2018

Synthesis of Sialic Acid Derivative for Modifying Cell Surface Sialylation

Isaac Turan
Cleveland State University

Joseph Keil

Synthesis of Sialic Acid Derivative for Modifying Cell Surface Sialylation

College of Sciences and Health Professions

Student Researchers: Isaac Turan and Joseph Keil

Faculty Advisor: Xue-Long Sun

Abstract

The exterior of cell surfaces express a dense layer of glycans which are often terminated by sialic acid (SA). SA is an acidic monosaccharide whose presence is found on the terminal ends of glycans of either glycoproteins or glycolipids. Due to its hydrophilic and electronegative nature, SA is often involved in both physiological and pathological processes, such as in regulating cellular interactions with ligands, microbes and neighboring cells. In addition to these functions, SA is also implicated in controlling cellular activation, differentiation, transformation and migration. Cell surface glyco-metabolic engineering provides a useful tool to remodel cell surface SA. In this study, a di-methyl amide derivative of SA, which lacks anionic character, was designed and synthesized for modulation of cell surface SA application. By treating cells with this amide derivative of SA, it is possible to modify the native SA expressed on the cell surface (sialylation status) and study the functions of cell surface SA. The di-methyl amide derivative of SA is synthesized from free SA via benzyl-*O*-sialoside, amidation and hydrogenation in 6 steps. We hope that the di-methyl amide derivative of SA will provide information regarding the specific mechanisms that are involved in SA biosynthesis and binding events as well as possible cellular consequence due to SA derivation. Eventually, by modifying the cell surface sialylation status, it may be possible to modify cellular functions.