

NDnano Summer Undergraduate Research 2023 Project Summary

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Glucose Responsive Molecule Library

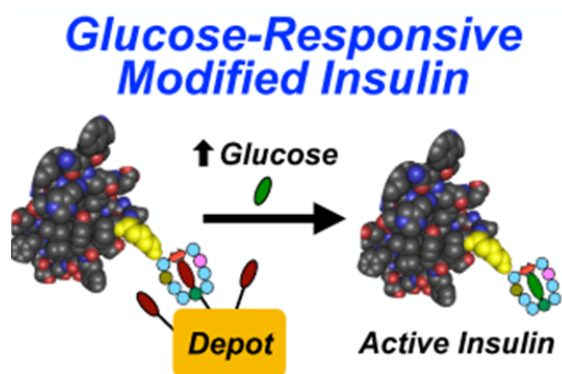
During the summer I learned how to use various mass spectroscopy and NMR machines for molecule recognition. I learned synthesis skills for creating molecules and purification methods including Biotage Isolera One.

Carbohydrate receptor molecules open up a world of potential for combating various diseases, antibiotic resistant bacteria, and even diabetes. The Webber lab is seeking to identify different glucose-binding molecules to assist in the aid of insulin delivery to type one diabetes patients.

Reference: Sun, Zhanhu, Fan, Bowen, Webber, Matthew et al. "Molecular Engineering of Carbohydrate Recognition." *ChemSystemsChem*, 2023, <https://doi.org/10.1002/syst.202200050>.

Project Summary

Carbohydrate recognition opens up a world of potential for combating various diseases, antibiotic resistant bacteria, and even diabetes. The Webber lab is seeking to identify different glucose-binding molecules to assist in the aid of insulin delivery to type one diabetes patients.



This summer I developed my synthesis skills in the creation of new molecules using two different methods of dynamic covalent chemistry. Using amines, aldehydes, and isocyanates in different combinations I was able to create many different types of molecules for exploration in glucose recognition.

Additionally, I learned reaction work up techniques, methods of purification, and identification. After synthesizing our molecules, I would often purify them using the biotage machine. This machine purifies compounds by their components and sorts them into different fractions which can then be rotovaped to obtain the final product. Then, I would often run two methods of identification to ensure I had created the molecule I hoped to. The first method would be nuclear magnetic resonance (NMR) in which molecules are identified by the number of protons they have. The second method is mass spectroscopy, where a molecule is identified by its molecular weight. For both methods I had to be trained on new machines and I had the opportunity to develop new technical skills.

Finally, I will be continuing my work during the school year. During the year I will continue with the synthesis process and also begin glucose binding studies.