Conserved role for Ovo protein in reproductive cell development in mice and fruit flies

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Germline cells are the only cells that develop into eggs or sperm, while somatic cells develop into the body. Progenitors of the germline, known as primordial germ cells (PGCs), differentiate into eggs or sperm after embryonic development. The expression of a select group of genes

occurs in the PGCs of a number of different animal groups, indicating a possible conserved mechanism of germline gene activation. Indeed, the conserved transcription factor protein Ovo is required for expression of these genes, but it was previously unclear if Ovo was needed for normal germline development of the fruit fly (Drosophila) or whether the related mouse protein played a similar role in mouse embryos.

Japanese research coordinated by the University of Tsukuba has now identified an evolutionarily conserved mechanism of controlling germline development involving Ovo. The study was reported in *Scientific Reports*.

The ovo gene of Drosophila encodes three proteins, of which Ovo-B was found to be the most abundant in PGCs. The researchers used the Ovo-A protein to block the function of Ovo-B, and observed that both male and female Drosophila had underdeveloped reproductive organs.

"We next compared Drosophila PGCs lacking Ovo-B function with normal PGCs, and identified 510 genes that showed increased expression, including several involved in the development of somatic tissues and organs of the body," corresponding author Satoru Kobayashi says. "This suggested to us that within PGCs, Ovo-B suppresses expression of genes that are active in somatic cells."

In contrast, using previously published data combined with current findings, the team showed that Ovo-B switches on the expression of key germline genes.

To examine the role of the related mouse protein Ovol2, the researchers studied mice with and without the Ovol2 gene. "In the absence of Ovol2, no change was seen in the somatic development of the mouse at an early embryonic stage," Kobayashi says. "However, very few PGCs were observed, suggesting that it is required for germline development."

The similarity between the defects seen in both mice and Drosophila lacking the Ovo function indicates a conserved role for Ovo protein in controlling germline development in the two species. The team speculates that Ovo is involved in regulating common genes for germline development.

More information: Makoto Hayashi et al. Conserved role of Ovo in germline development in mouse and Drosophila, *Scientific Reports* (2017). DOI: 10.1038/srep40056

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