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On-chip evaluation and manipulation of directed cell migration

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Directed cell migration is a complex cellular function that critically mediates a broad range of physiological and pathological processes. Chemical concentration gradient and electric field are two important guidance cues for many cell types such as immune cells, metastatic cancer cells, adult stem cells and neurons. Microfluidic devices can precisely configure cellular microenvironments and therefore have been increasingly employed to investigate the mechanism of directed cell migration and to manipulate migratory cells. In this short talk, I will briefly discuss our recent work in on-chip evaluation and manipulation of cell migration in response to chemical and electrical cues including 1) application of microfluidic systems for studying the molecular mechanisms of chemotaxis; 2) development of an all-on-chip method for rapid chemotaxis analysis; 3) microfluidic selection of therapeutic stem cells; 4) on-chip characterizations of immune-cancer cell migratory interactions.

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