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Indian Journal of Clinical Anaesthesia

Journal homepage: [www.ijca.in](http://www.ijca.in)

From the Editor's Desk.....

## Waning immunity and COVID-19 vaccines: What's next?

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### ARTICLE INFO

#### Article history:

Received 26-09-2021

Accepted 28-09-2021

Available online 21-10-2021

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Clinical evidences are suggesting that the risk of reinfection or primary infection gradually increases in the months after vaccination as time passes. This is well-supported by research on Pfizer-BioNTech vaccine that there is a significant fall in level of antibodies level approximately six months after the second dose. However, science always finds some way out and in case of declining antibodies immunity, the ray of light is adaptive immune system that appears to continue provide strong protection against severe category of infection and death and has tamed the Novel Corona virus to mild or moderate degree of infection like other Influenza viruses. However, a big question lies in search of answering for a booster dose that could probably save most vulnerable individuals by further reducing transmission and hence the evolution and adaptation of new dreaded strains.

United States has taken lead by approving Third doses as 'BOOSTER' dose for their geriatric patients over 65 years of age, people working in high-risk zones of infection like health care professionals, teachers and for the people with weakened immune systems like organ transplant patients.

### Is there enough evidence based justification of 'Booster dose' for public?

In a study done by P. Naaber et al,<sup>1</sup> they concluded that antibodies against spike proteins of virus (needed to enter

human cells) starts waning by 12 weeks after second dose of Pfizer Vaccine. After six months of second dose, on average antibodies levels further diminished to around 7% of their peak initial value. However, this much fall is expected with any vaccine. Turner, J.S et al<sup>2</sup> has further demonstrated that after having an mRNA-based Corona vaccine, antibodies may not be circulating in blood after a certain time. Apparently, this appears to represent a pestering loss of immediate immunity, but antibodies are only a small subdivision of the body's adaptive immune system they induces a well determined germinal B cell reaction, which enables the production of vigorous humoral immunity as and when required. This innate immune response also includes cells that remember past infections or vaccinations and swing into full action when challenged by the same infectious agent yet again. The vaccine induces a strong IgG-dominated germinal B cell response in blood that peaks few weeks after the booster immunization.

A recent preprint research by Goel et al<sup>3</sup> has further affirmed role of B cells by showing memory B cells actually increases nearly 3 to 6 months post second dose of vaccination. The B cells even recognise Alpha, Beta and Delta Variants. The research also highlighted the role of other two types of immune cells known as helper T cells (CD4+ cells) and killer T cells (CD8+ cells), primed to detect the virus and ramp up the immune response to destroy virus cells in most individuals 6 months after their second dose of vaccine.

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For any vaccination, the hallmark of effectiveness lies in the effectiveness of sustained and arousable robust germinal centre reaction. SARS-CoV-2 mRNA-based vaccines are about 95% effective in preventing COVID-19 by both B cells and T cells immune response of body.<sup>4,5</sup> Vaccines that uses Viral Vector technology to deliver the code that allows body cells to make the SARS-CoV-2 spike protein also elicit same adaptive immune system. The spike protein once generated and displayed on the surface of the body's cells, are then recognised as invaders by the immune system to produce suitable antibodies. The induced germinal centre reaction recruits cross-reactive memory B cells as well as newly engaged clones that target unique epitopes within SARS-CoV-2 Spike protein.


Keeping on the data from evidence based researches and available facts; 'Booster dose' should be given only to the vulnerable and at-risk populations, when there is an evidence of waning immunity against severe disease and death. More clinical data from research trails are needed to recommend 'Booster shots' at present for the general public who has already received two doses of any vaccine and not at-risk. When global supply of vaccines is so limited and where billions in the world are still in wait of any dose of vaccine, it becomes profound duty of every country to help

other countries for administrating at least first and second dose at earliest. 'Booster dose' can wait for public until vaccine production is sufficient worldwide.

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**Cite this article:** Gupta L. Waning immunity and COVID-19 vaccines: What's next?. *Indian J Clin Anaesth* 2021;8(Special Issue):1-2.