

# A Review of Fabrication and Applications of Confined Microchannels for Cell Migration Assay

## Abstract

Cell migration is an essential process in a number of physiological and pathological events, and known to be modulated by external microenvironment because cells may sense physical and chemical signals from the microenvironment and collectively respond to these signals. Over the past two decades, a lot of efforts have been made to study how external microenvironment can affect cell migration behaviors. Cells often migrate through confined environments *in vivo*, such as extracellular matrices in tissues and capillary vessels. Understanding how cells move in these constrained spaces is crucial to clarify various biological processes. For instance, during embryonic development, cells migrate through specific pathways to form tissues and organs. In wound healing, cells migrate to repair damaged tissues. In cancer, tumour cells migrate to invade surrounding tissues and metastasize to distant sites. Recent advances of bio-MEMS technologies have enabled to characterize cell mechanics and to control local cellular environment at micro-scale. In order to study cell migration under confinement, microchannels have been widely fabricated and used due to their directionality and compatibility. Thus, this study reviews recent work on fabrication of microchannels and their applications to investigate cell migration behaviors, ranging from straight channels to tortuous structures. Challenges and limitations associated with studying cell migration in microchannels are also discussed. Reviewing cell migration in confined environments may provide valuable insights into the underlying mechanisms of cell migration and aid in developing strategies for therapeutic interventions.

## Keywords

Cell migration; Confined environments; Device fabrication; Microchannels; PDMS devices