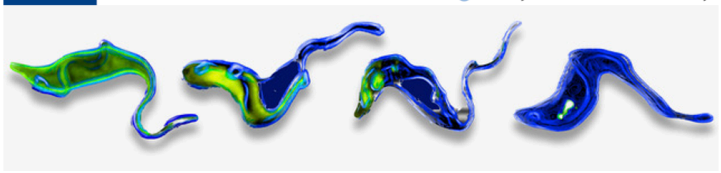

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Bacterial motility differs on slippery and non-slipper surfaces

Many microorganisms form sessile communities, called biofilms, in self-secreted extracellular polymeric substances (EPS), which often attach to solid surfaces. Biofilm-associated infections have dramatic economic and societal impacts. Recently, slippery surfaces based on liquid infused surfaces have been developed to prevent biofilm formation [1]. However, their antibiofilm performance can decay in hydrodynamic conditions due to shear induced oil depletion [2]. Therefore, another slippery surfaces (i.e. liquid-like solid surfaces) have been proposed as an alternative antibiofilm strategy [2]. For both liquid infused surfaces and liquid- like solid surfaces, they can significantly inhibit initial bacterial attachment and biofilm formation which is possibly due low contact angle hysteresis. It has been reported that various surface parameters such as surface roughness, surface wettability and surface charge could affect bacterial attachment and motility [3]. We hypothesized that these slippery surfaces can significantly affect how bacteria sense the surfaces and the subsequent bacterial motility.

In this work, we have designed flow cells, co-registered to microscope with high-speed camera, to enable the in-situ capture of bacterial movement. We have demonstrated that *P. aeruginosa* PAO1 and its mutant (e.g. type B Flagellin mutant, fliC) are much more motile on those slippery surfaces compared to non-slippery surfaces such as glass and Polydimethylsiloxane (PDMS). Furthermore, bacterial motility patterns have also significantly differed between slippery and non-slippery surfaces. This may advance our understanding about how bacteria sense the surfaces for better biofilm control.

References

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