Abstract

Charles University
Faculty of Pharmacy in Hradec Králové
Department of Biochemical Sciences

Candidate: Bc. Andrea Exnerová
Supervisor: Mgr. Petra Žádníková, Ph.D.
prof. RNDr. Lenka Skálová, Ph.D.

Title of diploma thesis: Degradation of hyaluronic acid in the skin and percutaneous absorption of exogenous hyaluronic acid through the skin

Up to half of the body's total hyaluronic acid (HA) content is present in the skin. HA acts as an organizer of the extracellular matrix and is involved in maintaining skin hydration and elasticity. In the last decade, several important findings have been added to the field of HA degradation in the skin, and one of the aims of this thesis was to create a comprehensive overview. Degradation of HA in the dermis was elucidated by the discovery of the essential role in the degradation of HA in dermal fibroblasts played by the KIAA1199 protein. In the epidermis, the lysosomal enzyme hyaluronidase 1 is overexpressed in the *stratum granulosum* just below the *stratum corneum (SC)*. It is uncertain how HA is internalized into the keratinocytes or whether only intracellular HA is degraded in this way. Epidermal degradation of HA remains elusive.

HA is part of a range of topically applied products on the skin, mainly due to its unique moisturizing properties, but it is not yet clear whether HA is able to penetrate deeper layers of the skin. Based on the available studies, the absorption of HA into the skin depends on its molecular weight. The experimental part of this thesis is devoted to the study of epidermal absorption of HA, 290 kDa. Absorption was performed on porcine epidermis in Franz cells for 24 hours and evaluated under a microscope. 290 kDa HA has been shown to be able to penetrate the entire epidermis and accumulate in the basal layer of the epidermis. The affinity of HA to the surface layer of the *SC* was observed. A suitable derivate for the study of percutaneous HA absorption is biotin-labeled HA, because by using this derivate we obtained the same results as in the epidermal absorption of native HA and biotin-labeled HA allows differentiation from endogenous HA.