

# Understanding cell behavior in complex multi-cue environments

C. van der Putten, A.B.C. Buskermolen, M. Werner, H.F.M. Brouwer, T.E. Woud, C.V.C. Bouten and N.A. Kurniawan

*Department of Biomedical Engineering, Eindhoven University of Technology, The Netherlands*

In vivo, cells are embedded in the extracellular matrix, which provides the cells with a variety of physical, (bio)chemical and mechanical cues. To understand cell behavior in this complex environment, researchers often isolate single environmental cues and subject cells to these cues in vitro. Although this approach gives useful insights, the environment is oversimplified. The response of cells to a combination of cues like what they experience in vivo is still poorly understood. Here we present a novel experimental platform to explore the cell response to a combination of curvature- and contact-guidance cues. Contact guidance cues are applied using photo-patterning of ECM proteins to a 2.5D cell culture chip containing a library of convex and concave curvatures mimicking tissue geometry. When subjected to opposing contact- and concave curvature-guidance cues, the cells showed an alignment response in the direction of the protein pattern. On convex curvatures, however, cells reorient to avoid a bent morphology, consistent with the results using curvature guidance cues only.