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**Emergence of fractal behavior and other changes of cell surface during malignant transformation: AFM study of human cervical epithelial cells** MAXIM DOKUKIN, NATALIJA GUZ, CRAIG WOODWORTH, IGOR SOKOLOV, Clarkson University — Fractal behavior, self-similarity when zooming in or out, is frequently found in natural patterns emerged from chaos or any far from equilibrium systems. While expected and observed for tissues, the emergence of fractal behavior associated with malignant transformations was not observed at the level of single cell. Here report on the appearance of fractal behavior when normal human cervical epithelial cells become malignant. This was found by analyzing the adhesion maps imaged with AFM working in HarmoniX mode. Normal and malignant (a mix of cancerous and precancerous) cells were enzymatic only extracted from cervical tissue of healthy individuals and cancer patients, respectively. A surprising 100% discrimination of malignant and normal cells was observed. Although we previously reported differences in surface (brush) layer of cancer cells, the unambiguous quantitative divergence of the fractal behavior of the adhesion maps is a surprise (in particular, when compared to no difference found in the regular AFM images). The nature of the observed difference in the adhesion behavior will be discussed. These results may suggest that the fractal dimensionality can be treated as a new potential “physicomarker” for detection of individual cervical cancer cells.

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