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Tracing and characterizing the development of transplanted female germline stem cells *in vivo*

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Recent evidence has demonstrated the isolation and culture of Female Germline Stem Cells (FGSCs) from adult mice and humans. However, the process and mechanisms of FGSC differentiation *in vivo* following transplantation have not yet been studied. Here we isolate and characterize FGSCs from a single EGFP-transgenic mouse. Results show FGSCs exhibit a homing ability and begin to differentiate into early-stage oocytes only when they reach the edge of the ovarian cortex. The transplanted FGSCs restore function of premature ovarian failure (gdf-9iCre; PtenloxP/loxP genotype) and generate offspring. Furthermore, results demonstrate that the developmental mechanisms of follicles derived from transplanted FGSCs are similar to that of WT follicles. Weighted gene co-expression network analysis identifies two potential sub-networks and core genes that play a critical role in follicular development. These findings provide a theoretical basis and lay a technology platform for specific or personalized medical treatment of ovarian failure or other ovarian diseases.

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