

Magnetic Nanoparticles for Cancer Treatment

Prelims - Science and Technology.

Mains (GS III) - Science and Technology - Developments and applications of science and technology and their effects on everyday life.

Why in news?

Scientists from the Institute of Advanced Study in Science and Technology (IASST), Guwahati, in collaboration with NIT Nagaland, used magnetic nanoparticles to treat cancer.

- The magnetic system is developed with newly synthesized nanocrystalline cobalt chromite magnetic nanoparticles.
- It can treat cancer by increasing temperature of tumour cells through a procedure called **magnetic hyperthermia**.

Magnetic Hyperthermia

• Magnetic hyperthermia is a non-invasive technique to treat cancer, where magnetic nanoparticles are introduced into the body and guided to the tumour site.

• When subjected to an alternating magnetic field, these particles generate localized heat, raising the temperature of tumour cells to around 46°C, leading to necrosis (cell death) of cancerous cells without affecting nearby healthy tissue.

- **Material used** - Scientists developed nanocrystalline cobalt chromite magnetic nanoparticles using the chemical co-precipitation method.
- These nanoparticles are doped with Gadolinium (Gd) to enhance magnetic and heat-generating properties.
- They act as nano-heaters when introduced into the body in fluid form.
- Under an alternating magnetic field, they produce localized self-heating.
- This heating can raise the tumour temperature to 46°C, leading to cancer cell death (necrosis).
- **Advantages** - Targeted and localized treatment of cancer.
- External control through magnetic fields.
- Minimally invasive and potentially cost-effective therapy.
- Fewer side effects compared to chemotherapy and radiation.

Reference

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