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Response of Quiescent Cerebral Cortical Astrocytes to Nanofibrillar Scaffold Properties[1] VIRGINIA AYRES, VOLKAN MUJDAT TIRYAKI, KAN XIE, Michigan State University, IJAZ AHMED, DAVID I. SHREIBER, Rutgers, The State University of New Jersey — We present results of an investigation to examine the hypothesis that the extracellular environment can trigger specific signaling cascades with morphological consequences [1]. Differences in the morphological responses of quiescent cerebral cortical astrocytes cultured on the nanofibrillar matrices versus poly-L-lysine functionalized glass and Aclar, and unfunctionalized Aclar surfaces were demonstrated using atomic force microscopy (AFM) and phalloidin staining of F-actin. The differences and similarities of the morphological responses were consistent with differences and similarities of the surface polarity and surface roughness of the four surfaces investigated in this work, characterized using contact angle and AFM measurements. The three-dimensional capability of AFM was also used to identify differences in cell spreading. An initial quantitative immunolabeling study further identified significant differences in the activation of the Rho GTPases: Cdc42, Rac1, and RhoA, which are upstream regulators of the observed morphological responses: filopodia, lamellipodia, and stress fiber formation. The results support the hypothesis that the extracellular environment can trigger preferential activation of members of the Rho GTPase family with demonstrable morphological consequences for cerebral cortical astrocytes. [1] VM Tiryaki et al, Int. J. Nanomed.: 07, 3891 (2012)

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