A Thermostable Oral SARS-CoV-2 Vaccine Induces Mucosal and Protective Immunity

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, Luján, Lucas A., Molina, Cecilia R., Luján, Hugo Daniel and Klatzmann, David (2022) *A Thermostable Oral SARS-CoV-2 Vaccine Induces Mucosal and Protective Immunity.* Frontiers in Immunology, 13. ISSN 1664-3224

Resumen

An ideal protective vaccine against SARS-CoV-2 should not only be effective in preventing disease, but also in preventing virus transmission. It should also be well accepted by the population and have a simple logistic chain. To fulfill these criteria, we developed a thermostable, orally administered vaccine that can induce a robust mucosal neutralizing immune response. We used our platform based on retrovirus-derived enveloped virus-like particles (eVLPs) harnessed with variable surface proteins (VSPs) from the intestinal parasite Giardia lamblia, affording them resistance to degradation and the triggering of robust mucosal cellular and antibody immune responses after oral administration. We made eVLPs expressing various forms of the SARS-CoV-2 Spike protein (S), with or without membrane protein (M) expression. We found that prime-boost administration of VSP-decorated eVLPs expressing a pre-fusion stabilized form of S and M triggers robust mucosal responses against SARS-CoV-2 in mice and hamsters, which translate into complete protection from a viral challenge. Moreover, they dramatically boosted the IgA mucosal response of intramuscularly injected vaccines. We conclude that our thermostable

orally administered eVLP vaccine could be a valuable addition to the current arsenal against SARS-CoV-2, in a stand-alone prime-boost vaccination strategy or as a boost for existing vaccines.

TIPO DE DOCUMENTO: Artículo

DOI: https://doi.org/10.3389/fimmu.2022.837443

PALABRAS CLAVE: COVID-19. Vacunas. Antígenos. Inmunización.

TEMAS: Q Ciencia > Q Ciencia (General)

Q Ciencia > QR Microbiología > QR180 Inmunología

Q Ciencia > QR Microbiología > QR355 Virología

UNIDAD ACADÉMICA: Universidad Católica de Córdoba > Facultad de Ciencias de la Salud

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