

Plenary Talk PV XIV Thu 9:00 RW 1
Optical Coherence Tomography: From First Experiments to Clinical Impact — ●WOLFGANG DREXLER — Zentrum für Medizinische Physik und Biomedizinische Technik, Medizinische Universität Wien, Währnnger Gürtel 18-20 / 4L

Since its first experimental demonstrations, Optical Coherence Tomography (OCT) has evolved into one of the most powerful imaging modalities in medicine. This talk traces the technological and translational journey of OCT over more than three decades, highlighting the dramatic advances in axial and lateral resolution, imaging speed, and tissue penetration that have transformed the technique from a laboratory curiosity into a clinical cornerstone. Progress in light sources, detection schemes, and system engineering has enabled real-time, micrometer-

scale visualization of tissue microstructure in vivo. Beyond structural imaging, functional extensions such as Doppler OCT, OCT angiography (OCTA) and dynamic contrast OCT as well as transverse resolution enhancing adaptive optics (AO) OCT have opened new windows into blood flow, microvasculature, cellular-scale morphology, and tissue dynamics. Integration with multimodal microscopy and multimodal endoscopy has further expanded the reach of OCT across organ systems and clinical applications. Most notably, OCT has become the gold standard for ophthalmic diagnosis, fundamentally changing clinical practice and largely replacing ultrasound for retinal and anterior segment imaging. The OCT story exemplifies how sustained innovation and close interaction between physics, engineering, and medicine can lead to profound and lasting clinical impact.