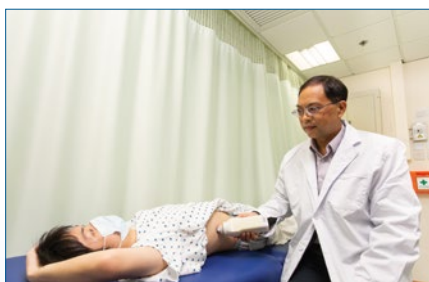


# Technology Frontier

News Bite on PolyU's Innovation

## Liverscan: Portable, Non-invasive System Performs accurate liver fibrosis assessments

Liver fibrosis may lead to cirrhosis and even cancer. The gold standard of diagnosis has been biopsy, which is invasive and prone to complications. Transient elastography (TE) is the recommended non-invasive method for such assessment, but it is costly and not always accurate. Researchers from the Department of Biomedical Engineering thus developed Liverscan, a palm-sized device that measures liver stiffness with TE and a real-time ultrasound image guided system, greatly improving accuracy, lowering the cost and making the procedure available to more people.



Ir Prof. Yongping Zheng demonstrates the operation of Liverscan.

Liver fibrosis occurs when the liver tissues become extensively scarred due to prolonged inflammation of the liver. It can also be caused by alcohol use. It may lead to cirrhosis, loss of liver functions or even cancer. As of 2018, cirrhosis was the 11th most common cause of death globally, accounting for 1 million deaths each year.<sup>1</sup> Unfortunately, early detection of liver fibrosis is not easy as it is often asymptomatic. Liver biopsy has long been the gold standard for diagnosis of liver fibrosis – a long needle is inserted repeatedly through the abdomen into the liver to collect samples of liver tissue. The process is painful and may cause complications.

In recent years, transient elastography (TE) emerged as a non-invasive method to assess liver fibrosis by

measuring its stiffness, but it is costly and the result isn't always reliable. In light of this, Ir Prof. Yongping Zheng, Henry G. Leong Professor in Biomedical Engineering and Chair Professor of Biomedical Engineering, led a research team to develop Liverscan, a palm-sized wireless device that combines TE with a real-time ultrasound image guided system, substantially bringing the cost down and greatly enhancing the accuracy of measurement by using a real-time imaging guiding approach. Its portable form factor also allows the procedure to be conducted almost anywhere.

### **Best of both worlds: TE plus B-mode ultrasound**

TE is the technology that measures the true physical stiffness of the liver as recommended by WHO. "It does measure the stiffness of a certain



The compact system providing ultrasound imaging and stiffness measurement for the liver, and all its imaging and control modules are included in one single probe.



Interface of the system's software

spot accurately, but the operator needs much experience and expertise to make sure the spot being measured does not contain other non-liver tissues that may interfere with the result, such as blood vessels or tumours," explained Prof. Zheng.

In this regard, the team came up with the idea of combining TE with B-mode ultrasound imaging. "Most people are familiar with ultrasound – it uses the reflection of the ultrasonic waves to form an image of organs and tissues. Liverscan has a patented B-mode ultrasound image guided feature, so that the stiffness of liver tissues can be measured by TE with real-time guiding. This way, the operator is given a map of where to measure and where to avoid, greatly improving the accuracy."

### Portable, low-cost and easy to use

Better still, all those complicated technologies are tightly bundled in a palm-sized probe with Wifi connectivity. Simply install an app in a tablet computer, connect to the probe and it's ready to go. "Most existing TE machines are bulky and need to be set up in a clinic or hospital setting. Some may cost as much as HK\$2 million for one set. On the other hand, Liverscan is highly portable and at a fraction of the cost of other TE machines. Essentially, Liverscan makes liver fibrosis assessment more available to the public by lowering the cost, shortening the examination time, improving the measurement accuracy, and taking the procedure to the people in the community." Clinical trials are now being conducted on Liverscan with a plan for local release in 2023 and full-scale worldwide launch in 2026.

### Startup for social good

Instead of licensing the technology to a biomed company, Prof. Zheng

decided to form a startup, Eieling Technology Limited, together with former and current team members, to manufacture and market Liverscan. "It has always been my dream to benefit the public at large with our research outcomes. Once we licensed a technology to a company, we often have no say on the project whatsoever. Companies have their own concerns and the product may not turn out the way we envisioned. That's why we founded a startup company to commercialise the technology," explained Prof. Zheng.

But turning a technology into a business is not as easy as it sounds. Prof. Zheng was grateful that his team has always had the users in mind. "Instead of focussing only on technology and research, our team has always thought about the user interface, reliability and convenience. To be a marketable product, Liverscan also needs a competitive edge in terms of cost, form factor, and even its look." Eieling Technology Limited successfully secured funding from PolyU Tech Launchpad Fund and a private investor. It has also been accepted into the Incu-Bio incubator programme under Hong Kong Science and Technology Parks.

In March 2021, Liverscan won a silver medal at the Special Edition 2021 Inventions Geneva Evaluation Days - Virtual Event, an online version of the prestigious International Exhibition of Inventions of Geneva.

<sup>1</sup> Asrani, Devarbhavi, Eaton and Kamath. "Burden of liver diseases in the world." *Journal of Hepatology*. Jan 2019. Retrieved from <https://pubmed.ncbi.nlm.nih.gov/30266282/>