PLUNGING INTO THE THAI GENE POOL

Thailand is positioning itself to play a leading role in collecting local genomic data to better tailor regional responses to conditions such as DIABETES AND STROKE.

Most of Thailand's top 10 causes of death are non-communicable diseases. A few decades ago, most deaths in Thailand were the result of infectious diseases, such as tuberculosis, but the rapid shift to a more Western lifestyle has led to a rise in non-communicable (or non-infectious) diseases such as heart disease, diabetes, obesity and stroke. Figures show some developing countries shoulder a disproportionate burden of these diseases, and now roughly one in three people in Thailand experiences high blood pressure at some point.

Genetic factors mean the emergence of these diseases is sometimes slightly different between ethnicities. However, roughly 80% of broad genetic studies have been conducted on Europeans, leading to a paucity of relevant data for most of the world's population. To improve this situation, the Thai government has invested US$150 million in the Genomics Thailand Initiative, a collaboration between academic institutions and the Ministry of Health, to sequence the genomes of 50,000 Thai people by 2024.

One of the aims of Genomics Thailand will be to look into genome risk profiling, which will use sequencing to identify groups at risk of developing a non-communicable disease, so they can be treated sooner. "This area of science is under development," explains Jakris Eu-ahsunthornwattana, a lecturer in the Faculty of Medicine Ramathibodi Hospital, at Mahidol University. Eu-ahsunthornwattana leads the collaboration's efforts to address non-communicable disease. "Risk prediction is promising when combined with other genetic and environmental factors," he says. He adds that preventing rather than treating diseases could save the Thai healthcare system billions.

Slower, but higher impact

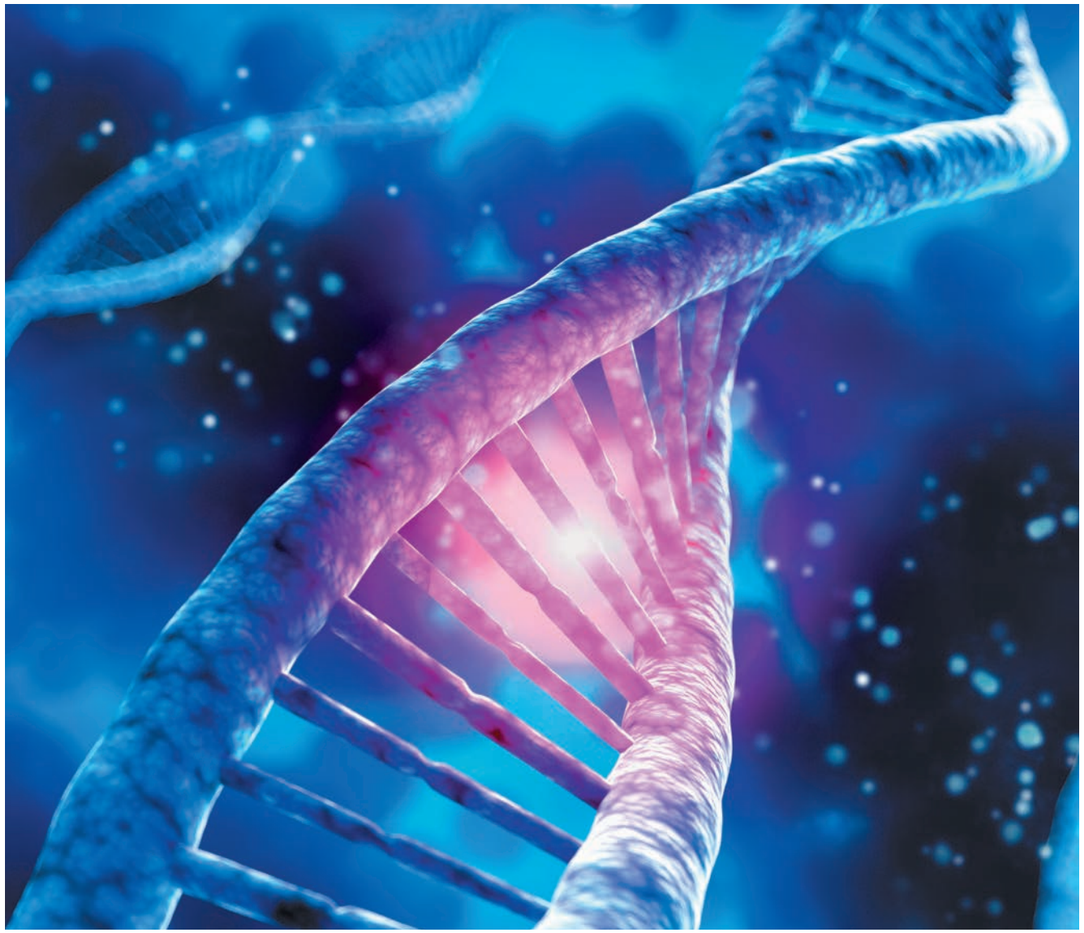
Many southeast Asian countries are making big strides in genomic medicine to better understand local susceptibility to diseases. The region's two largest economies, Singapore and Malaysia, have already established major projects to sequence the genomes of thousands of their residents, but research on non-communicable diseases lags slightly.

"RISK PREDICTION IS PROMISING WHEN COMBINED WITH OTHER GENETIC AND ENVIRONMENTAL FACTORS."

"For national genome-sequencing projects, you usually first see results from cancer and rare disease research because they can get data from individuals or a small number of patients," explains Eu-ahsunthornwattana. "For many non-communicable diseases, however, you normally require many more samples to study the genetic effect. We're just at the beginning of our genomic research into these diseases, but once we start getting results, it has the potential to help far more people."

Fortunately, the research is accelerating. Ten years ago, if someone were to be assessed for their genetic risks of a non-communicable disease, they would be tested for each of the top-ranking genes associated with that disease one at a time, and several genes are often involved in non-communicable diseases. "Next-generation sequencing allows us to screen all of a person's genes at once and can capture the influence of multiple genes that act together to affect the overall susceptibility of an individual to a non-communicable disease," says Eu-ahsunthornwattana. "For complex diseases, which most non-communicable diseases are, this helps us gain a more complete risk profile than by using a much more limited set of genes."

Studying such a vast number of genome sequences can sometimes open other opportunities, including discovering new targets for drugs. For example, US researchers studying the genes involved in high cholesterol stumbled upon the proprotein convertase subtilisin/kexin type 9 (*PCSK9*) gene that, when mutated, lowers a person's levels of bad fats. This led to the development of a new class of drugs for treating high cholesterol.



© peterschreiber.media/Shutterstock

No small undertaking

A sequencing facility, under construction for the Genomics Thailand Initiative, is expected to be operational by 2021. But Genomics Thailand needs more researchers. There is a five-year target of training 30 clinicians, 100 genetic counsellor, 100 molecular geneticists and 500 bioinformaticians. "Our situation differs a bit from the developed world," notes Eu-ahsunthornwattana. "Many countries already have the necessary infrastructure and laws in place, but we are starting from scratch."

He says Thailand must pay particular attention to the potential misuse of the technology, and appropriate regulations and laws must be passed quickly. "There is a risk of discrimination if employers or insurance companies ask for genetic information to see if someone is likely to become ill in the future," says Eu-ahsunthornwattana. "People can have the genes that make them more prone to diabetes or heart attack, but never show symptoms."

A group tasked with looking into the ethical, legal and social implications are reviewing and drafting legislation and regulations, but it can take ten years to pass a new law in Thailand.

Nonetheless, a decade ago it would have been unimaginable to start a genome project to tackle non-communicable diseases, Eu-ahsunthornwattana points out. "The government was more focused on disease risk factors such as hygiene. But there is a lot more support for genome projects now." ■

GENOMICS THAILAND

Faculty of Medicine Ramathibodi Hospital, Mahidol University

www.rama.mahidol.ac.th/en

Advertiser retains sole responsibility for content