Julianna Follmar

EXPAND Mentor

UC San Diego
PHYSICAL SCIENCES
Student Success Center

Synthesis of mannosylated polymer precursors

Godula Lab (2021)

What you will do

Synthetic chemists build compounds often through a scheme of several reactions that provides their desired final product. Having a good foundation of organic synthesis practices and methodology is essential for chemists. You will become familiar with **organic synthesis from several aspects – planning, mechanisms, set-up, purification, characterization – eventually applying your compounds to a larger project to develop a receptor targeting polymer**. Mannose 6-phosphate receptors (M6PR) on the cell surface play a crucial role in regulating extracellular components. When bound to the M6PR, ligands are taken into the cell and trafficked to the lysosome for degradation. You will be responsible for synthesizing precursors to a polymer which will bind specifically to the M6PR allowing for controlled regulation of growth factors and extracellular proteins. During this 10-week project you will learn numerous techniques to develop a synthetic strategy and complete successful synthesis of precursors.

Skills you will acquire

- ChemDraw
- Structure determination by NMR
- Chromatography
- Recrystallization
- Familiarity with carbohydrate and polymer synthesis
- Understanding of protecting groups and subsequent deprotecting strategies

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Evaluating protein binding to neoProteoglycans

Godula Lab (2021)

What you will do

Are you curious as to how proteins interact and bind to large biomolecules, or how scientists study these interactions in the laboratory? Enzyme-linked immunosorbent assays (ELISAs) are commonly used to study protein interactions. In this 10-week project you will study the interaction of growth factors with glycocalyx structures. The glycocalyx is the dense layer of carbohydrates (sugars) that surround the extracellular membrane of cells along with the lipids and proteins they are attached to. Proteoglycans are one component of the glycocalyx and are involved in cell signaling, differentiation, growth, adhesion, and disease. We have developed tools, neoProteoglycans, which mimic these structures in a biorelevant manner and now we want to understand their binding characteristics. You will learn how to design protein binding experiments through ELISAs. **You will complete several growth factor binding experiments to various proteoglycan structures and learn how to process large data sets.** You will build skills working with Prism software to prepare generated data for presentation/publication. You will become familiar with the numerous structures of proteoglycans and how their sulfation pattern dictates biological processes. In addition to the ELISA experiments you will be involved with the transition of these experiments to a more high-throughput method with the development of a microarray.

Skills you will acquire

- Familiarity with Prism software
- Data management and processing
- Protein and antibody recognition
- Proteoglycan structure-function relationship
- Expertise in ELISAs
- Experience in developing and printing microarrays