

Module title:	Regenerative Medicine	ECTS	4
Polish translation:	Medycyna Regeneracyjna		
Course:	Veterinary Medicine		

Module language: English	Stage: JM		
Form of studies: ☒ intramural ☐ extramural	Type of module: ☐ basic ☒ directional ☐ mandatory ☒ elective	Semester: 11	☒ winter semester ☐ summer semester
Academic year:		2021/2022	Catalogue number: ...

Module coordinator:	Prof. Romuald Zabielski Dr Sc; Joanna Bajon PhD, DVM
Teachers responsible for the module:	Academic teachers of Center for Translational Medicine (CMT), PhD students, visiting professors and other specialists in the field of study
Unit responsible for the module:	Center for Translational Medicine (CMT)
Faculty in charge:	Faculty of Veterinary Medicine (FVM)
Objectives of the module:	Regenerative Medicine (RM) encompasses clinical activities related to the regeneration of organs and tissues using a range of tissue engineering and molecular biology techniques. RM refers to all actions aimed at treating, among others, body injuries resulting from trauma, cancer, and genetic diseases. Regenerative medicine also includes the cultivation of tissues and organs in laboratories for transplantation when the body's regenerative capabilities are limited or impossible. These activities concern both human and veterinary medicine. RM should be considered in two ways: as a clinical module for modern veterinary medicine, and as a module preparing for conducting in vitro and in vivo research for human medicine (translational medicine). Regenerative medicine is an interdisciplinary subject, combining knowledge from tissue engineering, molecular biology, transplantology, immunology, and oncology. <u>Lectures</u>: Introduction to regenerative medicine (definition, purpose, and scope). Cell and tissue culture for regenerative medicine. Possibilities and limitations of therapies using stem cells. Biomaterials in regenerative medicine (supporting tissue healing processes). Selected clinical applications, including cell therapies and treatments using platelet-rich plasma (PRP) preparations, e.g., the use of stem cells and PRP in orthopedics and ophthalmology. <u>Laboratory exercises</u>: Preparation and validation of platelet-rich plasma (PRP) for the treatment of difficult-to-heal wounds and veterinary orthopedics. Isolation and culture of mesenchymal stem cells (MSC) for use in veterinary orthopedics and neurology. Preparation of biological dressings made of collagen and chitin, as well as xenografts from porcine skin. Preparation of protocols for the application of selected regenerative medicine procedures in veterinary practice. <u>Clinical exercises</u>: Collection of biological material for stem cell production (various biopsy techniques). Collection of biological material for the preparation of biological dressings. Treatment using PRP and IRAP in orthopedics for horses and small animals. Techniques for intra-articular and peri-articular administration on isolated limbs. Techniques for allogenic and xenogenic grafts in extensive skin defects. Practice of transplantation techniques and application of biological dressings on models. Classes will be conducted depending on the current research activities of the CMT. Selected topics may be discussed with the aid of photographic materials and videos.
Teaching forms, number of hours:	Lectures: 10 hours Laboratory exercises: 45 hours Clinical exercises: 30 hours
Teaching methods:	Original multimedia presentations, utilizing photographic and video materials. Laboratory exercises in labs equipped with apparatus necessary for sample collection, cell culture, tissue storage, performing physico-chemical analyses, etc., using consumable equipment. Preparation of a project/presentation on the application of regenerative medicine techniques/methods in clinical practice or solving a specific scientific problem – presentation and defense of the project based on data/materials available in scientific literature. Consultations outside of regular classes. The organization of consultations will be determined by the course coordinator at the beginning of the semester.

Formal prerequisites and initial requirements:	The student possesses the knowledge and skills acquired through the completion of core subjects in the semesters preceding the Regenerative Medicine module. Completed subjects: Histology and Embryology, Cell Biology, Biophysics, Chemistry, Biochemistry, Animal Physiology, Pathophysiology, Immunology.		
Learning outcomes:	Knowledge: 01 – The student knows the principles of culturing cells, tissues, and organs in the laboratory for regenerative purposes. 02 – The student understands the principles of implanting biological material into experimental animals, including techniques supporting healing processes, as well as the possibilities and limitations of therapies using stem cells.	Skills: 03 – The student is able to design an experimental protocol for research in the field of regenerative medicine. 04 – The student can assess the healing process and the appropriateness of applying regenerative medicine techniques.	Competences: 05 – The student has the competence to evaluate their own knowledge and use scientific sources to supplement it. 06 – The student has the competence to share knowledge with others. 07 – The student has the competence to work effectively in a team.
Assessment methods:	Effects 03-07 evaluation of the project task, effects 01-03 evaluation of student activity in classes. Evaluation of the project task based on compliance of the content with the assigned topic, correct inference, formulation of rational solutions, discussion and answers to questions. Evaluation of the degree of preparation and activity of the student in class. In the case of a top-down suspension of the realization of classes at the University and the need for remote/hybrid teaching, other forms of verification of learning outcomes are permitted in a manner adequate to the situation.		
Formal documentation of learning outcomes:	Record into the eHMS system and documentation contained in the 'Course File' (i.e. student assessment cards, attendance lists, students' essays).		
Elements impelling final grade:	A student who has not obtained a minimum acceptable number of points or not submit a project task does not obtain credit for the course. The final course grade is influenced by the following elements: - evaluation of completion of the project task, - evaluation of student activity in class.		
Teaching base:	Lecture and exercise rooms at the CMT and FVM, laboratories.		
Literature: 1. „Principles of Regenerative Medicine“. Author: A Atala. Editor: Academic Press, 2018. 2. „Regenerative Biology and Medicine“. Author: D.L Stocum, Editor: Academic Press, 2012. 3. „Regenerative Medicine and Stem Cell Biology“. Author: N. El-Bardi, Editor: Springer, 2020, ed 1. 4. Relevant scientific publications in the field of course, including those recommended by the module coordinators.			

Quantitative summary of the module:

Estimated number of work hours per student (contact and self-study) essential to achieve presumed learning outcomes of the module - base for quantifying ECTS:	100
Total ECTS points, accumulated by students during contact learning:	3

Learning outcomes of the module relative to the learning outcomes of the subject:

Outcome category	Learning outcomes:	Learning outcomes relative to the course outcomes	Impact on the each for course outcomes
Knowledge	01-The student knows the principles of culturing cells, tissues, and organs in the laboratory for regenerative purposes.	A.W1, A.W3., A.W4, A.W12, B.W1, B.W6	Each 3
Knowledge	02-The student understands the principles of implanting biological material into experimental animals, including techniques supporting healing processes, as well as the possibilities and limitations of therapies using stem cells.	A.W1, A.W3, A.W12, B.W1, B.W2, B.W6	Each 3

Skills	03 – The student is able to design an experimental protocol for research in the field of regenerative medicine.	A.U2, A.U5, A.U8, B.U6, B.U13	Each 3
Skills	04 – The student can assess the healing process and the appropriateness of applying regenerative medicine techniques.	A.U2, A.U5, A.U8, B.U6, B.U13	Each 2
Competences	05 – The student has the competence to evaluate their own knowledge and use scientific sources to supplement it.	KS.4	3
Competences	06 – The student has the competence to share knowledge with others.	KS.6	3
Competences	07 – The student has the competence to work effectively in a team.	KS.4	2