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Inactivated Virus Vaccine in Focus for Covid-19

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Why in News

Recently, researchers from the **Centre for Cellular and Molecular Biology (CCMB)** have started developing an **inactivated virus vaccine** for the **novel coronavirus** (SARS-CoV-2).

Key Points

- Vaccination is thought to be the most effective and sure way to arrest the progress and deadly effect of the virus.
- Inactivated vaccines are known for their safety and easy production.
- **Inactivated Vaccines**
 - **Active pathogens are grown** in large numbers and **then killed** either by a chemical or heat. Although the pathogen is killed, or made to lose its reproduction capacity, **various parts of the pathogen are intact**. E.g The antigen (the chemical structure) that is recognised by the immune system is left unimpaired.
 - When this dead microbe is introduced in the body, **the immune system is tricked to respond by producing antibodies** against specific antigens still left intact, without knowing that the pathogen is defective.
 - As the pathogen is dead, it cannot reproduce nor cause even a mild disease. Thus, it is safe to administer to even people with lesser immunity, like the old and those who have comorbidity.
 - Inactivated **polio vaccine** and the **rabies vaccine** are made this way.
- **Benefit:** If a **large amount of coronavirus is grown and inactivated**, that will be material for candidate vaccines to be injected.
- **Challenges:** The important technological challenge is **growing the coronavirus outside of the human host**.

As the novel coronavirus has evolved to life on human cells, locating the **right source of the cell line to grow the virus outside of the human body** is key to this technology.

- CCMB is using the **epithelial cell line from African green monkeys** to artificially grow and harvest the deadly virus.
- The cells will be observed and if **the cells show changes, including dying of cells and release of the virus, then the culture is positive.**
- Finding a right cell growing technology for the novel coronavirus **will also help in drug development.**

Other Types of Vaccine

Live-attenuated vaccines

- Live vaccines use a **weakened (or attenuated) form of the germ** that causes a disease.
- Because these vaccines are so **similar to the natural infection** that they help prevent, they create a strong and long-lasting immune response.
Just one or two doses of most live vaccines can give you a lifetime of protection against a germ and the disease it causes.
- The limitation of this approach is that these vaccines usually **cannot be given to people with weakened immune systems**
- Live vaccines are used against: **Measles, mumps, rubella** (MMR combined vaccine), **Rotavirus, Smallpox** among others.

Subunit, recombinant, polysaccharide, and conjugate vaccines

- They use **specific pieces of the germ** — like its protein, sugar, or capsid (a casing around the germ). They give a very strong immune response.
- They can also be used on people with weakened immune systems and long-term health problems.
- These vaccines are used to protect against: **Hib** (Haemophilus influenzae type b) disease, **Hepatitis B, HPV** (Human papillomavirus), **Pneumococcal disease** among others.
- **Toxoid vaccines**
- Toxoid vaccines use a toxin made by the germ that causes a disease. Toxoid vaccines are used to protect against: Diphtheria, Tetanus

Source: PIB