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Poster Presentations

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In vitro spermatogenesis in artificial testis

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Background: As a valuable resource for cell therapy, human spermatogonial stem cells (hSSCs) have raised hopes for the treatment of male infertility. Various 3D methods have been developed to produce cellular aggregates and mimic the organization and function of the testis. The rate of progression and breakthrough in vitro spermatogenesis is lower than that of SSC transplantation, but newer methods are also being developed.

Objective: Therefore, this paper discusses the promising methods of artificial testis development, which can be used for sperm production in vitro.

Materials and Methods: The relevant articles were searched in PubMed, Google Scholar, and ScienceDirect databases.

Results: The production of an artificial reproductive organ capable of supporting SSC differentiation will certainly be a major step forward in male infertility. The mammalian extracellular matrix (ECM) increases proliferation, migration, and/or differentiation of different stem cells and can facilitate the survival of hSSC in the culture medium. The use of testicular ECM for culture of germ cells has recently been reported. Given the importance of testicular ECM, seeding stem cells onto such decellularized scaffolds to create artificial tissues and organs can be promising for the restoration, preservation, or improvement of tissue/organ function in clinical therapy. ECM hydrogels as substrates for cell culture can also be appropriate for hSSC culture. Organoids can be formed from pluripotent stem cells or under the support of a scaffold (generally matrigel) and tissue-specific growth factors and morphogens. Recently, few studies have been conducted on the development of dynamic culture systems including bioreactor and microfluidic systems in testicular tissue that the tissue is exposed to a continuous, controlled flow of fresh media. 3D bio-printing is a novel way of developing organs or functional structures that allow cells and tissues to accumulate with great accuracy. Bioprinting can support gamete differentiation in a matrix-rich 3D environment.

Conclusion: Fabrication of biofunctional testis can be one of the new options for in vitro sperm production, maintaining fertility, or transplantation without the risk of cancer cell infestation to restitute spermatogenesis in vivo.

Key words: *Spermatogonial stem cell, Bioartificial testis, Differentiation.*