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Orientation and shape dependence of embryonic wound healing¹ HOLLEY LYNCH, XIAOYAN MA, M. SHANE HUTSON, Vanderbilt University — Wounds in embryonic epithelia heal without scarring. They do so via the combined action of two cytoskeletal structures: an actin-rich supracellular purse-string at the wound margin; and actin-based projections like filopodia. Neither structure is absolutely required for wound closure and their relative importance depends strongly on wound shape. To further investigate this dependence, we have followed the healing process in fruit fly embryos using confocal microscopy after precise laser incisions. The wound shape and rate of healing depend on the orientation of the incision. Cuts along the long axis of the embryo initially expand to greater areas and round up. Cuts along the short axis expand less and remain elliptical. These short-axis wounds heal more quickly and in a different manner. For such cuts, cellular projections tend to bridge across the ends of the wound. After such bridges are formed, the smaller holes (towards the ends of the wound) close quickly. On the other hand, for cuts along the long axis, the cellular projections tend to bridge across the middle of the wound – often leaving two to three holes of similar size that then close independently at similar rates.

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M. Shane Hutson Vanderbilt University

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