

Nasal vaccine as a tool for conferring rapid-sustained-broad protection against pathogens without inducing systemic inflammation

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We report that intranasal administration of a nonreplicating Ad5 (Δ E1E3 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-vectored influenza vaccine 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. An Ad5-HA vector 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., 5 hours to 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. In addition to Δ E1E3 Ad5's capacity to rapidly induce an anti-influenza state, an Ad5 vector encoding a bioengineered *Bacillus anthracis* protective antigen (PA) could also confer rapid (e.g., 1-2 days) prophylactic or post-exposure anthrax therapy with synergy to antibiotic treatment in a murine model. Both rabbits and macaques were well protected by an Ad5-PA-vectored nasal anthrax vaccine in a single-dose regimen against inhalation anthrax following challenge with a lethal dose of *Bacillus anthracis* Ames spores. Overall, the nonreplicating nasal vaccine capable of inducing protective innate-adaptive immunity duo represents an entirely new line of holistic thinking about vaccinology at its core.

Biography

De-chu Christopher Tang obtained his PhD from Indiana University. He joined the faculty at University of Alabama at Birmingham; subsequently founded Vaxin Inc. on UAB campus and was responsible for Vaxin's daily operation as the Chief Scientific Officer (1997-2012). 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 Korean Brain Pool Program in 2012, and was appointed as a Scientist at International Vaccine Institute in 2013.

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