Abstract Submitted
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Healing of small circular model wounds OLIVIER COCHET, PHILIPPE MARCQ, JONAS RANFT, Laboratoire Physico-Chimie Curie, UMR168, Institut Curie/CNRS, MYRIAM REFFAY, Laboratoire Matière et Systèmes Complexes, Université Paris Diderot/CNRS, AXEL BUGUIN, PASCAL SILBERZAN, Laboratoire Physico-Chimie Curie, UMR168, Institut Curie/CNRS, BIOLOGY INSPIRED PHYSICS AT MESOSCALE TEAM[1], PHYSICAL APPROACH OF BIOLOGICAL PROBLEMS TEAM[2] — We develop a new method to produce numerous circular wounds in an epithelial tissue of MDCK cells in a non-traumatic fashion. The reproducibility of the wounds allows for a quantitative study of the dynamics of healing and for a better understanding of the key processes involved in those collective morphogenetic movements. First, we show different mechanisms of closing depending on the initial size of the wound. We then focus on the healing of the smallest wounds from an experimental and theoretical point of view. At the onset of closure, an actomyosin ring is formed around the wound and small protrusions appear and invade the free surface. Using inhibition and laser ablation experiments, we show the relative contribution of both processes to the dynamics of closing. Finally, we develop a theoretical model of the tissue as a whole, combined with the observed forces, in order to better understand the underlying mechanics of this process. We hope that this qualitative and quantitative description will prove useful in the future for the study of epithelial architecture, collective mechanisms in migrating tissues and, on a broader context, cellular invasion in cancerous tissues.

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