Medical Xpress

Decoded DNA from 100,000 Kaiser members opens new research doors

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A team of Bay Area researchers faced a herculean challenge 15 months ago: Sequence the DNA of more than 100,000 Kaiser Permanente members who joined an unprecedented study of genetics and environmental conditions links health.

On Thursday, the elated scientists announced they had crossed the finish line.

"This moment represents a technological tour de force," said Cathy Schaefer, executive director of the Kaiser Permanente Research Program on Genes, Environment and Health in Oakland.

The project, she said, will accelerate research into conditions such as cardiovascular disease, diabetes, cancers, mental health disorders and age-related diseases such as Alzheimer's.

Not only was the project completed in a time span unthinkable even four years ago, but there's no genetic database in the world with such a racially diverse collection, Schaefer said. Most genome research has focused on Caucasians, she said, so this opens the door for better research on health disparities among races.

Nor has any research embarked on such a close examination of how environmental conditions - such as water and air quality, and even access to grocery stores and parks - influence health based on a person's genotype.

"This is a unique and novel aspect of what we're doing," said Neil Risch, director of the University of California, San Francisco Institute for Human Genetics. Kaiser partnered with UCSF on the $25 million project, funded by the National Institutes of Health.

And there's long-term data on participants' medical histories and health screenings. Most genome studies capture only a snapshot in time, with little medical background.

But Kaiser maintains the world's largest civilian electronic health record, which provides "every lab test, every blood pressure measurement, every EKG, every mammogram," Risch said.

The study volunteers, long-term Kaiser members who average age 65, returned saliva kits and questionnaires about their lifestyles and neighborhood environments. The researchers also used geography and public records to detail on how far the study participants lived from freeways, pollutants in air and water, and many other factors.

Custom-built equipment rapidly sequenced up to 900,000 DNA regions in each Kaiser member's sample.

The length of telomeres, genetic caps on chromosomes that protect them, was also measured. With age, telomeres shorten, which is associated with increased risk of disease. There's keen interest in understanding why, and the exact nature of how telomeres influence health.

"No one has ever done telomere data on this scale," Risch said.

The genetic data may also improve understanding of different biological pathways that, for example, trigger cancer from air pollution. Or why certain prescription drugs work for many patients, but are ineffective for

some.

Other research and academic institutions can access the data, Schaefer said, which is stripped of any identifying information.

The newly-deciphered DNA trove will provide years of research, the researchers said.

"This project is without end," Risch said.