

Course Title: Retinal Immunology				
Module Identification-Nr.	Workload	Credit Points	Frequency of Occurrence	Duration
M-Neuro-AM7 a-d	180h	6CP	Summer and Winter Term	3 weeks
1	Type of lessons a) Lectures (L) b) Practical/Lab (P) c) Seminar (S)	Contact times a) 8 h b) 41 h c) 4 h	Self-study times 127 h Preparation and revision of L, P and S; Seminar presentation; written exam)	Intended group size a) <u>Min 2</u> ; max. 6 b) <u>Min 2</u> ; max. 6 c) <u>Min 2</u> ; max. 6
2	<p>Aims of the module and acquired skills</p> <p>This module provides a general introduction into retinal function and biology with a special emphasize on innate immunity. Students are offered to obtain detailed knowledge about the role of microglia in the retina during health and disease. In addition, students will learn key in vivo retinal imaging and functional assessment techniques, including optical coherence tomography (OCT) and fundus fluorescein angiography (FFA), as well as electroretinography (ERG) to evaluate retinal function.</p> <p>The practical part provides hands-on training in microglia-focused experimental techniques. Students will learn the basic handling and maintenance of a microglia cell line, including stimulation experiments. Students will also perform retinal tissue preparation and staining, including whole-mounts and cryosections to analyze microglia in the retina. Finally, the practical course will include a demonstration of in vivo retinal imaging techniques (e.g., OCT and FFA).</p> <p>The accompanying seminar talk gives students the opportunity to perform background research on a topic related to retinal immunology and to plan and prepare an oral presentation.</p>			
3	<p>Contents of the module</p> <ul style="list-style-type: none"> • Function of the retina (cell biology, physiology, signal transduction) • Retinal disease (degenerative diseases of the retina) • Mouse models of retinal diseases • Innate immune system: microglial biology in the retina (immune privilege, microglial phenotypes, blood retinal barrier, human genetic aspects) • Wholemout and cryosection preparation • Visualization of microglial cells in the retina by immunohistochemistry (antibody structure) • Microscopy • Cell culture (handling, maintenance and stimulation) • In vivo retinal imaging techniques (OCT and FFA) 			
4	<p>Teaching/Learning methods</p> <p>Lectures; Seminar; Training on presentation techniques in oral and written form, hands-on lab work</p>			
5	<p>Requirements for participation</p> <p>Bachelor; enrollment in the Master's degree course "Biological Sciences" (see examination regulations for details) or Master's degree course Clinical and Experimental "Neurosciences"</p>			
6	<p>Type of module examinations</p> <p>Exam prerequisites: Regular and active participation Exams: Written examination (60 min)</p>			
7	<p>Requisites for the allocation of credits</p> <p>Total module mark at least "adequate"</p>			

8	Compatibility with other Curricula* None
9	Significance of the module mark for the overall grade In the Master's degree course "Experimental and Clinical Neuroscience": 6 % of the overall grade (see also appendix of the examination regulations)
10	Module coordinator: Univ.-Prof. Dr. Thomas Langmann, phone 478-7324, thomas.langmann@uk-koeln.de Participating faculty: Dr. rer. nat. Anne Wolf
11	Additional information Subject module of the Master's degree course "Master of Experimental and Clinical neuroscience" Focus of research: Retinal Microglia, Photoreceptor Genetics Literature: Karlstetter M, Scholz R, Rutar M, Wong WT, Provis JM, Langmann T. Retinal microglia: just bystander or target for therapy? Prog Retin Eye Res. 2015 Mar;45:30-57 Akhtar-Schäfer I, Wang L, Krohne TU, Xu H, Langmann T. Modulation of three key innate immune pathways for the most common retinal degenerative diseases. EMBO Mol Med. 2018 Oct;10(10):e8259. General time schedule: tba (3 weeks, 9am – 5pm) Location: Chair of Experimental Immunology of the Eye Joseph-Stelzmann-Straße 9, building 35 (Anatomy) 3 rd floor, room 3.014 50931 Cologne Written exam: tba Chair of Experimental Immunology of the Eye 3 rd floor, room 3.012

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