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Ming-Chung Kan^{1,*}

¹ Vaxsia Biomedical Inc., 11503 Taipei, Taiwan

A self-adjuvanted protein nanoparticle that stimulates Ultra-High affinity antibodies

The extent of antibody affinity maturation is limited by the molecule diffusion rate and endocytosis of antigen-BCR complex from plasma membrane. B cell expressing BCR that has binding affinity in excess of these limits does not gain advantages during clonal selection. We have developed a self-adjuvanted protein nanoparticle platform, Vaccine Delivery system X for protein (VADEX-pro), that is able to incorporate a bacterial protein on the surface of protein nanoparticle through GFP strand complementation. In this study, we have expanded the application of VADEX-Pro by combining it with Spycatcher/Spytag technology. A receptor binding domain (RBD) from SARS-CoV2 was incorporated on the surface of VADEX by fusing with the spytag and formed covalent bond with spycatcher assembled on the surface of VADEX protein nanoparticle. After immunization, the antibody collected was subject to binding affinity measurement using surface plasma resonance (SPR). The results support the induction of ultra-high affinity antibodies that breaks the limit of both the rate constant of association and dissociation by a self-adjuvanted protein nanoparticle.

Keywords

self-adjuvanted protein nanoparticle (SAPN); superfolder green fluorescent protein (sfGFP); surface plasma resonance (SPR); Spycatcher/spytag technology; rate constant of association (k_a); rate constant of dissociation (k_d)

Biography

Ming-Chung Kan is a researcher and biotechnology professional at Vaxsia Biomedical Inc., Taipei, Taiwan. His work focuses on advancing biomedical innovation, with particular emphasis on vaccine technology, therapeutic development, and translational research. At Vaxsia Biomedical, he contributes to projects aimed at improving public health outcomes through cutting-edge biotechnological solutions. His expertise supports the development of novel biomedical strategies and drives progress in the life sciences sector.