Cell differentiation and Specialisation

1- Cell Differentiation

➤ **Definition**:

Differentiation is the process by which cell changes to become a specialised for its job.

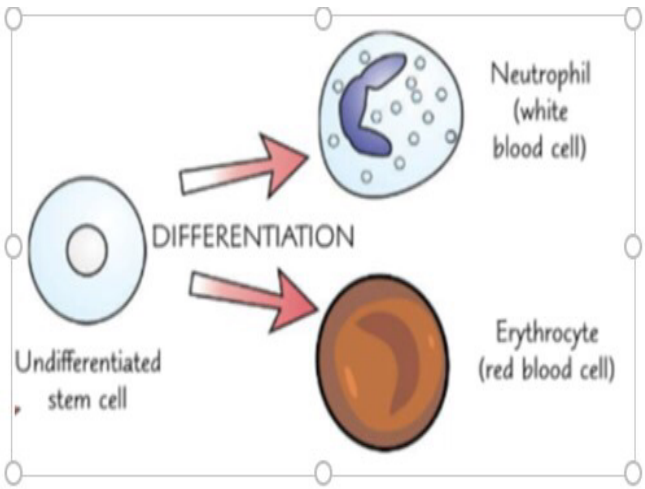
➤ **Example**:

Stem cells are differentiated into different types of cell carrying specific Function

- ◆ osteocytes ——> Bone cell
- ◆ neurons —-> Brain cell

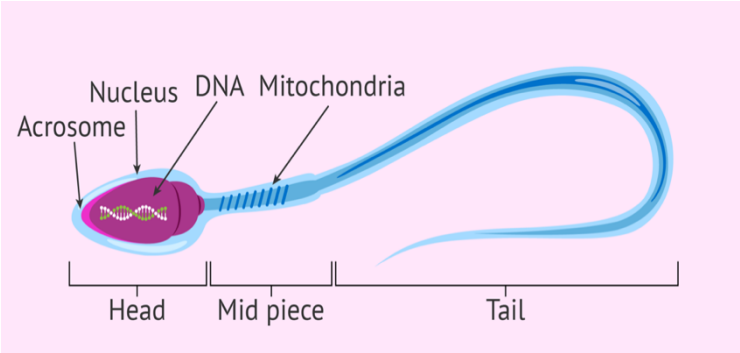
➤ Cell that differentiated into mature animals is manly used in repairing and replacing cell e.g skin cells

➤ Cell that are undifferentiated—-> called stem cells.



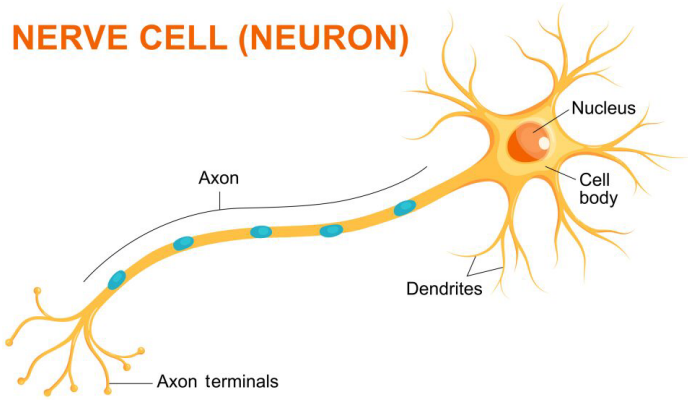
I. Sperm cell are specialised for Reproduction

- **Structure:** long tail and streamlined head which help to swim to egg
  Has a lot of mitochondria to provide energy
  Also carries enzyme to digest thorough egg cell membrane.
- **Function**: to get male DNA to Female DNA.



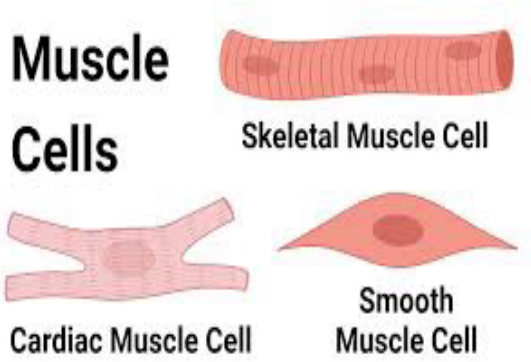
II. Nerve cell are specialised for Rapid signalling:

- **Structure:** They are long, and branched connection at the end to connect other nerve cells.
- **Function**: Carry electric signals from one body parts to other.



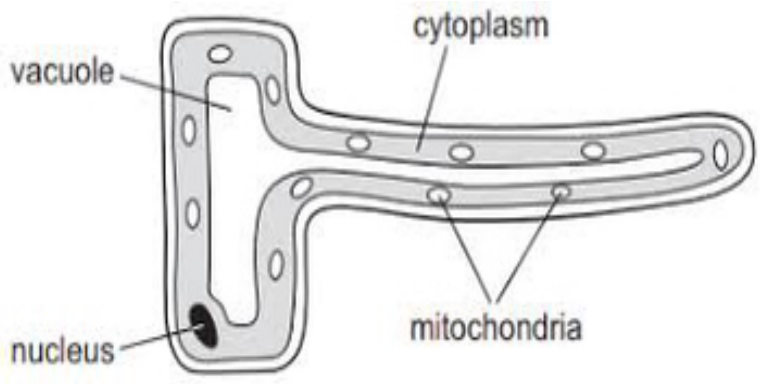
III. Muscle cell are Specialised for contraction:

- **Structure:** they are long and contain lots of mitochondria to generate energy when needed
- **Function**: is to contract quickly.



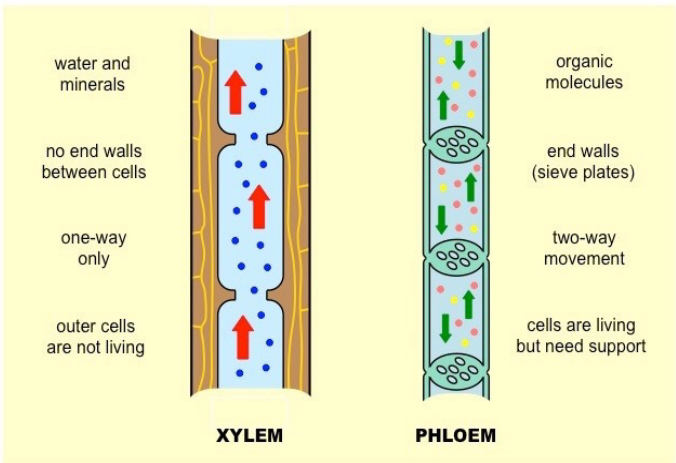
IV. Root cell are specialised for absorbing water and minerals:

- **Structure**: are present on surface of plant root that grow into long hairs.
- **Function**: these hair are stick to the soil and absorb water and mineral from the soil.



V. Phloem and Xylem are specialised for transporting substances.

- **Structure:** Both are tube like structure. Xylem cells are hollow in the centre and phloem cell have sub cellular structure
- **Function:** Both are used for transporting substances like water and phloem.



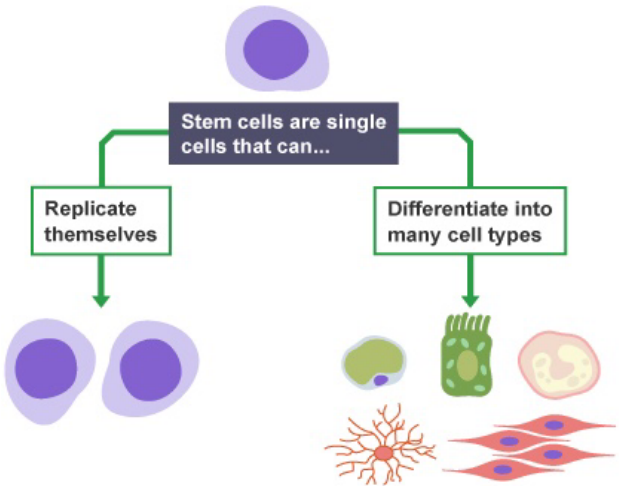
Stem cells

Stem cell undergo 2 types of process

1- Replication

2- Differentiation

- Undifferentiated cell called produces a lot of undifferentiated cells by Replication.
- stem cell differentiate into different type of cell e.g oocytes differentiate into bone cell
- stem cell from embryo or bone marrow can be grow in the lab to produce clone(identical copies of parent), and differentiate them to use in medicine and research.

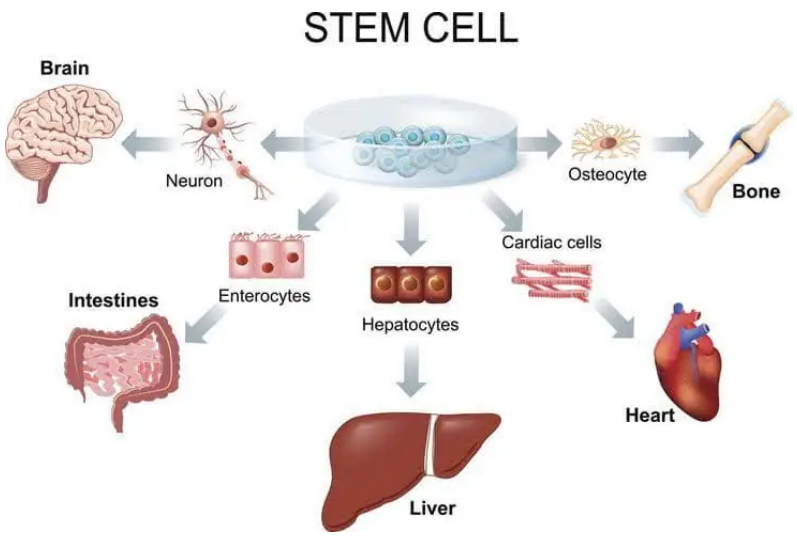


- **Stem cell may be able to cure disease**

a- Medicine already uses Adult stem cell to cure disease

b- stem cell transferred from bone marrow of healthy person can replace faulty red blood cells in the patients.

c- embryonic stem cells can be used to replace faulty cells with the healthy cell e.g insulin producing cells for diabetes patient and nerve cell for paralysed patient and many more



Stem cell can produce identical plants

- Stem cell are found in Meristem cell in plant
- Meristem cell are used in

  a) to make clones

  b) to grow more plants

  c) to grow more plants with desired feature.