

Cell-biological investigation of the stem cell system that supports the mammalian spermatogenesis

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【Outline of survey】

Mammals including humans exhibit a numerous daily sperm production for long reproduction period. This is supported by “stem cells” that supply differentiating progeny, while maintaining their own population. However, it is still largely a puzzle which cells the “stem cells” are among a numerous spermatogenic cells found in the testis, or, where and how the “stem cells” behave to ensure the continuous spermatogenesis.

Previous studies of our own have suggested that a particular subpopulation of transit amplifying cells retain the self-renewing potential, while do not self-renew in the normal spermatogenesis. This population may play an important backup role in replenishment of the occasional homeostatic stem cell loss, and thus ensure the spermatogenesis continuity. This research project will “look the shapes”, “clarify the locations”, “watch the movements” and “chase the fates” of these populations, taking advantages of a variety of experimental strategies. Subsequently, this study aims to reveal the entire composition and function of the “stem cell system” for the mammalian spermatogenesis.

【Expected results】

Results of this study would contribute toward a general understanding and control of the stem cell system, not only in spermatogenesis but also other system such as skin or blood stem cells. Revealing the mammalian spermatogenic stem cell system would contribute, on one hand, to the investigation and care of the male infertility in human. On the other hand, this would also lead to development of a novel contraceptive strategy against the global population problem.

【References by the principal investigator】

- T. Nakagawa, Y-i. Nabeshima and ***S. Yoshida**: Functional identification of the actual and potential stem cell compartments in mouse spermatogenesis
Developmental Cell 12, 195-206 (2007)
- ***S. Yoshida**, M. Sukeno and Y-i. Nabeshima: A vasculature-associated niche for undifferentiated spermatogonia in the mouse testis
Science 317, 1772-1776 (2007)

【Term of project】 FY2008–2012

【Budget allocation】

79,500,000 yen (direct cost)

【Homepage address】 <http://lmls.med.kyoto-u.ac.jp>