Exploring the role of motility in bacterial infections

E. P. Ipiña[1], S. Otte[1], R. Pontier-Bres[2], D. Czerucka[2] & F. Peruani[1]

[1] Université Côte d'Azur, Lab. J. A. Dieudonné, UMR 7351 CNRS, Parc Valrose, F-06108 Nice Cedex 02, France,
[2] Centre Scientifique de Monaco (CSM), 8 Quai Antoine 1er, Monaco 98000, Principality of Monaco.
emperipi@unice.fr

During the early stages of pathogenic infections, bacterial motility plays a central role as it determines the ability of a bacterium to reach target cells. Locating host cells is the first step of a complex multi-step process involved in the bacterial infection : bacteria need first to find target cells, locate entry sites, adhere to the cell membrane, and finally infect the host cells, resulting in a large number of fail attempts before succeeding in infecting a cell. The infection capacity is thus determined by i) the motility properties of bacteria and ii) the affinity between the interaction bacteria-host cells. In this talk, we will present a mathematical model based on *in vitro* experiments with *Salmonella enterica* and human epithelial colonic cells. We define the first infection time (FIT) as the time it takes for a bacterium to infect a cell. The FIT allows us to correlate motility parameters and bacterium-cell affinity and estimate the number of bacteria infecting host cells as a function of time. Our results indicate that knowledge on FIT provides a solid understanding on the infection process, allowing to identify the virulence of the pathogen and define the timescale in which the immune system and medical treatments should respond to prevent the spread of the infection.