

CHEMOENZYMATIC SYNTHESIS AND BIOLOGICAL FUNCTIONS OF COMPLEX GLYCANS AND GLYCOCONJUGATES

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Carbohydrates are involved in a wide range of physiological and pathological processes. Due to the complexity and diversity of carbohydrates, it is difficult to isolate a large number of structurally well-defined glycans and glycoconjugates in high purity and sufficient quantities from natural sources, which results in poor understanding of their biological roles and structure-function relationships. To address the issue, we have developed an innovative diversity-oriented chemoenzymatic platform by integrating chemical synthesis and enzyme-catalyzed diversification. This platform enables the efficient synthesis of a wide variety of complex carbohydrates, including sulfated ganglioside glycans [1], glycosphingolipids [2,3], and O-glycopeptides [4,5]. Furthermore, we have employed high-throughput glycan microarray and surface plasmon resonance technologies to investigate the structure-binding relationships of various carbohydrates. Our research has unveiled the specific recognition modes of different glycan sequences towards disease-related proteins, thereby providing new opportunities for biomedical discovery and the development of carbohydrate-based therapeutics.

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