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APC-targeting increases immunogenicity of DNA vaccines, and can modulate the type of immune responses that are induced

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New influenza A viruses with pandemic potential periodically emerge due to viral genomic re-assortment. In the face of pandemic threats, production of conventional egg-based vaccines is time consuming and of limited capacity. We have developed a novel DNA vaccine where viral hemagglutinin (HA) is bivalently targeted to Major Histocompatibility Complex (MHC) class II molecules or chemokine receptors (CCR1/3/5) on antigen presenting cells (APCs). The DNA encoded vaccine molecules are homodimers, each chain consisting of a targeting unit that binds MHC class II molecules on APCs, a dimerization unit, and an antigenic unit (hemagglutinin). The vaccines were delivered by a single intradermal DNA injection, immediately followed by electroporation to increase cellular uptake and expression of DNA. Upon secretion from producer cells, vaccine proteins were targeted to APCs for efficient immune activation. A single DNA immunization in mice with MHC class II targeted hemagglutinin induced within 8 days long-lasting and protective levels of strain-specific antibodies. In contrast, vaccination with hemagglutinin targeted to chemokine receptors protected mice by a T cell mediated mechanism. Thus, the selected targeting of different receptors on APCs can polarize the induced immune responses towards either dominant antibody responses or T cell responses.

Biography

Gunnveig Grodeland completed an MSc in Molecular Biology from the University of Bergen in 2007, and a PhD from the University of Oslo in 2013. She is currently continuing research in a Postdoc position at the University of Oslo, as well as coordinating the newly established K.G. Jebsen Centre for Influenza Vaccine Research, Institute of Immunology, University of Oslo.

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