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Frontier in Optical Coherence Tomography: Doppler OCT, OCTA, and Optical Coherence Elastography

Doppler OCT, a technology that we developed almost 25 years ago, is one of the fastest growing areas of biomedical optics with many potential clinical applications. I will describe the latest advances in Doppler OCT and OCT angiography. In addition, I will report the development of an acoustic radiation force optical coherence elastography (ARF-OCE) technology to characterize tissues biomechanical properties based on Doppler OCT. Knowledge of tissue mechanical properties provides valuable medical information in disease diagnosis and prognosis. There is a close correlation between tissue elasticity and pathology. We recently demonstrated, to the best of our knowledge, the first in vivo OCE imaging of retina and lens in animal model. The ARF-OCE technology will have a broad range of clinical applications, including imaging and evaluating ophthalmic diseases such as keratoconus, myopia, presbyopia, age-related macular degeneration, and glaucoma. The challenges and opportunities in translational this technology for clinical application in ophthalmology will be discussed.

Biography

Dr. Zhongping Chen is a Professor of Biomedical Engineering and Director of the OCT Laboratory at the University of California, Irvine. He is a Co-founder and Chairman of OCT Medical Imaging Inc. Dr. Chen received his B.S. degree in Applied Physics from Shanghai Jiao Tong University in 1982, his M. S. degree in Electrical Engineering in 1987, and his Ph.D. degree in Applied Physics from Cornell University in 1993.

Dr. Chen and his research group have pioneered the development of Doppler optical coherence tomography, which simultaneously provides high resolution 3-D images of tissue structure and vascular flow dynamics. These functional extensions of OCT offer contrast enhancements and provide mapping of many clinically important parameters. In addition, his group has developed a number of endoscopic and intravascular rotational and linear miniature probes for OCT and MPM imaging and translated this technology to clinical applications. He has published more than 300 peer-reviewed papers and review articles and holds a number of patents in the fields of biomaterials, biosensors, and biomedical imaging.

Dr. Chen is a Fellow of the American Institute of Medical and Biological Engineering (AIMBE), a Fellow of SPIE, and a Fellow of the Optical Society of America.



Zhongping Chen

Beckman Laser Institute, Department of
Biomedical Engineering
University of California Irvine,
United States