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Building Blocks for Oligosaccharide Synthesis

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Introduction

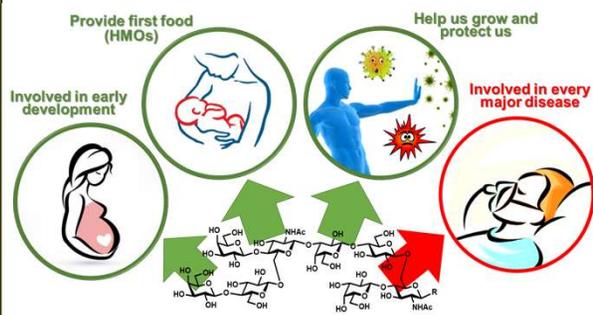


- Carbohydrates, which include cellulose, starches, sugars, and many other compounds, are the most abundant single class of organic substances found in nature.
- Chemists in the 19th century found that carbohydrates contain the elements of carbon, hydrogen, and oxygen. Hence, they referred to them as carbon-hydrates.
- They are formed in green plants and certain bacteria by a process known as photosynthesis, in which energy derived from sunlight is used for the assimilation of carbon dioxide from the air.



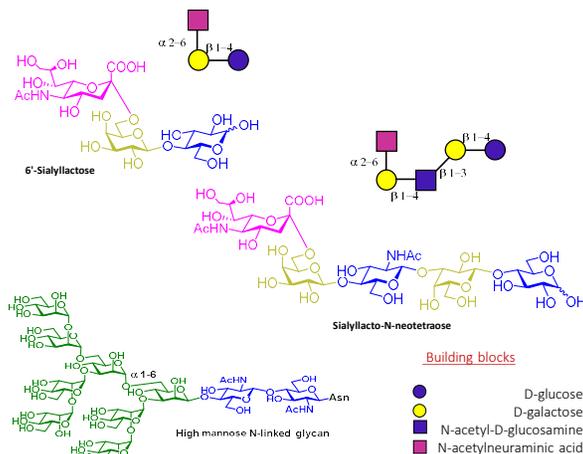
- The life on Earth ultimately depends on this process in which carbohydrates are the first intermediates.
- Photosynthesis, through the operation of the food chain, is the ultimate source of energy for nearly all organisms.

Carbohydrates – Molecules of Life and Death



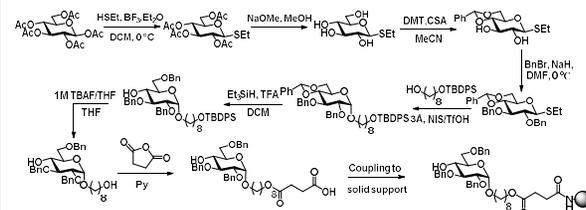
CARBOHYDRATES

Ultimate goals of the project

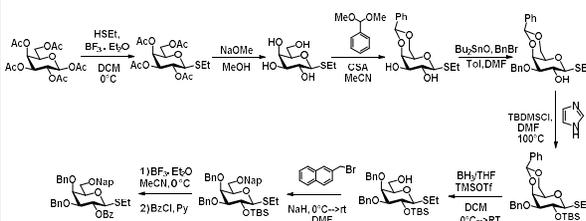


- Oligosaccharides present in human milk (HMOs) can provide prebiotic effects, function as antimicrobial agents, and provide necessary nutrients for the development of the brain and cognition of infants.
- Thanks to the explosive growth of glycomics, we already know that HMOs are a unique and diverse family of glycans, but our understanding of the HMO function is far from complete.
- Adding HMOs to infant formulas could be beneficial for the infant's health, but HMOs are challenging to produce and purify.
- Presented herein is the synthesis of two different families of building blocks. The first one will be used for the synthesis of HMOs.
- The synthesized molecules will help to investigate the exact roles of individual HMOs which remain largely unknown.
- The second family of building blocks will be used for the synthesis of high mannose N-glycans that are involved in many fundamental processes.
- The synthesized molecules will aid our collaborative efforts dedicated to understanding the roles of N-glycans in mediation of the pathogenesis of cancers, AIDS, and other diseases.

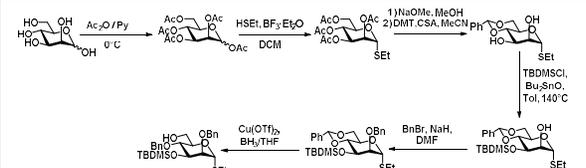
Synthesis of an Acceptor for HMOs



Synthesis of a Building Block for HMOs



Synthesis of a Building Block for High Mannose N-Glycan



Conclusions

- Successfully synthesized the building blocks for HMOs and high mannose N-glycans.
- Further synthesis is currently under progress.

Acknowledgements



References

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- Pistorio, S. G.; Yasomanee, J. P.; Demchenko, A. V., Hydrogen Bond mediated Aglycone-delivery-Focus on β -mannosylation. *Org. Lett.* **2014**, *16*, 716-719.