Title

Plasma cell antibody repertoire analysis following administration of meningococcal polysaccharide and protein-polysaccharide conjugate vaccines: evidence of distinct patterns of B cell activation

Authors

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Abstract

Vaccines against *N.meningitidis* have been developed from the plain capsular polysaccharide, (T-independent antigen), and by covalently linking the polysaccharide to a protein carrier to from a polysaccharide-protein conjugate (T-dependent antigen). To investigate differences in the immune response to these two vaccine types, plasma cells were isolated 7 days following administration of meningococcal serogroup ACWY polysaccharide and conjugate vaccines. Additionally, naïve, marginal zone, IgM memory and IgG memory B cell subsets were isolated at baseline. Next-generation sequencing was used to obtain B cell receptor sequence data from all populations.

The different B cell subsets could be distinguished by principal component analysis of sequence diversity, mutation from germ-line, and complementarity-determining region 3 length. Plasma cells also demonstrated greater sequence convergence between participants than did baseline B cell subsets. Antibody repertoire properties between HLA-DR+ and HLA-DR- plasma cells were highly similar. A comparison of plasma cell sequences with sequences from the baseline B cell subsets identified distinct patterns of B cell activation in the different vaccine groups. Following conjugate vaccination, plasma cells were predominantly IgG1, and most similar to IgG memory cells. In contrast, following polysaccharide vaccination, plasma cells were predominantly IgG2, and equally similar to marginal zone, IgM memory and IgG memory cells.

B cell receptor sequencing offers a novel perspective on vaccine immunogenicity and can be used to investigate patterns of B cell activation. Such data is likely to be of benefit during vaccine development to guide generation of optimal B cell responses.