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## Efficient approach to 3D breast cancer structure formation and growth *in vitro*, in environments of varying rigidities

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Biological tissues normally possess varying levels of rigidity, which contribute to the performance of their physiological functions. Changes in tissue rigidity may reflect transformation from a normal to a pathological state. Cancer cells within the tumor are influenced by the mechanical conditions of their microenvironment, which can drive cell fate. Multicellular three-dimensional models provide a more suitably organized, *in vivo*-like structure, and respond better to external stimuli than 2D cultures. In the present study, we propose an efficient approach to mimic the desired surrounding rigidity *in vitro* for 3D breast cancer object/structure formation and growth. Non-adherent, non-tethered 3D objects were generated from *single cells* within a hydrogel array, cultured under various mechanical conditions and measured at single-object resolution exploiting the advantageous mechanical and optical properties of agarose. This study demonstrates differences in the *in vitro* development of 3D breast cancer structures under various rigidity conditions. Study of individual 3D breast cancer structures reveals that significant differences in object growth rate, morphology and vital features are associated with the extent of environmental rigidity, the point in time at which a change occurred and the initial number of seeded cells. The 3D objects initiated from less than six cells are significantly different from those initiated by more cells and demonstrate a growth rate independent from surrounding rigidity. Additionally, the control culture of 3D objects grown freely under low-rigidity conditions lacks the specific subset of the preinvasive phenotype which developed in the stiffer surroundings.

### Biography

Elena Afrimzon has completed her PhD from Central Institute of Immunology, Microbiology and Infectious Diseases (Alma-Ata, Kazakhstan). She is Senior Researcher at the Biophysical Interdisciplinary Jerome Schottenstein Center for the Research and the Technology of the Cellome, Department of Physics, Bar-Ilan University. She is the initiator of the development and utilization of a novel hydrogel micro-chamber array for protracted culturing of live cells and 3D multicellular objects, which permits kinetic live cell studies. She has published more than 25 papers in reputed journals.

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