The iOncology-AI Project

For Prelims: Artificial Intelligence, Centre for Development of Advanced Computing, supercomputer, Genomic Data, Genomic sequencing, National Cancer Grid, National Cancer Awareness Day
For Mains: Application of AI to Medical Science, Scientific Innovations

Source: IE

Why in News?

At the forefront of medical innovation, researchers at the **All India Institute of Medical Sciences (AIIMS)** in Delhi have developed an **artificial intelligence (AI)**-powered model named iOncology-AI Project, integrated with a **supercomputer**, to aid oncologists in making informed decisions regarding **cancer treatment**.

What are the Key Highlights of the iOncology-AI Project?

- **About:**
  - The iOncology-AI project emerges from a collaborative effort between the AIIMS in Delhi and Pune's Centre for Development of Advanced Computing (C-DAC), and the Ministry of Electronics & Information Technology. This partnership brings together expertise in medical research and computational science to revolutionize cancer care.
  - It aims to leverage AI to enhance the precision and efficacy of cancer treatment. By analysing vast datasets encompassing genetic profiles, clinical histories, and treatment outcomes, the project seeks to unravel the complex interplay between genetics and cancer therapy.
- **Working Procedure:**
  - The platform, developed with C-DAC, stores and analyses various cancer-related data, including blood tests, lab reports, scans, and patient histories.
  - Utilising advanced algorithms, the AI-enabled platform assists doctors in making treatment decisions **based on comprehensive genomic data analysis**, helping to tailor treatment plans to individual patients.
    - By studying the clinical data and genomic makeup of thousands of cancer patients, the platform can provide **personalised treatment recommendations, improving therapeutic outcomes.**
  - Particularly beneficial in resource-constrained settings, the tool aids doctors in making targeted treatment decisions and optimising healthcare delivery.
    - While not replacing doctors, the platform serves as a valuable guide by **automatically flagging abnormalities in scans and reports,** enhancing clinical decision-making.
- **Focus on Breast and Ovarian Cancers:**

    - Given the prevalence of **breast and ovarian cancers among women in India,** the initial application of iOncology-AI is focused on early detection of these cancers.
- **Impacts:**
    - The iOncology-AI platform can improve cancer patient outcomes and quality of life through early detection and personalised treatment of breast and ovarian cancers.
    - It also reduces the **burden and cost of cancer care** by enhancing healthcare professionals' efficiency and productivity and optimising resource use. Additionally, it contributes to cancer research and innovation by providing valuable insights and data for further analysis and development.

Genomic Data

- Genomic data is information about the structure and function of an organism's genome.
- It is a powerful tool for medical researchers and doctors. It helps them understand how variations in DNA affect our health.
- Through **genomic sequencing,** they decipher a patient's genetic makeup and spot alterations in our genes. These changes are key to understanding how diseases such as cancer develop.

Global Cancer Scenario

- Cancer is a complex group of diseases characterised by the **uncontrolled growth and spread of abnormal cells in the body.**
    - These cells, known as cancer cells, can invade and destroy healthy tissues and organs.
- In a healthy body, cells grow, divide, and die in a regulated manner, but in the case of cancer, genetic mutations disrupt this normal cell cycle, causing uncontrollable growth. This can lead to the formation of a **tumour**.
- The **Global Cancer Observatory (GLOBOCAN)** estimates for 2020 reported 19.3 million incident cancer cases worldwide, with **India ranking third after China and the United States.**
- A Lancet study predicts a **57.5% increase in cancer cases in India by 2040,** reaching 2.08 million. In 2022 alone, over 8 lakh deaths in India were caused by cancer, primarily due to late detection, resulting in only a 20% survival rate.

What are the Government Initiatives Related to Cancer Treatment?

- National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke
- National Cancer Grid
- National Cancer Awareness Day
- **HPV Vaccine**

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q 1. Consider the following statements: (2010)

1. The Taxus tree is naturally found in the Himalayas.
2. The Taxus tree is listed in the Red Data Book.
3. A drug called “taxol” is obtained from Taxus trees and is effective against Parkinson’s disease.

Which of the statements given above is/are correct?

(a) 1 only
(b) 1 and 2 only
(c) 2 and 3 only
(d) 1, 2 and 3

Ans: (b)

Q. With the present state of development, Artificial Intelligence can effectively do which of the following? (2020)

1. Bring down electricity consumption in industrial units
2. Create meaningful short stories and songs
3. Disease diagnosis
4. Text-to-Speech Conversion
5. Wireless transmission of electrical energy

Select the correct answer using the code given below:

(a) 1, 2, 3 and 5 only
(b) 1, 3 and 4 only
(c) 2, 4 and 5 only
(d) 1, 2, 3, 4 and 5

Ans: (b)

Mains:

Q.1 What are the research and developmental achievements in applied biotechnology? How will these achievements help to uplift the poorer sections of the society? (2021)

Q.2 What do you understand by nanotechnology and how is it helping in health sector? (2020)