Design of novel glycopeptide-based cancer vaccines

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Mucin MUC1 is an *O*-glycoprotein overexpressed in various tumors. While in healthy tissues, the peptide sequence of this protein carries complex oligosaccharides, in cancer cells, it shows simple and truncated carbohydrates, such as the Tn antigen (α-*O*-GalNAc-Ser/Thr). These antigens are exposed to the immune system and can interact with it. Due to this unique characteristic, partially glycosylated MUC1 derivatives are attractive antigens for the development of therapeutic vaccines for the treatment of cancer.[1]

Currently, considerable effort is dedicated to synthesizing MUC1 derivatives that can elicit a strong immune response. However, the identification of the significant structural elements involved in the presentation of the antigen, as well as the recognition process of these antigens by anti-MUC1 antibodies remains partly unclear. We are developing a multidisciplinary approach that combines synthesis, X-ray diffraction, nuclear magnetic resonance and molecular modeling to identify these structural features (Figure).[2,3] Our results provide valuable hints for the design of efficacious cancer vaccines.

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