

Optical clearing of biological tissues

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ENGINEERING CENTER
ROOM EC 2300
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Abstract: Recent developments in photonic technologies, optical molecular probes, and transgenic animal models, have led to remarkable advances in visualization of biological structures and processes. Despite these advances, optical imaging in turbid biological tissues remains a challenge due to scattering. In this lecture, I will discuss our current understanding involving the use of chemical agents to reduce scattering in tissues and increase the effective imaging depth of optical imaging techniques. I first will describe the use of hyperosmotic chemical agents, such as glycerol and dimethyl sulfoxide, to induce optical clearing of skin. I will focus on studies designed to 1) quantify the optical clearing potential of various agents and 2) understand the mechanism by which these chemicals affect tissue scattering properties. I then will describe recent optical clearing approaches used to image structures in the brain, with a focus on our protocol used to image the neurovasculature and other structures in thick-tissue sections of brain and other organs. Finally, I will present preliminary results from a study in which we applied optical clearing to examine the relationship between intravascular amyloid deposition and formation of cerebral microhemorrhages

Biography Bernard Choi, PhD, is an Associate Professor of Biomedical Engineering and Surgery at University of California, Irvine. He is a core faculty member of the Beckman Laser Institute and Medical Clinic, affiliated faculty member of the Edwards Lifesciences Center for Advanced Cardiovascular Technology, and visiting scientist at CHOC Children's Hospital. He received his BS in Biomedical Engineering from Northwestern University and his MSE and PhD in Biomedical Engineering from The University of Texas at Austin. After completing an Arnold and Mabel Beckman Fellowship at University of California, Irvine, he joined the faculty there as an Assistant Professor. He currently serves as the Associate Chair of Undergraduate Studies in the Department of Biomedical Engineering, and he has won several teaching awards at University of California, Irvine. He has held several leadership roles in international optics societies, including the American Society for Laser Medicine and Surgery (ASLMS), Optical Society of America (OSA), and SPIE. He has published more than 100 peer-reviewed papers and two book chapters. He currently is Principal Investigator of the Microvascular Therapeutics and Imaging (MTI) laboratory in Beckman Laser Institute, and is funded by research awards from the Air Force Office of Scientific Research and National Institutes of Health

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