

# Stanford

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## Alfredo Dubra, PhD

Professor of Ophthalmology

### Bio

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#### BIO

My interest in ophthalmology started at a very early age, motivated by my own amblyopia and hyperopia. These led me to study physics and optics, first at the Universidad de la República (Uruguay), and later at Imperial College London (UK) and the University of Rochester (USA). Since then, my research has focused on the advancement of optical technologies for improving the understanding, diagnosing and monitoring of conditions that result in vision loss.

The premise that motivates all the work in my lab, is that after the first few days of life most retinal cells are post-mitotic, and thus early detection and treatment of disease are paramount for preventing vision loss. Therefore, my work is centered on optical technologies that can reveal and monitor pathology with ever increasing sensitivity and detail, even revealing cellular and sub-cellular structural and functional changes. I also believe that people affected by vision loss are better served by the scientific community if we work synergistically, and for that reason, everyone in my lab is committed to the dissemination of our technical advances across the vision research community.

#### ACADEMIC APPOINTMENTS

- Professor, Ophthalmology
- Member, Bio-X
- Member, Wu Tsai Human Performance Alliance
- Member, Wu Tsai Neurosciences Institute

#### ADMINISTRATIVE APPOINTMENTS

- Chair, Laser Safety Committee, Stanford University and SLAC, (2018- present)
- Associate Adjunct Professor of Ophthalmology, Medical College of Wisconsin, (2016- present)

#### HONORS AND AWARDS

- Overseas Research Student Award, Universities UK (Ex. Committee of Vice-Chancellors and Principals) (2000)
- Career Award at the Scientific Interface, Burroughs Wellcome Fund (2008)
- Career Development Award, Research to Prevent Blindness (2012)

#### BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, The International Society for Optics and Photonics (2011 - present)
- Member, Association for Research in Vision and Ophthalmology (2001 - present)
- Member, Optical Society of America (2008 - present)

## PROFESSIONAL EDUCATION

- PhD, Imperial College London, UK , Physics (2004)
- MSc, Universidad de la Repùblica, Uruguay , Physics (2000)
- BSc, Universidad de la Repùblica, Uruguay , Physics (1998)

## PATENTS

- Alfredo Dubra. "United States Patent 8,226,236 Method and apparatus for imaging in an eye", University Of Rochester, May 18, 2006

## LINKS

- Dubra Lab: <https://dubralab.stanford.edu/>

## Research & Scholarship

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### CURRENT RESEARCH AND SCHOLARLY INTERESTS

The optics of the eye can be thought of as an imperfect microscope objective through which the retina can be observed. Our lab develops and uses adaptive optics, eye movement correction and optical microscopy technologies to improve the non-invasive visualization of the retina to the point that individual retinal structure and function and can be visualized at the cellular and even sub-cellular scale.

## Teaching

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### STANFORD ADVISEES

#### Postdoctoral Faculty Sponsor

Gaston Ali Ayubi Zavalla, Aubrey Hargrave, Xiaojing Huang

## Publications

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### PUBLICATIONS

- Robust real-time estimation of non-uniform angular velocity and sub-pixel jitter in images captured with resonant scanners *OPTICS EXPRESS*  
Ayubi, G. A., Dubra, A.  
2023; 31 (26): 44199-44211
- Structural and Functional Changes in Non-Paraneoplastic Autoimmune Retinopathy. *Diagnostics (Basel, Switzerland)*  
Akhavanrezayat, A., Khatri, A., Onghanseng, N. G., Halim, M. S., Or, C., Sredar, N., Razeen, M., Hasanreisoglu, M., Regenold, J., Thng, Z. X., Mohammadi, S. S., Jain, T., Yavari, et al  
2023; 13 (21)
- Invited Session V: The eye as a window to systemic and neurodegenerative health: Seeking Answers through a keyhole: Harnessing the Synergy of Dynamic OCT/OCT Angiography and Adaptive Optics SLO for Retinal Assessment of Systemic Disease. *Journal of vision*  
Rosen, R., Otero-Marquez, O., Migacz, J., Zhou, D., Pinhas, A., Castanos, M., Ahsanuddin, S., Rickford, K., Murillo, B., Zhou, R., Spellman, L., Sredar, N., Gillette, et al  
2023; 23 (11): 30
- Comparison of macular Macrophage Like Cell and Muller Cell Density in Patients with Multiple Sclerosis using OCT  
Navarro, S., Soetikno, B., Hargrave, A., Buickians, D., Dubra, A., Moss, H.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2023
- Quad-Fusion Adaptive Optics Scanning Light Ophthalmoscopy: A Novel Multi-Directional Non-Confocal Imaging Technique for Enhancement of Microvascular and Cellular Structures  
Rosen, R. B., Dubra, A., MuncharazDuran, L., Rios, H., Migacz, J., Ahsanuddin, S., Weitz, R., Glassberg, J. A., Chui, T. P.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2023
- Longitudinal imaging of microscopic scattering features in the foveal avascular zone of multiple sclerosis using adaptive optics ophthalmoscopy

Hargrave, A., Navarro, S., Buickians, D., Kipp, L., Han, M., Kowalski, B., Dubra, A., Moss, H.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2023

● **Surpassing the diffraction limit for improved resolution in adaptive optics optical coherence tomography in the living human eye**

Bower, A. J., Zhang, F., Liu, T., Kowalski, B., Lu, R., Liu, Z., Hammer, D. X., Dubra, A., Tam, J.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2023

● **Sub-diffraction adaptive optics fluorescence imaging of the living human eye using pixel reassignment**

Zhang, F., Giannini, J., Lu, R., Kowalski, B., Bower, A. J., Aguilera, N., Li, J., Abouassali, S., Das, V., Liu, T., Dubra, A., Tam, J.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2023

● **Warp speed multi-aperture adaptive optics scanning laser ophthalmoscopy using machine learning**

Park, J., Hagan, K., DuBose, T., McNabb, R., Dubra, A., Izatt, J., Farsiu, S.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2023

● **Special Section Guest Editorial: Advances in Optical Measurements and Instrumentation for Ophthalmology and Optometry *OPTICAL ENGINEERING***

Malacara-Hernandez, D., Dubra, A., Schwiegerling, J., Artal, P., Mejia, Y., Plaza, E.  
2022; 61 (12)

● **Insights into Sickle Cell Disease through the Retinal Microvasculature: Adaptive Optics Scanning Light Ophthalmoscopy Correlates of Clinical OCT Angiography. *Ophthalmology science***

Pinhas, A., Migacz, J. V., Zhou, D. B., Castanos Toral, M. V., Otero-Marquez, O., Israel, S., Sun, V., Gillette, P. N., Sredar, N., Dubra, A., Glassberg, J., Rosen, R. B., Chui, et al  
2022; 2 (4): 100196

● **Widespread subclinical cellular changes revealed across a neural-epithelial-vascular complex in choroideremia using adaptive optics. *Communications biology***

Aguilera, N., Liu, T., Bower, A. J., Li, J., Abouassali, S., Lu, R., Giannini, J., Pfau, M., Bender, C., Smelkinson, M. G., Naik, A., Guan, B., Schwartz, et al  
2022; 5 (1): 893

● **Reflectance adaptive optics findings in a patient with Vogt-Koyanagi-Harada disease. *American journal of ophthalmology case reports***

Pham, A. T., Onghanseng, N., Halim, M. S., Ormaechea, M. S., Hassan, M., Akhavanrezayat, A., Uludag, G., Tran, A. N., Razeen, M. M., Sredar, N., Dubra, A., Nguyen, Q. D.  
2022; 27: 101660

● **Photoreceptor and Retinal Pigment Epithelium Relationships in Eyes With Vitelliform Macular Dystrophy Revealed by Multimodal Adaptive Optics Imaging. *Investigative ophthalmology & visual science***

Liu, T., Aguilera, N., Bower, A. J., Li, J., Ullah, E., Dubra, A., Cukras, C., Brooks, B. P., Jeffrey, B. G., Hufnagel, R. B., Huryn, L. A., Zein, W. M., Tam, et al  
2022; 63 (8): 27

● **Retinal magnification factors at the fixation locus derived from schematic eyes with four individualized surfaces *BIOMEDICAL OPTICS EXPRESS***

Huang, X., Anderson, T., Dubra, A.  
2022; 13 (7): 3786-3808

● **Retinal magnification factors at the fixation locus derived from schematic eyes with four individualized surfaces. *Biomedical optics express***

Huang, X., Anderson, T., Dubra, A.  
2022; 13 (7): 3786-3808

● **Investigating hyalocyte-like cells in epiretinal membranes using serially acquired optical coherence tomography**

Soetikno, B., Miller, D., Zhang, H., Goldberg, J. L., Leng, T., Dubra, A.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022

● **Assessing vitreous cortex hyalocyte morphology and dynamics in the living human eye**

Rosen, R. B., Otero-Marquez, O., Migacz, J. V., Ahsanuddin, S., Rickford, K., Murillo, B., Zhou, R., Spellman, L., Weitz, R., Dubra, A., Chui, T.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022

● **Characterization of fluorescently labeled photoreceptors observed in carriers of choroideremia using multimodal adaptive optics imaging**

Bower, A. J., Aguilera, N., Abouassali, S., Liu, T., Li, J., Lu, R., Giannini, J., Smelkinson, M., Fariss, R. N., Dubra, A., Liu, Z., Hammer, D., Brooks, et al  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022

● **Retinal Magnification Factor Derived from Individualized Four-Surface Schematic Eye using Real Ray Tracing**

- Huang, X., Dubra, A.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022
- **Evaluation of the double-pass wavefront in model and human eyes**  
Akondi, V., Huang, X., Dubra, A.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022
  - **Automated correction of jitter, interleaving and non-uniform image sampling in scanning ophthalmoscopes**  
Dubra, A., Akondi, V., Hargrave, A., Kowalski, B.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022
  - **In vivo measurement of the light distribution in the focal plane of an AOSLO focused at inner and outer retina**  
Rogers, J., Stangel, N., Dubra, A.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022
  - **Automatic retinal layer segmentation of visible-light optical coherence tomography images using deep learning**  
Gopal, B., Zhang, T., Norcia, A., Goldberg, J. L., Dubra, A., Zhang, H., Soetikno, B.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022
  - **Imaging of vitreous cortex hyalocyte dynamics using non-confocal quadrant-detection adaptive optics scanning light ophthalmoscopy in human subjects** *BIOMEDICAL OPTICS EXPRESS*  
Migacz, J., Otero-Marquez, O., Zhou, R., Rickford, K., Murillo, B., Zhou, D. B., Castanos, M., Sredar, N., Dubra, A., Rosen, R. B., Chui, T. P.  
2022; 13 (3): 1755-1773
  - **Imaging of vitreous cortex hyalocyte dynamics using non-confocal quadrant-detection adaptive optics scanning light ophthalmoscopy in human subjects.** *Biomedical optics express*  
Migacz, J. V., Otero-Marquez, O., Zhou, R., Rickford, K., Murillo, B., Zhou, D. B., Castanos, M. V., Sredar, N., Dubra, A., Rosen, R. B., Chui, T. Y.  
2022; 13 (3): 1755-1773
  - **Correction of non-uniform angular velocity and sub-pixel jitter in optical scanning** *Optics Express*  
Kowalski, B., Akondi, V., Dubra, A.  
2022; 30 (1): 112-124
  - **Hybrid FPGA-CPU pupil tracker** *BIOMEDICAL OPTICS EXPRESS*  
Kowalski, B., Huang, X., Steven, S., Dubra, A.  
2021; 12 (10): 6496-6513
  - **Hybrid FPGA-CPU pupil tracker.** *Biomedical optics express*  
Kowalski, B., Huang, X., Steven, S., Dubra, A.  
2021; 12 (10): 6496-6513
  - **Clinical Imaging of Macular Surface Macrophages in Retinal Vasculopathies - Automated OCT Cell Density Mapping and Adaptive Optics Microscopy**  
Rosen, R., Otero-Marquez, O., Toral, M., Zhou, D., Weitz, R., Migacz, J., Dubra, A., Chui, T.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2021
  - **Millisecond-latency FPGA-based pupil tracker for eye motion stabilization**  
Kowalski, B., Dubra, A., Huang, X.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2021
  - **Fundus albipunctatus photoreceptor microstructure revealed using adaptive optics scanning light ophthalmoscopy.** *American journal of ophthalmology case reports*  
Sobol, E. K., Deobhakta, A., Wilkins, C. S., Francis, J. H., Chui, T. Y., Dubra, A., Zhou, D. B., Castanos, M. V., Lema, G. M., Rosen, R. B., Migacz, J. V.  
2021; 22: 101090
  - **Direct comparison of photoreceptor reflectivity measurements using simultaneous adaptive optics SLO and OCT**  
Bower, A., Liu, T., Liu, Z., Aguilera, N., Li, J., Lu, R., Giannini, J., Cornelissen, S., Dubra, A., Hammer, D., Tam, J.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2021
  - **Adaptive optics fluorescence lifetime ophthalmoscopy of iGlucoSnFR-TS suggests increased glucose in RPE of rho(-) compared to healthy mice**  
Kunala, K., Xue, Y., Huynh, K., Yang, Q., Parkins, K., Steven, S., Dubra, A., Cepko, C., Hunter, J.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2021

- **Correction of resonant optical scanner dynamic aberrations using nodal aberration theory** *OPTICS EXPRESS*  
Huang, X., Dubra, A.  
2021; 29 (7): 10346–63
- **In-vivo sub-diffraction adaptive optics imaging of photoreceptors in the human eye with annular pupil illumination and sub-Airy detection.** *Optica*  
Lu, R., Aguilera, N., Liu, T., Liu, J., Giannini, J. P., Li, J., Bower, A. J., Dubra, A., Tam, J.  
2021; 8 (3): 333-343
- **Persistent Dark Cones in Oligocone Trichromacy Revealed by Multimodal Adaptive Optics Ophthalmoscopy** *FRONTIERS IN AGING NEUROSCIENCE*  
Li, J., Liu, T., Flynn, O. J., Turriff, A., Liu, Z., Ullah, E., Liu, J., Dubra, A., Johnson, M. A., Brooks, B. P., Hufnagel, R. B., Hammer, D. X., Huryn, et al  
2021; 13: 629214
- **Integrating adaptive optics-SLO and OCT for multimodal visualization of the human retinal pigment epithelial mosaic.** *Biomedical optics express*  
Bower, A. J., Liu, T., Aguilera, N., Li, J., Liu, J., Lu, R., Giannini, J. P., Huryn, L. A., Dubra, A., Liu, Z., Hammer, D. X., Tam, J.  
2021; 12 (3): 1449-1466
- **multimodal visualization of the human retinal pigment epithelial mosaic** *BIOMEDICAL OPTICS EXPRESS*  
BOWER, A. J., LIU, T. O., AGUILERA, N. Y., LI, J. E., LIU, J. I., LU, R. N., GIANNINI, J. P., HURYN, L. A., DUBRA, A. O., LIU, Z. N., HAMMER, D. X., TAM, J. Y.  
2021; 12 (3): 1449–66
- **Comparison of confocal and non-confocal split-detection cone photoreceptor imaging.** *Biomedical optics express*  
Sredar, N., Razeeen, M., Kowalski, B., Carroll, J., Dubra, A.  
2021; 12 (2): 737-755
- **Comparison of confocal and non-confocal split-detection cone photoreceptor imaging** *Biomedical Optics Express*  
Sredar, N., Razeeen, M., Kowalski, B., Carroll, J., Dubra, A.  
2021; 12 (2): 737–55
- **Dynamic wavefront distortion in resonant scanners** *Applied Optics*  
Akondi, V., Kowalski, B., Dubra, A.  
2021; 60 (36): 11189-11195
- **Novel Foveal Features Associated With Vision Impairment in Multiple Sclerosis.** *Investigative ophthalmology & visual science*  
Hargrave, A., Sredar, N., Khushzad, F., Yarp, J., Tomczak, A., Han, M., Kipp, L., Dubra, A., Moss, H. E.  
2021; 62 (12): 27
- **Shack-Hartmann wavefront sensor optical dynamic range** *Optics Express*  
Akondi, V., Dubra, A.  
2021; 29 (6): 8417-8429
- **Multi-layer Shack-Hartmann wavefront sensing in the point source regime.** *Biomedical optics express*  
Akondi, V., Dubra, A.  
2021; 12 (1): 409-432
- **Multi-layer Shack-Hartmann wavefront sensing in the point source regime** *Biomedical Optics Express*  
Akondi, V., Dubra, A.  
2021; 12 (1): 409-432
- **Dynamic distortion in resonant galvanometric optical scanners.** *Optica*  
Akondi, V., Kowalski, B., Burns, S. A., Dubra, A.  
2020; 7 (11): 1506-1513
- **Discovery and clinical translation of novel glaucoma biomarkers.** *Progress in retinal and eye research*  
Beykin, G., Norcia, A. M., Srinivasan, V. J., Dubra, A., Goldberg, J. L.  
2020: 100875
- **Quadrant Non-Confocal AOSLO Imaging of Retinal Vasculature**  
Migacz, J. V., Sredar, N., Zhou, D. B., Toral, M., Pinhas, A., Dubra, A., Rosen, R., Chui, T. P.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2020

- **Intraobserver Repeatability and Interobserver Reproducibility of Foveal Cone Density Measurements in CNGA3- and CNGB3-Associated Achromatopsia** *TRANSLATIONAL VISION SCIENCE & TECHNOLOGY*  
Georgiou, M., Litts, K. M., Singh, N., Kane, T., Patterson, E. J., Hirji, N., Kalitzeos, A., Dubra, A., Michaelides, M., Carroll, J.  
2020; 9 (7)
- **Multi-directional image fusion in AOSLO angiography**  
Migacz, J. V., Sredar, N., Zhou, D. B., Castanos, M. V., Pinhas, A., Weitz, R., Dubra, A., Rosen, R. B., Chui, T.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2020
- **Dynamic Visualization of Abnormal Parafoveal Blood Flow in Sickle Cell Patients Using AOSLO Vascular Imaging**  
Pinhas, A., Migacz, J. V., Zhou, D., Toral, M., Israel, S., Sun, V., Gillette, P., Sredar, N., Dubra, A., Glassberg, J., Rosen, R. B., Chui, T.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2020
- **Functional consequences of disrupted cone photoreceptor reflectivity visualized using multimodal adaptive optics retinal imaging in oligocone trichromacy**  
Li, J., Liu, T., Flynn, O., Turriff, A., Liu, Z., Liu, J., Dubra, A., Hufnagel, R., Johnson, M. A., Brooks, B., Hammer, D. X., Huryn, L., Jeffrey, et al  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2020
- **Multimodal cellular assessment of the retinal pigment epithelium using an integrated adaptive optics retinal imager**  
Bower, A. J., Liu, T., Li, J., Aguilera, N., Liu, J., Lu, R., Giannini, J., Huryn, L., Dubra, A., Liu, Z., Hammer, D., Tam, J.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2020
- **Characterization of Retinal vascular changes in Multiple Sclerosis using Adaptive Optics and OCTA**  
Khushzad, F., Yarp, J., Hargrave, A., Sredar, N., Mahesh, V., Tomczak, A., Kipp, L., Han, M., Dubra, A., Moss, H.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2020
- **Novel microscopic foveal pit pathology in multiple sclerosis revealed with adaptive optics ophthalmoscopy**  
Hargrave, A., Sredar, N., Razeen, M. M., Khushzad, F., Yarp, J., Leishangthem, L., Tomczak, A., Kipp, L., Han, M., Kowalski, B., Dubra, A., Moss, H.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2020
- **Intraobserver Repeatability and Interobserver Reproducibility of Foveal Cone Density Measurements in CNGA3- and CNGB3-Associated Achromatopsia.** *Translational vision science & technology*  
Georgiou, M., Litts, K. M., Singh, N., Kane, T., Patterson, E. J., Hirji, N., Kalitzeos, A., Dubra, A., Michaelides, M., Carroll, J.  
2020; 9 (7): 37
- **Photoreceptor Structure in GNAT2-Associated Achromatopsia** *INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE*  
Georgiou, M., Singh, N., Kane, T., Robson, A. G., Kalitzeos, A., Hirji, N., Webster, A. R., Dubra, A., Carroll, J., Michaelides, M.  
2020; 61 (3): 40
- **Dynamic distortion in resonant galvanometric optical scanners** *Optica*  
Akondi, V., Kowalski, B., Burns, S. A., Dubra, A.  
2020; 7 (11): 1506-1513
- **ANATOMIC, GENETIC AND FUNCTIONAL PROPERTIES OF THE RETINAL CIRCULATION IN PULMONARY HYPERTENSION** *Pulmonary Circulation*  
Nickel, N. P., Shamskhou, E. A., Razeeen, M., Condon, D., Messentier, L., Dubra, A., Liao, Y., Zamanian, R. T., Yuan, K., de Jesus Perez, V. A.  
2020
- **Average gradient of Zernike polynomials over polygons** *Optics Express*  
Akondi, V., Dubra, A.  
2020; 28 (13): 18876-18886
- **Advances in Retinal Imaging** *NEUROPHOTONICS*  
Yi, J., Dubra, A., Farsiu, S.  
2019; 6 (4)
- **Special Section Guest Editorial: Advances in Retinal Imaging.** *Neurophotonics*  
Yi, J., Dubra, A., Farsiu, S.  
2019; 6 (4): 041101
- **RAC-CNN: multimodal deep learning based automatic detection and classification of rod and cone photoreceptors in adaptive optics scanning light ophthalmoscope images** *BIOMEDICAL OPTICS EXPRESS*

Cunefare, D., Huckenpahler, A. L., Patterson, E. J., Dubra, A., Carroll, J., Farsiu, S.  
2019; 10 (8): 3815–32

● **Near infrared fluorescence detection and evaluation in an adaptive optics scanning laser ophthalmoscope**

Liu, T., Cornelissen, S., Dubra, A., Tam, J.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019

● **RAC-CNN: multimodal deep learning based automatic detection and classification of rod and cone photoreceptors in adaptive optics scanning light ophthalmoscope images.** *Biomedical optics express*

Cunefare, D., Huckenpahler, A. L., Patterson, E. J., Dubra, A., Carroll, J., Farsiu, S.  
2019; 10 (8): 3815–3832

● **Quantifying nystagmus in patients with Achromatopsia using image-based tracking with AOSLO**

Kane, T., Singh, N., Georgiou, M., Dubra, A., Michaelides, M., Kalitzeos, A.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019

● **Reflectance adaptive optics scanning light ophthalmoscopy of epiretinal membranes**

Razeen, M. M., Leng, T., Dubra, A.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019

● **Shack-Hartmann wavefront sensor bias at the pupil boundary: problem and solution**

Akondi, V., Dubra, A.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019

● **Chromatic Shack-Hartmann wavefront sensor with adaptive optics correction of monochromatic aberrations**

Steven, S., Akondi, V., Dubra, A.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019

● **Deep learning multimodal detection and classification of cone and rod photoreceptors in adaptive optics scanning light ophthalmoscope images**

Cunefare, D., Huckenpahler, A. L., Patterson, E. J., Dubra, A., Carroll, J., Farsiu, S.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019

● **Adaptive Optics Findings in Vogt-Koyanagi-Harada Disease**

Pham, A., Halim, M., Razeen, M. M., Hassan, M., Ormaechea, M., Razeen, E., Uludag, G., Anh Ngoc Tram Tran, Al-Kirwi, K., Mahajan, S., Afridi, R., Dubra, A., Quan Dong Nguyen  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019

● **Natural history of foveal cone structure in RPE65-associated Leber congenital amaurosis (LCA)**

Kalitzeos, A., Kumaran, N., Georgiou, M., Singh, N., Kane, T., Kasilian, M., Dubra, A., Carroll, J., Michaelides, M.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019

● **Deep Phenotyping of PDE6C-Associated Retinopathy**

Georgiou, M., Robson, A. G., Hirji, N., Singh, N., Kane, T., Dubra, A., Carroll, J., Webster, A., Kalitzeos, A., Michaelides, M.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019

● **Evaluating seasonal changes of cone photoreceptor structure in the 13-lined ground squirrel** *VISION RESEARCH*

Sajdak, B. S., Salmon, A. E., Litts, K. M., Wells, C., Allen, K. P., Dubra, A., Merriman, D. K., Carroll, J.  
2019; 158: 90–99

● **Design of two spherical mirror unobscured relay telescopes using nodal aberration theory** *OPTICS EXPRESS*

Steven, S., Bentley, J., Dubra, A.  
2019; 27 (8): 11205–26

● **CELLULAR IMAGING OF THE TAPETAL-LIKE REFLEX IN CARRIERS OF RPGR-ASSOCIATED RETINOPATHY** *RETINA-THE JOURNAL OF RETINAL AND VITREOUS DISEASES*

Kalitzeos, A., Samra, R., Kasilian, M., Tee, J. L., Strampe, M., Langlo, C., Webster, A. R., Dubra, A., Carroll, J., Michaelides, M.  
2019; 39 (3): 570–80

● **Evaluating Seasonal Changes of Cone Photoreceptor Structure in the 13-Lined Ground Squirrel.** *Vision research*

Sajdak, B. S., Salmon, A. E., Litts, K. M., Wells, C., Allen, K. P., Dubra, A., Merriman, D. K., Carroll, J.  
2019

- **Adaptive Optics Retinal Imaging in CNGA3-Associated Achromatopsia: Retinal Characterization, Interocular Symmetry, and Intrafamilial Variability.** *Investigative ophthalmology & visual science*  
Georgiou, M., Litts, K. M., Kalitzeos, A., Langlo, C. S., Kane, T., Singh, N., Kassilian, M., Hirji, N., Kumaran, N., Dubra, A., Carroll, J., Michaelides, M. 2019; 60 (1): 383–96
- **Deep Phenotyping of PDE6C-Associated Achromatopsia.** *Investigative ophthalmology & visual science*  
Georgiou, M. n., Robson, A. G., Singh, N. n., Pontikos, N. n., Kane, T. n., Hirji, N. n., Ripamonti, C. n., Rotsos, T. n., Dubra, A. n., Kalitzeos, A. n., Webster, A. R., Carroll, J. n., Michaelides, et al  
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