KEYNOTE ADDRESS

Transforming Medicine: Genomics, Bioinformatics & Global Health

Professor Wasun Chantratita, PhD

Head of Center for Medical Genomics, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand 10400

E-mail: rawct@mahidol.ac.th

The 4th Industrial Revolution is the current trend of automation and data exchange in manufacturing technologies. It includes cyber-physical systems, the Internet of things (IoT),and cloud computing controlled by smart algorithms or artificial intelligent (AI). Three ways the 4th Industrial Revolution can transform healthcare; one of them is genomic medicine.

1. Embedding disease management in our daily lives

Devices could become more seamlessly interconnected through IoT to enhance patient monitoring, potentially allowing individuals and their physicians to better manage conditions like non-communicable diseases (NCDs). Sensors connected to the IoT have the potential to engage NCD patients in their disease management, which could help reduce the incidence of adverse events and associated costs. Patients with a respiratory condition, for example, could have "invisible" sensors embedded in objects in their homes and cars that may be able to determine when their breathing could become labored, and remind them to intervene with therapies like an inhaler before hospitalization is necessary.

2. Caring for the aging population

The population over age 60 is expected to reach nearly 2 billion by 2050. In the U.S., for example, the cost of providing healthcare for one person aged 65 or older is three to five times higher than the cost for someone younger than 65. Combined with AI, robotics could potentially provide some caregiving services to older individuals such as continuous monitoring and assisting with tasks like keeping track of medicines.

3. Precision medicine based on genomic medicine

New technology, such as next generation sequencing, has made it possible to sequence a person's genome within 24 hours for $1,000, resulting in an explosion of genomic data that helps patients take preventative measures, and physicians and scientists develop more personalized treatments. Although there are important ethical dilemmas to consider, the high demand for genomic counsellors and the emerging field of gene editing may offer new hope for untreatable genetic conditions, or diseases like Alzheimer's. Genome editing technology could allow us to precisely delete, repair or replace the genes that cause certain diseases.

Diseases such as HIV and hepatitis C were not even discovered until the 1980s, and today we now have medicines that treat HIV-infected patients, and curing HCV-infected patients, patients suffering from these once life-threatening conditions.

Center of Medical Genomics, Ramathibodi Hospital, Mahidol University has been recently established due to the Thailand 4.0 policy. Many success applications of genomic medicine have been implemented into clinical practices. For example, in the fields of infectious diseases, reproductive health, pharmacogenomics, next-generation sequencing for diagnosis of rare or undiagnosed diseases, metagenomics, and cancer genomics.