

We recently uncovered the cellular and molecular mechanisms for adaptive immune responses mediated by glycoconjugate immunization. We demonstrated that, upon uptake by antigen presenting cells (APCs), glycoconjugate vaccines are involved in a depolymerization reaction that yields glycan-peptide—a processed glycan chemically bound to a peptide fragment. Glycan-peptide is displayed on the surface of APCs in the context of an MHCII protein. We next showed that glycoconjugate immunization induces CD4+ T cells that recognize the carbohydrate portion of the vaccine. Finally, we designed and synthesized a prototype new-generation glycoconjugate vaccine and tested it for immunogenicity and protective capacity in comparison with a traditional counterpart.