Syllabus subtopic: Science and Technology- Developments and their Applications and Effects in Everyday Life.

Prelims and Mains focus: about the study and its significance; about cancer

News: In a series of papers published in the journal ‘Nature’, scientists from several international consortium have mapped the handful of genes whose mutation causes several different kinds of cancer.

Why is it important

Cancer is often said to be many diseases, rather than one disease, because of the vastly different way that different kinds of cancers are known to behave. This mapping raises hopes of treatment tailored for specific cancers.

About the research

- On average, cancer genomes contained 4-5 driver mutations when combining coding and non-coding genomic elements; however, in around 5% of cases no drivers were identified, suggesting that cancer driver discovery is not yet complete.

- About half of these mutations occurred in the same set of nine genes. The scientists analysed 2,658 whole-cancer genomes and their matching normal tissues across 38 tumour types from the Pan-Cancer Analysis of Whole Genomes (PCAWG) Consortium of the International Cancer Genome Consortium (ICGC) and The Cancer Genome Atlas (TCGA). Driver genes are genes whose mutations are linked to development of a disease, in this case cancer.

Significance of the research

- It is an exciting development. Identifying the driver gene means a lot because that decides whether doctors can do targeted treatment or go with traditional options like chemotherapy. But the time taken for developing a drug from identifying a gene varies. In case of ALK-1, identified as the driver
gene for 5-7 per cent lung cancers, the time from its identification in 2006-7 to a drug was just five years."

- However the path is not always as short. Currently, when a tumour is sent for genetic analysis, there is capacity to analyse about 1,000 genes in a standard laboratory. Of these, less than 200 are implicated in various cancers, of which there are medicines for less than 40.

- For more than 30 cancers we now know what specific genetic changes are likely to happen and when these are likely to take place. Unlocking these patterns means it should now be possible to develop new diagnostic tests that pick up signs of cancer earlier.

**About Cancer**

- Cancer is a group of diseases **involving abnormal cell growth** with the **potential to invade or spread to other parts of the body**. These contrast with benign tumors, which do not spread.

- Possible signs and symptoms include a lump, abnormal bleeding, prolonged cough, unexplained weight loss, and a change in bowel movements.

- While these symptoms may indicate cancer, they can also have other causes. **Over 100 types of cancers affect humans.**