UNIWERSYTET GDAŃSKI

Course title
Innowacyjne metalofarmaceutyki w diagnostyce i leczeniu / Innovative metallopharmaceuticals in diagnostics and treatments

ECTS code
13.3.0941

Name of unit administrating study
Faculty of Chemistry

Studies

Field of study	Type	Form	
Chemistry	Masters	Full-time studies	

Teaching staff
Dr. Agnieszka Chylewska

Forms of classes, the realization and number of hours

A. Forms of classes, in accordance with the UG Rector's regulations
lecture

B. The realization of activities
in-class learning

C. Number of hours
30 h lecture

ECTS credits 3

classes - 30 h
tutorial classes – 10 h
student's own work – 35 h

Total: 75 h - 3 ECTS

The academic cycle
2019/20 summer semester

Type of course
obligatory

Language of instruction
Polish

Teaching methods

Discussion
Lecture with multimedia presentation

Form and method of assessment and basic criteria for evaluation or examination requirements

A. Final evaluation, in accordance with the UG study regulations
course completion (with a grade)

B. Assessment methods
written exam with open and closed questions regarding the subject of the lecture

C. The basic criteria for evaluation or exam requirements

Passing the lecture on the basis of obtaining a positive mark from the written test consisting of closed questions (single choice test) and open ones in a 1: 1 ratio covering the issues mentioned in the lecture's program content; We reserve the right to ask open-ended questions justifying the selection of responses to closed questions. The applied rating scale complies with the regulations at UG.

Required courses and introductory requirements
Lack

Aims of education
- acquainting with the basic factors determining the biological activity of the metallopharmaceutical
- developing the ability to combine knowledge from the area of chemistry and medicine with regard to the practice of drugs based on metal ion complexes
- familiarizing with examples of metalolics used in our life
- introduction to the basics of designing and obtaining metallopharmaceuticals from the last 15 years

Problems of the lecture: characteristics of metallopharmaceuticals and their possible physiological effects; systematisation and discussion of factors determining metallolecular activity (hydrophilic-lipophilic nature, central ion oxidation state, degree of ionization, particle size, kinetic and thermodynamic stability); characterization of metallopharmaceuticals properties that are important for their use in medical diagnosis and treatment; discussion of the method of designing the structure and conditions for the synthesis of metallopharmaceuticals; classification of metal-drugs and prodrugs due to the structure: type of ionic metallic center, type of ligand(s), geometry, coordination number; presentation of examples of anticancer drugs based on metal ion complexes with particular attention on single- and multi-core ion complexes with the oxidation states (a) + I: gold; (b) + II: cobalt, ruthenium, rhodium, osmium, copper, palladium, platinum, molybdenum; (c) + III: cobalt, ruthenium, rhodium, osmium, iridium, gold; (d) + IV: platinum, molybdenum; mechanisms of metallodrugs action and their cellular targets; metal complexes used in

practice as anti-inflammatory drugs; metallopharmaceuticals in medical diagnostics (radiopharmaceuticals, contrast agents, metal-radiosensitive compounds, metal-systems with antiviral, antibacterial and antifungal activities).

Bibliography of literature

A. Literature required to pass the course

1. „Metallopharmaceuticals in Therapy – a New Horizon for Scientific Research", Curr. Med. Chem., 25: 1729-1791, 2018.
2. „Metal complexes in cancer therapy – an update from drug design perspective", Drug Des. Devel. Ther. 11: 599-616, 2017.
3. „Molybdenum Metallopharmaceuticals Candidate Compounds – The "Ranaissance" of Molybdenum Metallodrugs?", Curr. Med. Chem., 23: 3322-3342, 2016.
4. "Ruthenium metallopharmaceuticals", Coord. Chem. Rev. 232: 69-93, 2002.
5. "Copper Complexes as Anticancer Agents", Anti-Cancer Agents Med. Chem. 9: 185-211, 2009.
6. "Dicarba-closo-dodecarborane-containing half-sandwich complexes of ruthenium, osmium, rhodium and iridium: biological relevance and synthetic strategies", Chem. Soc. Rev., 41: 3264-3279, 2012.
7. "Ruthenium (II/III)-Based Compounds with Encouraging Antiproliferative Activity against Non-small-Cell Lung Cancer." Chem. Eur. J. 2012, 18, 14464-14472, 2012.
8. "Advances in cobalt complexes as anticancer agents", Dalton Trans. 44: 13796-13808, 2015.
9. "Effects of NAMI-A and some related ruthenium complexes on cell viability after short exposure of tumor cells", Anti-cancer Drugs, 11: 665-672, 2000.
10. "Thioamido coordination in a thioxo-1,2,4-triazole copper(II) complex enhances nonapoptotic programmed cell death associated with copper accumulation and oxidative stress in human cancer cells", J. Med. Chem. 50: 1916-1924, 2007.
11. M. Cieślak-Golonka, J. Starosta, M. Wasielewski, "Wstęp do chemii koordynacyjnej" PWN, 2010.

B. Extracurricular readings

Knowledge

The Student:
1. knows and recognizes metalopharmaceutics
2. knows how to design the metalopharmacutics structure
3. understands how to plan the synthesis
4. understands and can explain the importance of factors affecting the biological activity of metal ion complexes
5. uses terminology related to the naming of metallopharmaceuticals and their construction
6. gives specific examples of metallopharmaceuticals used in practice as: anti-cancer, anti-inflammatory, antimicrobial and used in medical diagnostics
7. correctly identifies types of metallopharmaceuticals

Skills

Social competence

The Student understands the importance of metallopharmaceuticals in human life, including: medical diagnosis and treatment of diseases