

Abstract Submitted
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Long-range mechanical force in epithelial tubule self assembly

CHIN-LIN GUO, None — In vivo, epithelial cells can respond to extracellular matrix (ECM) molecules, type I collagen (COL), and switch their morphology from a lobular lumen (100-200 micron) to a tubular lumen (1mm-1cm). However, the mechanism is unclear. Using a temporal control of cell-ECM interaction, we find that epithelial cells, in response to a fine-tuned percentage of COL in ECM, develop various linear patterns. Remarkably, these patterns allow cells to self-assemble into a tubule of length ~ 1 cm and diameter ~ 400 micron in the liquid phase. In contrast with conventional thought, the linear patterns arise through bi-directional transmission of traction force, but not through diffusible biochemical factors secreted by cells. In turn, the transmission of force evokes a long-range (~ 600 micron) intercellular mechanical interaction. A feedback effect is encountered when the mechanical interaction modifies cell positioning and COL alignment. Micro-patterning experiments further reveal that such a feedback is a novel cell-number-dependent, rich-get-richer process, which allows cells to integrate mechanical interactions into long-range (> 1 mm) linear coordination.

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None

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