

The Matrix: How the Mechanics of the Environment Informs Critical Cell Decisions

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THE mechanics of cell micro- and nano-environment in mammalian organisms shapes and is shaped by the cells embedded in the extracellular matrix. To self-organize and maintain a viable organism consisting of a multitude of cells and organs, there must be exquisitely sensitive mechanisms informing individual cells about their mechanical neighborhood. Compared to chemical cues, mechanical signals controlling cell behavior and the molecular networks transducing them are relatively poorly understood. However, emergence of new tools has enabled recent progress in unraveling multiple aspects of these processes, strongly suggesting that mechanical cues can provide powerful guidance of such crucial cell decisions as the direction of polarity of cell division and migration, selection of cell fate during tissue development and repair, and collective cell responses during functioning of a tissue. In this talk I will review recent results from our lab related to this research topic, with the particular emphasis on the decision-making signaling networks controlling cell differentiation.