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GENOME SEQUENCING TO MAP POPULATION DIVERSITY

Relevant for: Science & Technology | Topic: Biotechnology, Genetics & Health related developments

Many countries have studied genetic traits of citizens using sequencing. | Photo Credit: REUTERS

In an indigenous genetic mapping effort, nearly 1,000 rural youth from the length and breadth of India will have their genomes sequenced by the Council of Scientific and Industrial Research (CSIR). The project aims at educating a generation of students on the “usefulness” of genomics.

Globally, many countries have undertaken genome sequencing of a sample of their citizens to determine unique genetic traits, susceptibility (and resilience) to disease. This is the first time that such a large sample of Indians will be recruited for a detailed study.

The project is an adjunct to a much larger government-led programme, still in the works, to sequence at least 10,000 Indian genomes.

Typically, those recruited as part of genome-sample collections are representative of the country’s population diversity. In this case, the bulk of them will be college students, both men and women, and pursuing degrees in the life sciences or biology.

“This will not be an exercise to merely collect samples from people,” said Vinod Scaria, a scientist at the Institute of Genomics and Integrative Biology (IGIB), a CSIR laboratory.

“We will be reaching out to a lot of collegians, educating them about genomics and putting a system in place that allows them to access information revealed by their genome,” he said. Because genomics is largely confined to a rich urban demographic in India, this exercise, according to Dr. Scaria, would make such information ubiquitous even to villages. “Just as CT scans are now known across the country, we hope to do the same for genomes,” he said.

Genomes will be sequenced based on a blood sample and the scientists plan to hold at least 30 camps covering most States.

Every person whose genomes are sequenced will be given a report. The participants would be told if they carry gene variants that make them less responsive to certain classes of medicines. For instance, having a certain gene makes some people less responsive to clopidogrel, a key drug that prevents strokes and heart attack.

“We wouldn’t be sharing such information in the report. In some cases the correlation between disease and genes is weak. A person can request such information through their clinician because many disorders have single-gene causes but no cure or even a line of treatment. Ethics require such information to be shared only after appropriate counselling,” said Dr. Scaria.

The project would involve the Hyderabad-based Centre for Cellular and Molecular Biology (CCMB) and cost 18 crore, with the sequencing to be done at the IGIB and the CCMB.

Anurag Agrawal, Director, IGIB, said that the project would prove India’s capabilities at executing whole-genome sequencing. The human genome has about 3.2 billion base pairs and just 10 years ago cost about 10,000 dollars. Now prices have fallen to a tenth. “We can establish

a baseline Indian population and ask novel questions. For instance, in developed countries diarrhoeal infections are rarer than in India. Do genes have a role? We can follow people over long periods and track health changes," he said .

Ever since the human genome was first sequenced in 2003, it opened a fresh perspective on the link between disease and the unique genetic make-up of each individual. Nearly 10,000 diseases — including cystic fibrosis, thalassemia — are known to be the result of a single gene malfunctioning. While genes may render some insensitive to certain drugs, genome sequencing has shown that cancer too can be understood from the viewpoint of genetics, rather than being seen as a disease of certain organs.

The data generated will help scientists understand how the jets of luminosity that enabled us to see the black holes actually work and behave.

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