

## Sven Hellerström Memorial Lecture 2014: Torbjörn Egelrud – “Desquamation, a controlled breakdown”

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The Sven Hellerström memorial lecture series at the Dermatology Clinic, Karolinska University Hospital, started in 1962 to celebrate the 60th birthday of Professor Hellerström. Sven Hellerström was truly a visionary leader in our field and was the driving force behind the building of a large and modern Dermatology department at the Karolinska, which was inaugurated in 1948 and still is home for our clinic. In 1957 he was president of the International Congress of Dermatology in Stockholm placing Swedish dermatology on the map.

Since the start of the Memorial Lectures in 1962, this annual event has hosted a majority of internationally renowned dermatologists. The Lecture is a proud tradition of Karolinska Dermatology Clinic, always takes place in September and in the presence of the honorary guests, The Hellerström family.

Professor Torbjörn Egelrud from the Dermatology Clinic at Norrlands University Hospital, Umeå, gave this year's lecture. Professor Egelrud is internationally one of the pillars of skin barrier research and has made a permanent imprint on skin biology with his pioneering work on horny layer desquamation.

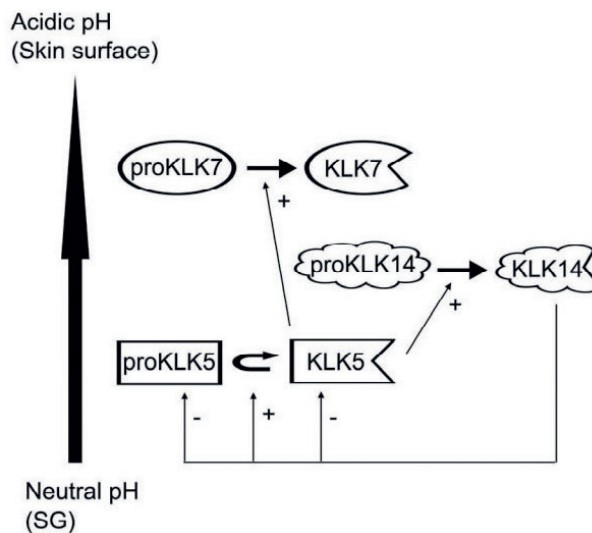
Professor Egelrud started his research career studying lipoprotein lipases in skim milk in the early 1970s. In the early 1980s he began his dermatological research focusing on the effect of proteolytic enzymes on IgA deposits in dermatitis



Sven Hellerström (1901–1977) Professor of Dermatology during the years 1942–1968, first at S:t Görans Hospital and later at Karolinska Institutet.

herpetiformis. In 1988, he published the pioneering paper 'Proteolytic degradation of desmosomes in plantar stratum corneum leads to cell dissociation *in vitro* in Acta Dermatovenereologica, showing that incubation with trypsin results in cell dissociation in plantar stratum corneum. This was the beginning of a long series of important papers outlining the biochemical underpinnings of stratum corneum desquamation. Several proteases involved in the desquamation process were identified in human stratum corneum, including stratum corneum chymotryptic enzyme (SCCE; human kallikrein 7, hK7) and stratum corneum tryptic enzyme (SCTE; human kallikrein 5, hK5).

Desquamation plays a central role in skin biology and skin disease. If, during epidermal differentiation, a constant stratum corneum thickness cannot be upheld by continuous shedding of superficial most stratum corneum cells, scaling and plaque formation will ensue, as well as skin barrier deficiency. As Professor Egelrud pointed out during his lecture, a central



Model of the proteolytic kallikrein (KLK) cascade in the stratum corneum. Thick arrows represent conversion of proform into active KLK via removal of the propeptide. Thin arrows represent activation (+) or inactivation (-) pathways. SG = stratum granulosum. From Kristina Stefansson 2008 (Thesis, Umeå University Medical Dissertations, New Series No 1174, ISSN 0346-6612, ISBN 978-91-7264-555-4) based on Brattsand M. et al. (J Invest Dermatol 2005; 124: 198–203).

event in desquamation is elimination of stratum corneum cell cohesion. Stratum corneum cells have no protein synthesis and can therefore not respond to extracellular signalling. Thus, desquamation somehow has to be “programmed” in the underlying viable part of epidermis. How this “programming” takes place remains one of the outstanding questions in dermatology. Professor Egelrud showed during his lecture how proteolytic degradation of desmosomes plays a central role in

desquamation and discussed a number of possible regulatory mechanisms for the desquamation process including activation of enzyme precursors, changes in water activity, pH, and changes in lipid composition by modifying enzymes.

Few scientists can claim to be the founder of a whole research field, Professor Egelrud is, however, without doubt one of those.



Claes Hellerström and AnnMarie Otto (the children of Sven Hellerström) together with this year's lecturer, Professor Torbjörn Egelrud, Umeå University and the Chairman of the meeting, Professor Mona Ståhle, Karolinska Institutet.