Insight into the structure-properties relationship of hydrophobic hyaluronan derivatives

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Hyaluronan (HA) is a polymeric biomolecule affiliated to glycosaminoglycans. It is promising macromolecule for many cosmetic and biomedical applications thanks to its biocompatibility and non-toxicity. Derivatives of HA with hydrophobic functional groups are often synthetized to prolong the resistance to natural degradation or to fabricate amphiphilic molecules with desired properties that can bind active compounds.[1] For complete characterization of novel derivatives not only essential parameters are needed, such as a degree of substitution (DS), molar mass distribution and polydispersity, but also distribution of substituents along the molecule chain[2] is indispensable for proper assessment of structure-property relationship of these polymers, due to the fact that HA derivatives with the same DS can differ in their properties.

A comprehensive two-dimensional liquid chromatography method for separation of oligosaccharides derived by enzymatic digestion from polymeric HA derivatives was developed and a detail investigation of enzymatic degradation by three possible hyaluronidases[3] was executed.

Finally, the developed method provided more insight into understanding very important structure-property relationship. Group of samples that showed good correlation of swelling with their DS was analyzed and compared with other samples that showed high deviation from a dependence of swelling ratio on DS. Results enabled us to find structurally irregular patterns in distribution of substituents for these deviant samples and thus explain the differences in their properties in comparison with other samples.

References

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