Tailoring sulfation codes *via* a well-defined synthetic scaffold to modulate glycosaminoglycan-mediated biological processes

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Glycosaminoglycans (GAGs) display diverse sulfation patterns spatiotemporally *in vivo* that lead to a wide range of protein-binding motifs and enable modulation of many critical physiological processes. However, the chemical complexity and structural diversity of these sulfated polysaccharides present a formidable barrier to establish the structural codes for GAG bioactivity and develop new therapeutics for targeting GAG-mediated disease processes. While numerous approaches have been proposed, regrettably, there is no currently existing means to fully access diverse sulfate presentation in a desired manner, and thus field has been working with only limited sulfation patterns. To overcome this challenge, in this presentation, we describe a new class of synthetically facile, structurally tunable GAG mimetic strategy that streamlines the fine-tuning of sulfation codes in the context of the target proteins *via* a well-defined synthetic scaffold. We demonstrate that computational modeling can be employed to identify the plausible GAG binding sites on protein targets. Such information can then be applied to build the mimetic agents for optimal protein recognition by fine-tuning the sulfate presentation via a synthetic scaffold. Using this integrated approach, we describe its impact on protein recognition specificity and tailoring signaling events both *in vitro* and *in vivo*. We anticipate that our GAG mimetic platform, powered by a high level of synthetic accessibility and tunability, will permit unprecedented versatility and efficiency toward emulating GAG functions in various biological contexts.

Dr. Song-Gil Lee is a chief technology officer at C-BIOMEX. He received his PhD from Purdue University and conducted his postdoctoral studies under the guidance of Professor Linda Hsieh-Wilson at Caltech. His research combines chemical synthesis and glycobiology to establish the well-defined glycomimetic platform and thus develop carbohydrate-based drugs, vaccines, adjuvants, as well as novel biomaterials.