CARB 113: Co-assembly of peptide and carbohydrate amphiphiles to generate proteoglycan mimics

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Body

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Peptide amphiphiles (PA) have been used as building blocks that generate nanofibrous protein mimics through self-assembly under physiological conditions. These supramolecular structures are maintained by non-covalent interactions, such as, Pi-Pi stacking, hydrogen bonding and hydrophobic effects. The generated fibers can be further crosslinked via salt bridges thus forming hydrated systems that resemble the extracellular matrix (ECM) at structural and functional level. However, the proteins in the ECM are often presented as glycoconjugates such as glycoproteins and proteoglycans. Carbohydrate-modified PAs are just emerging as alternative or complementary building blocks able to generate closer supramolecular ECM mimics. Such PAs are challenging at synthetic, supramolecular and biofunctional level. Carbohydrates bear different –OH groups prompt to react and thus, different protections are needed for selective functionalization. Moreover, once conjugated to the PA, the carbohydrate moiety can alter its self-assembling capacity, as well as, the biofunctionality of the incorporated bioactive peptide. We therefore developed a simpler approach for generation of minimalistic proteoglycan mimics: co-assembly of short, aromatic PA and their carbohydrate analogues. The nanofibers generated by this approach

have a PA core (e.g. fmoc-FF) and a carbohydrate shell (e.g. fmoc-glucosamine-6-phosphate or fmoc-glucosamine-6-sulfate). They is able to: 1) modulate hydrogel stiffness; 2) an improved biofunctionality compared to the single PA systems, as demonstrated by our studies with growth factors (e.g. FGF2), lectins and cells.

Presentation Details

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Tuesday, Aug 21 4:20 PM
Summer 1, Aloft Boston Seaport
(/acsboston18/event/f4d5b151f6cf911ef18f3d35f186f294)