

New Engineering Tools to Study Cell-ECM Interactions in-vitro

Francesco PASQUALINI – University of Pavia

We aim to characterize and model the complex interactions between cells and the extracellular matrix to understand mechanobiology and morphogenesis. To achieve this, we developed three innovative tools: TEMPO, a cell line with advanced sensors for phenotypic screening; HYDRA, an automated method for fabricating hydrogels in high-throughput microplates; and SEM2, a computational framework for cell and tissue mechanics. With the vertically integrated development of TEMPO, HYDRA, and SEM2, we seek to tackle aspects of mechanobiology and morphogenesis that would be difficult to address using only engineered cells, platforms, or computational models. Together, these tools enhance our capacity to characterize and model cell-material interactions, contributing to theoretical and practical applications in the field. We have developed these tools to be available to the academic community via open science channels and foster collaborative progress in mechanobiology and morphogenesis. We expect these tools to be handy for 3D bio-printing applications where programming ECM-cell interactions remains challenging.