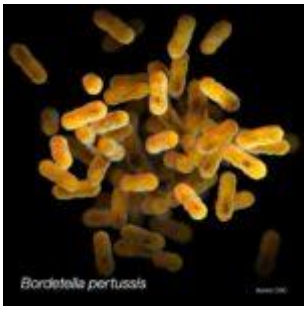
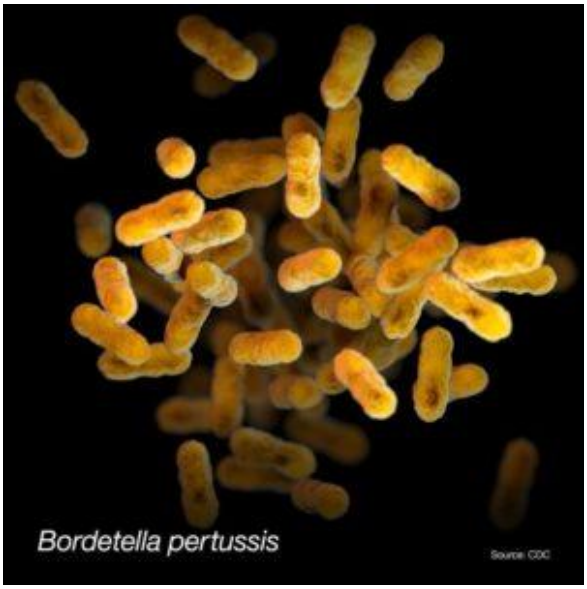
Does whole cell pertussis vaccination skew infection induced Ab profiles?





This illustration depicts a three-dimensional (3D) computer-generated image of a group of aerobic, Gram-negative, Bordetella pertussis bacteria. The artistic recreation was based upon scanning electron microscopic (SEM) imagery. [Source: CDC PHIL: CDC/ Sarah Bailey Cutchin]

Pertussis also known as Whooping Cough, is a highly infectious vaccine-preventable respiratory disease. Inactivated whole-cell pertussis vaccine (wPV), is predominantly given in developing countries, while most developed countries replaced administration of wPV with acellular pertussis vaccines (aPV) which contains purified *B.pertusis* antigens. In spite of good global vaccine coverage, there is an increase in pertussis cases, as neither vaccine gives lifelong protection. Few studies that have compared the effect of vaccination strategy on *B.pertusis* re-infection, and suggest differences in antibody (Ab) specificity upon re-infection which could be attributed to vaccination strategy. Study by Raeven *et al.,* aimed to contribute to this body of work, by conducting an in-depth profiling of Ab repertoire following a pertussis episode in adolescents and young adults with a specific focus on determining the effect of vaccine priming in infancy on subsequent infection induced Ab profile.

Ravean *et al.,* conducted their study in Denmark, where wPV was replaced with aPV that only contains the pertussis toxin (PTx) in 1997. All participants were at least 10 year post-PV, thus detectable pertussis-specific (sp) Ab responses were infection induced, due to waning of vaccine induced immunity. Overall no difference in infection induced pertussis IgG and IgA serum levels were observed between wPV and aPV individuals using multiplex immunoassay. Additionally, individuals with detectable pertussis-sp IgG exhibited great variability in pertussis-antigen specificity, this variability was not be attributed to differences in vaccination strategy.

However, using a combination of 2 dimensional electrophoresis and western blot to further profile antibody responses, Ravean *et al.,* showed that PTx-seronegative individuals that were vaccinated with either wPV or aPV had similar pertussis-sp IgG Ab profiles. Where as pertussis-sp IgG Ab profiles were vastly different between PTx-seropositive wPV and aPV vaccinated

individuals. Specifically IgG Ab specific for SecA (protein involved in translocation of proteins across the inner membrane) and a cluster of unknown proteins, were detected at much higher levels in aPV compared with wPV vaccinated individuals. This suggests pertussis reinfection in wPV individuals boosts already existing immune responses, where as aPV allows generation of novel antigen specific Ab immunity..

In summary, wPV does not skew infection induced Ab profiles, however Raeven *et al.,* did observe lower induction of infection SecA and other unknown Ab responses in wPV compared with aPV vaccinated individuals. It should be noted that this research was conducted a relatively small sample size, and a larger cohort study will be required to validate the results obtained, as well as one that compares how previous vaccination strategy affects severity of subsequent diseases.

Journal Article: Raeven *et al.,* 2019. Antibody Specificity Following a Recent Bordetella pertussis Infection in Adolescence Is Correlated With the Pertussis Vaccine Received in Childhood. Frontiers in Immunology