The multifunctional Staphylococcus aureus virulence factor Extracellular Adherence Protein (Eap) acts as an invasin addressing different cellular uptake mechanisms

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In the course of the evolutionary arms race, bacteria have developed the ability to invade host cells, which is considered a major immune evasion strategy. Specific proteins facilitate the invasion into non-phagocytic cells, offering protection from the host immune system and from antibiotic treatment. The bacteria can survive intracellularly with a downregulated metabolism and cause relapsing infection outbreaks. *S. aureus*, formerly described as extracellular pathogen is nowadays known as potentially intracellular present pathogen. One of its well described invasins is the extracellular adherence protein (Eap) which is able to alter the cytoskeleton structure of host cells [1] and increase the uptake of substances from the extracellular space. Our recent work demonstrates that Eap promotes the engulfment of particle of bacterial size [2] as well as smaller, virus sized particles [3] and liquids into eukaryotic cells. Eap seems to stimulate different energy dependent and independent uptake processes, depending on the host cell type [3]. Currently we focus on the effect of Eap on mechanisms like clathrin coated pits, calveolae and micropinocytosis using specific inhibitors. First trials for a clinical usage of this function show a significantly increased killing of intracellular *Salmonella enterica* by treating the cells with Colistin filled liposomes functionalized with Eap [3].

References:

[1] Eisenbeis et al., IJMM 307, 116-125 (2017).

[2] Bur et al., J. Invest. Dermatol. 2004-2012 (2013).

[3] Menina et al., Adv Healthc Mater.22, e1900564 (2019).