Two studies with a biophysical multitool: *Candida albicans* adhesion to central venous catheters; and the stiffening of human primary CD4$^+$ T cells during immunological synapse formation

Philipp Jung[1], Xiangda Zhou[2], Clara E. Mischo[1], Gubesh Gunaratnam[1], Christian Spengler[3], Sören L. Becker[1], Markus Hoth[2], Karin Jacobs[3], Bin Qu[2] and Markus Bischoff[1]

[1]*Institute for Medical Microbiology and Hygiene, Saarland University Homburg, Germany*
[2]*Center for Integrative Physiology and Molecular Medicine, Saarland University Homburg, Germany*
[3]*Experimental Physics, Saarland University Saarbrücken, Germany*

Atomic Force Microscopy is a versatile tool for a multitude of life science applications. Here, two approaches are presented in which AFM was used to study cellular interaction with the surfaces of medical devices and immunological model surfaces, respectively.
In a first approach, we addressed the *C. albicans* adhesion to central venous catheters (CVC), which is a basic condition for catheter-related infections. *C. albicans* is capable to form two morphotypes (yeast and hyphae). Although the contribution of these types to adhesion is still discussed, the yeast type is considered mostly responsible for initial host adherence [1]. Our force spectroscopy results indicate that *C. albicans* early state hyphae adhere with a significantly higher force to naïve and plasma-coated CVC than yeast cells, suggesting a bigger contribution of hyphae to initial adherence than previously expected.
In a second approach, the stiffness of T cells during the immunological synapse (IS) formation was studied by elasticity mapping. It is known that T cells are mechanosensitive [2]. However, the impact of cell stiffness on its functions is still discussed. Our experiments showed a reduced cell stiffness on LFA1 antibody-coated surfaces, compared to IS inducing surfaces (coated with LFA1, CD3 and CD28 antibodies), indicating an actively-driven cell stiffening and thus a role of stiffness in the formation of IS.

[1]F.L. Mayer *et.al.*, Virulence 15;4, 22913 (2013)
[2]M. Saitakis et al.,Elife 8;6, e23190 (2017)