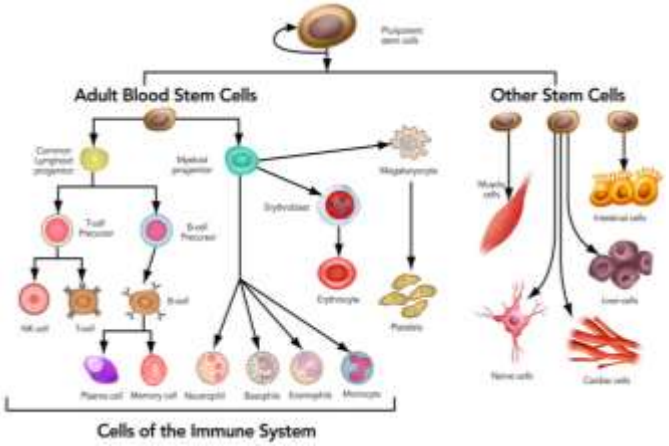
1.3.4 Stem cell Therapy



- Stem cells are the raw materials for other body cells.
- They are considered raw materials, because all other cells with specialised functions are generated from these cells.

Two important properties

i. Ability of self-renewal into numerous cells.

ii. Ability to specialise into various body cells types such as blood cells, brain cells, heart muscle.

Stem Cells are of three types

1. Embryonic Stem cells
2. Somatic Stem Cells
3. Induced Pluripotent cells

Embryonic Stem Cells	Somatic stem Cells	Induced Pluripotent Stem Cells
• Embryonic stem cells are derived from embryos. • They are totipotent in that they can be differentiated into most of the cell types. • They can produce a clone of the entire organism. • Use is ethically questionable in many countries • Due to the lack of complete immune-compatibility, organs and tissues generated from them, will likely be immune-rejected	• Somatic stem cells or adult stem cells. • These are undifferentiated cells present in differentiated cells in a tissue or organ. • They help in repair and maintenance of specific tissue or organ where they are present. • No risk of rejection during auto-transplantation • Less/no risk of tumour formation. • Limitation: Limited number in tissue	• These are Pluripotent cells. • Obtained through reprogramming of somatic cell. • Low rate of reprogramming • No ethical problems. • Personal regenerative medicine. • Low risk of immune rejection

Potency of Cells

- **Totipotent cells** can be **specialised into all cell types** in a body with the addition of extra-embryonic or placental cells. Embryonic cells within the first two cell divisions after fertilization are the only cells that are totipotent.
- **Pluripotent cells** can be specialised into all the cell types that make up the body; eg. embryonic stem cells

The difference between totipotent and pluripotent cells is only that **totipotent cells** can give rise to **both the placenta and the embryo.**

- **Multipotent cells** can be developed into more than one cell type, but their ability to specialise is more limited than pluripotent cells. E.g. Adult stem cells and umbilical cord blood stem cells