

Vaccines Using Synthetic Peptide-Poly IC Complexes that Elicit T-cell Responses Comparable to Live Vaccination



A new vaccine technology that utilizes peptide-nucleic acid complexes that are dramatically more immunogenic than the separate components. Small synthetic peptides from the known sequences of viral, bacterial, parasitic or tumor antigens are modified so they can spontaneously form complexes with a synthetic nucleic acid (Poly-IC) that is an immunological adjuvant. For synthetic peptides that do not bind well to Poly-IC, covalent binding of the peptides to poly-lysine (poly-K) results in a general method to create peptide-poly IC complexes that are highly immunogenic.

COMMERCIAL OPPORTUNITY

- New vaccine technology would work with vaccines where T cells are important, such as viruses, AIDS, Cancer, Malaria, Leishmania, Hepatitis B or C, Influenza, and SARS.
- The unmet need is to make synthetic vaccines more like “live” vaccines. For comparison, with the flu or EBV, people get 30-50% of all T cells specific for the viral challenge, but synthetic vaccines only result in 1-2% of all T cells specific for the epitope being used.
- In a murine system, these modified synthetic peptides generate responses as high as 30-50% of all CD-8 T cells specific for the epitope being used.
- The vaccine market is a multi-billion dollar market with 2009 sales of over \$20 billion from the five largest companies: Sanofi Pasteur, GlaxoSmithKline, Merck, Pfizer, and Novartis.

TECHNOLOGY

Peptides that are modified by the addition of either the cationic amino acids arginine (R), lysine (K), a small stretch of hydrophobic residues (e.g., MFVMFV) or lipids (e.g., palmitic acids) become highly immunogenic, generating large numbers of antigen-specific CD8 T-lymphocytes when administered together as a mix with the immune adjuvant, polyinosinic:polycytidylic acid (Poly-IC). The modified peptides can associate via ionic bonds and/or hydrophobic interactions with Poly-IC. Because not all modified peptides associate with Poly-IC, the inventors have also developed a more general approach where the peptides can be covalently linked to poly-lysine (poly-K), and then the peptide/poly-K conjugate can associate with Poly-IC resulting in a strong immunogenic response. The efficacy of the vaccine has been demonstrated to elicit robust CD8 T-cell specific responses in a murine system.

PUBLICATION/PATENT

- PCT international patent application filed April 9, 2012 for Dr. Esteban Celis.
- Invited Oral Presentation at PIVAC-11, October 2011; manuscript in preparation

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LICENSING OPPORTUNITY

