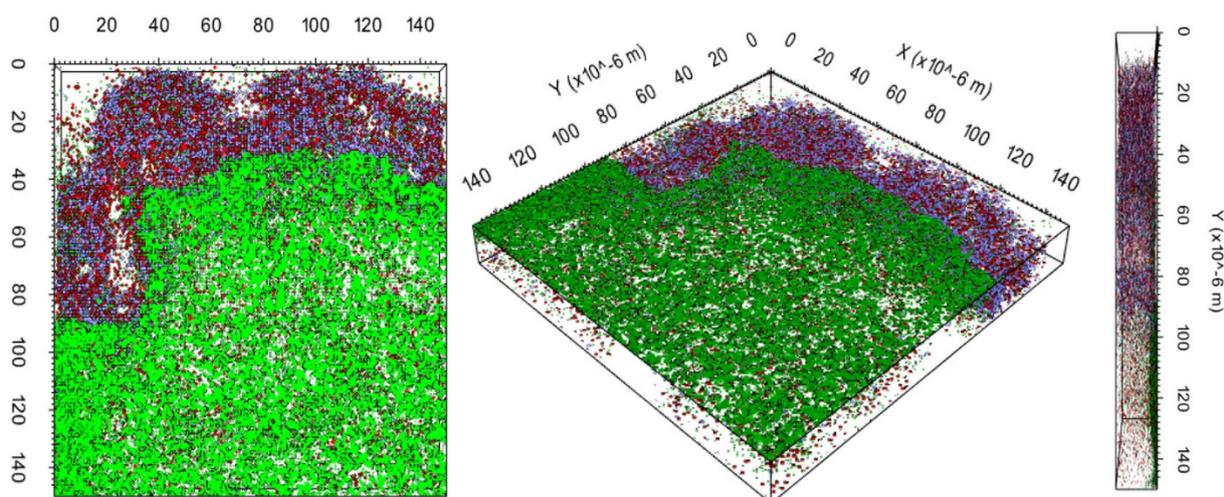


Developing an animal-free test bed for skin uptake

We have recently demonstrated an animal-free skin permeation analytical approach suitable for testing pharmaceuticals, cosmetics, occupational skin hazards and skin allergens. The method aims to replace or significantly reduce existing in-vivo models and improve on already established in-vitro models. This by offering a more sensitive and flexible analytical approach that can replace and/or complement existing methods in the OECD guidelines for skin adsorption (no 427 and no 428) and measure multiple compounds simultaneously in the skin while being able to also trace endogenous effects in cells.



Mass spectrometry imaging data. Different views of a three-dimensional render of Bemotrizinol (in purple) and Avobenzone (in red) distribution in skin tissue (green). Field of view 150x150x10 μm .

We have demonstrated this by studying how active ingredients in sunscreen permeate through left-over human skin, from routine surgery, in a Franz-cell permeation model. Two common sunscreens were therefore applied to the human skin and Time of flight secondary ion mass spectrometry (ToF-SIMS) was used to trace the molecules through the skin. We showed that ToF-SIMS imaging can be applied in visualizing the distribution of Avobenzone, Bemotrizinol, Biscotrizole and Ethyl hexyl triazine at subcellular resolution in the skin. The UV-blockers could be visualized at the same time in one single experiment without any probes or antibodies used. The UV-blockers mostly remained in the stratum corneum. However, in certain features of the skin, such as sebaceous glands, the penetration of the UV-blockers was more prominent, and the compounds reached deeper into the epidermis.

We now wish to further develop the model to also study the uptake and distribution of topically applied pharmaceuticals at the cellular level. You will use imaging mass spectrometry to study pharmaceutical uptake through the skin and evaluate limit of detection and achievable lateral resolution.

Contacts: Per Malmberg, malmper@chalmers.se 031-7728321

Lina Hagvall, Lina.Hagvall@skane.se