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Investigation and comparison of antibody response to different combinations of recombinant and native *Bordetella pertussis* antigens in BALB/c mouse

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Introduction & Aim: Despite high coverage of vaccination, *Bordetella pertussis* (BP) is still one of the major causes of infectious mortality in children. Improvement of the efficacy of the current acellular pertussis vaccines is an important health priority. In this study, the mouse antibody response to recombinant fragments of filamentous hemagglutinin (FHA) and pertactin (PRN) and native pertussis toxin (PT) has been investigated following immunization with different formulations of the antigens.

Methods: Four and two overlapping recombinant fragments of FHA and PRN, respectively, were expressed in *E. coli* and purified by affinity chromatography. PT was purified from bacterial suspension of BP. BALB/c mice were immunized twice with different combinations of antigens. Then, the mice received a respiratory challenge with wild type BP. Specific antibody levels were measured in serum samples, bronchoalveolar lavages (BALs) and splenocytes supernatant using enzyme-linked immune-sorbent assay (ELISA). In addition, lung clearance was also investigated by CFU-assay.

Results: Dominant antibody response against two fragments of PRN (PRN2) and FHA (FHA3), spanning amino acids 341-699 and 1877-2250 of the mature PRN and FHA molecules, respectively, was observed following vaccination with recombinant antigens as well as acellular standard vaccine. CFU-assay results showed no bacterial growth in culture of the BALs of vaccinated challenged mice, while bacterial growth was observed in unvaccinated groups.

Conclusion: Our results suggest that PRN2 and FHA3 are the immune-dominant fragments of PRN and FHA molecules. In addition, all combinations of antigens were able to block the bacterial colonization similar to the standard acellular vaccine.

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