Life Sciences

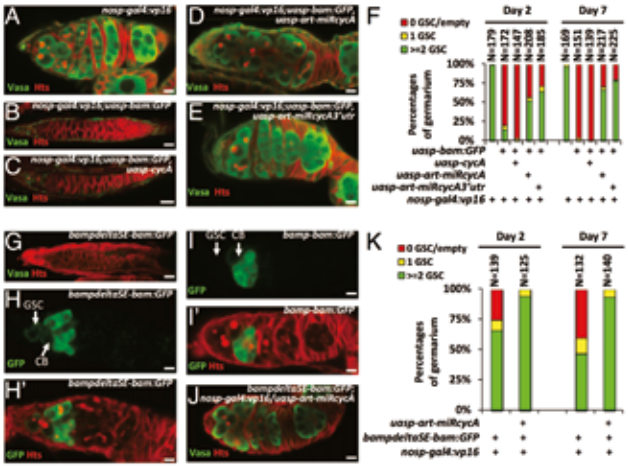
Researchers Identify a Novel Mechanism That Regulates Germline Stem Cell Function in *Drosophila*

In adult tissues, stem cells are defined by their unique capacity to self-renew and produce non-equivalent daughters that can differentiate into cell lineages to maintain tissue homeostasis. Misregulation of stem cell functions has been implicated in a variety of human diseases such as degenerative diseases and cancer. Thus, understanding the regulatory mechanisms of adult stem cells is important for stem cell biology and their future use in regenerative medicine.

The *Drosophila* ovarian germline stem cell (GSC) system has provided a heuristic model to study stem cell regulation *in vivo*. Early genetic studies have demonstrated that the *bag of marbles* (*bam*) gene plays a critical role in promoting GSC and cystoblast (CB) differentiation in *Drosophila* ovary. During the last decades, genetic functions of *bam* and its regulation in early germ cells have been extensively investigated, however, the biochemical nature of the Bam protein has remained a mystery.

Prof. CHEN Dahua and Prof. SUN Qinmiao, who lead a research team at the Institute of Zoology, Chinese Academy of Sciences, characterize that Bam functions as a ubiquitin-associated protein to regulate germline stem cell function and germline cyst division. Their mechanistic study reveals that Bam forms a complex with *Otu*, a deubiquitinase, to promote deubiquitination and stabilization of CycA, thereby promoting germline stem cell differentiation.

This research not only identifies a novel biochemical function of Bam, which contributes to GSC fate determination, but also uncovers a novel mechanism by which a coordinated action via both ubiquitination and deubiquitination pathways is critical to balance stem cell self-renewal and differentiation.



Otu genetically interacts with *bam*. (Image by CHEN Dahua's group)

This study, entitled "*Bam-dependent deubiquitinase complex can disrupt germ-line stem cell maintenance by targeting cyclin A*", was published online in the *PNAS* on May the 8th (http://www.pnas.org/content/early/2017/05/05/1619188114.full). It was supported by the National Basic Research Program of China, the Natural Science Foundation of China, and the Strategic Priority Research Program of the Chinese Academy of Sciences.

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