Using atomic force microscopy and live cell imaging to unravel new functions of the extracellular adherence protein Eap of *Staphylococcus aureus*

Janina Eisenbeis, Henrik Peisker, Christian S. Backes, Nicolas Thewes, Markus Greiner, Christian Junker, Eva C. Schwarz, Markus Hoth, Karin Jacobs, Markus Bischoff

Institute for Medical Microbiology and Hygiene (IMMH), Homburg, Germany

Staphyloccocus aureus is a major human pathogen, and a common cause for superficial and deep seated wound infections. The pathogen expresses a multitude of virulence factors which facilitate attachment to various eukaryotic cell structures and modulate the host immune response. One of these factors is the extracellular adherence protein Eap that is secreted by *S. aureus* into the host milieu to exert a number of adhesive and immune evasive functions. Eap is also known to contribute to a delayed wound healing of *S. aureus* infected wounds. In order to better understand the latter phenomenon, we analyzed here the impact of Eap on keratinocyte morphology and behavior by atomic force microscopy and live cell imaging. We could show that treatment of keratinocytes with Eap resulted in cell morphology changes as well as a significant reduction in cell proliferation and migration. Specifically, we found that Eap-treated keratinocytes changed their appearance from an oblong to an astral-like shape, accompanied by decreases in cell volume and cell stiffness, and exhibited significantly increased cell adhesion. Additionally, we found that Eap interfered with growth factor-stimulated activation of the MAPK pathway that is known to be responsible for cell shape modulation, induction of proliferation and migration of epithelial cells.