IIT Indore's Innovation: Low-Cost Compact Device for Early Cancer Diagnosis

In a groundbreaking development, researchers at IIT Indore have created a compact and affordable cancer screening device using photoacoustic technology. This innovation is designed for early-stage cancer detection, particularly in remote areas where advanced healthcare facilities are limited. The device is based on the principle of Photoacoustic Spectral Response (PASR), which combines optical and acoustic signals to detect abnormal tissue changes. It is aimed at addressing the growing need for early cancer detection in India, especially for breast cancer.

The heart of the device lies in its ability to distinguish between cancerous and non-cancerous tissues. A compact pulsed laser diode (PLD) is used to generate light, which interacts with the tissue. The response is then analyzed to identify whether the tissue is normal, benign, or malignant. This cost-effective screening tool is designed to reduce the need for expensive diagnostic methods and is particularly useful for breast cancer screening, as it can differentiate between malignant tumors, fibrocystic changes, and normal breast tissue.

What makes this innovation even more significant is its potential for rural healthcare. The device is incredibly affordable, reducing the cost to approximately 1/10th of the price of traditional diagnostic methods. Its compact size and simplicity make it ideal for quick cancer screenings in areas with limited medical infrastructure. Patients who test positive can then be referred for more detailed diagnostic procedures. This makes the device highly suitable for rural applications, where access to advanced diagnostic equipment is often lacking.

This photoacoustic screening tool has several advantages over existing methods. While ultrasound is currently the most common technique for diagnosing breast and thyroid cancer, it has limitations in detecting certain types of tumors. The photoacoustic technique can be combined with ultrasound technology to provide additional information about tissue vascularity and other characteristics, allowing for a more accurate diagnosis. This combination can make it particularly useful for identifying cancerous tissues that other methods alone may miss.

A MoU signed by the Executive Director and CEO of AIIMS Bhopal Prof (Dr.) Ajai Singh, and the Director of IIT Indore Prof. Suhas S Joshi has paved the way to collaborative research in biomedical engineering and its applications in the healthcare system. This cutting-edge technology developed by Prof. Srivathsan Vasudevan from IIT Indore's Electrical Engineering Department could be validated in a hospital care set up through the collaborative research efforts of Dr Sramana Mukhopadhyay lead Investigator from AIIMS Bhopal, Department of Pathology and Lab Medicine along with faculty of Department of Radiation Oncology, Dr Saikat Das. Together, they are working to bring this technology to the forefront of cancer diagnostics in India, with the goal of making it widely available for use in the healthcare sector.

The initial development of this work was funded by DST-SERB and DBT, highlighting the importance of government support in fostering innovative healthcare solutions.

In terms of intellectual property, two patents have been filed for the technology, with one already granted. The device is currently at Technology Readiness Level (TRL) 5 and it will undergo clinical trials before it is ready for mass production and licensing. Once these trials are completed, the technology will

be made available to the healthcare industry for commercialization.

The societal impact of this innovation is profound. Most diagnostic tools used in India, such as MRI and CT scanners, are imported and expensive, making them inaccessible to a large portion of the population. By developing a cost-effective and indigenous cancer screening device, IIT Indore is addressing a critical need in the healthcare system. The device has the potential to significantly improve cancer detection in rural and underserved areas, where early diagnosis can make a life-saving difference.

Interested parties are encouraged to contact on the eo-ctr@iiti.ac.in for more information on technology transfer, commercialization and collaboration opportunities.





