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Effect of surface topography on actin dynamics and receptor clustering in B cells CHRISTINA KETCHUM[1], XIAOYU SUN[2], WENXIA SONG[3], JOHN FOURKAS[4], ARPITA UPADHYAYA[5], University of Maryland - College Park — B cells are activated upon binding of the B cell receptor (BCR) with antigen on the surface of antigen presenting cells (APC). Activated B cells deform and spread on the surface of APCs which may comprise of complex membrane topologies. In order to model the diverse range of topographies that B cells may encounter, substrates fabricated with vertical ridges separated by gaps ranging from hundreds of nm to microns were coated with activating antigen to enable B cell spreading. Simultaneous imaging of actin and BCR shows that the organization of both depends profoundly on the ridge spacing. On smaller ridge spacing (<2 microns), actin forms long filopodial structures that explore the substrate parallel to ridges while the BCR clusters accumulate linearly along the direction of the ridges with limited ability to escape these channels. Cells on larger ridge spacing (>2 microns) exhibit central actin patches and peripheral actin waves and form semi-stable polymerization zones at ridges, while BCR distribution is more homogeneous. Our results indicate that surface topography may be a critical determinant of cytoskeletal dynamics and the spatiotemporal organization of signaling clusters.

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