that the student gets familiar with biology and molecular mechanisms of the disease- cancer progression. He also gets the basis in experimental oncology within a broader aspect of biomedicine. - The student acquires knowledge on biochemical processes and changes that are responsible for appearance of malignant transformed cells and their specific biological properties. - The student learns about biological basis of cancer initiation and progression of tumours and possible treatments modalities. - The student also learns about epidemiology and prevention of cancer, as well as latest diagnostics tools and targeted biological therapies in broader he light of personalised medicine. - The acquired theoretical and practical knowledge give the student the basis for the potential work in biomedical laboratories, being research or in clinics.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje Slušatelji bodo pridobili znanje o specifičnih lastnostih rakavih celic in pristopih zdravljenja raka:. Uporaba Študentje bodo uporabljali pridobljena znanje za razumevanje vse večje razširjenosti raka ter kakšni so problemi pri zdravljenju te bolezni. Nadalje, kateri so novi pristopi zdravljenja in kako načrtovati bazične in translacijske raziskave v predklinični onkologiji. Refleksija Kritično ovrednotenje pridobljenega teoretičnega in praktičnega znanja o biologiji raka z nadaljnjim delom v raziskovalnih ali rutinskih laboratorijih. Prenosljive spretnosti Razumevanje temeljih zakonitosti biologije raka z osnovami diagnostike in zdravljenja raka bo omogočilo študentom spoznavanje in reševanje problemov s tega podrročja ter uspešno timsko delo s	Knowledge and Comprehension The students will get the knowledge on - cancer incidence - specific properties of tumours and clinical aspect of disease progression - prevention and - therapeutic approaches. Application The students will use the acquired knowledge for understanding of cancer prevalence. The understanding of problems of the disease incidence and therapy approaches are relevant for a broader knowledge. The knowledge on the principles of planning basic and translational research has a wider application in applied biochemistry and biomedicine, Analysis The appreciation of the impact of even small molecular changes in the development and spread of

strokovnjaki z drugih medicinskih in biomedicinskih področij.	the diseases- cancer is very relevant for understanding ad analyses of other diseases that are or are not related to cancer. It also leads to better understanding of similar disciplines such as pharmacy and medicine in general. Skill-transference Ability The understanding of basic cancer biology for biochemistry students can be transferred to application in biomarkers research for diagnosis and as targets for therapy in drugs design. The critical evaluation of the acquired theoretical and practical knowledge on cancer biology is relevant for potential future work in research or industry.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja (30) Seminar (15) Vaje (30)	Lectures. 30 hours Seminars (by students), 15 hours Practical courses, 30 hours

Načini ocenjevanja:	**Delež/Weight**	**Assessment:**
Seminar Pisni izpit Ocene: 6-10 (pozitivno), 1-5 (negativno).		Seminar Written exam Grades: 6-10 (positive), 1-5 (negative)

Reference nosilca/Lecturer's references:

MAJC, Bernarda, HABIČ, Anamarija, NOVAK, Metka, ROTTER, Ana, PORČNIK, Andrej, MLAKAR, Jernej, ŽUPUNSKI, Vera, PEČAR FONOVIĆ, Urša, KNEZ, Damijan, ZIDAR, Nace, GOBEC, Stanislav, KOS, Janko, LAH TURNŠEK, Tamara, PIŠLAR, Anja, **BREZNIK, Barbara**. Upregulation of cathepsin X in glioblastoma : interplay with γ-enolase and the effects of selective cathepsin X inhibitors. International journal of molecular sciences. 2022, vol. 23, iss. 3, str. 1-22.

PORČNIK, Andrej, NOVAK, Metka, **BREZNIK, Barbara**, MAJC, Bernarda, HRASTAR, Barbara, ŠAMEC, Neja, ZOTTEL, Alja, JOVCHEVSKA, Ivana, VITTORI, Miloš, ROTTER, Ana, KOMEL, Radovan, LAH TURNŠEK, Tamara. TRIM28 selective nanobody reduces glioblastoma stem cell invasion. Molecules. Aug. 2021, vol. 26, iss. 17, str. 1-16, ilustr. ISSN 1420-3049. https://www.mdpi.com/1420-3049/26/17/5141, DOI: 10.3390/molecules26175141.

LAH TURNŠEK, Tamara, NOVAK, Metka, **BREZNIK, Barbara**. Brain malignancies : glioblastoma and brain metastases. Seminars in cancer biology. [Print ed.]. 2020, vol. 60, str. 262-273.