>>> ANNOUNCEMENT

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Implications of catch bonds and high aspect ratio shape on the mechanics of bacterial uptake by macrophages

ABSTRACT

To clear invading pathogens from the host, macrophages as major component of the innate immune system, are recruited to the site of inflammation. Upon binding of the target, the actin cytoskeleton of the macrophages is remodelled, leading to the formation of the phagocytic cup and subsequent internalization of the bacteria. While the underlying biochemical pathways of bacterial phagocytosis are well studied, little is known about the role of mechanical forces, the impact of bacterial shape, and the adhesion strength of the pathogens to the underlying substrate. Within my talk, I will discuss how alterations in *E.coli* shape upon exposure to antibiotics affect bacterial phagocytosis by macrophages [1] and how high-aspect ratio bacterial filaments accelerate biofilm formation on heterogeneously adhesive surfaces under fluid flow [2]. I will further describe a multistep process that macrophages exploit to pick-up firm surface adhering bacteria [3]. Our study highlights that the kinetics and mechanical properties of the macrophage filopodia, lamellipodia as well as the *E. coli* fimbriae have to be tightly tuned to each other to facilitate bacterial uptake from surfaces. Finally, our study suggests that soluble inhibitors that are exploited to suppress bacterial adhesion might instead have an unanticipated adverse effect by protecting firmly adhering E.coli from being sensed and cleared by host immune cells.

References

[1] Möller, Lühmann, Hall, Vogel. Nano Letters, 2012, vol. 12(6), pp. 2901-2905

[2] Möller, Emge, Avalos Vizcarra, Kollmannsberger, Vogel. New Journal of Physics, 2013, vol. 15(12), p. 125016

[3] Möller, Lühmann, Chabria, Hall, Vogel. Scientific Reports, 2013, vol. 3, p. 2884

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2010	PhD in Material Science, Laboratory of Applied Mechanobiology, ETH Zurich, Zurich, Switzerland
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