9th Yazd International Congress and Student Award on Reproductive Medicine with 4th Congress of Reproductive Genetics

Key Lectures

K-87
Current state of art use of stem cells for regenerating tissues and possibility of using iPSCs to generate mature spermatozoa in the future

Zandieh Doulabi B.
Department of Oral Cell Biology, Academic Centre for Dentistry Amsterdam (ACTA), University of Amsterdam and VU University Amsterdam, Amsterdam, Netherland.
Email: bzandiehdoulabi@acta.nl

Integrated research of stem cells and tissue engineering is essential to improve health issues in the field of regenerative medicine. Tissue engineering combines various fields such as biochemistry, cell biology, materials science, transplantation and hardware engineering in an effort to repair or replace damaged tissues. Stem cells are defined by their ability to self-renew and differentiate into a variety of cell types. Stem cells are divided into 3 groups depending on multilineage differentiation capacity (Totipotent, pluripotent and multipotent). To date, in contrast with tissue-engineered bone, cartilage, muscle, nerve, and skin, tissue engineering of other tissues and organs is much less advanced. This is caused by the fact that there is a limited choice of appropriate cells, biomaterials, chemical stimuli such as hormones and physical stimuli such as mechanical loading. Infertility affects 15% of men of reproductive age worldwide. Spermatogenesis is the proliferation and differentiation of spermatogonial stem cells. For spermatogonial stem cell therapy to be a success, and cultured sperm stem cells to become mature sperm, they need the proper stimuli such as the right microenvironment. However, until now these microenvironment conditions remain the object of speculation. Besides spermatogonial stem cells, the use of adult-derived induced pluripotent stem cells (iPSCs) might be a promising cell source to generate mature sperms. These cells, like embryonic stem cells, have the potential to form eggs and sperm. Although controversy surrounds their use, iPSCs have a huge potential for biological and therapeutic applications for male infertility, provided that in vitro spermatogenesis models for iPSCs can be established, thereby providing insights into the mechanism of human spermatogenesis and its regulation. The challenge remains that the molecular mechanisms underlying human male germ cell development remain poorly understood. But the iPSCs will have extra therapeutic implications for male infertility when combined with genome editing technology in near future.