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Insights: Publications

Novel Insights From 3D Models: The Pivotal Role Of Physical Symmetry In Epithelial Organization

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3D tissue culture models are utilized to study breast cancer and other pathologies because they better capture the complexity of in vivo tissue architecture compared to 2D models. However, to mimic the in vivo environment, the mechanics and geometry of the ECM must also be considered. Here, we studied the mechanical environment created in two 3D models, the overlay protocol (OP) and embedded protocol (EP). Mammary epithelial acini features were compared using OP or EP under conditions known to alter acinus organization, i.e. collagen crosslinking and/or ErbB2 receptor activation. Finite element analysis and active microrheology demonstrated that OP creates a physically asymmetric environment with non-uniform mechanical stresses in radial and circumferential directions. Further contrasting with EP, acini in OP displayed cooperation between ErbB2 signalling and matrix crosslinking. These differences in acini phenotype observed between OP and EP highlight the functional impact of physical symmetry in 3D tissue culture models.