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Key role of cutaneous neuropeptides in skin-bacterial communication and virulence

Skin is the principal neuroendocrine organ of the human body but it is also hosting its second microbial population. In skin, neuropeptides released by nerve terminals and cells diffuse in upper epidermal layers and sweat and it was recently shown that some of these peptides control skin bacteria virulence. Substance P, CGRP and Atrial Natriuretic Peptides (ANP, CNP) can be detected by bacteria between micro- and pico-molar concentrations through moonlighting (i.e. multifunctional) proteins, such as the Thermo Unstable Ribosomal Elongation Factor (EfTu), the chaperone DnaK or the amidase AmiC which are translocated to the bacterial surface through specific systems, including MscL mechanosensitive channels, and acquire environmental sensor functions. Substance P, CGRP, ANP and CNP are without effect on bacterial growth at physiological concentrations but modulate the cytotoxicity, virulence and biofilm formation activity of very different skin bacterial species, such as *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Bacillus cereus*, *Pseudomonas fluorescens* or *Propionibacterium acnes*. The effect of neuropeptides on bacteria is generally rapid


(<5 min) but can last for days in the case of biofilm formation and leads to dramatic increases of virulence (>400%). Some of these neuropeptides, such as substance P and CGRP, have antagonistic effects. Others are only acting on one specific species, such as CGRP on *S. epidermidis* or have opposite actions, such as CNP on biofilm formation by *S. aureus* and *P. acnes*. The microbiote is integrating these host signals which determine its aggressivity and skin reaction. New dermo cosmetic products are now designed on this basis.

Speaker Biography

Marc G J Feuilleley has started his carrier in Cell Biology and Endocrinology an INSERM unit before tuning to Microbiology in 1996. When he joined his present research laboratory (LMSM) of which he is Director since 2008 and where he has developed Microbial Endocrinology. He is an Invited Professor at the Max Plank Institute, expert for national and international agencies. He is managing a parallel technology transfer society for cosmetic and pharmaceutical industry and is involved in the first world pole in cosmetic industry (Cosmetic-Valley). He is the author of 138 articles in international journals and more than 340 oral and poster communications in national and international conferences.

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