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3D Confinement Effects on *Helicobacter pylori* Swimming SURAJ KUMAR KAMARAPU, HENRY FU, University of Utah — H. pylori bacterium has evolved to swim through highly acidic gastric mucus layer by diffusing ammonia from its body, neutralizing the surrounding medium and forming a pocket of Newtonian fluid around itself. The shape of this pocket, which depends on the Peclet number, determines the overall swimming behavior of the bacterium. We previously used a 2D Taylor sheet to model the swimming bacterium nearby a Brinkman medium that represented the mucus gel and found that the swimming speed monotonically increases as the distance between the swimmer and the gel decreases. However, swimming in such situations can also be highly dependent on body geometry, diffusion, swimming flows around the swimmer and requires a complete 3D model factoring in the above possible influences. Here we model the mucus gel with a random spatial distribution of regularized stokelets placed outside the Newtonian fluid pocket, and quantify its influence on the swimming speeds for a constant stroke. Advection-diffusion of ammonia is treated numerically allowing us to access large Peclet numbers. We find that for small Peclet numbers, the bacterium swims faster than predicted by a 2D model, but beyond a certain Peclet number, the bacterium can swim with reduced speed as it faces 3D confinement upstream.

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