

Study on physical property and physiological safety of hyaluronan and its derivatives as cosmetic materials

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Hyaluronan (HA) is a non-sulfated glycosaminoglycan (GAG) that plays an important biological and physiological role in normal and pathogenic states. The physiological function of HA is highly dependent on its molecular weight (MW). As a normal constituent of the extracellular matrix (ECM), and in its native form, HA exists as a high MW polysaccharide, typically in excess of 10⁶ Da, where it is associated with the structural fluid dynamic, homeostasis and maintenance of tissue connective tissue integrity. In biological fluids such as blood or lymph, or at sites of inflammation or disease, the molecular weight of HA is often significantly lower. Both intermediate (200–500 kDa) and smaller MW HA (<20 kDa) are involved in cellular processes, in particular as signaling molecules for angiogenesis, induction of inflammatory gene expression, wound repair, cell proliferation and migration. These processes are important in inflammation and tumor invasion. On the other hand, hyaluronan is very popular as one of cosmetic materials based on its physiological and physical property, however, the physical and chemical stability of hyaluronan which is used as cosmetics and/or functional food is still unclear. The objective of this work is: 1) to obtain the knowledge of the physical stability of hyaluronan under several pH conditions by using polyacrylamide electrophoresis (PAGE), capillary electrophoresis (CE) and nuclear magnetic resonance (NMR) spectroscopy; 2) to investigate its physiological safety by orally administration to rats. We have found that the chemical stability of HA and the oral availability of hyaluronan by the grant. Interestingly, orally administered HA is existing as a complex with plasma proteins in blood circulation. The metabolic fate and function of the orally administered HA will be investigated in detail in the near future.