



<b>Study program:</b> Doctoral Academic Studies in Biomedical Sciences
<b>Name of the subject:</b> CEREBROVASCULAR BIOLOGY
<b>Teacher(s):</b> Otto F. Barak, Nada M. Naumović, Željko D. Živanović
<b>Status of the subject:</b> elective
<b>Number of ECTS points:</b> 20
<b>Condition:</b> -
<p><b>Goal of the subject</b></p> <p>The aim of the course is to get students acquainted with current trends in the field of cerebrovascular research. Within this course, the concept of neurovascular unit, state-of-the-art methods and current issues in the physiology of the regulatory mechanisms of cerebral blood flow will be presented, as well as some pathological conditions where modern approaches extend knowledge beyond the limits of classical diagnostics.</p>
<p><b>Outcome of the subject</b></p> <p>Students will gain new knowledge in the field of cerebrovascular regulation and learn completely new techniques for testing the functions of the cerebral circulation.</p>
<p><b>Content of the subject</b></p> <p><i>Theoretical lectures</i></p> <ol style="list-style-type: none"> <li>1. Neurovascular unit (NVU)</li> <li>2. Blood-brain barrier (BBB)</li> <li>3. Changes in the NVU and BBB in chronic inflammation</li> <li>4. Regulation of cerebral blood flow</li> <li>5. Cerebral vasoreactivity</li> <li>6. Autoregulation of cerebral blood flow</li> <li>7. Vegetative regulation of cerebral blood vessels</li> <li>8. Neurovascular coupling (NVC)</li> <li>9. Assessment of blood flow in the extracranial blood vessels of the brain</li> <li>10. Transcranial Doppler ultrasonography</li> <li>11. Differences in regulation of the anterior and posterior circulation of the brain</li> <li>12. Changes in cerebral blood flow during physical exertion</li> <li>13. Extreme hypoxia</li> <li>14. Stroke</li> <li>15. Rehabilitation after stroke</li> <li>16. Cerebrovascular changes in breath-hold diving</li> </ol> <p><i>Labwork</i></p> <ol style="list-style-type: none"> <li>1. Ultrasound of the Internal carotid artery</li> <li>2. Ultrasound of the Vertebral artery</li> <li>3. Transcranial Doppler of the anterior, middle, and posterior cerebral arteries</li> <li>4. Cerebral vasoreactivity to hypoxia</li> <li>5. Autoregulation of cerebral blood flow</li> <li>6. Neurovascular coupling</li> </ol>
<p><b>Recommended literature</b></p> <p><i>Compulsory</i></p> <ol style="list-style-type: none"> <li>1. Cipolla MJ. The Cerebral Circulation, 2<sup>nd</sup> edition, Morgan and Claypool Life Sciences, Mississippi, USA, 2016.</li> <li>2. Michael-Titus A, Reverst P, Shortland P. The Nervous System Basic Science and Clinical Conditions, 2<sup>nd</sup> edition, Churchill Livingstone Elsevier, London, 2010</li> <li>3. Mtui E, Gruener G, Dockery P. Fitzgerald's Clinical Neuroanatomy and Neuroscience, 7<sup>th</sup> edition Elsevier, Philadelphia, USA, 2016</li> <li>4. Felten DL, O'Banion MK, Summo Maida M. Netter's Atlas of Neuroscience, 3<sup>rd</sup> edition, Elsevier, Philadelphia, USA, 2016</li> <li>5. Willie CK, Tzeng YC, Fisher JA, Ainslie PN. Integrative regulation of human brain blood flow. J Physiol. 2014;592(5):841-859.</li> <li>6. Bailey DM. The brain in hypoxia; curiosity, cause and consequence. Exp Physiol. 2016;101(9):1157-1159.</li> </ol> <p><i>Supplementary</i></p> <p>student will be provided with literature along with each methodical unit of theoretical lectures</p>

<b>Number of active classes</b>	<b>Theory: 60</b>	<b>Practice: 45</b>
<b>Methods of delivering lectures</b> Lectures, seminars, labworks		
<b>Evaluation of knowledge (maximum number of points 100)</b> activity during lectures: 10 labwork: 10 seminars: 30 written exam: 50		