Robert J. Zawadzki, Ph.D.

Clinical Interests

Dr. Zawadzki is studying various types of retinal and ONH diseases. His research interests focus on development of new instrumentation for high-resolution in vivo retina imaging (allowing visualization of individual cellular structures). This includes, but is not limited to Optical Coherence Tomography (OCT), Scanning Laser Opthalmoscopy (SLO), Adaptive Optics (AO) and combinations of all the above. Currently, Dr. Zawadzki is also involved in studying eye aging process as well as various types of retinal diseases by using these novel instruments to enhance the understanding of its mechanisms.

Research/Academic Interests

Dr. Zawadzki has a broad background in biomedical optics, biomedical engineering, and vision science. He is currently developing several novel in vivo retinal imaging modalities to study structural and functional changes of the retina over time at cellular resolution. These include several multimodal (combined OCT and fluorescence SLO) adaptive optics enhanced clinical and basic science retinal imaging systems. Additionally, he has experience in the development and application of early generation of OCT handheld based retinal imaging systems for clinical investigations in the pediatric population. He is also involved in development of novel image acquisition and data processing schemes that help to quantify structural and functional changes in the retina in response to normal aging, disease progression as well as therapy. As an example, one of the new functional retinal tests developed at UCD, so-called optoretinography (ORG), focuses on measuring light-evoked optophysiology signals from photoreceptors using OCT. We choose term ORG to show similarities to ERG (electroretinogram), which has long been used to assess retinal function in vivo.

Title

Managing Director, UC Davis EyePod - Small Animal Ocular Imaging Laboratory
Associate Professor, Department of Ophthalmology & Vision Science

Specialty

Ophthalmology

Department

Ophthalmology & Vision Science

Division

Ophthalmology

Center/Program Affiliation

Eye Center

Address/Phone

Lawrence J. Ellison Ambulatory Care Center, Ophthalmology Clinic-Eye Center, 4860 Y St. Suite 2400 Sacramento, CA 95817
Phone: 916-734-6602

UCDAVIS HEALTH

Robert J. Zawadzki, Ph.D.

Tupper Hall, Tupper Hall- UC Davis, Davis, CA 95616

Languages

Polish

Education

M.S., Medical Physics, Nicolaus Copernicus University, Torun, Poland 2000
Ph.D., Natural Sciences, Technical University of Vienna, Vienna, Austria 2003
B.S., Experimental Physics, Nicolaus Copernicus University, Torun, Poland 1998

Professional Memberships

Association for Research in Vision & Ophthalmology
International Society for Eye Research
Optica
The International Ocular Circulation Society
The International Society for Optical Engineering

Honors and Awards

BrightFocus Foundation National Glaucoma Research the Dr. Douglas H. Johnson Award, 2021
Silver Fellow of The Association for Research in Vision and Ophthalmology, 2021
Senior member of Optica (formerly known as The Optical Society (OSA), 2018
R&D 100 Award for MEMS-based AO-SLO & MEMS-based AO-OCT, 2007, 2010
Laser Focus World: Commendation for Excellence in Technical Communication, 2006, 2008

Select Recent Publications

Azimipour M, Valente D, Vienola KV, Werner JS, Zawadzki RJ, Jonnal RS. Optoretinogram: optical measurement of human cone and rod photoreceptor responses to light. Opt Lett. 2020 Sep 1;45 (17):4658-4661. doi:10.1364/OL.398868. PMID:32870829.

Zhang P, Miller EB, Manna SK, Meleppat RK, Pugh EN Jr, Zawadzki RJ. Temporal speckle-averaging of optical coherence tomography volumes for in-vivo cellular resolution neuronal and vascular retinal imaging. Neurophotonics. 2019 Oct;6(4):041105. doi:10.1117/1.NPh.6.4.041105. Epub 2019 Sep 4. PMID:31528657.

Pircher M, Zawadzki RJ. Review of adaptive optics OCT (AO-OCT): principles and applications for retinal imaging [Invited]. Biomed Opt Express. 2017 Apr 19;8(5):2536-2562. doi:10.1364/BOE.8.002536. PMID:28663890.

Zhang P, Zawadzki RJ, Goswami M, Nguyen PT, Yarov-Yarovoy V, Burns ME, Pugh EN Jr. In vivo optophysiology reveals that G-protein activation triggers osmotic swelling and increased light

UCDAVIS HEALTH

Robert J. Zawadzki, Ph.D.

scattering of rod photoreceptors. Proc Natl Acad Sci U S A. 2017 Apr 4;114(14):E2937-E2946. doi:10.1073/pnas.1620572114. Epub 2017 Mar 20. PMID:28320964.

Schwartz DM, Fingler J, Kim DY, Zawadzki RJ, Morse LS, Park SS, Fraser SE, Werner JS. Phase-variance optical coherence tomography: a technique for noninvasive angiography. Ophthalmology. 2014 Jan;121(1):180-187. doi:10.1016/j.ophtha.2013.09.002. Epub 2013 Oct 21. PMID: 24156929.

Kim DY, Fingler J, Werner JS, Schwartz DM, Fraser SE, Zawadzki RJ. In vivo volumetric imaging of human retinal circulation with phase-variance optical coherence tomography. Biomed Opt Express. 2011 Jun 1;2(6):1504-13. doi:10.1364/BOE.2.001504. Epub 2011 May 11. PMID:21698014.

Zawadzki RJ, Choi SS, Fuller AR, Evans JW, Hamann B, Werner JS. Cellular resolution volumetric in vivo retinal imaging with adaptive optics-optical coherence tomography. Opt Express. 2009 Mar 2;17(5):4084-94. doi:10.1364/oe.17.004084. PMID:19259248.

Gerth C, Zawadzki RJ, Werner JS, Héon E. Retinal microstructure in patients with EFEMP1 retinal dystrophy evaluated by Fourier domain OCT. Eye (Lond). 2009 Feb;23(2):480-3. doi:10.1038/eye.2008.251. Epub 2008 Sep 12. PMID:18791549.

Gerth C, Zawadzki RJ, Héon E, Werner JS. High-resolution retinal imaging in young children using a handheld scanner and Fourier-domain optical coherence tomography. J AAPOS. 2009 Feb;13(1):72-4. doi:10.1016/j.jaapos.2008.09.001. Epub 2009 Jan 1. PMID:19121595.

Marmor MF, Choi SS, Zawadzki RJ, Werner JS. Visual insignificance of the foveal pit: reassessment of foveal hypoplasia as fovea plana. Arch Ophthalmol. 2008 Jul;126(7):907-13. doi:10.1001/archopht.126.7.907. PMID:18625935.

UCDAVIS HEALTH

Robert J. Zawadzki, Ph.D.

© 2024 UC Regents

UCDAVIS HEALTH