

Study programme: PhD in Biology				
Level: Doctoral degree				
Course title: MOLECULAR MECHANISMS & SIGNALING PATHWAYS IN REGULATION OF TESTICULAR FUNCTIONS				
Lecturers: Prof. Dr Silvana Andric, Prof. Dr Tatjana Kostic				
Status: Elective				
ECTS: 15				
Requirements: -				
Learning objectives				
Objective of this course is to acquire knowledge about the molecular mechanisms and signaling pathways and their interactions in the regulation and synchronization of testicular function in mammals. Students should gain the ability in scientifically-based interpretation of the experimental data in the area of the signaling pathways that regulate testicular function.				
Learning outcomes				
At the end of this course students will be able to understand and describe the general features of the intracellular signaling pathways and method of network detection, transduction, transmission, propagation and amplification of information in order to achieve adequate testicular function. Students will acquire the ability to analyze and discuss scientific papers in the field of signaling networks pathways that regulate testicular function.				
Syllabus				
<i>Theoretical instruction</i>				
Functional anatomy of the testis and the regulation of exocrine function (spermatogenesis). Regulation of testicular endocrine function: production of male sex hormones (androgens). Signaling pathways involved in prenatal differentiation of testicular cells. Network of signaling pathways that regulate the differentiation of postnatal testicular cells. Molecular markers of different populations of Leydig cells. Network of signaling pathways that are active during puberty and maturation of the hypothalamic-pituitary-testicular axis. cAMP and cGMP signaling in the regulation of testicular steroidogenesis. MAPK/PRKC in regulation of testicular steroidogenesis. Signaling networks that include androgens. Signaling pathways of reproductive aging and andropause. The molecular mechanisms and signaling pathways that are activated in the testes, as an adaptation to a disturbed homeostasis of the organism.				
<i>Practical instruction – Students research work</i>				
Each student will have an individual project assignment in the research related to the molecular events that regulate testicular function. The various <i>in vivo</i> experimental models (pubertalni male laboratory rats; hypogonadism, castration of males and androgenization; knock-out "mice (<i>Insr/Igf1r</i> , <i>Cyp11Cre</i> SKO/DKO)) will be used.				
<i>Seminars.</i> Short presentation of the specified topics connected with the subject of student's PhD thesis.				
<i>Journal Club.</i> Presentation of the original peer-review scientific paper from the field.				
Recommended Literature:				
Payne A & Hardy M (2007) <i>The Leydig Cell in Health & Disease</i> . Springer www.springerlink.com/content/978-1-59745-453-7#section=302000&page=1				
01. A History of Leydig cells www.springerlink.com/content/gq516158rw000558/				
02. Anatomy and History of Steroidogenesis www.springerlink.com/content/w7r38781707610r5/fulltext.pdf				
03. Fetal Leydig cells www.springerlink.com/content/xh23582111648665/fulltext.pdf				
04. Regulation of Leydig Cells During Pubertal Development www.springerlink.com/content/mr4r204555hx2u77/fulltext.pdf				
Skinner MK & Griswold MD (2007) <i>Sertoli Cell Biology</i> . Elsevier				
Brehm R & Steger K (2005) <i>Sertoli Cell Diff</i> www.springerlink.com/content/978-3-540-29446-7#section=550071&page=1				
Spermatogenesis www.springerlink.com/content/w671675207626628/fulltext.pdf				
Sertoli Cells www.springerlink.com/content/h58458108r654072/fulltext.pdf				
The Differentiation of Male Germ Cells www.springerlink.com/content/u56855810k8p7896/fulltext.pdf				
Alukal JP & Lamb DJ (2005) <i>The Sertoli cell: morphology, function, and regulation</i> . Cambridge University Press www.ebooks.cambridge.org/chapter.jsf?bid=CBO9780511635656&cid=CBO9780511635656A012				
Review peer-review scientific paper from the field of mol. mech. & sign. path. in regulation of testicular function.				
Weekly teaching load				Other:
Lectures: 2	Exercises:	Other forms of teaching: 3	Student research: 5	
Teaching methodology				
<i>Theoretical part</i> – Lectures/Consultative discussions. <i>Students research work</i> – participation in the planning and execution of the experiments and the analysis, interpretation and discussion of the experimental results from the field of mol. mech. & sign. path. in regulation of testicular function. <i>Seminars</i> - Short presentation of the specified topics connected with the subject of student's PhD thesis. <i>Journal Club.</i> Presentation of the original peer-review scientific paper from the field.				
Grading method (total number of points 100)				
<i>Scientific project problem</i> – up to 30; <i>Seminar</i> – up to 5; <i>Presentation of the original scientific paper (Journal club)</i> – up to 20; <i>Oral exam</i> – up to 45.				