

Physical parameters matter in terms of cancer cells' metastatic ability

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The micro-environment surrounding cancer cells is just as important as genes in regulating tumour progression. Scientists have therefore examined the biophysical and biochemical cues occurring in the vicinity of cancer cells. This represents a departure from the traditional measurement of secreted molecules, called biomarkers. The latest research in this field, recently published in *EPJ Plus*, found that the presence of a substance called Epidermal Growth Factor (EGF) promotes the motility of elongated mesenchymal tumour cells, which migrate depending on their adhesive properties by climbing along collagen fibres, in contrast to rounded tumour cells, which migrate in an adhesion-independent manner. These findings stem from the work of

Dongil Geum and BJ Kim in the Wu biofluidics lab at Cornell University, Ithaca, New York, USA.

Previous research has demonstrated that EGF regulates the motility of tumour cells embedded within a 3D biological matrix. The authors thus used a malignant breast tumour cell line cultured in a 3D biological gel, made of collagen, to mimic the in vivo conditions. In addition, they used live cell imaging to follow the evolution of individual cells' shape and dynamics. Combining the two approaches, they then quantified the physical parameters of the tumour cells, including their cell shape, motility types, speed and persistence.

They found that EGF promotes cell dissemination through a significant increase in cell persistence - that is, cells migrate in one direction for a long time before switching to a different direction - along with a moderate increase in speed of motion. The increase of persistence is correlated with the increase in the percentage of the [mesenchymal cells](#) within the population. This means that micro-environmental cues linked to the presence of EGF contribute to modulating the mobility of [tumour cells](#) - which by their nature can easily change and vary in form. These findings suggests that the cell aspect ratio could constitute a potential visual cue for diagnosing invasive states of breast [cancer cells](#), and ultimately other cancer cells.

More information: Dongil T. Geum et al. Epidermal growth factor promotes a mesenchymal over an amoeboid motility of MDA-MB-231 cells embedded within a 3D collagen matrix, *The European Physical Journal Plus* (2016). [DOI: 10.1140/epjp/i2016-16008-8](https://doi.org/10.1140/epjp/i2016-16008-8)

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