EDITORS' CHOICE | VACCINES

Livening up pertussis vaccine development

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Despite consistent vaccine efforts globally, pertussis infection remains a substantial global health burden with devastating consequences for infants. Acellular pertussis vaccines (aPV) do not protect from nasal colonization nor induced long lasting and highly efficacious protection. Indeed, the replacement of the whole-cell pertussis vaccine with aPV in the 1990s is a likely contributor to ongoing transmission and lack of control of this disease. BPZE1, a live attenuated vaccine candidate, has shown considerable promise in both mice and baboons. Importantly, this vaccine candidate both induces immune responses that protect from disease and also prevent nasal colonization. Thus, it has the potential to reduce global incidence.

Lin *et al*. follow the induction of antibodies and cellular immunity in responses to BPZE1 in a small human clinical trial. They show that a single intranasal dose of BPZE1 in young adults induces a robust immunoglobulin G (IgG) and IgA response, accompanied by a T helper 1 (T_H1)–biased CD4 T cell activation, including within the circulating T follicular helper cell subset. Although induced IgG antibodies were at a lower magnitude than seen in aPV vaccine recipients in a separate study, BPZE1-induced antibodies were more strongly skewed to cytophilic subclasses and had superior functionality, with a higher capacity to induce reactive oxygen species release from neutrophils. These two features are likely important in mediating protection. Further, the antibody response following BPZE1 recognized a broader array of antigens compared with aPV vaccination responses. Overall, data shows that BPZE1 has great promise as an improved pertussis vaccine and is, as such, currently undergoing further clinical trials.

This study highlights the potential of live attenuated vaccine approaches to tackle important global infections. Further, data show the value of comprehensive studies of vaccine induced immunity in humans to understand induced immunity and to develop new strategies to further optimize vaccinations. Future studies are required to investigate how prior exposure to aPV or pertussis infection may impact BPZE1 vaccine responses and immunogenicity, and, most importantly, to assess whether BPZE1 vaccination in humans can prevent disease and nasal colonization.

Highlighted Article

A. Lin, D. Apostolovic, M. Jahnmatz, F. Liang, S. Ols, T. Tecleab, C. Wu, M. van Hage, K. Solovay, K. Rubin, C. Locht, R. Thorstensson, M. Thalen, K. Loré, Live attenuated pertussis vaccine BPZE1 induces a broad antibody response

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