# Novel synthetic glycosaminoglycans (GAGs) and their potential applications

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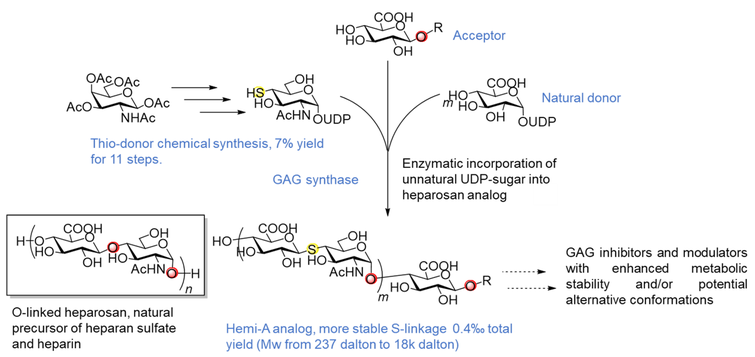
## Introduction

Glycosaminoglycans (GAGs) are a family of structurally complex heteropolysaccharides composed of alternating hexosamine and uronic acid or galactose residues. GAGs display a range of critical biological functions, including regulating cell–cell interactions and cell proliferation, inhibiting enzymes, and activating growth factor receptors during various metabolic processes. Because of the potential application of GAGs and their derivatives toward different diseases (e.g., heparin derivatives against Alzheimer's disease) and glycomaterials (e.g., implant coating materials, tissue scaffolds, hydrogels, and adsorbents), there is a growing demand for new natural, semi-synthetic, and functionalized GAGs.

## Methods

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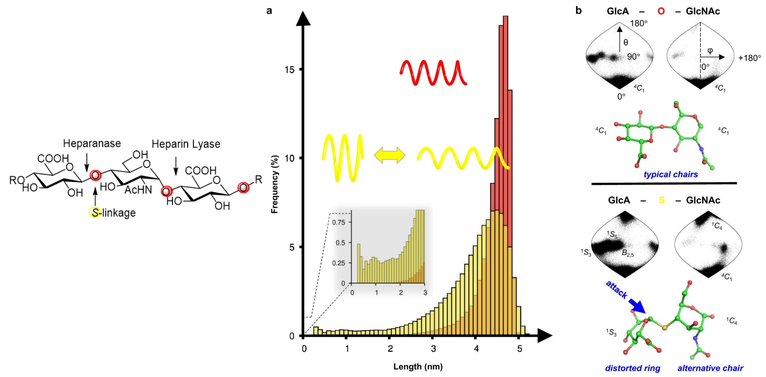
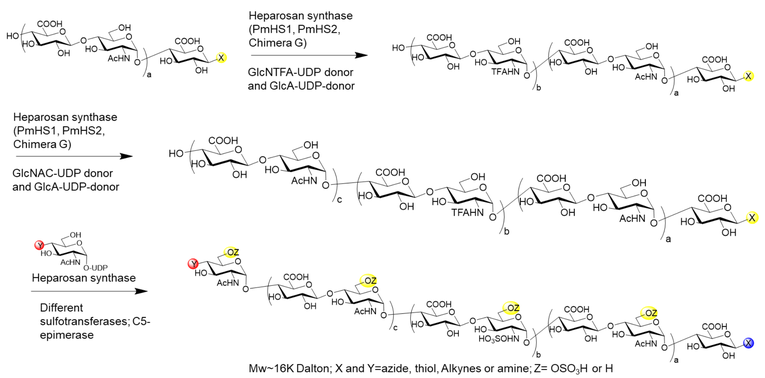
## Results




S-linked heparan sulfate analogs are not cleaved by human heparinase, which may protect against inflammation and cancer. Such analogs act as competitive inhibitors with > ~200-fold higher potency than expected; as a rationale, molecular dynamic simulations suggest that the S-linked polymer conformations mimic aspects of the transition state.

## Ongoing work

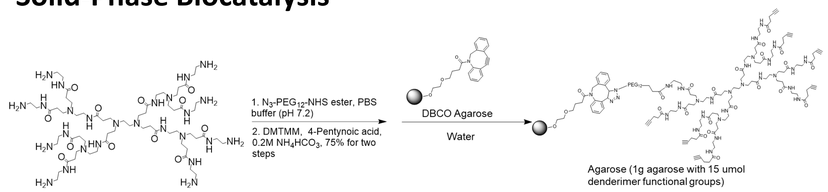
### 1. Development of Novel GAG-Based Materials




Mw~16K Dalton; X and Y=azide, thiol, Alkynes or amine; Z= $OSO_3H$ or H

Novel GAG-based polymeric materials with different functional groups, which can be conjugated with other materials very easily, both from the reducing end and non-reducing end.

### 2. Preparation of Dendrimer Supports for High Density Solid-Phase Biocatalysis




## Conclusion

We synthesized novel S-linked polysaccharides with the a unique UDP-4-SH-GlcNAc donor. These analogs act as competitive heparanase inhibitors, which has potential as anti-cancer and anti-inflammatory agents. The preparation of dendrimeric agarose and the development of novel GAG-based materials are underway with modifications at the reducing end, non-reducing end and with unique sulfation patterns.

## Acknowledgement

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## References

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