Development of semi-synthetic methods to obtain glycosaminoglycans mimics from sustainable sources

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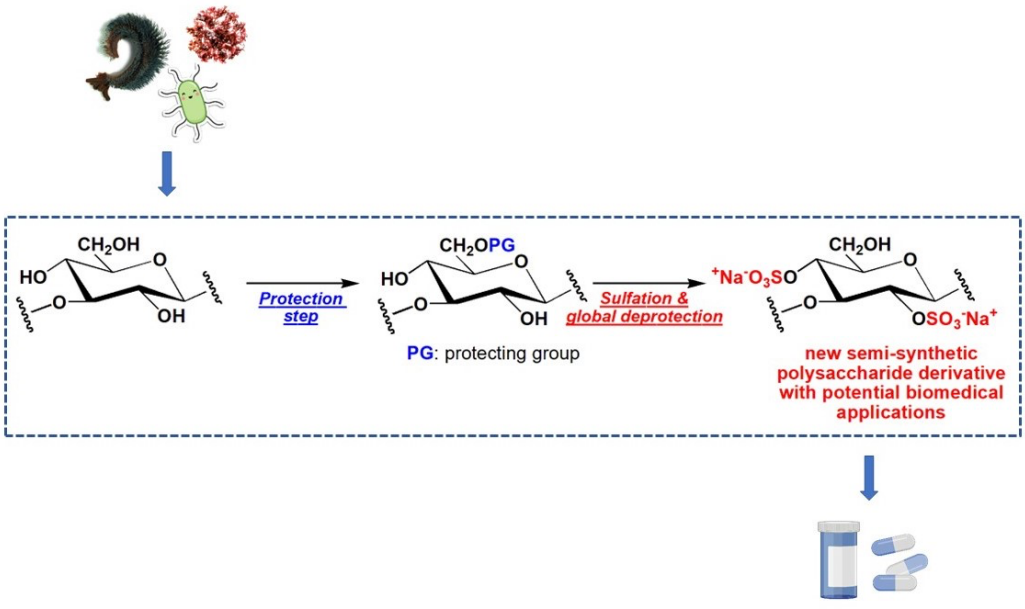
Polysaccharides are the most abundant biomacromolecules on our planet, possessing enormous structural diversity and functional versatility. They are currently employed for several purposes, both in their natural and structurally modified forms. Nonetheless, several polysaccharides used in pharmaceutical field are obtained from animal sources (*e.g.* glycosaminoglycans, GAGs) and this limits their use both for ethical and ecological reasons and for problems related to the possible contamination of the batches. However, sulfated polysaccharides can also be obtained in a semi-synthetic way: the introduction of sulfate groups into the backbones of natural unsulfated polysaccharides allows to endow them with bioactivities similar to sulfated GAGs but without risks derived from their typical animal sources.[1] In this frame, a special interest is focused on the sulfation of polysaccharides from eco-sustainable natural and/or biotech sources (algae, fungi, bacteria) already used in the biomedical and/or food fields, in order to improve their properties or to introduce new ones. Regioselective sulfation reactions can be conducted through multi-step strategies consisting in protection-sulfation-deprotection sequences.[2] In particular, the polysaccharides selected to this aim are M-rich alginic acid extracted from brown algae, curdlan from *Agrobacterium* strains,[3] and finally an exopolysaccharide (EPS)[4]from *Vibrio diabolicus* HE800 composed only of aminosugars and uronic acids. Their regioselective sulfation has been performed to obtain new derivatives acting as GAG mimics.



General scheme of semi-synthetic approaches towards glycosaminoglycans mimics

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