# Organ size control via the interplay between luminal pressure and cell mechanics

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Organ size control is fundamental in animal development. However, the underlying mechanisms acting across the scales from the whole multi-cellular tissues to single cells remain elusive. Given that luminal formation is universal in epithelial tissues, fluid pressure may play a substantial role during morphogenesis [1]. Here, we use early mouse embryos and combine genetics and biophysics to understand the mechanisms by which cell fate specification is coordinated with organ size control. Mammalian embryogenesis involves the formation of a fluid-filled cavity in the blastocyst. We showed that the cortical tension of the cells surrounding the blastocyst cavity is developmentally controlled. This is achieved by multiple feedback loops between the luminal pressure, tissue/cell geometry, cortical tension and cell-cell adhesions operating from sub-cellular to whole organism scales. In contrast with previous models based on cell proliferation and growth, our findings reveal the integral roles of fluid and tissue mechanics in controlling organ size and development.

[1] Navis. A, Bagnat. M, Current Opinion in Genetics & Development 32:24-30 (2015).