**Mitosis**

Mitosis is a type of **cell division** whose **purpose** is to produce **two new cells** that are **genetically identical (**to each other and to the parent cell) **for the GROWTH of the organism AND REPAIR of tissues and REPLACE worn-out or damaged cells**

It produces **two new daughter cells** that are **genetically identical** to each other - so that they can continue to carry out essential life processes. (so each new cell has the same number of chromosomes and genetic content) f

The Daughter cells are **diploid** (have the normal number / two of each chromosomes)

Mitosis occurs in all **somatic cells** (body cells)- where ever more cells are needed

**Process**

During mitosis the DNA is organised so that the two copies can be separated. The **replicated** chromosomes separate, 2 new nuclei form, cell splits in two. *sciPad Pg 69 & 70*

**Mitosis occurs at a higher rate** in areas where most **growth or replacement of cells** is occurring, such as:

* **Root / Shoot tips** - are the growing point for a plant - so Mitosis rapid here especially during spring OR when seedlings are young/**seeds are germinating, buds, flowers** are forming etc
* **Hair follicles** - constantly growing
* **Bone marrow** - constantly active in forming new red blood cells to replace those damaged or worn out from transporting Oxygen around the body (replaced after approx 100 days)
* **Skin cells** - are constantly active in forming new cells to replace the daily loss from the epidermis
* **Mucous** membranes etc.

Mitosis rates increase in areas of cellular repair, the site of damage and in Cancer cells.

Cells that divide less often include Liver cells and Neurones.

**Factors that Affect Mitosis**

**Stages in life and growth & repair**

**After an injury** many cells are replaced in order to repair the damage. The rate of mitosis must increase in order to produce these new cells.

Similarly the **rate of mitosis also increases during periods of growth**, such as our **development in the womb – zygote to embryo - childhood and puberty.**

**Nutrient availability**

Nutrients are needed as a source of energy and as building blocks. Cells will need DNA nucleotides in order to synthesise new DNA and the cell organelles will have to be copied too. **A lack of necessary nutrients can restrict or stop mitosis**.This is why people in areas of famine are often smaller and shorter.

**Cell Type & Location**

Body tissues that are replaced frequently have a higher rate of mitosis. For example **bone marrow which is responsible for blood cell production** is an area in the body where rapid mitosis occurs. **Skin cells, hair follicles and the cells lining our intestines** (epithelial cells) all have high rates of mitosis as these tissues constantly need to be replaced. 

**Enzyme Activity**

**DNA replication, mitosis and cell division** are controlled by an array of proteins and enzymes. Therefore the **factors that affect enzymes can also affect mitosis**. Some of the key factors that affect enzyme activity include:

• Temperature

• pH

• Substrate concentration (e.g. the availability of nutrient building blocks)

• Enzyme Cofactors (some dietary vitamins are essential for enzyme function)

For further details see*ENZYMES ACTIVITY -FACTORS*

**Factors that can slow down the Rate of Mitosis:**

* **Temperature**, pH ie: factors that affect Enzyme action !
* Presence of **mutagens** such as alcohol or radiation and or carcinogens
* Availability of r**aw materials** in the cell such as **Phosphorous** (which is needed for DNA Replication)