

Scientists uncovered molecular machinery related to stem cell fate

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The Stowers Institute's Xie Lab has revealed how the BAM protein affects germline stem cell differentiation and how it is involved in regulating the quality of stem cells through intercellular competition. The work was published today by *PNAS Early Edition*.

Maintaining the proper balance between stem cell self-renewal and differentiation is critical for normal homeostasis. An imbalance between the two can lead to tissue degeneration and to the development of tumors. It has long been known that the BAM protein is necessary for germline stem cell differentiation, but the specific [molecular mechanism](#) underlying BAM function had remained a mystery until now.

Examining the fruit fly ovary, the Xie Lab established that BAM controls stem cell differentiation and competition by interfering with the function of the protein translation initiation factor eIF4A. EIF4A and BAM antagonize each other to regulate the balance between self-renewal and differentiation by promoting proper expression of E-cadherin — a molecule crucial to the stem cell's ability to attach to its microenvironment (its niche).

"Our studies contribute to the understanding of stem cell fate control," said Run Shen, Ph.D., Postdoctoral Research Associate in the Xie Lab and lead author on the paper. "Many protein translation initiation factors have been reported to be unregulated in different human cancer tissues, so our study may help to understand how translational initiation factors participate in stem cell misregulation and the development of tumors."

"Our studies have established the role of BAM as a protein translational repressor using biochemical and genetic tests," said Ting Xie, Ph.D., Investigator and senior author on the paper. "Translational control is very important in regulating [gene expression](#). Many genes critical for stem cell development in the fruit fly germline are suggested to be translational regulators, but their exact roles have not been carefully studied. The knowledge generated by this work and the tests we have developed give us great advantage in tackling many additional questions."

Source: Stowers Institute for Medical Research

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