1.1.07 - Stem cells

They can continuously divide and replicate
- They have the capacity to differentiate into specialised cell types.

Totipotent - can differentiate into any type of cell
Pluripotent - can differentiate into many types of cell
Multipotent - can differentiate into a few closely-related types of cell
Unipotent - can regenerate but can only differentiate into their associated cell type

Stargardt's macular dystrophy - treated by embryonic stem cells. The retinal cells are injected into the retina.

Leukemia - cancer of the blood or bone marrow. Chemotheraphy and radiotherapy used to destroy the diseased white blood cells

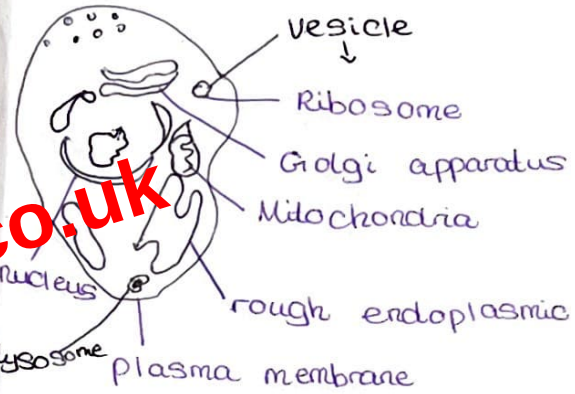
Arguments for Therapeutic cloning - May be used to cure diseases. Transplants do not require the death of another human. Cells are taken at a stage when the embryo has no nervous system and can feel no pain

1.2 - The Ultrastructure of Cells

Electron microscopes have a much higher resolution than light microscopes.
- light microscopes allow us to see the structure of cells.
- Electron microscopes allow us to see the ultra-structure of cells. They can see viruses

E.coli → ribosomes, cell wall, nucleoid, pili, plasma membrane, plasmid, flagella. Some strains are toxic to humans and can cause food poisoning.
prokaryotes reproduce asexually using the process of binary fission.
- DNA is replicated semi conservatively
- The two DNA loops attach to the membrane

Effeciency of metabolism - enzymes and substrates can localised and more concentrated



Nucleus:

- Generically spherical with a double membrane
- pores are present in the membrane
- Contains genetic information
- Uncoiled chromosomes are refered to as chromatin

Mitochondria → has a double membrane
- A smooth outer membrane folded inner membrane

Free ribosomes → Larger than ribosomes found in prokaryotes. No membrane

The Rough Endoplasmic Reticulum → consists of flattened membrane. often located near to the nucleus

The Golgi apparatus → also consists of flattened membrane. No attached ribosomes. Modifies proteins

Vesicles → single membrane with fluid inside very small in size

Lysosomes → spherical with single membrane
They contain digestive enzymes for breakdown of indigested food

Vacuoles → single membrane with fluid inside
- Vacuoles are large

Flagellum → Thin projection (usually singular) contain microtubules

Cilia → Thin projections from the cell surface

Chloroplasts → A double membrane surrounds the chloroplast
The shape of chloroplast is variable

Nucleolus → produces and assembles cells ribosomes