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Run and Tumble of *Escherichia coli* in Micropillar Arrays[1]
POOJA CHOPRA, BIN LIU, Univ of California - Merced — Responses of microorganisms to emergent environmental conditions compose the dynamic nature of these biological systems. In an aqueous environment, an *Escherichia coli* bacterium responds to a gradient of chemical attractant or repellant by frequently switching between its 'run' and 'tumble' modes. Despite these extensively studied chemotactic behaviors, it remains unclear how and whether an individual bacterium responds to mechanical signals, such as physical contacts with boundary walls. Such a potential mechanosensing to solid boundaries is associated with bacterial adhesions and thus crucial for formation of their aggregates, known as biofilms. Here, we applied a patterned array of micropillars as well-controlled mechanical stimuli to aqueous bacteria. We examined the run-and-tumble swimming of *E.coli* subjected to these pillars. The long-term behaviors of individual bacteria were captured by a 3D tracking microscope for obtaining cell-specific statistics. By correlating the cellular behaviors to the pillar geometry and the detailed interactions, we explored the mechanisms of bacterial sensing and responding to solid structures by run-tumble statistics.

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