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Short Communication

Recovery of Spermatogonia Stem Cells in Regenerative Medicine

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DESCRIPTION

Spermatogonial stem cells are unique cells that have the potential of self-renewal and differentiation and line the basal lamina of seminiferous tubules in the testis. These cells are crucial to maintaining male fertility because they participate in the process of spermatogenesis, which transmits genetic information to the next generation. Recent studies have revealed the cellular and molecular properties of spermatogonial stem cells' pluripotency. These cells have the ability to differentiate into all three germ layers ectoderm, endoderm, and mesoderm and exhibit characteristics that are similar to those of embryonic stem cells [1].

Spermatogonial stem cells considered as a novel cell source that confines the technical and ethical difficulties accompanied with the other pluripotent stem cells. Patient-specific cell lineages without limitations of immunological rejection and specific auto transplantation are the beneficial's associated with these cell population.

Additionally, spermatogonial stem cell engraftment-based cell therapy offers to preserve fertility and stimulate individuals who are infertile to develop their reproductive potential [2].

Isolation and propagation of SSCs

The first stage in cellular approaches for regeneration strategies is the isolation of SSCs. The issue of SSCs' low density in the testis can be resolved by purifying them.

Undifferentiated spermatogonia, which include singles, pairs, and chains of up to 16 spermatogonia, are present at the beginning of spermatogenesis [3]. The SSCs are among the single spermatogonia. Up to now, broadly different approaches to purify SSC have been informed by various groups.

STRA8, a premeiotic marker, was used to select the cells in order to purify SSCs from adult testes. Hofmann employed GFR1, a membrane marker, for SSC purification.

The proliferative activity and colony formation of spermatogonia cells that were positive for this marker resulted in lineage differentiation and the development of mature sperm. Id4-Gfp marker was chosen by Chan et al. to isolate SSCs from adult mouse testes. Their results demonstrated that the Id4-Gfp+cell population satisfies the prerequisites for SSCs that can establish colonies upon transplantation into donor testes. In contrast to other markers like GFR1, Komai et al. first introduced Bmi1 as a particular marker for SSCs. Since SSCs express the Bmi1 marker and their proliferation depends on the seminiferous stage, SSCs that are BMI positive can sustainably regenerate SSCs. In undifferentiated mouse spermatogonia cells, Melissa in 2014 demonstrated expression of the transcriptional repressor ID4, which mediates cell proliferation and is up-regulated [4,5].

In undifferentiated mouse spermatogonia cells, Melissa in 2014 demonstrated expression of the transcriptional repressor ID4, which governs cell proliferation and is up-regulated in response to stimulation with GDNF.

CONCLUSION

SSCs may be cultured and multiplied *in vitro*, making them an excellent model for research on spermatogenesis, male infertility, and genetic engineering for the preservation of species. The best methods for maintaining SSCs *in vitro* have been developed recently, and they include co-culturing systems, specific stem pro media, and SSC culture in the presence of serum or serum-free medium.

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