



Heat-Tolerant Covid-19 Vaccine by IISc

[Source: TH](#)

Why in News?

A heat-tolerant vaccine developed by the [Indian Institute of Science \(IISc\)](#) researchers is **said to be** effective against all **current strains of SARS-CoV-2** besides having the potential to be quickly adapted for future variants as well.

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The infographic is divided into two main sections. The left section, titled 'What is a viral variant?' in a pink box, explains that a viral variant is a version of the SARS-CoV-2 coronavirus that has evolved and changed shape, which can alter its behaviour. It includes a diagram showing the 'Original SARS-CoV-2' (a grey sphere with blue spikes) and the 'Omicron variant' (a grey sphere with red spikes). The right section, titled 'What is immunity?' in a teal box, explains that the immune response generated by vaccination or infection activates B cells and T cells. B cells make highly specific antibodies that bind to the virus and stop it from entering cells. T cells stimulate B cells and kill infected cells. A diagram shows a B cell producing antibodies that bind to a virus, and a T cell interacting with a B cell. The text concludes that these cells and antibodies remain in the body to protect against future infection, which is immunity, but immunity can wane over time.

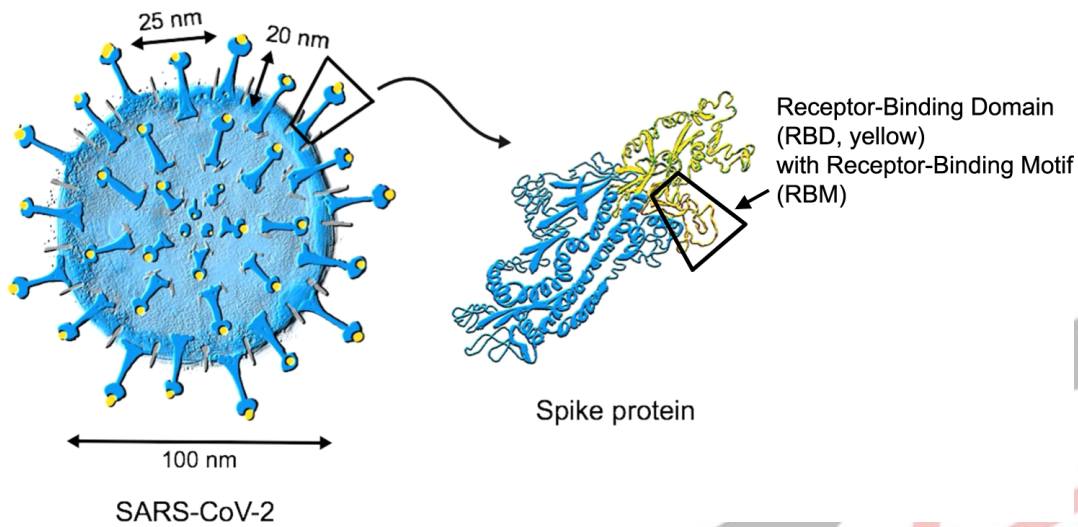
What are the Key Points Related to the Vaccine Developed by IISc?

- **Background:** According to IISc, while current vaccines are proven to be effective against most SARS-CoV-2 strains, **their efficacy has declined due to rapid mutation by the virus.**
- **Antigen Selection:** After analyzing various proteins found in the virus, the researchers selected two parts of SARS-CoV-2's spike protein, the **S2 subunit and the Receptor Binding Domain (RBD)** for designing their vaccine candidate.
 - The **S2 subunit is highly conserved.** It mutates much less than the S1 subunit, which is the target of most current vaccines and the RBD can provoke a robust immune response.
 - A hybrid protein, **RS2**, was created by **combining the selected components.**
 - The researchers then tested the effects of the protein in both mice and hamster models. They found that the hybrid protein triggered a strong immune response.

Note

A receptor-binding domain is a key part of a virus located on its 'spike' domain that allows it to dock to body receptors to gain entry into cells and lead to infection.

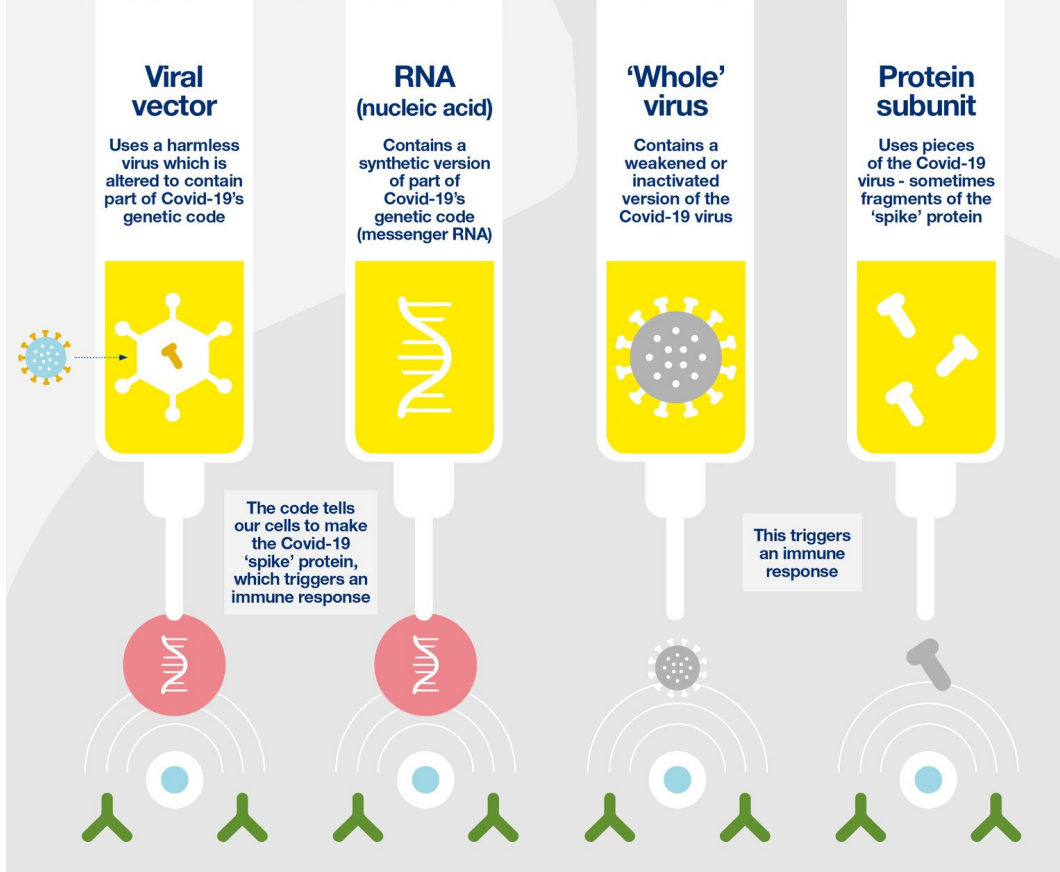
- The **spike (S) protein of SARS-CoV-2**, which plays a key role in the receptor recognition and cell membrane fusion process, is composed of two subunits, **S1 and S2**.



- **Characteristics of RS2 Antigen:**

- **Adaptability to Variants:** The RS2 antigen can be customized to incorporate the **RBD region of any new SARS-CoV-2 variant including XBB.1.5 and JN.1 variants.**
 - This adaptability addresses concerns related to the virus's rapid mutation.
- **Storage and Distribution:** RS2 antigen can be stored at room temperature for a month without requiring cold storage.
- **Economic Advantage:** Reduced production and distribution costs make it economically viable.

How do different Covid-19 vaccines work?



UPSC Civil Services Examination, Previous Year Questions (PYQs)

Q. In the context of vaccines manufactured to prevent COVID-19 pandemic, consider the following statements: (2022)

1. The Serum Institute of India produced COVID-19 vaccine named Covishield using mRNA platform.
2. Sputnik V vaccine is manufactured using vector-based platform.
3. COVAXIN is an inactivated pathogen-based vaccine.

Which of the statements given above are correct?

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

Ans: (b)