

## Biophysics of Killing - Theory and Experiment

Cytotoxic T lymphocytes and natural killer cells are the main cytotoxic killer cells of the human body to eliminate pathogen-infected or tumorigenic cells. Various processes are involved in a successful killing event: activation of the killer cell, migration and search for the target, formation of a synapse and polarization upon contact with the target, transport of cytotoxic agents towards the synapse, and finally elimination of the target via necrosis or apoptosis. In this talk I will review various biophysical aspects of killing that were studied in collaboration with research groups from the UKS in Homburg. Topics include the analysis of search strategies of migrating killer cells; the efficiency of the spatial organization of the cytoskeleton for search problems occurring in intra-cellular cargo transport; the analysis of different killing strategies inducing necrosis or apoptosis; the modulation of the intracellular calcium homeostasis by mitochondria relocation towards the synapse; and the mechanistic understanding of the molecular motor driven cytoskeleton rotation towards the synapse during polarization.