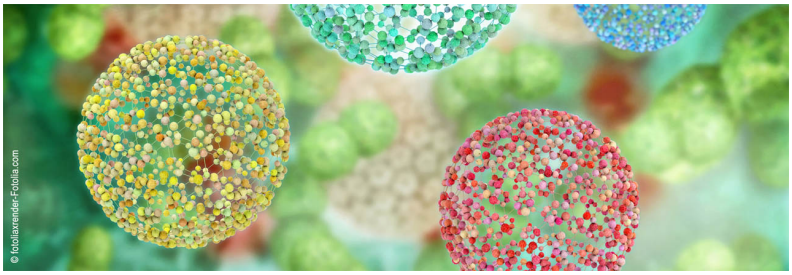

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Unraveling the Healthy-to-Cancer Transition: Water Dynamics as a Key Biomarker

The normal-to-cancer transition (NTC) is still a poorly understood process, known to be closely associated to cellular biomechanical properties. These are strongly dependent on the behaviour of water, which plays a key role in normal cellular activity and in maintaining the three-dimensional architecture of the tissue. In this study, quasi-elastic neutron scattering (QENS) was used to probe the dynamics of water in (1) human cells (breast, prostate and lung), both malignant and non-malignant; and (2) human tissues (breast and tongue), cancer and respective surrounding normal specimens. An increased plasticity of the cytomatrix was observed upon normal-to-malignant transformation, the lung carcinoma cells displaying the highest flexibility followed by prostate and breast cancers. Additionally, different dynamics were found for malignant and non-malignant tissue samples, depending on their characteristics: a higher plasticity for breast invasive cancer tissue versus normal, and an opposite profile for tongue. This biophysical description of malignancy provides a novel approach for identifying specific reporters of cancer, and for helping to understand the NTC transition. This may contribute for the development of improved diagnosis and chemotherapeutic tools, thus benefiting cancer treatment and oncology patients' prognosis.

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