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Sub-cellular structure studied by combined atomic force-fluorescence microscopy[1] ANDREEA TRACHE, Texas A&M Health Science Center — A novel experimental technique that integrates atomic force microscopy (AFM) with fluorescence imaging was used to study the role of extracellular matrix proteins in cellular organization. To understand the mechanism by which living cells sense mechanical forces, and how they respond and adapt to their environment, we developed a new technology able to investigate cellular behavior at sub-cellular level that integrates an AFM with total internal reflection fluorescence (TIRF) microscopy and fast-spinning disk (FSD) confocal microscopy. Live smooth muscle cells exhibited differences in focal adhesions and actin pattern depending on the extracellular matrix used for substrate coating. Data obtained by using the AFM-optical imaging integrated technique offer novel quantitative information that allows understanding the fundamental processes of cellular reorganization in response to extracellular matrix modulation. The integrated microscope presented here is broadly applicable across a wide range of molecular dynamic studies in any adherent live cells.

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