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Genomics picking up pace in India'

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Singapore: Genomics research in India has grown leaps and bounds in the past 20 years. Funding agencies including the Department of Biotechnology (DBT), Department of Science and Technology (DST), Indian Council of Medical Research (ICMR), Council of Scientific and Industrial Research (CSIR), and Indian Council of Agricultural Research (ICAR) have been steadily increasing the quantum of funding and grant programs in the area.

Scientists from eminent institutes like IARI, CCMB, IGIB, NIPGR, and NBRI have contributed significantly towards genomics research. A good number of private, non-profit DSIR (Department of Scientific and Industrial Research) recognized institutes are gaining momentum in quality genomic research.

Currently, genomics is said to be at a very nascent stage in India. Even academic interest in this field is yet to pick-up steam.

Research data in the genomics space is minimally available in the country. Thus, in the Indian context, this calls for a collaborative effort between academia and private organizations.

At the global level, India seems to be way behind other countries. "Scientific papers published in top journals are very few, and Indian impact or even participation in global research efforts is minimal. Indian Genomic research has to improve a lot, both in quality and quantity when compared not only with western countries but also with countries like China. There needs to be a lot of transparency, reduced bureaucracy and red tapism when it comes to the process followed by funding agencies. Also, scientists need to raise the bar of grant proposals and manuscripts that are published. They need to collaborate more with the private sector. It is a surprise that India with a population of 1.2 billion is not a part of Human Genome Project, and also 1,000 Genome Project in any significant way," expressed Mr Sam Santhosh, CEO, SciGenom.

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On the other hand, Dr Raja C Mugasimangalam, founder and CEO, Genotypic Technology, has a different opinion.

He added, "We were the first to bring Genomics to India and started providing services back in 1999. India is not lagging behind and it is like any other country as a result of globalization. Genomics is applied in every field including agriculture, biopharma, pharmaceuticals and biotechnology to name a few. Genomics is essentially an enabling technology and it doesn't have any boundaries like biotechnology. Right now it is difficult to define the exact market value of genomics with numbers and figures."

Genomics has benefited significantly in the last few years due to major revolution in DNA sequencing technologies.

While it took 10 years and $3 billion to sequence the first human genome by 2003, it can now be done in 10 days for as little as $5,000.

The new set of technologies that have made this possible are called 'Next Generation Sequencing' technologies or simply, NGS. This drastic reduction in cost along with a dramatic increase in speed using NGS has enabled scientists across the world to sequence the genome of many species of animals, plants and microbes.

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Dr Partha Majumder, director, National Institute of Biomedical Genomics (NIBMG), Kolkata, said, "We now have access to the next-generation sequencing platform. The result have been a tremendous impetus with increase in genomics research and its applications."

The research data generated has enabled scientists not only to understand how genome's function, but have also helped create new drugs, understand diseases, enhance crops, clean-up the environment, and even generated biofuel.

"In fact, through genomics we might even create new life forms through synthetic biology," says Mr Sam Santhosh.

Genomics is expected to drive the next wave of personalized medicine, nutrition and fitness, and possibly save millions of lives in the process.

In a time where big data is held high in analytics, genomic data along with other types of aggregated information such as lifestyle and clinical data, can bring about accurate risk predictions.

Today, most of the cancer treatments are based on genomics, though chemotherapy is often the primary treatment. Genomics can help determine the type of chemotherapy that a patient can be given.

In fact, genomics has gone beyond just predicting susceptibility of patients to certain diseases. Since genomics has application in biology and applied biology, it opens up numerous avenues and ways of creating new companies and products that were never imagined before (For example, siRNA technology is a new class of drugs, and a product of genomics).

So far, sequencing the genome has enabled deciphering of the code of life. Mr Sam Santhosh further added, "Though the current understanding of this code is very meager at present, it will us amass knowledge over the next 10 or 20 years. Its impact on healthcare and biotechnology will be remarkable. The current paradigm of making drugs for the general population will vanish."

In a few years, most drugs will be based on specific genetic mutations and targeted towards a set of individuals. Convergence with other technologies like nanotechnology, artificial intelligence and robotics will see the development of new devices like 'nanobots' (for example, very small robots entering the bloodstream and fixing problems like clots) and even create body organs like heart, liver, and kidneys.

Right now in India, the challenge is in gathering high-quality clinical information from patients. Our hospitals, most of the time, are over-crowded and it is impossible for clinicians and doctors to gather clinical information from every individual patient.

As huge quantities of data is generated, it calls for qualified and skilled analytical personnel and manpower to handle them.

Dr Majumder said, "Our biggest challenge is that there are many diseases that need to be thoroughly researched because there is plenty of evidence that they have genomic underpinnings to them. On the other hand, R&D is not cheap either. It requires a strong funding support. We can do a lot more with proper funding and infrastructure."

Public-private partnerships can partly help solve the funding issue, but most of the time they halt at the negotiation level.

"Funding from the government will be fantastic and that kind of money, if provided, can be used to achieve much more in genomics. Private companies are looking for outcomes. They lose interest as they look for solid return on investment (ROI) over a short period of time," concluded Dr Majumder.

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