University of Gdańsk

Subject card

Subject name and code	Radiosensitizers - in the service of oncology, PG_00179581						
Field of study	Chemistry						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2027/2028			
Education level	Master's studies		Subject group	Optional subject group			
Mode of study	full-time studies		Mode of delivery	at the university			
Year of study	2		Language of instruction	Polish			
Semester of study	4		ECTS credits	2.0			
Learning profile	academic		Assessment form	credit			
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Lidia Chomicz-Mańka				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours	Self-study	SUM	
	Number of study hours	30		15.0	15.0	60	
Subject objectives	The aims are: to acquaint students with the basics of cancer treatment, with particular emphasis on radiotherapy and the role of radiosensitizers to develop the ability to describe the processes and reactions taking place in cancer cells during irradiation with high-energy radiation to develop skills to describe the mechanisms of action of basic types of radiosensitizers						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEMMU2_W02] Has extended and in-depth knowledge in the field of basic chemistry.	Can describe the physiological structure of DNA, understands the influence of physical factors (ultraviolet and high-energy radiation) on the formation of DNA damage. Can discuss the effects on DNA of chemical compounds with carcinogenic properties, such as PAHs, aromatic amines, nitrosamines and nitrosamides, asbestos.	[SW4] test/exam - oral or written
[CHEMMU2_U06] Presents the results of scientific discoveries in chemistry and related disciplines in an understandable way.	The student is able to prepare a written report or an oral presentation on a topic related to the etiology and therapy of cancer diseases based on scientific literature.	[SU2] presentation/project/paper/ report
[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.	The student works independently, is cautious and critical in expressing opinions, and argues his opinion using verified data. Is able to use the proposed English-language literature in the process of self-education and verify information in reliable sources of knowledge.	[SK1] oral statement/conversation/ discussion
[CHEMMU2_U10] Reads with understanding scientific and popular science chemical texts in English.	The student is able to search for necessary information in scientific publications, analyze tables, graphs, diagrams.	[SU2] presentation/project/paper/ report
[CHEMMU2_W11] Demonstrates general knowledge about the current trends in the development of chemistry as a science and the latest discoveries in this field.	Knows the methods of research on mechanisms of drug action. Identifies the basic classes of radiosensitizers and characterizes the mechanisms of their action.	[SW4] test/exam - oral or written
[CHEMMU2_U03] Finds necessary information in specialist literature, databases and other sources, lists basic scientific journals in chemistry.	The student is able to find scientific articles needed to solve the problem using the Scopus and Google Scholar databases. Knows examples of publishers, scientific journals and articles in the field of computational, medical and radiation chemistry.	[SU1] oral statement/conversation/ discussion [SU5] implementation of a problem task

Subject contents

Carcinogens, basics of tumor biology, cancer cell hypoxia, survival of patients with malignant tumors, tumor markers and selected laboratory indicators, cancer treatment methods, chemotherapy, hormonal therapy, photodynamic therapy, targeted therapy, radiotherapy, combination therapy (including chemoradiotherapy), side effects of radiotherapy, radioprotectors and radiosensitizers, direct and indirect effects of irradiation with ionizing radiation, water radiolysis products, radiation-induced DNA damage, hydroxyl radical, hydrated electrons, types of radiosensitizers, uracil derivatives as radiosensitizers, oxygen mimetics, novel anticancer drugs and treatments as well as official procedures for their introduction into clinical practice, unconventional activities in oncology.

Prerequisites and co-requisites

Required courses: Physical and Organic Chemistry

Introductory requirements: - knowledge of the structure and biosynthesis of DNA - knowledge of the types and role of eklectromagnetic radiation - the ability to present the mechanisms of simple radical reactions.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
graded credit	51.0%	100.0%

Recommended reading

Basic literature	1. Onkologia. Podręcznik dla studentów i lekarzy red. Radzisław Kordek; Via Medica, Gdańsk 2007. 2. Chemical Radiosensitizers for Use in Radiotherapy P. Wardman, Clinical Oncology (2007) 19: 397-417. 3. Basic Clinical Radiobiology ed. Michael Joiner, Albert van der Kogel; Hodder Arnold, Londyn 2009. 4. Free-Radical-Induced DNA Damage and its Repair. A Chemical Perspective Clemens von Sonntag; Springer, Berlin 2006.
Supplementary literature	Druga twarz tlenu Grzegorz Bartosz; Wydawnictwo Naukowe PWN, Warszawa 2003
eResources addresses	

Example issues/ example questions/ tasks being completed	1. Anticancer treatment methods 2. Radiosensitizers in anticancer treatment 3. Impact of high energy irradiation on the living cell 4. Types of radiosensitizers 5. Carcinogens 5. Radioprotectors vs. radiosensitizers 6. Anti-cancer prevention - addictions, diet, lifestyle. 7. BRCA1 syndrome - what is it, what does it mean for the patient? 8. Oncological screening in Poland.9. Biological therapies - oncological immunotherapy and gene therapy. 10. Uracil derivatives as radiosensitizers - idea of action, examples, directions of research.24. Oxygen mimetics as radiosensitizers - idea of action, examples, directions of research.25. The role of solvated electrons in radiosensitization using uracil derivatives.
Work placement	Not applicable

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