HETEROGENITY OF RAT CARCINOSARCOMA CELLS ON ELASTIC POLYMER SUBSTRATES

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One of the basic steps in biomedical research is to examine cells in vitro under a microscope. To make this experiment reliable, researchers have to provide conditions similar to physiological ones. While chemical conditions are always provided by chemical composition of media and concentration of carbon dioxide in measurement chamber, physical factors, except temperature regulation, are often neglected. Most of research has been done on Petri dishes made of glass or plastic. In fact, most cells living inside a body interact with elastic tissues and have an ability to sense and transmit forces by means of membrane receptors and actomyosin skeleton attached to them. One of the easiest ways to mimic tissues' elasticity is to use polyacrylamide substrates. Change in the ratio between acrylamide (monomer) and bis-acrylamide (cross-linker) causes a difference in elasticity, varying from 0.1 kPa, up to hundreds of kilopascals. This range of Young modulus is corresponding to elasticity of physiological tissues.

In our study we have investigated the impact of substrate's elasticity on cell migration and behavior. The research has been conducted on highly heterogenous migrating rat carcinosarcoma cells (WC256 line). Single cells were migrating on two substrates: one made of glass ($E \approx 1$ GPa) and the second one made from polyacrylamide ($E = 40$kPa). To make a dynamic characterization of cell behavior, 4-hour time lapse movies have been recorded. Afterwards, the analysis of morphology and cell migration parameters has been conducted.

There are clear differences both in migration parameters and cell morphologies between cells cultured on two types of substrates. We have observed a change in velocity and directionality of cell movement, differences in cells shape, change in number of cells with particular morphologies and creation of different, dynamic migration strategy.