

Guest lecture

"Dynamics of Lipid Metabolism in Water and Immune Barriers of Mammalian Skin"

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11 AM in the BMB seminar room

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Abstract: The major function of mammalian skin is to form and maintain a functional barrier between the hostile external environment and the body's internal milieu. A healthy outer epidermal layer (stratum corneum) provides optimal restrictions on the permeability of water (permeability barrier) while also representing the first line of defense against pathogenic and environmental assaults (innate immune barrier). Maintaining these two interdependent barriers requires not only the ongoing process of epidermal differentiation, but also a dynamic and coordinated response to external challenges and damage to skin integrity. The first of these barriers, the permeability barrier, is mediated primarily by lipid-enriched lamellar membranes that are localized to the extracellular spaces of the stratum corneum. Formation and maturation of these extracellular membranes requires major alterations in the metabolic program within differentiating keratinocytes as they traverse from nucleated basal cell to enucleate corneocytes. Timely production and delivery of precise lipid and protein components as well as their subsequent and ordered rearrangement, allows for the ongoing regeneration of these highly-organized membrane structures. The second of these barriers, the innate immune barrier, protects against both microbial penetration through the stratum corneum and contributes to normal skin microbial colonization, as well as to the regulation of biofilm formation by pathogenic bacterial species. Antimicrobial peptides (AMPs) are ubiquitous innate immune elements in all epithelial tissues, including the epidermis, and are major components of the skin's

innate immune barrier. Dynamic links between these two barriers are evident from a number of recent studies: For example, the production of barrier lipids and AMPs are coordinated in response to skin challenges and during response to wounding. In addition, two important signaling lipids, sphingosine-1-phosphate (S1P) and ceramide-1-phosphate (C1P), play critical roles in orchestrating stress-specific signals that then regulate production of the major skin innate immune elements, including cathelicidin antimicrobial peptide (CAMP) and the beta-defensins. This presentation will focus on the intrinsic dynamics of lipids in these two key epidermal barriers, and review recent advances related to skin disorders and skin cancer.

Host: Professor Nils J. Færgeman, Department of Biochemistry and Molecular Biology, SDU.