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Editorial: Ocular imaging technology and application

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Editorial on the Research Topic Ocular imaging technology and application

Ocular imaging plays an essential role in contemporary clinical diagnosis and vision care. Advancements in technology have enabled more clinical studies to investigate detailed structural and functional changes in the eye. The widespread clinical adoption of these imaging techniques not only accelerates the discovery of relevant biomarkers but also reciprocally drives further improvements in imaging instrumentation. This positive feedback loop, which is precisely what this Research Topic aims to promote, will ultimately lead to enhanced vision healthcare and tangible benefits for patients.

This Research Topic on “*Ocular Imaging Technology and Application*,” comprising submissions from Frontiers in Photonics and Frontiers in Medicine, was expertly organized by Associate Editors Dr. Xinyu Liu (Peking University, China), Dr. Binyao Tan (Singapore Eye Research Institute, Singapore), and Dr. Xiaojun Yu (Northwestern Polytechnical University, China), under the supervision of Dr. Leopold Schmetterer (Medical University of Vienna, Austria). This Research Topic has been highly successful, publishing 14 articles—including original research (10), mini-reviews (2), and case reports (2)—selected from a total of 31 submissions.

Key highlights include studies by Wang et al., who utilized non-invasive imaging technologies for faster and less invasive diagnosis of polypoidal choroidal vasculopathy. Yang et al. observed subclinical retinal perfusion loss and choroidal thickening in acute myeloid leukemia, which partially resolved upon remission. Piekarczyk et al. reported that reduced peripapillary choroidal vascularity may increase the risk of glaucomatous optic neuropathy. Cai et al. demonstrated the effectiveness of *in vivo* confocal microscopy in characterizing conjunctival nevi. Farias et al. evaluated machine learning algorithms for sex classification from retinal thickness data, highlighting total retinal thickness and RNFL as significant markers. Yao et al. found that uncomplicated phacoemulsification increased retinal and choroidal thickness in early diabetic retinopathy patients. Kaushik et al. reviewed advances in two-photon excitation fluorescence imaging, emphasizing adaptive optics and laser safety improvements. Liao et al. showed partial recovery of retinal vein diameter post-ranibizumab injections in retinal vein occlusion patients. Zhang et al. described recovery in peripapillary RNFL thickness following scleral buckling in rhegmatogenous retinal detachment. Liu et al. associated optic disc

swelling in Vogt-Koyanagi-Harada disease with delayed treatment but fewer retinal exudations. Shi et al. highlighted the superiority of ultra-widefield SS-OCT in imaging vitreous cysts. Finally, Recchioni et al. confirmed SS-OCT's reliability in anterior segment measurements across diverse ocular surface disorders.

Overall, this Research Topic featured the application of novel ocular imaging technologies, including OCT, OCTA, confocal microscopy, and two-photon imaging across various eye conditions. The emerging applications of artificial intelligence (AI) in ocular imaging analysis are particularly noteworthy, highlighting the field's progression toward more precise, efficient, and personalized vision care.

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