Breakthrough in cancer treatment: How gene therapy can stop growth of cancer cells

This helps identify gene changes that make cancer cells susceptible to certain drugs

Cancer, as we all know, happens when there's a change in or damage to genes in cells, which then cannot function normally or tell the cells when to start and stop growing. "That's why cancer can be treated only one way, the right way, the very first time, to help patients achieve longer and better lives," says radiation and medical oncologist Dr B S Ajaikumar.

And how best to do it ? "Get a deeper insight into the patient's genetic make-up that can show why he/she has become resistant to certain treatments for cancer, then adjust therapies and stay ahead of the disease," says the doctor who is making a strong case of genomics (the study of genes) to pave the way for precision and personalized medicine.

What is precision therapy in cancer?

Precision therapy, also referred to as personalized medicine, involves tailoring cancer treatment to the individual characteristics of each patient. This approach uses a patient's genetic makeup to guide the selection of targeted treatments, which tend to be more effective and have fewer side effects than traditional therapies. The goal of precision therapy is to target specific genetic mutations that are driving cancer growth, delivering the right treatment to the right patient at the right time.

How can genomics improve personalized medicine?

Genomics is the comprehensive study of a person's genes and their interactions. It helps identify the genetic mutations and alterations that cause cancer cells to grow and spread. Understanding these specific mutations allows for a more accurate selection of therapies that directly target cancer-driving genes while minimising harm to normal cells.

How can genomics help identify genetic changes that cause cancer?

Cancer is often driven by genetic changes like mutations, deletions, or duplications in specific genes. Genomic analysis enables us to sequence the tumor's DNA and compare it with normal DNA to pinpoint mutations linked to cancer development. Once we identify these genetic drivers, we can target them with therapies. For instance, mutations in the EGFR (epidermal growth factor receptor) or the ALK (anaplastic lymphoma kinase) gene in lung cancer can be treated using targeted drugs like EGFR tyrosine kinase inhibitors or ALK inhibitors.

How can it help prescribe targeted therapies?

Genomics helps identify genetic alterations that make cancer cells susceptible to certain drugs. Targeted therapies are specifically designed to work on proteins driving cancer. By profiling a patient's tumor at the genetic level, we can prescribe therapies that directly address the cancer's underlying mutations. Genomic testing may also uncover rare mutations for which existing drugs, already used for other cancer types, can be repurposed to treat the patient more effectively.

How can genomics help in predicting the risk of cancer?

Genomic testing can detect inherited mutations that increase a person's risk of developing cancer. For example, mutations in the BRCA1 and BRCA2 genes are known to elevate the risk of breast and ovarian cancer. Early identification of these mutations allows for proactive monitoring and preventive measures, including surgeries if necessary.

But gene testing is not yet affordable or accessible?

Accessibility of the test is not an issue. But the cost is steep. As volumes increase, the cost will come down. The problem is not with the initial investment but reagent costs. Some validation studies are going on with in-house reagents. I hope in a few years this will be a routine procedure that can cost under Rs 10,000.

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