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Introduction to Anatomy & Physiology

- Welcome to the study of body structure (Anatomy) & function(Physiology). Anatomy is the oldest of the medical sciences.
- Study of the subject will enhance understanding of how the body responds to normal and abnormal conditions and maintains a relatively constant internal stable state or *Homeostasis*. It is important knowledge for a HCA in helping to understand symptoms and signs of illness in a patient.

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Introduction to Anatomy & Physiology

- **Anatomy:** Anatomy is the study of the *structure* of the human body including it's organs and systems. It is concerned with size, shape & location of a structure for example.
- **Physiology:** Physiology is the study of the *function* of the human body including how it's organs and systems work and inter-relate.

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Subject Layout

12 Systems in the Human Body

1. Organisational Level of body – The Cell

2. Support & Movement – The Skin, Skeletal System, Muscular System

3. Control & Regulation- Nervous & Endocrine Systems

4. Fluids & Transport – Cardiovascular & Lymphatic Systems

5. Environmental Exchange – Respiratory, Digestive & Renal Systems

6. Continuity of Life – The Reproductive System

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Organisational Level of human body

- Cells are the smallest functional units of the body.

- Cells group together to form tissues.

- Tissues group together to form organs.

- Organs group together to form systems.

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The Cell

- The Cell is the basic unit of life & is too small to be seen by the naked eye. There are many types of cells, eg Skin cells, nerve cells, bone cells etc..
- The Cell consists of a plasma membrane inside which are a number of organelles floating in a watery fluid called *cytosol*.
- They include; the nucleus, mitochondria, ribosomes, rough and smooth endoplasmic reticulum, Golgi apparatus, lysosomes, microfilaments and microtubules.

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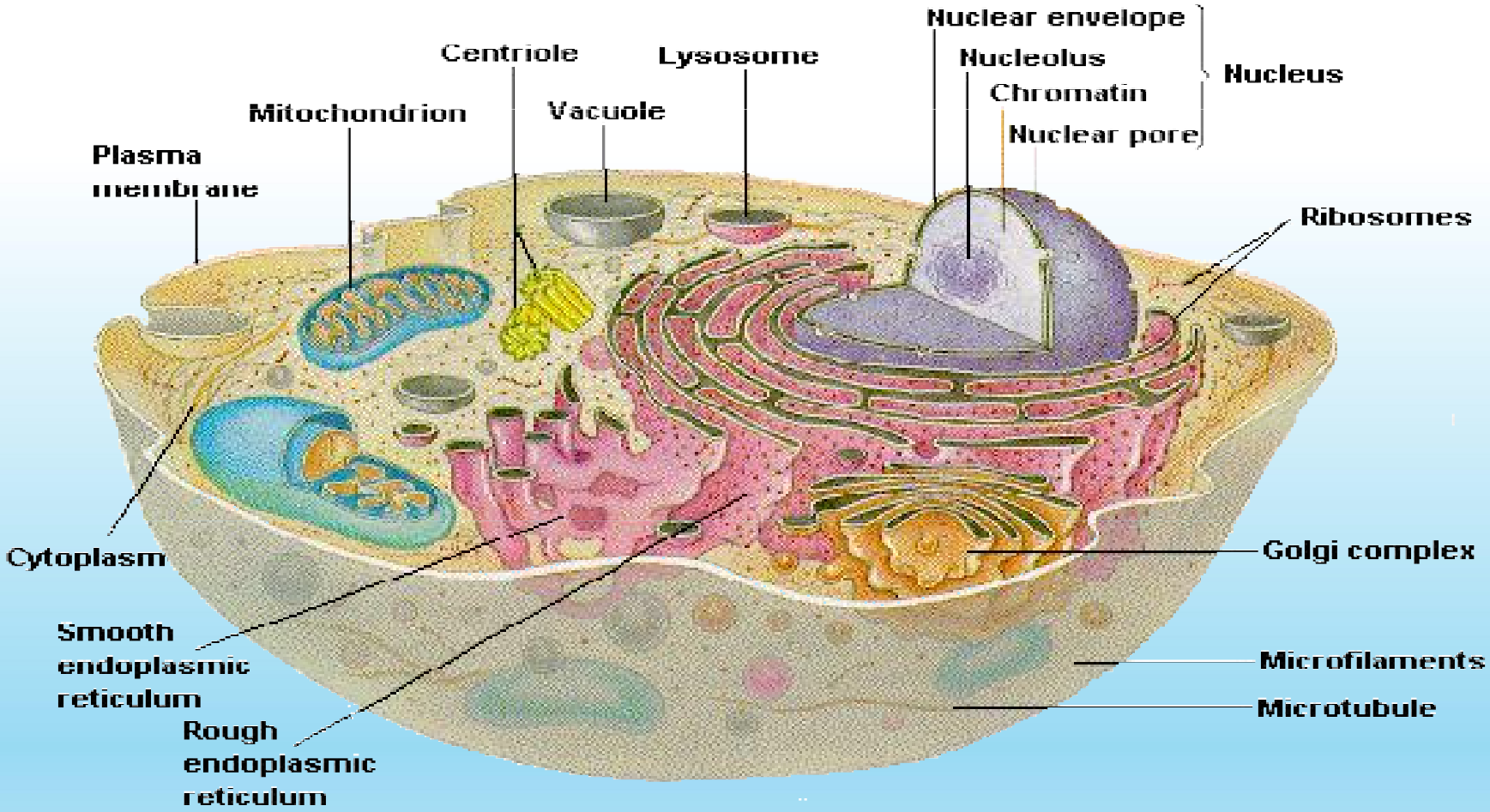

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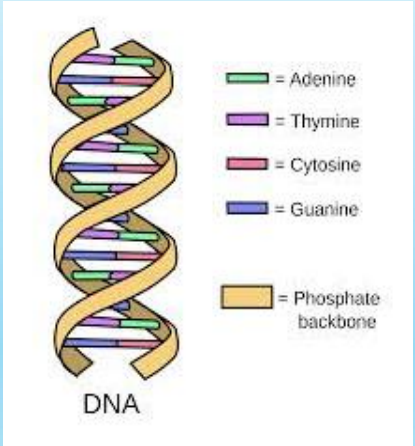
The Nucleus

- Every cell in the body has a nucleus except the erythrocyte (red blood cell).
- It is contained within a membrane similar to the plasma membrane that surrounds the cell and has tiny pores through which some substances can pass into the cytoplasm.
- Nucleus contains the body's genetic material on chromosomes / genes. These structures enable the cell to reproduce.



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Cell Organelles

1. Mitochondria – provide energy source for the cell

2. Ribosomes – synthesise proteins for energy & for export

3.Lysosomes - are enzymes which break down particles entering the cell

4. Endoplasmic Reticilum - transport substances within the cell

5 Centrosomes – play a part in cell division

6. Nucleus – Control centre of cell & contains the DNA

7. Nucleolus – Processes ribosomes

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Two Types of Cell Division

MITOSIS

Cells divide to ensure growth, repair & replacement of damaged or worn out cells.

Most cells divide by this method.

Diploid cells are the most numerous in the body & contain 46 Chromosomes or 23 pairs.

Mitosis occurs in 4 distinct stages.

New cells produced by Mitosis are exact copies of each other and of the parent cell.

MEIOSIS

Meiosis only relates to production of the sperm and ova.

Male sperm and female ovum (egg) are haploid cells, each containing 23 chromosomes.

When the egg and sperm fuse to form a zygote, the resulting cell will now have 46 chromosomes.

Meiosis occurs in 7 distinct phases with a crossing over of genetic material taking place. The process ensures each human being is unique.

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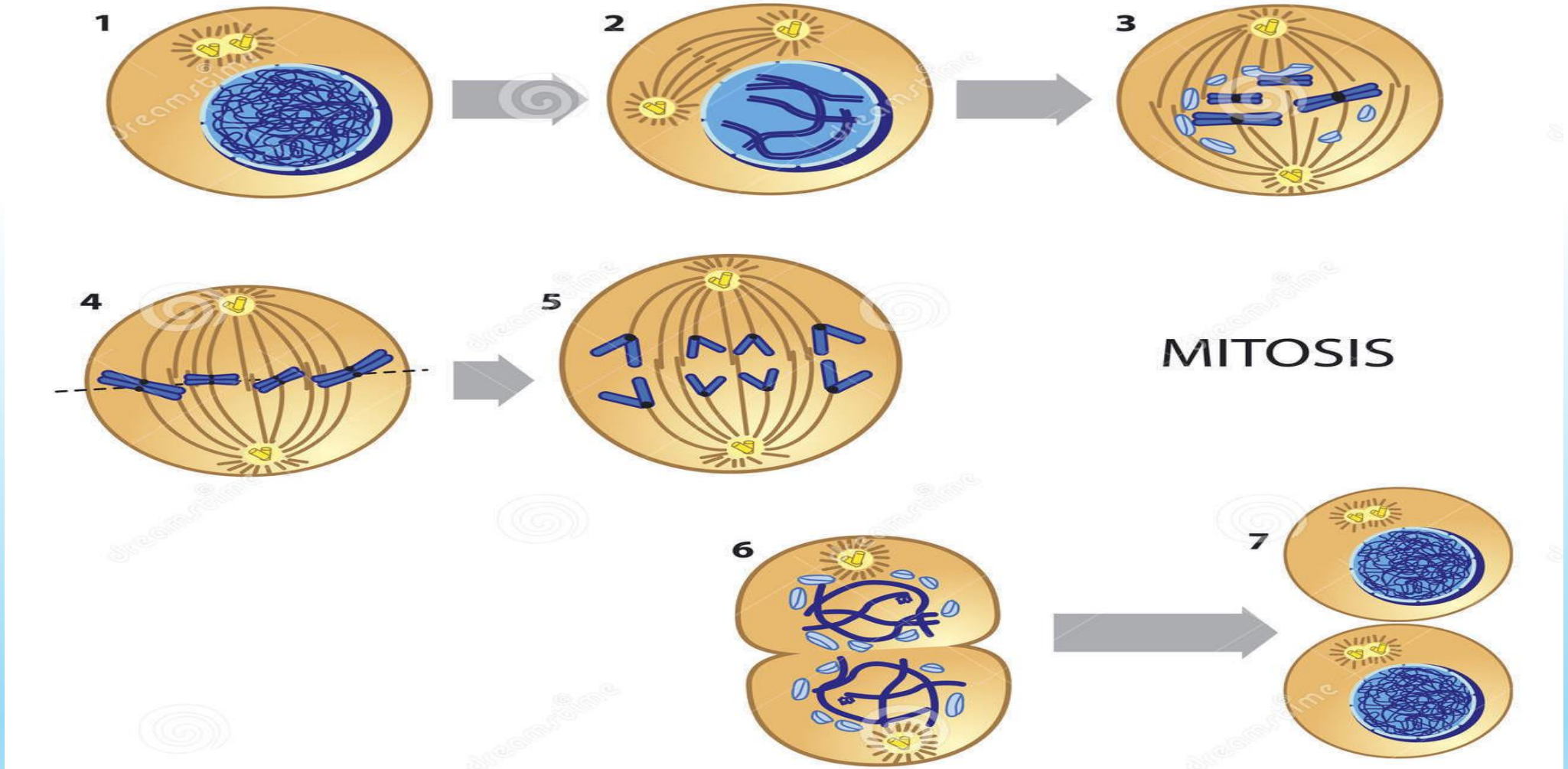

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Tumours

The life span of cells varies depending on the type of cell it is. Under normal conditions Mitosis occurs at a controlled steady rate. Skin cells for example are replaced at an interval of approximately 30 days.

A tumour (lump) appears when the cell loses control of the rate at which mitosis occurs and cells multiply at a faster rate. Carcinogens like asbestos or in cigarettes alters genes (genetic mutation) and gives rise to malignant tumours or cancers which can spread to other parts of the body from the original tumour (metastasise). Cancer can be life threatening.

Benign tumours are generally harmless & not life threatening unless pressing against a vital organ. Benign tumours tend to remain confined to its own encapsulated space.

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Tissues

Cells group together to form tissues.

1. **Epithelial:** Found covering the body and lining cavities and tubes. ***(Mucous membrane with the skin, is the body's first line of defence against infection)***

2. **Connective:** Cartilage, bone, adipose tissue (fat) are examples along with blood which is a fluid connective tissue.

3. **Nervous:** Found in the nervous system & function is to transmit signals to and from the brain.

4. **Muscular:** There are 3 types of muscle tissue: Cardiac, Smooth & Skeletal