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Journal of Biomedical Engineering and Medical Devices

Perspective

# Optical Coherence Tomography: An Overview

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## PERSPECTIVE

Optical coherence tomography (OCT) is a technique for capturing micrometer-resolution, two- and three-dimensional images from within optical scattering environments using low-coherence light (e.g., biological tissue). It's employed in medical imaging and nondestructive testing in the workplace (NDT). Low-coherence interferometry is used in optical coherence tomography, which commonly uses near-infrared light. The use of light with a relatively long wavelength permits it to pass through the scattering material. Another optical approach, confocal microscopy, often penetrates the sample less deeply but with higher resolution.

Optical coherence tomography has attained sub-micrometer resolution (with very wide-spectrum sources generating across a 100 nm wavelength range) depending on the qualities of the light source (superluminescent diodes, ultrashort pulsed lasers, and supercontinuum lasers have been used). Optical coherence tomography (OCT) is a type of optical tomography. [required citation] Optical coherence tomography (OCT) systems are utilised in a variety of applications, including art conservation and diagnostic medicine, particularly in ophthalmology and optometry, where they can be used to obtain detailed images from within the retina. It has just begun to be utilised in interventional cardiology to aid in the diagnosis of coronary artery disease, as well as in dermatology to aid in diagnosis.

Frequency-domain optical coherence tomography, a relatively new version of optical coherence tomography, gives advantages in the signal-to-noise ratio given, allowing for faster signal capture. Since Adolf Fercher and colleagues' work in Vienna in the 1980s on low-, partial-, or white-light interferometry for in vivo ocular eye measurements, imaging of biological tissue, particularly the human eye, has been studied in parallel by several groups across the world. It's ideal for ophthalmology and other tissue imaging applications that require micrometre resolution and millimetre penetration depth. In 1993, the first in vivo OCT images of retinal structures were published, followed by the first endoscopic images in 1997.

OCT has also been utilised in a variety of art conservation efforts, such as analysing distinct layers in a painting. Compared to other medical imaging methods, OCT has some intriguing advantages. Medical ultrasonography, magnetic resonance imaging (MRI), confocal microscopy, and optical coherence tomography (OCT) are all various types of morphological tissue imaging. The first two have the potential to image the entire body but at a low resolution. Low-coherence interferometry is used in OCT. Light interference occurs across a distance of metres in traditional interferometry with a long coherence length (i.e. laser interferometry). Due to the use of broad-bandwidth light sources in OCT, this interference is reduced to a distance of micrometres.

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**Received:** June 10, 2021, **Accepted:** July 17, 2021, **Published:** July 24, 2021

**Citation:** Singh A (2021) Optical Coherence Tomography: An Overview. J Biomed Eng & Med Dev. 6:177.