MAR08-2007-004924

Abstract for an Invited Paper
for the MAR08 Meeting of
the American Physical Society

Forces driven by morphogenesis modulate Twist Expression to determine Anterior Mid-gut Differentiation in *Drosophila* embryos

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By combining magnetic tweezers to *in vivo* laser ablation, we locally manipulate *Drosophila* embryonic tissues with physiologically relevant forces. We demonstrate that high level of *Twist* expression in the stomodeal primordium is mechanically induced in response to compression by the 60±20 nN force developed during germ-band extension (GBE). We find that this force triggers the junctional release and nuclear translocation of Armadillo involved in Twist mechanical induction in the stomodeum in a Src42A dependent way. Finally, stomodeal-specific RNAi-mediated silencing of Twist during compression impairs the differentiation of midgut cells, as revealed by strong defects in Dve expression and abnormal larval lethality. Thus, mechanical induction of Twist overexpression in stomodeal cells is necessary for subsequent midgut differentiation.

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