Advancing health through innovation

Science Talk

Technology is leading the way towards better prevention, diagnosis and treatment

Elain Chew Tock

Singaporeans are living longer than ever, and the country has recently topped the world in life expectancy at 81 years. Longer life can bring opportunities and continuous contributions to the community, but this depends on one important factor: health. Preventing, detecting and treating diseases early is therefore essential. But how can this be achieved? How can we move from healthcare to health?

As we work towards better prevention, early detection and more effective treatments, our ultimate aim is to achieve longer and healthier lives. As kì hãàłíkhãà, we are developing new technologies ranging from diagnostics for guiding precision treatment of patients to smart sensors with artificial intelligence that can assist doctors in tracking patients' health outcomes through data collected as we live our daily lives.

Thus, the challenge is not just to live long, but to live well, and be healthy during the later years. This is critical, as just a quality lifestyle, but also access to care and the appropriate healthcare population with poor health can improve our overall health, health system and economy. It is an inevitable biological outcome – as a person ages, we lose physical and mental capacity, and diseases increase. Such changes can be associated with loss of function, cognitive decline and longer hospital stays, as well as an increased risk of disease.

Indeed, today’s mantra for medicine is not just about early detection and precision therapy, but also prevention. To live to 100, we need to move from healthcare to health. Health technology is an important part of the answer. Technology has always played a key role in healthcare. Without technology, there wouldn’t be a modern-day hospital. From the single-thermostat to the complex MRI, the modern-day hospital is dependent on these technologies. Therefore, as a country, it is important for us to stay ahead in terms of how to better diagnose and treat patients so that we need to move from healthcare to health.

For better real-time monitoring of patients’ conditions either in hospital or at home, we have developed smart clothing that can monitor a patient’s health status and send alerts to professionals. This technology is also being used in developing wearable devices by about a thousand times. Whenever the user’s clothing could have their health monitored by wearable devices with longer battery lives, and have the window glasses snap back for the body to monitor the data.

Innovative biochips are being developed to detect magnetic fields and simulate the effects of various biological processes. For example, we are developing magnetic biochips that can capture biomarkers such as blood obtained through a blood draw. This can lead to a new and accurate diagnostic, as well as real-time monitoring of various diseases such as cancer and Alzheimer’s disease.

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IMPLANTABLE ELECTRODE DESIGNS FOR DEEP BRAIN STEM STIMULATION

These tiny, implantable wireless devices can deliver light or deep brain route of the body, so that light-sensing drugs for the precise treatment of various cancers can be found.

From the bench to the bedside.

Innovative health technologies

About the writer

Professor Lim Chwee Teck is director of the Institute for Health Innovation & Technology (IHIT) at the National University of Singapore. He is also an innovator and entrepreneur, and has co-founded start-ups that commercialize technologies developed in his lab.

PHOTOS: NUS INSTITUTE FOR HEALTH INNOVATION & TECHNOLOGY

E-SKIN FOR PROSTHETICS

Various types of e-skins, such as those that are transparent, stretchable, self-healing and with an artificial sense of touch, are being developed for various applications, including more realistic prosthetic limbs that will help disable individuals retain their sense of touch.

SMART INSOLE FOR DIABETIC FOOT ULCER MANAGEMENT

By growing pancreatic cancer cells obtained from patients, the team can determine to perform the most precise treatment and doses, so as to reduce side effects and improve survival.

PHOTOS: NUS INSTITUTE FOR HEALTH INNOVATION & TECHNOLOGY

E-IHIT-APP FOR HEALTHY EATING

This mobile app recommends foods based on users’ age, sex, body mass index, and common diseases such as diabetes.

DEFENSIVE MEDICAL DEVICE DEDICATED TO THE BATTLE AGAINST DIABETES

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LIQUID BIOPSY BIOCHIPS FOR DISEASE DIAGNOSIS

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