

# Smart screening broadens cervical cancer monitoring

Using AI-assisted diagnostic technologists, a high-tech biomedical company in Wuhan is **EXTENDING CERVICAL SCREENING SERVICES** to local communities.

**Deaths from cervical cancer are decreasing** in China as awareness grows about the importance of screening. However, an imbalance in the distribution of medical resources means women in some regions do not have access to adequate screening services, leading to gaps in monitoring and inaccurate diagnosis. Using artificial intelligence (AI) technologies to improve early cancer detection, Wuhan Landing Medical High-tech Co., Ltd. (Landing) has developed diagnostic devices and a novel service model to offer more accurate and affordable screening services.

## Intelligent products assisting cancer diagnostics

Cytological evaluation, which examines cells, is a widely used, low-cost and non-invasive method for preliminary diagnosis and screening of cancer. For cervical cancer screening, accurate diagnosis requires skilled professionals to check microscopic images from Pap smears, identifying a few abnormal cells among hundreds of thousands. An intelligent scanner, CytoScanner, developed at

Landing, digitizes cell images and automatically conducts analysis to classify test results, providing an affordable and cost-effective solution that can be easily deployed in regions which lack resources.

Using Internet of Things technology, the scanner sends the digitalized cell data to a cloud platform for AI processing. A deep learning algorithm, called CytoBrain, has been developed for the automatic identification of abnormal cells, based on big data studies from cervical cancer cytological evaluations. This eliminates the need for on-site cytologists.

To take on large-scale cervical cancer screening, the cloud platform, CytoCloud, has high computational and storage capacities. It can collect screening results from across the country, and can also send AI-processed diagnosis to cytological experts across the world for verification and quality control.

"Our products have integrated AI, big data, computer vision, microscopy and robotic control technologies to offer a complete solution to cervical cancer

screening," said Sun Xiaorong, Landing's CEO. "We can make screening more accurate, convenient, and affordable, and make it possible to extend the service to many more."

## AI-assisted service model for cancer screening

Landing's innovation also lies in developing a complete system for screening services, which connects local primary care clinics or hospitals, experts in laboratories, and individual patients. The remote cervical cancer screening services are built upon rapid development of cloud computing, AI and precision medicine technologies, said Pang Baochuan, Landing's CTO. "Our service model provides a feasible, one-stop solution to pathologic diagnosis in local communities."

Landing's service system has three key components. It starts with installing devices, such as the scanner for cell data collection, in laboratories

of local hospitals. Landing's central laboratory will supply the whole set of instruments and technologies to clinicians or local professionals, covering all necessary steps from sample collection, cell slide preparation, staining and slide scanning, to quality control. End devices provided by Landing also support remote data uploading, report downloading and printing.

A core in Landing's remote service system is the network of expert cytologists connected to the central laboratory via computers, touch pads or cell phones. Through the internet, experts can review, analyse and classify samples collected from end laboratories, offering diagnosis and quality control in real-time.

The cloud platform is another vital component, as it receives data uploaded from scanners, stores and processes the data, and sends it to the central laboratory and expert cytologists for remote diagnosis.

It also connects to end users, providing them with test reports.

## Implementation on the ground

The first to apply AI technology in large-scale cervical cancer screening, Landing's success is demonstrated in the wide use of its intelligent diagnostic technologies in local communities.

The company led the large-scale application of AI-assisted screening in rural China. In 2018, the health authorities of Hubei province used Landing's technology in its screening programme. In eight months, Landing's technology was used in screening 703,103 rural women, revealing more than 35,000 positive Pap smear results (5% of those tested), including 88 cases of cervical cancer.

In 2016, working with China's Association for Maternal and Child Health Studies, Landing's products and cloud diagnosis model were piloted in a cervical cancer screening project by 18

county-level hospitals. A local community in Shenzhen of Guangdong province equipped its mobile medical vehicle with Landing's CytoScanner, offering mobile screening services. With the CytoCloud and CytoBrain, data sent from the scanner were processed, and within a couple of hours, women's results were ready and sent via cell phones. The local community has further collaborated with Landing to establish a sample processing laboratory on site, screening 30,800 people in three years. It has become a national model site for cervical cancer screening, with increasing financial support from the local government. "We are very delighted to see local people being able to benefit from modern technology innovations," said Sun.

Landing has also collaborated with Shanxi Maternal and Child Health Hospital to establish a provincial cloud platform and

a central laboratory, as well as the municipal government of Luoyang in central China's Henan province. Its technologies and services have improved cervical cancer diagnosis and prevention, gaining praises from local governments and women across China.

## Expanding technologies and services

China's large population size provides rich data for improving AI-assisted diagnosis. With increasing participation in large-scale cervical cancer screening activities, Landing's database for cytological diagnosis is growing exponentially. In 2018, Landing performed analysis for more than 1.2 million cell samples, adding millions of microscopic images to its database. With increasing data, the algorithm is continuously upgraded, leading to improved diagnosis and detection rates of cervical abnormalities.

Landing's central laboratory will supply clinicians with the instruments and technologies covering all the steps from sample collection to scanning.

