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PO-009 - (23914) - SCANNING ULTRASOUND MICROSCOPIC INVESTIGATION OF SOME HUMAN TISSUE

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This study explores the potential of Scanning Acoustic Tomography (SAM) as a non-destructive imaging technique for comprehensive human tissue analysis. While SAM has been widely utilized in materials engineering, its application to biological specimen examination remains limited. The research aims to evaluate the efficacy of scanning ultrasound microscopy in visualizing microstructural details of human tissues without relying on conventional histological preparation methods.
After obtaining institutional review board approval, the researchers conducted a detailed examination of cadaveric tissues, including brain, skin, bone, and spleen, using a high-resolution 50 MHz scanning ultrasound microscope. Select tissue samples were additionally processed with standard histological staining techniques like Hematoxylin and Eosin and Masson trichrome to facilitate comparative analysis.
The investigation revealed remarkable capabilities of SAM in delineating tissue-specific microstructures with unprecedented clarity. In skull specimens, the technique precisely differentiated compact and interlaminar bone layers. Skin tissue analysis enabled clear visualization of epidermis, dermis, subcutaneous fat, and intricate hair follicle structures. Spleen samples demonstrated the method's effectiveness in identifying capsular, trabecular, and vascular architectures. Brain tissue examination was particularly notable, with the microscope revealing differential signal intensities in cerebellar cortex and medulla, and providing detailed visualization of meningeal layers and tissue stratification.

The findings suggest that SAM represents a promising approach to rapid, non-invasive tissue microstructure imaging. By leveraging tissue-specific acoustic impedance variations, this offers an efficient alternative to traditional histological methods, potentially revolutionizing tissue analysis across medical and research domains.

Palavras-chave : Ultrasonogram, Human, Cadaver