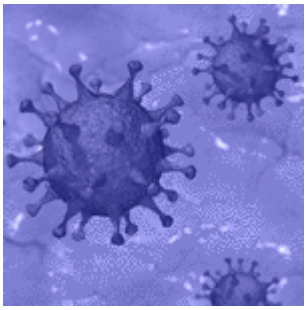
COVID-19 vaccines: can alum based adjuvants improve induction of nAbs?



Developing neutralising antibodies that target the SARS-CoV-2 Spike protein, has been highlighted as a potential strategy for an effective COVID-19 vaccine. Pre-clinical studies have demonstrated the ability to induce high levels of SARS-CoV-2 spike protein-specific neutralising Abs (nAbs) in animal models (Gao et al., 2020; Chen Pre-Print; Yu et al., 2020). However, adenovirus-based vaccines such as the ChAdOx1 (Pre-clinical study in Rhesus Macaques) and a human adenovirus 5 vectored COVID-19 vaccine, induced modest levels of spike protein-specific nAbs. More importantly, nAbs induced by ad5-vectored COVID-19 vaccine were lower than antibodies detected in convalescent plasma.

How can we improve vaccine-induced nAbs titres? Commentary by Hotez et al., suggest the use of aluminium-based adjuvant formulations, such as those used for PiCoVacc (Gao et al., 2020) could promote induction high titres of nAbs." Aluminium-based adjuvants, are the *"most widely tested adjuvant component and has proven to be one of the safest, administered to millions of children and adults*." Though the exact mechanism of how this adjuvant induces high levels of nAbs is it not fully understood, it has been suggested that the adjuvant:

- Forms subcutaneous depots which is associated with slow

release of antigens which may "*promote activation and trafficking of antigen-presenting cells to lymphoid tissues*".

- Induces Th2 cells which play an important role in promoting humoral immune responses.

These potential characteristics could be the key to inducing robust nAbs as observed in pre-clinical SARS-CoV-2 vaccine studies.

Journal Article: Hotez et al., 2020. COVID-19 vaccines: neutralizing antibodies and the alum advantage. Nature Reviews Immunology

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