



Alternative Anti-Cancer Therapy

Why in News

An **Innovation in Science Pursuit for Inspired Research (INSPIRE)** faculty from the [Department of Science & Technology](#) (DST) is working on an **Alternative Anti-Cancer Therapy (Anti-Angiogenic)** using **transgenic zebrafish**.

- **INSPIRE** is an **innovative programme** sponsored and managed by the DST for **attraction of talent to Science** and was launched in 2008.
- **Objective** of INSPIRE is **to communicate to the youth of the country the excitements of creative pursuit of science, attract talent to the study of science** at an early age and thus **build the required critical human resource pool** for strengthening and expanding the Science & Technology system and R&D base.

Key Points

▪ Angiogenesis:

- It is the **physiological process** through which **new blood vessels form from pre-existing vessels**.
- It is **critical in the growth of cancer** because tumors need blood supply to grow. Tumors trigger the growth of blood cells by giving off chemical signals that stimulate angiogenesis.
- **Inhibition of tumor angiogenesis** has become a popular **anti-cancer strategy** after chemotherapy.
 - **Angiogenesis inhibitors** are unique cancer-fighting agents because they **block the growth of blood vessels that support tumor growth** rather than blocking the growth of tumor cells themselves.
- **Limitation of Anti-Angiogenic Drugs:**
 - The clinically approved **anti-angiogenic drugs** are ineffective due to **parallel activation of various compensatory mechanisms** involving a cascade of molecules, which **aids tumor angiogenesis** and investigation of these mechanisms are essential for developing anti-angiogenic therapies.

▪ Alternative Anti-Cancer Therapy:

- Scientists are exploring an alternative anti-cancer therapy that involves **targeting tumor generated formation of new blood vessels** which **allows the delivery of oxygen and nutrients to the body's tissues**.
- An INSPIRE faculty is exploring the role of **compensatory mechanisms** signaling cues as key targets for cancer therapy.
- He has also found that **nitric oxide (NO)** plays a **key role in switching off angiogenesis** under tumor microenvironment and that the **melatonin hormone** suppresses tumor angiogenesis.
- The research has shown that **compensatory mechanisms could be a potential therapeutic target** for developing effective anti-cancer treatment regimes.

▪ Transgenic Zebrafish Platform (TZP):



- **About:**

- The INSPIRE faculty is further working to develop **transgenic zebrafish** (which have exogenous genes added to their genome) model by use of the [CRISPR/Cas9 gene-editing tool](#) to study the compensatory angiogenesis mechanism in tumor microenvironment.

- **Reason for Using Zebrafish Model:**

- It has been selected for the study because of its **rapid development, optically transparent, high yield in offspring, and easy techniques for forward and reverse gene manipulation.**

Cancer

- **About:**

- It is a **large group of diseases** that can start in almost any organ or tissue of the body when **abnormal cells grow uncontrollably**, go beyond their usual boundaries to invade adjoining parts of the body and/or spread to other organs. The latter process is called **metastasizing** and is a major cause of death from cancer.
- A **neoplasm** and **malignant** tumor are other common names for cancer.
- Lung, prostate, colorectal, stomach and liver cancer are the **most common types of cancer in men**, while breast, colorectal, lung, cervical and thyroid cancer are the **most common among women.**

- **Cancer Burden:**

- Cancer remains as one of the **leading causes of adult illness and death** due to chronic and [Non-Communicable Diseases \(NCD\)](#) world-over including in India.
- According to the [World Health Organisation \(WHO\)](#), cancer is the second **leading cause of death globally and in 2018**, there were approximately 18 million cases globally, of which 1.5 million were in India alone.

- **Prevention:**

- Between 30% and 50% of cancer deaths could be prevented **by modifying or avoiding the key risk factors.** Key risk factors include **tobacco use, alcohol use, diet, exposure to ultraviolet radiation, pollution, chronic infections, etc.**

- **Treatment:**

- Options include **surgery, cancer medicines and/or radiotherapy**, administered alone or in combination.
- **Palliative care**, which focuses on improving the quality of life of patients and their families, is an essential component of cancer care.

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