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Quantifying Single Molecule Interactions from Single Cell Force Spectroscopy Data WAYNE CHRISTENSON, ROBERT ROS, ASU Dept. of Physics, IVAN YERMOLENKO, TATIANA UGAROVA, ASU School of Life Sciences — Single cell force spectroscopy has been demonstrated to be a powerful tool for measuring the maximum adhesion force between a cell and a surface or another cell. We present a method for quantifying specific integrin-ligand interactions on living cells using AFM based SCFS experiments. SCFS data from HEK 293 cells expressing αMβ2 leukocyte integrin and wild-type HEK 293 cells on surfaces coated with fibrinogen were analyzed to identify specific "rupture events." High force load ruptures imply a connection of the integrin with the underlying actin cortex of the cell, while low force load ruptures result from the formation of a membrane tether. For highly adhesive fibrinogen surfaces, we found 41% of all rupture events to have a high force load for HEK Mac-1 cells compared to only 9% of rupture events having a high force load for HEK WT data on the same surface. The high force load events in the HEK Mac-1 data showed a median rupture force of 55 pN while HEK WT cells showed a median rupture force of 29 pN. After adding monoclonal antibody directed against the αM subunit of the integrin, HEK Mac-1 cells showed similar rupture force values to that of the HEK WT. This analysis demonstrates the ability to quantify specific integrin-ligand interactions.

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