Tissue optical clearing as an innovative means for optical imaging and phototherapy from UV to terahertz

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Tissue optical clearing (TOC) is based on temporary and reversible suppression of light scattering in tissues and organs using biocompatible immersion optical clearing agents (OCAs) [1-3]. Delivery of the appropriate OCA to living tissue ensures its temporal transparency over a wide spectral range from deep UV to THz, thereby providing higher image depth and contrast for optical techniques and better precision of phototherapy and laser surgery.

The tutorial summarizes the fundamentals and latest advances in the development of the TOC method for solving problems of intravital optical imaging, diagnostics and therapy. TOC can significantly improve advanced multimodal spectroscopy/imaging and phototherapy technologies. The combination of optical techniques with US, CT and MRI is possible through use of commercial coupling or contrast agents. The TOC method provides additional molecular diffusion markers for monitoring *diabetes mellitus* complications and cancer detection, as well as gives important data for optimal cryopreservation of organs.

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