Adenoviral vector-based influenza vaccines

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Due to high prevalence of adenovirus infections in humans, it is believed that preexisting adenoviral neutralizing antibodies (vector immunity) may negatively impact the immune response to vaccine antigens when delivered by human adenoviral vectors. In order to evaluate whether bovine adenovirus subtype 3 (BAd3), a nonhuman adenoviral vector, will effectively elude high levels of preexisting vector immunity, naive or human adenovirus serotype 5 (HAd)-primed mice were immunized with BAd-H5HA [BAd3 vector expressing the hemagglutinin (HA) gene from H5N1 influenza virus]. Even in the presence of very high levels of HAd-specific neutralizing antibody, no significant reductions in HA-specific humoral and cell-mediated immune responses were observed in HAd-primed mice immunized with BAd-H5HA. Naive mice immunized with HAd-H5HA (HAd5 vector expressing H5N1 HA) and boosted with BAd-H5HA elicited significantly higher (P<0.01) humoral and comparable cell-mediated immune responses compared to homologous prime-boost with either HAd-H5HA or BAd-H5HA alone, suggesting the importance heterologous prime-boost approach for an enhanced immune response. Naive or HAd-primed mice immunized with BAd-H5HA were fully protected from morbidity and mortality following a lethal challenge with A/Hong Kong/483/97. The results demonstrate the importance of BAd vectors as an alternate or supplement to HAd vectors for influenza pandemic preparedness.

Outcomes/Impacts:

Our findings demonstrates the potential of BAd vector based H5N1 vaccine for pandemic preparedness to serve as an alternate or supplement to its human counterpart (HAd-H5HA) in terms of immunogenicity, protective efficacy and overcoming exceptionally high levels of vector immunity. In addition, BAd vectored vaccine can effectively supplement HAd vectored vaccine in a heterologous prime-boost vaccine strategy.

Publications:


Participants:

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Target Audiences:

This information will be useful for scientists, policy makers, and health care workers involved in influenza pandemic preparedness.

Project Modifications:

None.