Development of an in vitro human skin model for evaluation of topical antimicrobial compounds

New topical antimicrobial compounds, effective against emerging bacteria such as *Staphyloccocus aureus* (especially MRSA), are greatly needed due the increase in multi-resistant bacteria. In Denmark, at least 500 mice are used yearly for skin infection studies. An alternative to the use of mice may be human skin equivalents; human skin grown in a petri dish based on cells isolated from skin from abdominoplasty (so-called “tummy tuck”). These cells (epidermal keratinocytes and dermal fibroblasts) are cultured to form a multi-layered model of the human skin, including a fully developed basement membrane. Different methods to obtain engineered human skin (the self-assembly approach, skin reconstructs) are presented. These models were used to evaluate and compare the pathogenicity of different strains of *Pseudomonas aeruginosa*. These experiments confirmed that bacterial signal molecules contribute to the tissue degrading activity of this bacterium. Human skin reconstructs are also to be used for evaluating the efficiency of topical antimicrobials where data from animal experiments already exists, thereby enabling comparison between *in vivo* and *in vitro* data.
Besides the ethical concerns in connection to animal experimentation, animal experiments are very laborious and expensive. The possibility for replacing at least some animal experiments with a cell based alternative will thus make it easier and cheaper to test e.g. new antimicrobial drugs. Moreover, since artificial skin can be grown using quite simple lab remedies, laboratories without access to animal facilities can also perform infection studies using this tool, thereby not only greatly benefiting animal welfare but also society in general and research in new antimicrobial drugs in particular.