New DNA sequencing technology arrives at the Research Institute

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Furthering the Institute’s leadership in translational research, CPMCRI is now home to the latest technology in DNA sequencing. This month, new funding from the CPMC Foundation supported the purchase of an Illumina MiSeq®, a next-generation sequencer that will enable our investigators to probe genetic variation across the genome.

“Next-generation sequencing (NGS) has revolutionized the field of genomics and molecular biology, and includes high-throughput sequencing capabilities to increase understanding of biology and the genetic mechanisms of complex illnesses,” said Tara Sigdel (PhD), an Associate Scientist at CPMCRI who facilitated the Institute’s purchase of the sequencer.

The technology is ideal for pursuing focused projects exploring the functions of single genes or a panel of genes, and to study specific mutations implicated in a particular illness. Sequencing can be completed in two to three days and requires minimal amounts of input DNA. Staff at CPMC will be trained on using the machine and processing the data, allowing for full in-house capabilities.

In this era of translational medicine, there is an ever increasing pull for researchers to enhance understanding of disease mechanisms and improved diagnostics. The ability to sequence specific regions of DNA and RNA in a targeted manner is critical, and the new sequencer will advance the work that researchers at CPMC are pursuing in cancer, age-related illnesses, transplant immunology, and liver diseases—helping lead to new strategies for personalized medicine.

“My research program aims to develop novel biomarkers for early identification of disease, and to advance the field of personalized interventions that extend the healthy years of aging,” said Greg Tranah (PhD), CPMCRI Scientist and an investigator at the San Francisco Coordinating Center (SFCC). He is among a select group of researchers in the U.S. uncovering how inherited and acquired alterations in mitochondrial DNA (mtDNA) lead to cognitive decline and dementia. “This sequencer will allow us to quickly generate large amounts of high-quality data to expand our research into aging and disease.”

Dr. Tranah is also pioneering the discovery of age-related changes in mtDNA that impact neurodegeneration, disability, vision and hearing. In a novel collaboration, he will use this new technology to examine how mtDNA sequence variation modifies individual responses to exercise.

“Regularly engaging in physical activity provides an important modifiable behavior to improve health in the elderly,” said Dr. Tranah. “However, a large heterogeneity exists in responsiveness to increased physical activity, and the explanation for this variability is partly genetic. Our study focuses on the role of mtDNA sequence variation in explaining the heterogeneity around how individuals respond to regular physical activity.”