**Lecture 9**

**S T E M C E L L S**

**Stem cells are unique cells present in the body that have the potential to differentiate into various cell types or divide indefinitely to produce other stem cells.**

**They are found in both embryonic and adult organisms ( but they have slightly different properties in each ).**

**They are usually distinguished from:**

**PROGENITOR CELLS which cannot divide indefinitely , and**

**PRECURS0R OR BLAST CELLS ,which are usually committed to differentiating into one cell type.**

**There are several sources of stem cells**

**EMBRYONIC STEM CELLS**

**These stem cells come from embryo that are 3 to 5 days old.**

 **At this stage , an embryo is called a blastocyst and has about 150 cells.**

**2-ADULT STEM CELLS**

**These stem cells are found in small numbers in most adult tissues, such as bone marrow or fat. Compared with embryonic stem cells , adult stem cells have amore li9mited ability to give rise to various cells of the body.**

**3-ADULT CELLS ALTETRED TIO HAVE PROPERTIES OF EMBRYO STEM CELLS.**

**Scientists have successfully transformed regular adult cells into stem cells using GENETIC REPROGRAMMING.**

**4-PERINATAL STEM CELLS**

**Researchers have discovered stem cells in AMNIOTIC FLUID**

**( Amniotic fluid fills the sac that surround and protects a developing fetus in the uterus ).as well as UMBILICAL CORD BLOOD. These stem cells have the ability to change into specialize cells.**

 **N O T E :- Have stem cells already been used to treat disease?**

**Yes ,Doctors have performed stem cells to transplants ,also known as bone marrow transplants.**

**In stem cells transplant , stem cells replace cells damaged by chemotherapy or disease or serve as a way for the Donor’s immune system to fight some types of cancer and blood-related diseases. Such as LEUKEMIA, LYMPHOMA. These transplant use adult stem cells or umbilical cord blood.**

**The only stem cells now used to treat disease are :**

**( HEMATOPOIETIC STEM CELLS ).**

**These are the blood cell forming adult stem cells found in bone marrow.**

**Each type of blood cell , in the bone marrow starts from a stem cells. Stem cells are special human cells that are able to develop into many different cell types. This can range from muscle cells to brain cells.**

**In some cases, they can also fix damaged tissues. Researchers believe that stem cells based therapies may one day be used to treat serous diseases such as ALZAHIMER diseases.**

**Stem cells are present inside different types of tissues., Scientists has found stem cells in tissues , including**

**BRAIN BONE MARROW BLOOD and BLOOD VESSELS**

**SKELETAL MUSCLES SKIN the LIVER**

**F U N C T I O N**

**How do stem cells FUNCTION ?**

**Stem cells do two things that no other cells can do :**

**1-They continuously renew and divide to make exact replicas of them cells. Typical or normal cells multiply and divide , but they have limited lifespans.**

**They’re the only cells that make specialized ( differentiated )**

**Cells to replenish or repair specific cell types. HEMATOIETIC stem cells support blood ane immune cells. Basal stem cells support skin cells.**

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