Summary and conclusion

End stage liver disease (ESLD) is a health problem worldwide**.** Liver transplantation is currently the only effective therapy, but it has drawbacks include a shortage of donor**,** operative damage, risk of rejection and in some cases recidivism of the pre-transplant disease, this factors account for the recent growing interest in regenerative medicine. And after many trials on the stem cells we put our foot on the right way to save our patients' life, give him a new hope for their problems and decrease number of waiting list for liver transplantation.

The objective of the present review is to update readers with the rapidly changing concepts in liver stem biology ,related clinical application and the great role of the stem cells in treatment of ESLD. Because of the important role of liver in the body ,deficiency of its function appear early and patients suffering from multiple symptoms and sign destroy his feeling of life . only one solution to end stage liver disease available now, liver transplantation but after many trials on the stem cells we put our foot on the right way to save our patients life, give him a new hope for their problems and decrease number of waiting list for liver transplantation. Application of stem cells for the treatment of liver disease. Several issues need to be addressed to fulfill this promise. One needs to identify the stem cell candidates, which are able to form hepatocytes in vitro as well as functional liver tissue after transplantation in vivo.

Stem cells have the unique capacity not only to give rise to more stem cells (self-renewal) but also to generate differentiated progeny. They are present at all stages of development and probably exist in all multicellular organisms.

The three broad categories of mammalian stem cells are:

- Embryonic stem cells, derived from blastocysts,

- Adult stem cells, which are found in adult tissues, and
- Cord blood stem cells, which are found in the umbilical cord.

Stem cell properties:

- **Self-renewal** the ability to go through numerous cycles of cell division while maintaining the undifferentiated state
- **Unlimited potency the** capacity differentiate into any mature cell type. This requires stem cells to be either totipotent or pluripotent, although some multipotent and/or unipotent progenitor cells are sometimes referred to as stem cells.

Types of adult stem cells

Adipose derived adult stem cells ,Mammary stem cells,Mesenchymal stem cells ,Neural stem cells,Olfactory adult stem cells and Hematopoietic stem cell.

The term adult stem cell refers to any cell which is found in a developed organism that has two properties: the ability to divide and create another cell like itself and also divide and create a cell more differentiated than itself. also known as somatic stem cells, they can be found in children, as adults. Pluripotent adult stem cells are rare and generally small in number but can be found in a number of tissues including umbilical cord blood.

When unspecialized stem cells give rise to specialized cells, the process is called differentiation. Scientists are just beginning to understand the signals inside and outside cells that trigger stem cell differentiation**.** The internal signals are controlled by a cell's genes. Scientists use techniques such as polymerase chain reaction (PCR) to detect the presence of genes that are “active” and play a role guiding the specialization of a cell.

Grounded in half a century of research, the study of hematopoietic stem cells is one of the most exciting and rapidly advancing disciplines in biomedicine today. Breakthrough discoveries in both the laboratory and clinic have sharply expanded the use and supply of life-saving stem cells. Yet even more promising application are not the horizon and scientists’ current inability to grow HSCs

outside the body could delay or thwart progress with the new therapies. New treatments include graft-versus-tumor therapy for currently incurable cancers, autologous transplants for autoimmune diseases, and gene therapy and tissue repair for a host of other problems. The techniques, cells, and knowledge that researches have now are inadequate to realize the full promise of HSC-based therapy.

The liver has a fantastic regenerative capacity but, following chronic liver damage, this begins to fail, and then fibrosis, and eventually cirrhosis, develops. New strategies for the treatment of advanced liver disease, and numerically cirrhosis is the most important target. It has been understandable enthusiasm for the development of stem cell therapies for liver regeneration . Stem cell technology represents a huge hope forward in treating many diseases particularly liver disease**.** It has been seen that stem cell technology really helps in therapy of end stage liver disease**.** The liver has a large regenerative capacity in response to injury. However, in severe cases of liver injury, its regenerative capacity may prove insufficient and the liver injury may progress to liver failure, and in such situations liver transplantation is the only treatment option. An alternative, less invasive approach may be transplantation of hepatocytes or hepatocyte precursor cells. In the adult liver two candidate progenitor cells have been identified: oval cells and small hepatocytes. The former are induced by liver injury under conditions preventing cell division of mature hepatocytes, while the latter are present in small numbers in normal liver. Both cell types have the capacity to expand and differentiate into hepatocytes. In recent years evidence has been presented that bone-marrow derived stem cells can also be expanded and differentiated into hepatocyte progenitor cells. Such cells may be a source for hepatocyte transplantation and hence have the potential to offer a novel therapy for liver failure.

Research on hepatic stem cells has entered a new era of controversy, excitement, and great expectations. Although adult liver stem cells have not yet

been isolated, an enormous repopulating capacity of transplanted mature hepatocytes under conditions of continuous liver injury has been discovered.

Stem/progenitor cells from fetal liver have been successfully isolated and transplanted, repopulating up to 10% of normal liver. However, progenitor cell lines from adult and embryonic liver have not shown significant repopulating activity. Intensive research on embryonic stem cells has revealed the first promising attempts to use these cells as a source of hepatic progenitors.

Conditions for their differentiation in vitro, isolation of purified hepatic progenitor cells, and liver repopulation are currently being evaluated. Multilineage adult progenitor cells of mesenchymal origin from bone marrow, muscle, and brain may turn out to be the long-sought primitive potential stem cells remaining in adult tissues.

Amniotic epithelial stem cells, fetal liver progenitor cells as well as embryonic stem cells currently emerge as alternative stem cell sources and open new possibilities for cellular therapies of liver disease.

In recent years, evidence has been presented that adult non-hepatic stem cells, which constitute a subpopulation of bone-marrow derived stem cells, can differentiate in vivo into hepatocytic precursor cells or even hepatocytes.

There are steps for transplant stem cell in hepatic patients firstly collection and processing , cryopreservation , preparatory treatment, infusion through two methods direct introduction into parenchyma of liver through percutaneous route under ultrasound guidance or through intraportal administration under ultrasound guidance lastly recovery and follow up this stem cells.

The major risk is an increased susceptibility to infection and bleeding and so doctors should give the patient prophylactic antibiotic to avoid this infections.

The Egyptian scientists and doctors are fond of the stem cell therapy due to the large number of the Egyptian patients with liver disease .

Many studies are made by them on the stem cells and the results of this studies were surprise for the patients and for the doctors themselves.

In this review of the essay we explain the informations about different types of the stem cells ,end stage liver disease how diagnose and manage.

The great role of the stem cells in treatment of the ESLD, we think that the few coming years many studies will be made to solve the problems of the stem cell like :

1-Longivity of transplanted cells

2-Execretory function

3-Is it really a replacement of liver transplantation?

4-Potential for HCC

5-How to follow the destiny of cells?