Stem Cell Therapy in Surgical Practice

An Essay
Submitted for partial fulfillment of master degree in general surgery

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بسم الله الرحمن الرحيم

وما أوتيتم من العلم إلا قليلا

صدق الله العظيم

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ACL	**Anterior cruciate ligament**
ADSCs	Adibose tissue-derived stem cells
AFDSCs	Amontic fluid derived stem cells
AFI	Autologous fat injection
AHSCT	Autologous human stem cells transplantation
AKI	Acute kidney injury
AT	Adipose tissue
BM	Bone marrow
BMP	Bone morphogenetic protein
BMSCs	Bone marrow stem cells
BMSCs	Bone marrow mesenchymal stem cells
CAL	Cell assisted lipotransfer
CB	Cord blood
CBC	Crypt base columnar
CD	Crohn's disease
CFU – ECs	Colony-forming unit embryonic cells
CLI	Critical limb ischemia
CSCs	Cardiac stem cells
CY	cyclophosphamide
DM	Diabetes mellitus
ECFCs	Endothelial colony forming cells
EG	Embryonic germ
EPC	Endothelial progenitor cells
EPCs	Endothelial progenitor cells

List of Abbreviations *(cont…)*

ESCS	**Embryonic stem cells**
G-CSF	Granulocyte colony stimulating factor
GVHD	Graft-versus-host disease
HASC	Human adibode tissue-derived stem cells
HDAC	Histone deacetylase
HEMSCs	Hemangioma-derived stem cells
hESCs	Human embryonic stem cells
HGF	Hepatocyte growth factor
HPCs	Hepatic progenitor cells
HSCs	Hematopoietic stem cells
HSCT	Hematopoietic stem cell therapy
IBD	Inflammatory bowel disease
IH	Infantile hemangioma
IMD's	Immune mediated diseases
IPSCs	Induced pluripotent stem cells
IRI	Ischemia-reperfusion injury
ISCs	Intestinal stem cells
LSCs	Limbal stem cells
MEFs	Mouse embryonic fibroblasts
Mi RNA	Micro RNA
MSCs	Mesenchymal stem cells
OA	Osteoarthritis
PAD	Peripheral arterial disease
PGCs	Primodrial germ cells
POF	Premature ovarian failure

List of Abbreviations *(cont…)*

PSCs	**Pancreatic stem cells**
RA	Rhematic arthritis
RBC	Red blood cells
ROS	Reactive oxygen species
SBS	Short bowel syndrome
SUI	Stress urinary incontinence
SVF	Stromal vascular fraction
TESE	Testicular sperm extraction
TGF	Transforming growth factor
UC	Ulcerative colitis
UCB	Umbilical cord blood
VEGF	Vascular endothelial growth factor
VISA	Victorian institute of sport assessment
WBC	White blood cells

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Introduction

Introduction

Regeneration of damaged adult tissues requires the existence of cells capable of proliferation and differentiation that will contribute functionally to the reparative process of a tissue. The field of regenerative medicine and tissue engineering holds promise in treating these conditions, especially with the renewed impetus that has arisen from the discovery of stem cells. The addition of stem cells to our regenerative medicine armamentarium has opened up new avenues with the potential for developing stem cell-based therapies for the treatment of these conditions (**McArdle et al., 2013).**

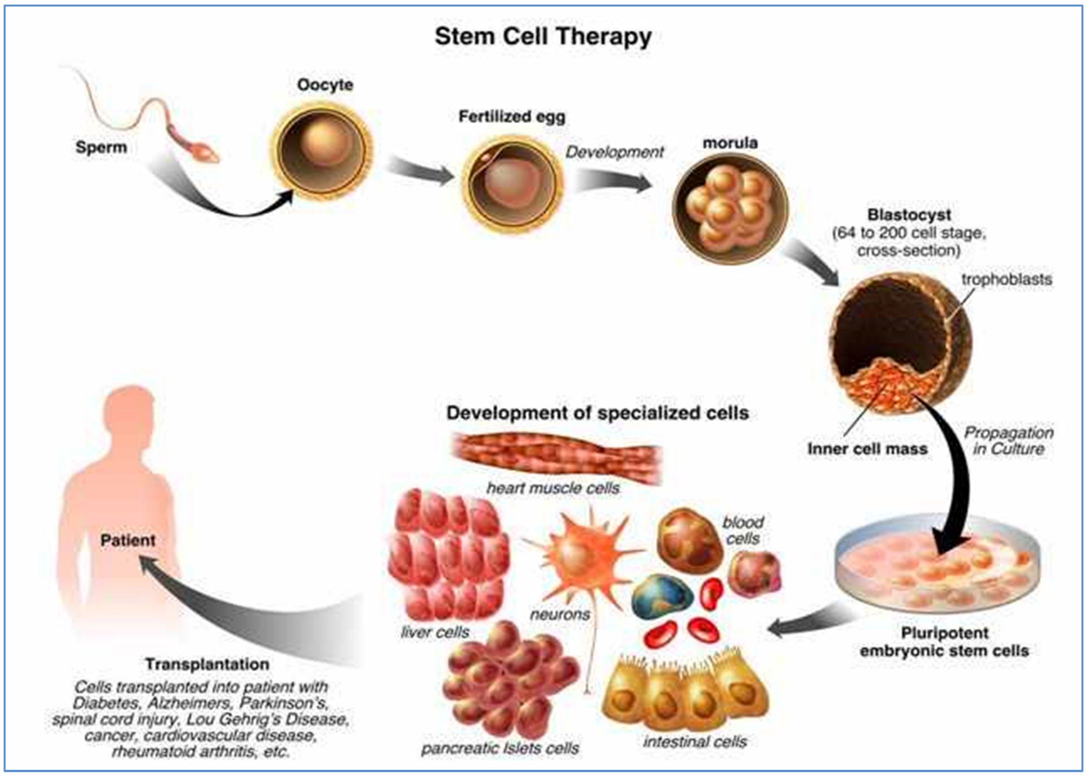

Fig. (1): Stem cell therapy **(Kang et al., 2013).**

Stem cells are the body's "master" cells. They have two unique abilities: They can proliferate virtually without limit to produce an essentially infinite supply of their unspecialized cellular selves, and they can differentiate to produce any other cell types that can be used to repair or replace worn-out or damaged tissues. Combine those two superpowers, and you have got the proverbial medical magic bullet – somewhat like having a box of elastic bandages in your medicine cabinet that always replenishes itself, always comes in exactly the right size for your needs and doesn't just cover a cut but can regrow the injured skin **(McQueen, 2013).**

Stem cells are essential during development and in adulthood in most multicellular organisms, as they are responsible for the generation of tissue-specific cell types. Stem cells are uncommitted cells with the potential to form one, many or all cell types present in an organism. They self-renew and, in adult animals, are able to adapt to changing physiological conditions, to respond to tissue damage and to replenish the host tissue **(Rojas-Rios and Gonzalez-Reyes, 2013).**

Recent advances in stem cell research have generated much excitement over their potential therapeutic applications. Stem cells can be introduced into organs or tissues to replace diseased or damaged cells with minimal risk of rejection and side effects **(Kang et al., 2013).**

The use of stem cells in treatment of disease continues to develop in many areas and there have been some successful applications of treatments derived from them. It is important to be aware that responsible researchers are careful to explain that some of these treatments are not yet universally applicable, but are still classified as experimental. More evidence is needed, but there is general optimism about their expanded use in the immediate future as well as in the long term **(McQueen, 2013).**

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The aim of this work was to study the role of stem cell therapy in different branches of surgery.