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Atomic force microscopy: A tool to measure mechanical properties of living cells

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Atomic force microscopy is a very useful tool used to characterize various properties of samples that can be placed in distinct environment. Its main advantage is to probe elastic properties of living cells in a quantitative manner through the Young's (elastic) modulus. Mechanical properties of single cells should play a critical role in the development and progression of various diseases. In particular, the increased/decreased deformability is manifested in various cancers giving possibility to use it as a non-labeled biomarker of cancer progression. The main objective of the presented studies is to show neighboring cells of the same or distinct type influences the mechanical properties of single cells. Thus, as the investigated system, skin cells have been chosen, namely, fibroblasts (CCL-110), keratinocytes (HaCaT) and melanoma cells from radial growth phase (WM35). The first step was to measure the elastic properties of both fibroblasts and keratinocytes cultured separately (as a mono-culture) and together (as a co-culture). Then, the elasticity of keratinocytes and melanoma cells has been probed. All measurements were carried out at two time points after 24 hours and 48 hours of culture on living cells grown in culture medium of distinct composition. The obtained results have demonstrated that single cell elasticity, viability and shape are dependent on both the presence of neighboring cells and medium composition. These findings open further possibility to study the mechanics of single cancerous cells, embedded within a normal matrix containing normal cells imitating the environmental conditions of cancer invasion.

Biography

Barbara Orzechowska has completed her Master's degree at the Jagiellonian University in 2012. She is currently a PhD student at the Institute of Nuclear Physics Polish Academy of Sciences in Cracow, Poland.

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