Synthesis and Immunology Evaluation of MUC1 Glycopeptide Vaccine

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The tumor associated mucin MUC1 is over-expressed in most epithelial tumor tissue. The extracellular part of MUC1 contains a large number of tandem repeat sequence of HGVTSAPDTRPAPGSTAPPA, which includes five potential *O*-glycosylation sites. On tumor cells, the glycosylation pattern of MUC1 is distinctly changed compared with normal cells, which makes MUC1 an attractive target for cancer immunotherapy. Typically, the *O*-glycosylation on the tumor cells is truncated, resulting in the Thomsen-Friedenreich antigen (T antigen), its precursor (Tn antigen), and their sialylated forms. Together with these tumor-associated carbohydrate antigens, the backbone peptide epitopes of MUC1 are also exposed. However, as B-cell epitopes, the immunogenicity of these glycopeptides is low. To induce sufficiently strong immune response, the synthetic glycopeptides need to be conjugated with an immunostimulating component.

Herein, the MUC1 glycopeptides bearing Tn, T, STn and 2,6-ST antigen at the sites of T9 and S15 were synthesized by microwave assisted solid-phase peptide synthesis strategy. After deprotection of the carbohydrate portion, these synthetic glycopeptides were conjugated to the carrier protein bovine serum albumin (BSA) via a triethylene glycol spacer. These synthetic vaccines were immunized with balb/c mice. Strong immune responses were induced by these vaccines. Except the IgM antibody, strong IgG type titers were also observed. The mouse sera reacted strongly with native MUC1 expressed on MCF7 human breast cancer cell line, which was examined by flow cytometry.

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