Developmental Biology

Volume 250, Issue 1, 1 October 2002, Pages 71-90

Regular Article

Drosophila APC2 and APC1 Have Overlapping Roles in the Larval Brain Despite Their Distinct Intracellular Localizations

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https://doi.org/10.1006/dbio.2002.0777

Abstract

The tumor suppressor APC and its homologs, first identified for a role in colon cancer, negatively regulate Wnt signaling in both oncogenesis and normal development, and play Wnt-independent roles in cytoskeletal regulation. Both *Drosophila* and mammals have two APC family members. We further explored the functions of the *Drosophila* APCs using the larval brain as a model. We found that both proteins are expressed in the brain. APC2 has a highly dynamic, asymmetric localization through the larval neuroblast cell cycle relative to known mediators of embryonic neuroblast asymmetric divisions. Adherens junction proteins also are asymmetrically localized in neuroblasts. In addition they accumulate with APC2 and APC1 in nerves formed by axons of the progeny of each neuroblast-ganglion mother cell cluster. APC2 and APC1 localize to very different places when expressed in the larval brain: APC2 localizes to the cell cortex and APC1 to centrosomes and microtubules. Despite this, they play redundant roles in the brain; while each single mutant is normal, the zygotic double mutant has severely reduced numbers of larval neuroblasts. Our experiments suggest that this does not result from misregulation of Wg signaling, and thus may involve the cytoskeletal or adhesive roles of APC proteins.

Keywords

APC; β-catenin; Armadillo; brain; Wingless; *Drosophila*; tumor suppressor; neuroblast; cadherin; asymmetric division

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