Toward a vaccine against group A streptococcus

Serious disease caused by the group A streptococcus (GAS; Streptococcus pyogenes), particularly rheumatic heart disease and invasive GAS infection, is responsible for more than half a million deaths worldwide per year. With no effective control strategies available for these diseases, a GAS vaccine is urgently needed. The development of a global GAS vaccine has been hindered by the large diversity of circulating strains (emm-types) of GAS. While ~ 80% coverage of the common emm-types in the USA is theoretically possible with a recently developed 26 emm-type vaccine, the coverage in low-income settings, where serious GAS disease is most common, would be as low as 30%. Recent in vitro and in silico discoveries offer an exciting new approach to developing vaccines that protect against the broad range of strains in different regions of the world. Recent immunologic data in rabbit suggest that antibodies against some emm-types may cross-protect against other emm-types. We have developed a molecular typing technique (“cluster typing”) that predicts most of this cross-protection and allow further investigating this phenomenon. Cross protection between emm-types within “clusters” represent a new paradigm in our understanding of immunity against GAS and an avenue for future GAS vaccine formulations.