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Activation of protective innate-adaptive immunity duo for conferring rapid-sustained-broad protection of vaccines against infectious agents

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We report that intranasal administration of an E1/E3-defective (Δ E1E3) adenovirus serotype 5 (Ad5)-vectored influenza vaccine could induce seroconversion in human volunteers without appreciable adverse effects, even in subjects with pre-existing Ad5 immunity. Mice and ferrets were well protected against challenge by a lethal dose of an H5N1 avian influenza virus following intranasal instillation of an Ad5 vector encoding hemagglutinin (HA) in a single-dose regimen. Moreover, the Δ E1E3 Ad5 particle itself without transgene could confer rapid-sustained-broad protection against influenza by inducing an anti-influenza state in a drug-like manner, conceivably by activating a specific arm of innate immunity. An Ad5 vector encoding HA thus consolidates drug and vaccine into a single package, which allows the Ad5 backbone to induce protective innate immunity capable of conferring nearly-immediate and prolonged (e.g., 1-47 days) protection as the first wave against influenza; followed by HA-mediated adaptive immunity as the second wave before the innate immunity-associated anti-influenza state declines away. Overall, the work conceivably would foster the development of a novel noninvasive drug-vaccine duo platform technology capable of conferring rapid-sustained-broad protection against pathogens with neither the potential to induce drug resistance nor that to trigger harmful systemic inflammation.

Biography

De-chu Christopher Tang founded VaxDome LLC in 2014 and Vaxin Inc. in 1997 in Birmingham, Alabama. He was an Assistant/Associate Professor at University of Alabama at Birmingham (1994-2004). He was one of the pioneers during the development of DNA vaccines, noninvasive skin-patch vaccines, adenovirus-vectored nasal vaccines, adenovirus-vectored poultry vaccines, as well as the protective innate-adaptive immunity duo platform technology. He was selected as a Distinguished Overseas Scientist by the South Korea KOFST Brain Pool Program in 2012; and was appointed as a Scientist at International Vaccine Institute in 2013.

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