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Cancer-Causing Mutated Genes Mapped

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Why in News

The Pan-Cancer Project involving 1,300 scientists has completed a **decade-long project** to map the many **gene mutations that drive cancer's development**.

This might be helpful in a treatment tailored for specific **cancers**.

Key Findings

- Scientists read the **cancer genomes** (DNA sequences) in 2,600 samples of **38 types of cancer** and **compared** them with the genomes of healthy tissue in the same patients.
- The project found people's cancers contain, on average, between four and five fundamental mutations that drive a cancer's growth.
 - The researchers divided cancer mutations into **“drivers”** and **“passengers”**.
 - Driver genes are genes whose mutations are linked to the development of a disease, in this case, cancer.
- However, 5% of cancers appeared to have no driver mutations at all, showing there is still more work to do.
- The genome of each patient's cancer is unique, but there are a finite set of recurring patterns, so with large enough studies, all patterns can be identified **to optimise diagnosis and treatment**.
- The mapping project also **developed a new method for “carbon dating” the origins of cancer tumours**. They were able to identify early mutations in cells that occurred years or decades before cancer appears — possibly opening a window for detection well ahead of any symptoms.

Pan-Cancer Project

- Pan-Cancer Project is also called **Pan-Cancer Analysis of Whole Genomes (PCAWG)**.

- It is an international collaboration of the **International Cancer Genome Consortium** and **The Cancer Genome Atlas (TCGA)** to identify and define similarities and differences between cancer types.

International Cancer Genome Consortium

- The International Cancer Genome Consortium (ICGC) was **launched in 2007**.
- It is a **voluntary scientific organization** that provides a forum for collaboration among the world's leading cancer and genomic researchers.
- The ICGC solved numerous data governance, ethical and logistical challenges to make global genomic data sharing for cancer possible, providing the international community with comprehensive genomic data for many cancer types.

The Cancer Genome Atlas

The Cancer Genome Atlas (TCGA) is a landmark **cancer genomics program** of the US, which has molecularly characterized over 20,000 primary cancer and matched normal samples spanning 33 cancer types.

Source: FI