

<b>Study program:</b> Doctoral Academic Studies in Biomedical Sciences		
<b>Name of the subject:</b> APPLICATION OF STEM CELLS IN BIOMEDICAL SCIENCES		
<b>Teacher(s):</b> Ivan Đ. Čapo, Branislav V. Bajkin, Dušan M. Lalošević, Matilda A. Djolai, Srđan S. Ninković, Stevan V. Milatović, Bojana M. Andrejić Višnjić, Dušica L. Marić		
<b>Status of the subject:</b> elective		
<b>Number of ECTS points:</b> 20		
<b>Condition:</b> -		
<b>Goal of the subject</b> The aim of this subject is that using a multidisciplinary approach introduces students with the basics of the origin, characteristics, and sources of stem cells. To become familiar with the methods of their isolation, cultivation, immunocytochemical typing, and finally their use in various animal models and human practice.		
<b>Outcome of the subject</b> <i>Candidate should acquire the following theoretical knowledge:</i> definition and classification of stem cells; basics of morphological and functional characteristics of embryonic and adult stem cells; basics of embryonic development and the importance of pluripotency of embryonic stem cells; preclinical and clinical aspects of the importance of amniotic fluid and umbilical cord stem cells; the importance of multipotent adult cells as well as the characteristics and potential of hematopoietic stem cells, peripheral blood, teeth, epithelium, muscle tissue, liver, pancreas, gastrointestinal tract, and reproductive tract; the use of stem cells in modeling various diseases; therapeutic potential and application of stem cells in the field of gynecology, dentistry, orthopedics, neurology and other branches of biomedical sciences. <i>Candidate should acquire the following practical knowledge:</i> basics of work in the laboratory for cell culture, which includes: preparation of medium and consumables, proper material handling, isolation, counting, cultivation, cryopreservation and storage of stem cells; preparation and isolation of stem cells from dental pulp and umbilical cord material; cell analysis on an inverted microscope and immunofluorescent phenotyping of cells on a biological microscope;		
<b>Content of the subject</b> <i>Theoretical lectures</i> 1. Definition, classification, and functional characteristics of stem cells; 2. Basics of embryonic development and the importance of pluripotency of embryonic stem cells; 3. Specifics and characteristics of embryonic and adult stem cells; 4. Modern aspects of storage and application of amniotic fluid and umbilical cord stem cells; 5. Uses of stem cells in experimental modeling of various diseases; 6. Therapeutic potential and application of stem cells in dentistry; 7. Therapeutic potential and application of stem cells in orthopedics; 8. Therapeutic potential and application of stem cells in gynecology; 9. Therapeutic potential and application of stem cells in neurology; 10. Therapeutic potential and application of stem cells in hematology; <i>Practical lectures</i> 1. Principles of work in the cell culture laboratory; 2. Basics of cell isolation, cultivation, and cryopreservation; 3. Preparation and isolation of stem cells from dental pulp and umbilical cord material; 4. Basics of immunohistochemical and immunofluorescent analysis of stem cells; 5. Use of membrane markers in cell stem cell typing; 6. Microscopic analysis and interpretation of the characteristics of native stem cells; 7. Immunofluorescent phenotyping of stem cells; 8. Morphometric analysis and quantification of stem cells on native and stained preparations		
<b>Recommended literature</b> 1. David Warburton. Stem Cells, Tissue Engineering and Regenerative Medicine 1 <sup>st</sup> ed. London, World Scientific; 2014. 2. Robert Lanza et al. Essentials of Stem Cell Biology. 2 <sup>nd</sup> ed. Elsevier; 2009. 3. Ariff Bongso and Eng Hin Lee. Stem Cells: From Bench to Bedside. 2 <sup>nd</sup> ed. Singapore, World Scientific Publications; 2011.		
<b>Number of active classes</b>	<b>Theory:</b> 60	<b>Practice:</b> 45
<b>Methods of delivering lectures</b>		
<b>Evaluation of knowledge (maximum number of points 100)</b> activity during the lecture: 25 practical classes: 25 seminar: 5 written exam: 15 oral exam: 30		