STEM CELLS IN TREATMENT OF MALE INFERTILITY

Essay

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(A pr)= A paired.

(AD)= A dark.

(AEC)= amniotic epithelial cell.

(AL)= A long.

(AMD)= age related macular degeneration.

(ANT)= alterd nuclear transfer.

(AP)= A pale.

(As)= A single.

(ASD)= adult stem cell.

(BFGF)= basic fibroblast growth factor.

(BM)= bone marrow.

(BMSC)= bone marrow stem cell.

(BMT)= bone marrow transplantation.

(CBAVD)= congenital bilateral absence of vas.

(CF)= cystic fibrosis.

(CFTR)= cystic fibrosis transmembrane conductance regulator gene.

(CIS)= carcinoma in situ.

(dpc)= day post coitus.

(EC)= embryonic carcinoma.

(ESC)= embryonic stem cells.

(FBS)= fetal bovine serum .

(FCS)= fetal bovine serum.

(FSC)= fetal stem cell.

(FSH)= follicular stimulating hormone.

(GCC)= germ cell cancer.

(GCT)= germ cell tumor.

(GDNF)= glial cell line derived neurotopic factor.

(Gn-RH)= gonadotrophine releasing hormone.

(GVHD)= graft versus host disease.

(HCG)= human chorionic gonadotrophine hormone.

(HD)= Hodgkin disease.

(HDCT)= high dose chemotherapy.

(HEGC)= human embryonic germ cell.

(HESC)= human embryonic stem cell.

(HIV)= human immunodeficient virus.

(HMG)= human menopausal globulin.

(HSC)= haematopoietic stem cell.

(HUCB)= human umbilical cord blood.

(IBT)= immunobead test.

(ICSI)= intracytoplasmic sperm insemination.

(IgG)= immunoglobulin G.

(IPS) = induced pluripotent stem cells**.**

(IVF)= in vitro fertilization.

(KSOM)= potassium simplex optimized medium.

(L)= leptoten.

(LESC)= limbal epithelium stem cell.

(LH)= leutinizing hormone.

(LIF)= leukaemia inhibitory factor.

(MESC)= mouse embryonic stem cells**.**

(MHC)= major histocompatibility complex.

(MSC)= mesenchymal stem cell.

(OAT)= oligo-astheno-teratozoospermia.

(P)= pachytene.

(PDR)= proliferative diabetic retinopathy.

(PGC)= primordial germ cell.

(PGD)= pre- implantation genetic diagnosis.

(P-L)= pre-leptoten.

(PSCT)= peripheral stem cell transplantation.

(RP)= retinitis pigementosa.

(SCID)= sever combined immunodifficient mouse.

(SCNT)= somatic cell nuclear transefer.

(SCT)= stem cell transplantation.

(SSC)= spermatogonial stem cell.

(STDs)= sexually transmitted disease.

(TRUS)= trans-rectal ultrasonography.

(UCB)= umbilical cord blood.

(VEGF)= vascular endothelial growth factor.

(Z)= zygoten.

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Introduction

Stem cells are body's unspecialized cells which having the capacity of self renewal and differentiating into various cell types depending on the stimuli that they are received.

Stem cells are classified into embryonic stem cells (ESCs) and adult stem cells (ASCs) where as (ESCs) are originate from inner cell mass of blastocyst, (ASCs) usually originate from various tissue of developed individual ***(Phinny and Prockop, 2007).***

Scientists interested in human development have been studying animal development for many years. This research yielded our first glimpse at a class of stem cells that can develop into any cell type in the body. This class of stem cells is called pluripotent, meaning the cells have the potential to develop almost all of the more than 200 different known cell types ***(Chandross and Mezey, 2001).***

In 1998, for the first time, investigators were able to isolate this class of pluripotent stem cell from early human embryos and grow them in culture. In the few years since this discovery, evidence has emerged that these stem cells are, indeed, capable of becoming almost all of the specialized cells of the body and thus may have the potential to generate replacement cells for a broad array of tissues and organs, such as heart, pancreas and the nervous system. Thus, this class of human stem cell holds the promise of being able to repair or replace cells or tissues that are damaged or destroyed by many of our most devastating diseases and disabilities ***(Slack, 2000a).***

At about the same time as scientists were beginning to explore human pluripotent stem cells from embryos and fetal tissue, a flurry of new information was emerging about a class of stem cells that have been in clinical use for years and are called adult stem cells. An adult stem cell is an undifferentiated cell that is found in a differentiated (specialized) tissue in the adult, such as blood. It can yield the specialized cell types of the tissue from which it originated. In the body, it can renew itself. During the past decade, scientists discovered adult stem cells in tissues that were previously not thought to contain them, such as the brain. More recently, they reported that adult stem cells from one tissue appear to be capable of developing into cell types that are characteristic of other tissues. For example, although adult hematopoietic stem cells from bone marrow have long been recognized as capable of developing into blood and immune cells, recently scientists reported that, under certain conditions, the same stem cells could also develop into cells that have many of the characteristics of neurons. So, a new concept and a new term emerged-adult stem cell plasticity ***(Bagutti et al., 1996)***.

The capacity of stem cell to differentiate almost to all cell type of human body highlight the potentially promising role in cell replacement therapies for treating of human diseases. One of the most common diseses that we will discuss the role of stem cells in treatment of it is infertility ***(Stojkovic et al., 2004).***

Infertility means inability to conceive or reproduce. The process of Reproduction having many complicated processes, two of the most important processes in humans and animals are embryogenesis and spermatogenesis, any defect in one of them will lead to infertility ***(Andreson et al., 2008***).

Embryogenesis is defined as "the formation and growth of an embryo" and it is the beginning of development of any living thing. Without totipotent stem cells the process of embryogenesis would not be able to proceed. A more specific example in embryogenesis is using stem cells in the development of male and female reproductive organ which starts early in the process of embryogenesis. Certain stem cells are designated to become primordial germ cells which after migration into the undifferentiated gonads can differentiate into female or male germ cell precursors. Depending on the sexual gonadal differentiation these cells either form oocytes or sperms ***(Nayernia, 2004)***.

Stem cells are also of high importance in the process of spermatogenesis. The initial stage of spermatogenesis (the proliferation phase) is the most important when focusing on the use of stem cells. In order to provide a continuous supply of spermatozoa the stem cell property of unlimited self-renewal is required and provides the foundation for it to continue through most of adult-hood and these self renewing cells used in spermatogenesis are commonly referred to as stem cell spermatogonia. These spermatogonia have reverted back to a more primitive type of spermatogonia which provide continual replacement of the stem cells from which new spermatogonia can be derived**.** Any defect in embryogenesis or spermatogenesis will lead to infertility ***(Oatley et al., 2004).***

Uptillnow the treatment of male infertility is limited and often range between the in vitro fertilization (IVF) and intracytoplasmic sperm insemination (ICSI) which are used circumvent rather than treatment ***(Bukovesky et al., 2004).***