Optical Methods in Vascular Biology and Medicine

The present-day vascular researcher has an impressive array of tools at his/her disposal. Advances in optical techniques have enabled noninvasive, in situ characterization of the anatomic and functional state of the vasculature. Specifically, the development of nonlinear optical microscopy and optical coherence tomography (OCT) has enabled depth-resolved, high-resolution imaging of important vascular features such as vulnerable plaques and tumor microcirculation. Furthermore, the ever-increasing number of molecular reporters and transgenic animal models has enabled researchers to image vascular-specific architectural features and functional states (i.e., gene expression) with exquisite specificity.

This special section on optical methods in vascular medicine serves as a comprehensive overview of research at the intersection of photonics technologies and important biological and biomedical problems related to the cardiovascular system. A total of 14 outstanding papers were selected for publication, including five invited articles which review the current state of vascular imaging using a variety of optical techniques: photoacoustics (Hu and Wang), functional optical microscopy (Salazar Vazquez et al.), cardiovascular OCT (Tanaka, Tearney, and Bouma), fluorescence lifetime microscopy (Marcu), and wide-field laser speckle contrast imaging (Boas and Dunn). The remaining articles span three topic areas of vascular photonics: (1) interventional cardiology, (2) wide-field optical imaging, and (3) oncology.

We greatly appreciate the contributions of the authors and reviewers to this special section of the Journal of Biomedical Optics. We believe that you will find the papers to be insightful and thought provoking, and we hope they will inspire the development of new breakthroughs in vascular photonics.

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Special Section Guest Editors