Surface tension of hyaluronan-surfactant systems

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Interactions between a natural negatively charged polysaccharide hyaluronan [1,2] and cationic surfactants tetradeceyltrimethylammonium bromide (TTAB) and hexadecyltrimethylammonium bromide (CTAB) were studied by a Du Noüy ring measurement method and maximum bubble pressure method. Hyaluronan (Hya) is one of the possible carriers in the targeted drug delivery. It is a very hydrophilic polymer, therefore a suitable hydrophobic domain providing the solubility of nonpolar drugs is required. For this purpose, cationic surfactants were chosen and the interactions between the surfactant head group and hyaluronan carboxylic group were studied. The aim of the present work was to study the expected electrostatic interactions using both static and dynamic surface tension methods. The experiments were performed in Milli-Q water with two molecular weights of hyaluronan (0.1 MDa – LMW, 1.4 MDa – HMW). The results are compared from the point of different hyaluronan molecular weight and its influence to the critical micelle concentration of surfactants.

Interfacial tension of hyaluronan-TTAB system: empty symbols – TTAB without Hya, grey full symbols – TTAB with LMW Hya, black full symbols – TTAB with HMW Hya.

The added hyaluronan decreased the interfacial tension of both surfactants in water, the influence of its molecular weight was not observed. In addition, the longer the carbon chain of surfactant the faster stabilization of interfacial tension.

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