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Comparative analysis of expression of stem cell and EMT markers from the 2D culture and different 3D models of mammospheres; applying a mathematical model

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The majority of the current cancer research is based on 2D cell cultures and animal models. These methods have limitations, including different expression of key factors involved in carcinogenesis and metastasis, depending on culture conditions. Addressing these differences is crucial in obtaining physiologically relevant results. Stemness and epithelial-mesenchymal transition (EMT) is linked to the increased invasive potential and metastasis, thus exploring the expression of this markers in a different growth conditions is essential. We report plasticity of expression of selected stem cell and EMT markers in different culture conditions, pointing to the importance of spatial parameters. The most significant difference is the expression of adherent cell junction protein E-cadherin, which changes dramatically between standard 2D culture, floating spheroid culture and matrigel scaffolded culture. As a step towards understanding the reasons causing these discrepancies, we have created a mathematical model of tensions within the 3D bioprinted culture.