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Microfluidics for bacterial chemotaxis

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The emerging microfluidic technology opens up new opportunities for bacterial chemotaxis studies. In this talk, I will present our efforts in correlating molecular level events with cellular phenotypes in bacterial chemotaxis using microfabricated device. I will present results of bacterial chemotaxis in both single and dual chemical gradients. In single gradient experiments, we demonstrated that bacteria sense the chemical concentration at a logrithmic scale, similar to sensory system in higher organism. In dual gradient experiments, we showed that the number ratio of the two different types of receptor plays a critical role in bacteria's chemotactic decision making process. Experimental results based on single cell analysis will be presented. This work is supported by the National Science Foundation and the Cornell Nanobiotechnology Center.