
REINFORCEMENT OF PROTEIN-PROTEIN INTERACTION BY GLYCOSYLATION

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Proteins are ubiquitously glycosylated and play essential roles in a variety of biological phenomena. The unique hydration properties of glycans facilitate interactions between glycoproteins and water molecules. However, little is known about the correlation between glycan hydration and protein function. To address this fundamental question, we carried out the total chemical synthesis of homogeneous glycoproteins and their functional analyses. We synthesized several glycoprotein derivatives incorporating different glycans. To investigate the interaction between water and glycoproteins, we conducted hydrogen-deuterium exchange (HDX) experiments using homogeneous glycoproteins. The HDX experiments indicated that the glycan moiety of glycoproteins affected the dynamic behavior of surrounding water molecules. Using isothermal titration calorimetry (ITC), we measured the binding affinity between small glycoproteins and their receptor. These data indicated that glycans enthalpically enhance protein-protein binding affinity. In addition to these experiments, using a new NMR technique, we also analyzed which sugar hydroxyl groups interact with water molecules. In this presentation, I will discuss how glycans regulate protein-protein binding events and interact with water.