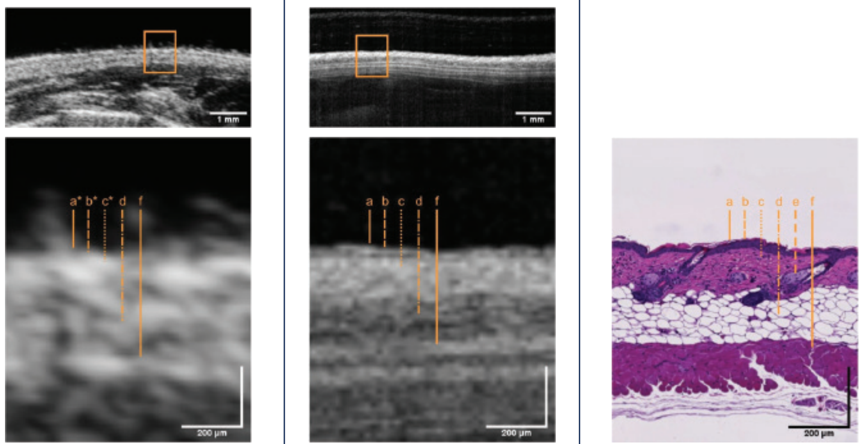
What is Optical Coherence Tomography (OCT)?

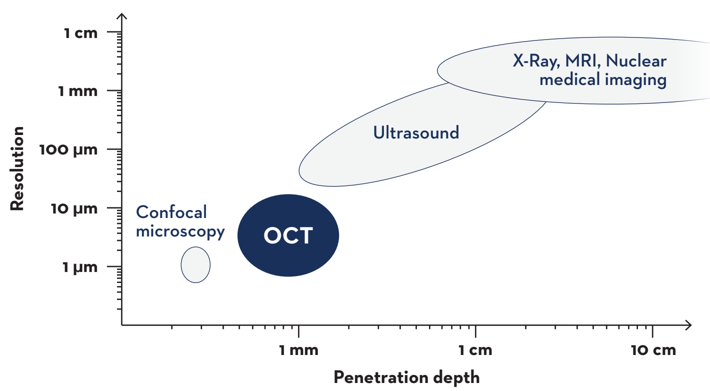
A High-Resolution Imaging Technology

OCT is a non-invasive optical imaging technique that produces images of subsurface tissue structures. It is similar to ultrasound but uses light instead of sound, resulting in 10x higher resolution. As such, OCT is a powerful tool for the visualization of blood vessels, ducts, glands, and surrounding structures.

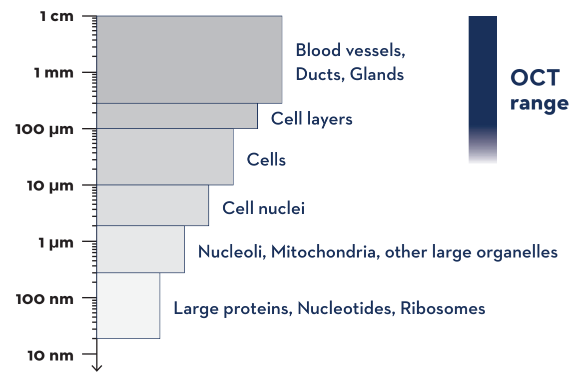


Ultrasound | OCT | Histology

OCT was developed at MIT in the 1990s, and has been widely used in clinical settings ranging from ophthalmology (retina) and interventional cardiology (vessel plaques), to dermatology (skin lesions). It is now being used for new applications, including visualization of excised tissue and shaved margins.



How OCT compares to other imaging technologies in resolution and penetration depth.



OCT optimal structures visualization capability.

OCT Benefits Over Traditional Imaging (Ultrasound, X-Ray)

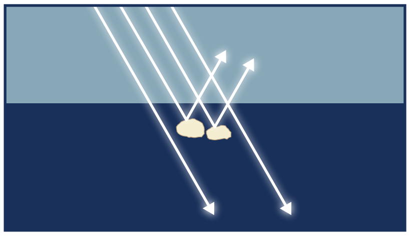
- High-resolution analysis of tissue at cellular level
- Direct correspondence to histological appearance of tissue structures
- Incredibly fast and portable, allowing for intraoperative tissue visualization
- Two and three-dimensional image generation

How OCT Technology Works

Light Interactions Reveal Different Tissue Characteristics

A single beam of light is directed at the tissue specimen and rapidly moved/translated across the desired scan area. Light that is reflected back from the tissue specimen down from a depth of 2mm is transformed into an OCT image.

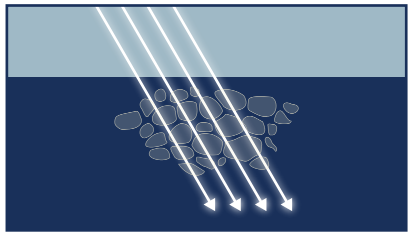
REFLECTION



Very dense features will reflect the light completely:

- Calcifications
- Surgical clips, wires

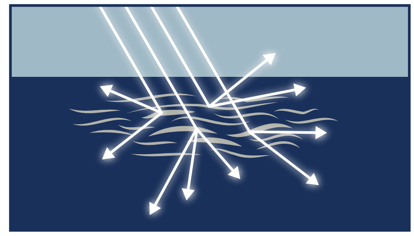
TRANSMISSION



Less dense features allow light to pass through them:

- Adipose tissue
- Cysts

SCATTERING

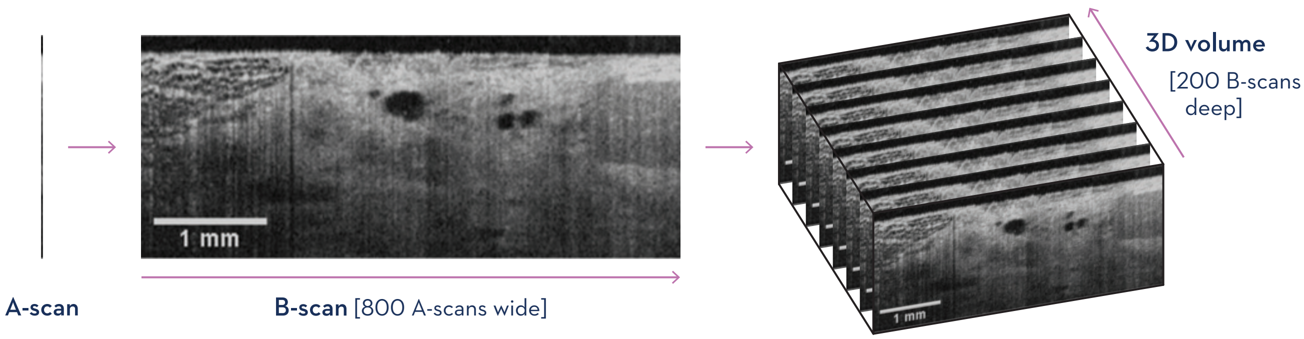


Denser features cause the light to scatter:

- Fibrous tissue

A-scan → B-scan → 3D Volume

Each light beam captures a single depth profile of a single area. This single image is called an axial A-scan. As the beam of light moves across the tissue in a line, it generates a long sequence of A-scans that can be compiled into a two-dimensional image known as a B-scan. A series of B-scans can then be stacked to form a three-dimensional image volume.



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Perimeter Medical Imaging AI
8585 North Stemmons Freeway
Suite 106N
Dallas, TX 75247

Canadian Headquarters
359 Eastern Avenue
Suite 110
Toronto, ON M4M 1B7

214-845-5154
888-988-7465 (PINK)
sales@perimetermed.com
PerimeterMed.com