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*Editorial*

# Special Issue on Photoacoustic Tomography

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Biomedical photoacoustic (or optoacoustic) tomography (PAT), or more generally, photoacoustic imaging (PAI), has been an active area of study and development in the last two decades [1,2]. As an emerging hybrid imaging modality that combines the high-contrast of optical imaging with the high spatial resolution of ultrasound imaging, PAI has been demonstrated to have broad applications in areas including basic research, pre-clinical investigation and clinical studies [3]. It offers great specificity with the ability to detect light-absorbing chomophores, such as hemoglobin, melanin, lipids, etc. This ability enables PAI to provide rich soft-tissue information regarding anatomy and function. The application of contrast agents further enables PAI to provide molecular information [4]. Because of these advantages, PAI has great potential in the clinical diagnosis of various diseases, such as cancer, stroke, atherosclerosis, arthritis, etc.

The goal of the current Special Issue is to showcase some of the most recent research and development into this fascinating imaging technology. Indeed, there are so many aspects that an engineer can work on to improve PAI and facilitate its translation into the clinic, from ultrasonic detector design, light delivery and illumination, to reconstruction algorithms. The 11 articles in the current Special Issue represent some of these efforts from research groups all over the world. Alijabbari et al. [5] were able to demonstrate that a full-ring system, not only for the ultrasound transducer, but also for light illumination, can provide superior imaging quality because of the improved illumination configuration. A similar idea was also adopted by Avanaki's research group [6], as well as by Sun et al. [7]. However, these research groups presented a low-cost system made of multi single-element transducers, rather than an expensive array system that could be cost-prohibited for many users. Improvement on the reconstruction algorithm is another major theme for the current Special Issue. Various methods were presented to improve the quality of PAT images by overcoming artifacts due to respiration [8], reflection [9] and scattering [10]. Novel approaches were proposed to reconstruct PAT images based on full-field detection [11] as well as detections with limited view angles [12]. Based on deconvolution and empirical mode decomposition, Guo et al. was able to improve final image quality by alleviating signal aliasing introduced by N-shape waves [13]. Ma et al. introduced a machine-learning method to PAT image analysis in order to measure the size of adipocytes [14]. Finally, Kothapalli and his research group developed a single simulation platform for both photoacoustic and thermoacoustic imaging [15]. These are truly some of the exciting developments.

PAI is a fast-evolving research and development field. Researchers all over the world are working diligently on continuously improving the technology and translating it to the clinic environment. The current Special Issue, with 11 articles from research groups across different parts of the world, is a very small sample to demonstrate the potential impact of this technology. We hope you will enjoy reading these selected articles and look forward to your future contribution to a future Special Issue.

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