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SupraVacc - Supramolecular Design of Synthetic Vaccines and Injectable Biomaterials

Friday, 8 March 2024 11:00 (30 minutes)

Peptide secondary structures can be harnessed to design monomers capable of self-assembling into supramolecular polymers in aqueous media. Decorating the surface with immunogenic molecular patterns results in pathogen-mimicking entities and potential vaccine candidates. In the context of antitumor vaccines, the challenge is to overcome self-tolerance mechanisms to enforce an immune response against endogenous, tumor-associated glycopeptide motifs. A co-stimulation of B cells with Th cells is mandatory, which is aimed to achieve using a co-presentation of different epitopes and immunostimulating agents at the surface of multicomponent supramolecular polymers. Mucin 1 (MUC1) is well-known for undergoing alterations in O-glycosylation during tumorigenesis,6 and is thus an excellent tumor-associated target structure for immunotherapy. In this contribution the focus is on the use of fully synthetic glycopeptide from MUC1 tandem repeat sequence. As T cell epitope we chose a small fragment from highly immunogenic tetanus toxin. Imidazoquinoline as potent TLR7/8 agonist, was synthesized. Epitopes were conjugated to supramolecular monomers and mixed in aqueous solution. High antibody titers of IgG type were observed in C57BL/6 mice and FACS analysis confirmed the high binding affinity of antibodies to T47D tumor cells. Results support the potential of this modular supramolecular platform approach for the development of glycoconjugate vaccines.

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