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Optical Coherence Tomography: Advancing Non-Invasive Ocular Imaging for Precision Eye Care

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Optical coherence tomography (OCT) has revolutionized ophthalmology by providing high-resolution, non-invasive visualization of retinal and optic nerve structures. This presentation reviews the evolution of OCT technology, including swept-source OCT, OCT angiography, and ultrahigh-resolution imaging systems that have significantly improved the diagnosis and monitoring of retinal diseases, glaucoma, and optic nerve disorders. Recent advances in image processing, artificial intelligence, and multimodal imaging have enhanced quantitative analysis of retinal microstructures and vascular networks, allowing clinicians to detect disease at earlier stages and monitor therapeutic response more accurately. The presentation also discusses future developments in portable OCT devices, real-time surgical imaging, and AI-assisted diagnostic systems that are expected to expand access to precision eye care worldwide.

Biography

James G. Fujimoto is Professor of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology, United States. He is internationally recognized as one of the pioneers of optical coherence tomography, a technology that has transformed ophthalmic diagnosis and biomedical imaging worldwide.