Course description

Informing students on course requirements

Program: elective PhD course
Course: **Principles, methods, and possibilities of virotherapy**.
Course code: **IODI-MEDMI-04**
Academic year/Semester: II.
Educator and contact details (e-mail): **Dr. Klara Megyeri** megyeri.klara@med.u-szeged.hu
Type of course: lecture/seminar/practice/laboratory
Weekly hours of the course: 2
Credit vale of the course: 6
Type of examination: final exam at the end of semester, practice exam, other:……..
Preliminary requirements (preliminary academic performance or completed course required to fulfill the purposes and requirements of the course): none
Purpose of course: Provide an overview of the structure and main characteristics of viral vectors with potential applications in the treatment of genetic and cancer diseases. Provide an introduction to the structure, mechanism of action, and potential medical application of genetically modified virotherapy agents.
Outcome requirements of the course (specific academic results to be established by the course): Knowledge: Basic knowledge of the structure, mechanism of action and possible medical uses of virotherapy agents. Attitude: Developing abilities for deepening basic knowledge of virotherapy and being committed to applying them in future scientific work. Responsibility/Autonomy: Following new scientific discoveries regarding the development and medical use of virotherapy agents using scientific literature sources.
Topics: The use of various viruses in the treatment of genetic or cancer diseases is called virotherapy. Studies with 12 viral agents are currently in clinical trials. These virus families are the *Retroviridae*, *Adenoviridae*, *Poxviridae*, *Parvoviridae*, *Herpesviridae*, *Reoviridae*, *Picornaviridae*, *Rhabdoviridae*, *Paramyxoviridae*, *Flaviviridae*, *Togaviridae*, and *Polyomaviridae*. The course discusses the structure, mechanism of action, and major applications of viruses with inherent oncolytic activity and virus constructs modified using biotechnological methods belonging to these virus families. Genetic modifications that enhance tumor selectivity and efficacy of

oncolytic viruses are described. Students in the course will also receive a comprehensive overview of the main results and lessons learned from clinical trials. 1. General concept of oncolytic virotherapy 2. Molecular techniques to develop safe and efficient oncolytic agents 3. Mechanism of cytopathogenicity of the oncolytic agents 4. Mechanism of action of the therapeutic genes incorporated into oncolytic viral vectors 5. Oncolytic adenoviral vectors 6. Oncolytic retrovirus vectors 7. Oncolytic herpes simplex virus vectors 8. Oncolytic vaccinia virus vectors 9. Oncolytic parvovirus vectors (adeno-associated virus (AAV) and autonomous rat parvovirus) 10. Orthoreovirus-based oncolytic virotherapy agents 11. Oncolytic vesicular stomatitis virus 12. Oncolytic newcastle disease virus 13. Oncolytic picornaviruses
Supporting methods to achieve learning outcomes: Review articles downloadable via PubMed search
Evaluation of the acquisition of expected learning outcomes: Requirements: Attendance at lectures is mandatory. Up to two absences are permitted; any additional absences must be justified. Make-up sessions are not available. To complete the course, students must prepare a short PowerPoint presentation on a specific topic. Examination requirements: The course concludes with a written multiple-choice test. Grading: passed / failed
Mandatory reading list: 1. Watanabe D, Goshima F. Oncolytic Virotherapy by HSV. Adv Exp Med Biol. 2018;1045:63-84. doi: 10.1007/978-981-10-7230-7_4. 2. Russell SJ, Peng KW, Bell JC. Oncolytic virotherapy. Nat Biotechnol. 2012 Jul 10;30(7):658-70. doi: 10.1038/nbt.2287. 3. Conry RM, Westbrook B, McKee S, Norwood TG. Talimogene laherparepvec: First in class oncolytic virotherapy. Hum Vaccin Immunother. 2018 Apr 3;14(4):839-846. doi: 10.1080/21645515.2017.1412896. 4. Raja J, Ludwig JM, Gettinger SN, Schalper KA, Kim HS. Oncolytic virus immunotherapy: future prospects for oncology. J Immunother Cancer. 2018 Dec 4;6(1):140. doi: 10.1186/s40425-018-0458-z. 5. Buijs PR, Verhagen JH, van Eijck CH, van den Hoogen BG. Oncolytic viruses: From bench to bedside with a focus on safety. Hum Vaccin Immunother. 2015;11(7):1573-84. doi: 10.1080/21645515.2015.1037058.
Recommended reading list: - scientific publications downloadable via PubMed search

Indicating course requirements on CooSpace scene (summary)

Description (public):

Provide an overview of the structure and main characteristics of viral vectors with potential applications in the treatment of genetic and cancer diseases.
Provide an introduction to the structure, mechanism of action, and potential medical application of genetically modified virotherapy agents.

Requirements:
Basic knowledge of the structure, mechanism of action and possible medical uses of virotherapy agents.

Topics:
1. General concept of oncolytic virotherapy
2. Molecular techniques to develop safe and efficient oncolytic agents
3. Mechanism of cytopathogenicity of the oncolytic agents
4. Mechanism of action of the therapeutic genes incorporated into oncolytic viral vectors
5. Oncolytic adenoviral vectors
6. Oncolytic retrovirus vectors
7. Oncolytic herpes simplex virus vectors
8. Oncolytic vaccinia virus vectors
9. Oncolytic parvovirus vectors (adeno-associated virus (AAV) and autonomous rat parvovirus)
10. Orthoreovirus-based oncolytic virotherapy agents
11. Oncolytic vesicular stomatitis virus
12. Oncolytic newcastle disease virus
13. Oncolytic picornaviruses

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