Journal of
Biomedical Optics

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Since its invention in the late '80s and early '90s, optical coherence interferometry (OCI) and its imaging version, optical coherence tomography (OCT), techniques experienced rapid scientific and technological advancements allowing high-resolution imaging and analysis of tissues and cells in three dimensions, with micrometer-level resolution and with speeds approaching and recently exceeding video rate. The unique capabilities of OCI and OCT to assess tissues, coupled with their noninvasive and contrast agent-free nature has resulted in a wide variety of exciting biomedical applications across the clinical spectrum, including ophthalmology, cardiology, and dentistry, among others. As a result, many labs and more than 40 OCT start-up companies currently invest significant resources for new OCT technology and product developments, for both preclinical and clinical use.

The articles published in this special section provide some examples of engineering advancements in the underlying OCT technology and methods of image analysis, along with examples from several biomedical applications encompassing eyes, teeth, and wound-healing studies.

Examples of technological advancement are represented by Watanabe et al. in "Graphics processing unit accelerated intensity-based optical coherence tomography angiography using differential frames with real-time motion correction" and Lin et al. in "All fiber optics circular-state swept source polarization-sensitive optical coherence tomography." These articles highlight several important aspects of advanced OCT engine development in the areas of fast image processing with reduced motion artifacts and novel polarization sensitive OCT, respectively.

Several manuscripts discuss further advances in OCT image processing. For example, quantification of OCT image metrics may enable tumor boundary detection, as represented by Wang et al. in "Three-dimensional computational analysis of optical coherence tomography images for the detection of soft tissue sarcomas," or automatic assessment of vascular tissues, as demonstrated by Ugji et al. in "Automatic characterization of neointimal tissue by intravascular optical coherence tomography." Development of relatively simple OCT image acquisition algorithms also allowed angle-independent reconstruction of tissue microvasculature, as shown in "Microcirculation imaging based on full-range high-speed spectral domain correlation mapping optical coherence tomography," by Subhash et al. These papers represent important steps in OCT signal/image analysis for tissue classification efforts.

Methods of optical elastography are currently a hot topic and undergoing significant development by several groups. Optical elastography can supplement traditional optical imaging by quantifying the mechanical properties of tissues on a scale that significantly exceeds other imaging modalities, such as ultrasound and magnetic resonance imaging. A representative article from this exciting field is by Zaitsev et al., "Elastographic mapping in optical coherence tomography using an unconventional approach based on correlation stability." More information on optical elastography methods can be found in the recent Special Section on Optical Elastography and Measurement of Tissue Biomechanics (*Journal of Biomedical Optics*, December 2013, Volume 18, Issue 12).

Application of OCT in dermatology and dentistry are represented by Gong et al. in "Assessment of human burn scars with optical coherence tomography by imaging the attenuation coefficient of tissue after vascular masking" and Marcauteanu et al. in "Quantitative evaluation of dental abfraction and attrition using a swept-source optical coherence tomography system." These are but a few examples from the vast variety of OCT applications in biomedicine.

Tissue optical clearing techniques, with their increase of imaging depth currently limited by tissue absorption and scattering properties, are gaining increasing popularity in biophotonics. Research by Genina et al. in "Optical coherence tomography monitoring of enhanced skin optical clearing in rats *in vivo*" represents an introduction to this field.

With the development of many different OCT engines (as mentioned before, by more than 40 start-up companies and numerous research laboratories), it becomes imperative to develop and standardize methods of their characterization using some common test objects. In "Retina-simulating phantom for optical coherence tomography," Baxi et al. address this issue for ophthalmological imaging by introducing a retina-simulating phantom which can be used to characterize and compare the performance of multiple OCT systems.

It is also of note that several of the special section articles are open-access and thus can be downloaded without subscription. These include the ones by Subhash et al., Watanabe et al., Baxi et al. and Marcauteanu et al. We hope that this ease of access will further increase the appeal of this interesting and exciting special section on OCT technology and its applications.