



FOURTH YEAR

2023/2024.

Application of biological therapy in medicine

Subject:

Application of biological therapy in medicine

The course is evaluated with 3 ECTS. There are 3 hours of active teaching per week (2 hours of lectures and 1 hour of work in a small group).

Teachers:

PБ	Name	email	title
1.	Ivan Jovanović	ivanjovanovic77@gmail.com	Full professor
2.	Gordana Radosavljević	perun.gr@gmail.com	Full professor
3.	Vladislav Volarević	drvolarevic@yahoo.com	Full professor
4.	Marija Milovanović	marijaposta@gmail.com	Full professor
5.	Jelena Pantić	panticjelena55@gmail.com	Associate professor
6.	Sladjana Pavlović	sladjadile@gmail.com	Associate professor
7.	Aleksandar Arsenijević	aleksandar@medf.kg.ac.rs	Associate professor
8.	Nevena Gajović	gajovicnevena@yahoo.com	Assistant professor
9.	Vladimir Marković	vladimirmarkovic.vlad@gmail.com	Teaching assistant
10.	Andjela Petrović	petrovicandjela9944@gmail.com	Junior teaching assistant
11.	Isidora Stanisavljević	isidorastanisavljevic97@gmail.com	Junior teaching assistant

COURSE STRUCTURE:

Module	Name of the module	Week	Lectures weekly	Work in a small group per week	Teacher
1	Biological therapy of inflammatory/autoimmune diseases and tumors	15	2	1	Ivan Jovanovic
					$\Sigma 30+15=45$

EVALUATION:

The grade is equivalent to the number of points won (see tables). Points are earned in two ways:

ACTIVITY DURING THE LESSON: In this way, the student can earn up to 30 points. In order to pass the activity during the lesson, the student must obtain more than 50% of the points.

FINAL TEST: In this way, the student can gain 70 points according to the attached scheme. In order to pass the final test, the student must obtain more than 50% of the points.

FINAL TEST
0-70points

EVALUATION OF FINAL TEST

The test has 35 questions.
Each question is worth 2 points.

The final grade is formed as follows:

In order to pass the course, the student must obtain a minimum of 51 points, pass pre-exam activities and pass the final exam (test).

number of points won	grade
0 - 50	5
51 - 60	6
61 - 70	7
71 - 80	8
81 - 90	9
91 - 100	10

LITERATURE:

the name of the textbook	authors	publisher	the library
Steven A. Rosenberg, John Rosenberg. Principles and Practice of the Biologic Therapy of Cancer 3rd Edition	Steven A. Rosenberg, John Rosenberg	Lippincott Williams & Wilkins, 2000	Has
Hematopoietic Stem Cell Transplantation and Cellular Therapies for Autoimmune Diseases, 1st edition	Richard K. Burt, Dominique Farge, Milton A. Ruiz, Riccardo Saccardi, John A. Snowden	CRC Press, 2021	Has

The presentations and accompanying document in *Word* can be found on the website of the Faculty of Medical Sciences: www.medf.kg.ac.rs

PROGRAM

Module **BIOLOGICAL THERAPY OF INFLAMMATORY/AUTOIMMUNE DISEASES AND TUMORS**

TEACHING UNIT 1 (FIRST WEEK)

BIOLOGICAL THERAPY

General characteristics of biological therapy
Types of biological therapy

TEACHING UNIT 2 (SECOND WEEK)

MONOCLONAL ANTIBODIES

Characteristics and functions of monoclonal antibodies
Production of monoclonal antibodies
Hybrid and humanized monoclonal antibodies

TEACHING UNIT 3 (THIRD WEEK)

MONOCLONAL ANTIBODIES IN THE THERAPY OF CHRONIC INFLAMMATORY AND AUTOIMMUNE DISEASES

Treatment of different inflammatory and autoimmune diseases by monoclonal antibodies

TEACHING UNIT 4 (FOURTH WEEK)

CYTOKINES IN THE TREATMENT OF CHRONIC INFLAMMATORY AND AUTOIMMUNE DISEASES

Characteristics and functions of cytokines
Usage of different cytokines in the treatment of different chronic inflammatory and autoimmune diseases

TEACHING UNIT 5 (FIFTH WEEK)

STEM CELL THERAPY OF AUTOIMMUNE DISEASES

Mesenchymal Stem Cells for Immune Diseases
Mesenchymal Stromal Cell Therapy for Acute Graft versus Host Disease
Adipose-Derived Stem Cells for Systemic Sclerosis Digital Ulcers
Mesenchymal Stromal Cell for Cell Therapy in Rheumatoid Arthritis (RA)
Mesenchymal Stromal Cells for Systemic Sclerosis
Mesenchymal Stromal Cell for Systemic Lupus Erythematosus (SLE)
Mesenchymal Stem/Stromal Cells for Multiple Sclerosis and Other Neurological Diseases
Mesenchymal Stromal Cells for Perianal Fistulizing Crohn's Disease
Umbilical Cord Blood or Mesenchymal Stromal Cells as Potential Therapies for Autism Spectrum Disorder

TEACHING UNIT 6 (SIXTH WEEK)

STEM CELL THERAPY IN INTERNAL MEDICINE AND SURGERY

Usage of stem cells in internal medicine and surgery

TEACHING UNIT 7 (SEVENTH WEEK)

BIOLOGICAL THERAPY OF INFECTIOUS DISEASES

Usage of biological therapy in the treatment of different infectious diseases

TEACHING UNIT 8 (EIGHT WEEK)

MONOCLONAL ANTIBODIES IN TUMOR THERAPY

Monoclonal antibodies: Basic principles
Immunotoxins and Recombinant Immunotoxins
Radioisotope Conjugates
Monoclonal Antibodies: Clinical Applications
B-Cell lymphomas
T-Cell leukemia and lymphoma
Melanoma
Breast cancer and Other Adenocarcinomas
Monoclonal antibodies against growth factor receptors

TEACHING UNIT 9 (NINTH WEEK)

CYTOKINES IN TUMOR THERAPY

Interleukins: Overview
Interleukin-2: Preclinical Trials and Clinical Applications
Interleukin-4: Clinical Applications
Interleukin-12: Clinical Applications
Colony-Stimulating Factors: Basic Principles and Preclinical Studies
Tumor Necrosis Factor: Basic Principles and Clinical Applications in Systemic and Regional Cancer Treatment
Interferon- α and Interferon- β : Basic Principles and Preclinical Studies
Interferon- α and Interferon- β : Clinical Applications
Interferon- γ : Basic Principles and Clinical Applications

TEACHING UNIT 10 (TENTH WEEK)

STEM CELLS THERAPY OF TUMORS

Usage of stem cell therapy in the treatment of different types of tumors

TEACHING UNIT 11 (ELEVENTH WEEK)

TUMOR THERAPY WITH IMMUNE CHECKPOINT INHIBITORS

Immune checkpoint inhibitors - general characteristics and function

Usage of immune checkpoint inhibitors in the treatment of different types of tumors

TEACHING UNIT 12 (TWELFTH WEEK)

VACCINES IN TUMOR THERAPY 1

Cancer vaccines: Cancer Antigens

Shared Tumor-Specific Antigens

Differentiation Antigens

Viral Antigens

Oncogenes and Mutations

Carbohydrate Antigens on Glycolipids and Glycoproteins

Glycoprotein Antigens

Identification of Human Tumor Antigens by Serological Expression Cloning

TEACHING UNIT 13 (THIRTEENTH WEEK)

VACCINES IN TUMOR THERAPY 2

Cancer vaccines: Basic Principles

General concepts and Preclinical Studies

Immune adjuvants

Mechanisms of Immune escape and Immune Tolerance

Principles of Immune Monitoring in Cancer Vaccine Trials

Cancer vaccines: Clinical Applications

Whole Cell and Lysate vaccines

Genetically modified Tumor vaccines

Peptides and Protein Vaccines

DNA vaccines

Recombinant Poxvirus vaccines

Adenovirus and other viral vaccines

Dendritic cell vaccines

Vaccines against carbohydrate antigens on glycolipids and glycoproteins

TEACHING UNIT 14 (FOURTEENTH WEEK)

VIRAL VECTORS FOR TUMOR GENE THERAPY

Basic Principles of Gene Therapy

Basic Principles and Safety Considerations

Gene Transfer into Mammalian Cells

Gene Therapy: Clinical Applications

Gene Therapy Using Lymphocyte Modification

Gene Therapy Using Stem Cell Modification

Suicide Gene Therapy

Gene Therapy Using Direct In vivo Gene injection

Antisense Oligodeoxynucleotides

Gene Therapy Using Lymphocyte Modification

Gene Therapy Using Stem Cell Modification

Suicide Gene Therapy

Gene Therapy Using Direct *In vivo* Gene injection

TEACHING UNIT 15 (FIFTEENTH WEEK)

TUMOR THERAPY WITH CAR T-CELLS, LAK AND TIL CELLS

General characteristics and production of CAR T- cells, LAK and TIL cells

Usage of CAR T- cells, LAK and TIL cells in treatment of different types of tumors

WEEKLY COURSE SCHEDULE

COURSE	TUESDAY
APPLICATION OF BIOLOGICAL THERAPY IN MEDICINE	LECTURES & SEMINAR 08:00 - 10:15 (R36 -Yellow halls on the left)

module	week	type	method unit name	teacher
	1	L	Biological therapy	Prof. dr Marija Milovanovic
		P	Biological therapy	Dr Vladimir Markovic
	2	L	Monoclonal antibody	Assis. prof. dr Nevena Gajovic
		P	Monoclonal antibody	Dr Isidora Stanisavljevic
	3	L	Monoclonal antibodies in the therapy of chronic inflammatory and autoimmune diseases	Assis. prof. dr Nevena Gajovic
		P	Monoclonal antibodies in the therapy of chronic inflammatory and autoimmune diseases	Dr Andjela Petrovic
	4	L	Cytokines in the treatment of chronic inflammatory and autoimmune diseases	Assoc. prof. dr Sladjana Pavlovic
		P	Cytokines in the treatment of chronic inflammatory and autoimmune diseases	Dr Andjela Petrovic
	5	L	Stem cell therapy of autoimmune diseases	Prof. dr Vladislav Volarevic
		P	Stem cell therapy of autoimmune diseases	Dr Vladimir Markovic
	6	L	Stem cell therapy in internal medicine and surgery	Prof. dr Vladislav Volarevic
		P	Stem cell therapy in internal medicine and surgery	Dr Vladimir Markovic
	7	L	Biological therapy of infectious diseases	Prof. dr Ivan Jovanovic
		P	Biological therapy of infectious diseases	Dr Andjela Petrovic
	8	L	Monoclonal antibodies in tumor therapy	Prof. dr Gordana Radosavljevic

module	week	type	method unit name	teacher
		P	Monoclonal antibodies in tumor therapy	Dr Isidora Stanisavljevic
	9	L	Cytokines in tumor therapy	Assoc. prof. dr Jelena Pantic
		P	Cytokines in tumor therapy	Dr Andjela Petrovic
	10	L	Stem cells in tumor therapy	Prof. dr Marija Milovanovic
		P	Stem cells in tumor therapy	Dr Vladimir Markovic
	11	L	Tumor therapy with immune checkpoint inhibitors	Prof. dr Ivan Jovanovic
		P	Tumor therapy with immune checkpoint inhibitors	Dr Isidora Stanisavljevic
	12	L	Vaccines in tumor therapy 1	Assoc. prof. dr Aleksandar Arsenijevic
		P	Vaccines in tumor therapy 1	Dr Isidora Stanisavljevic
	13	L	Vaccines in tumor therapy 2	Assoc. prof. dr Aleksandar Arsenijevic
		P	Vaccines in tumor therapy 2	Dr Andjela Petrovic
	14	L	Viral vectors for tumor gene therapy	Prof. dr Marija Milovanovic
		P	Viral vectors for tumor gene therapy	Dr Vladimir Markovic
	15	L	Tumor therapy with CAR T-CELLS, LAK and TIL cells	Prof. dr Gordana Radosavljevic
		P	Tumor therapy with CAR T-CELLS, LAK and TIL cells	Dr Isidora Stanisavljevic

module	week	type	method unit name	teacher
			FINAL TEST	