## **Proteasomes**

**Proteasomes**) are organelles that contain an assortment of protein-digesting (proteolytic) enzymes. Their job is to remove proteins from the cytoplasm.

## **The Endoplasmic Reticulum**

**Endoplasmic reticulum** [ER]) is a network of intracellular membranes continuous with the nuclear envelop.

### It has 4 major functions:

- I. Synthesis: Specialized regions of the ER synthesis proteins, carbs, and lipids
- II. Storage:
- III. Transport: Materials can travel from place to place in the ER
- IV. Detoxification: The ER can absorb drugs or toxins and neutralize them with encloses. e ER forms hollow tubes, and chambers called **cisternia**  $\underline{2 \text{ types on LP exist:}}$

The ER forms hollow tubes, and chambers called cisternia

Preview from <u>Continued o</u>

## Smooth Endoplasmic reticulum

- **Important function of the SER:**
- Synthesis of phospholipids and cholesterol
- Synthesis of steroids such as androgen and estrogen
- Synthesis and storage of glycerides, especially triglycerides
- Synthesis and storage of glycogen

### **Rough Endoplasmic Reticulum (RER)**

It functions as a combination workshop and shipping warehouse. Some of the proteins are enzymes that will function inside the endoplasmic reticulum.

Transport vesicles) term for packaging of the small sacs of proteins and glycoproteins produced by the RER that deliver their content to the Golgi apparatus

## The Golgi Apparatus

Is an organelle that looks a bit like a stack of dinner plates. Also known as the Golgi complex. It typically consists of 5 or 6 flattened membranous discs called *cisternae*.

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## Mitochondria

**Mitochondria**) the organelle that produce the energy required for functions of life. It produces 95% of the energy required by a cell

These small structures vary widely in shape, from long and slender to short and fat. They have an unusual double membrane.

The outer membrane contains numerous folds called **cristae**, which surround the fluid contents, or **matrix**, of the mitochondrian.

The mitochondria uses ADP to produce ATP and does this back and forth over and over again.

### Mitochondria Energy Production (aerobic metabolism)

Most ATP is produced inside mitochondria.

## **Steps of Energy production in the Mitochondria**

- 1) *Glycolysis*--- breaks down a glycose molecule into 2 molecules of *pyruvate* which the mitochondria then absorbs the pyruvate molecules
- 2) Citric acid cycle--- an enzymic pathway that breaks down the absorbed pyruvate

# The Nucleus contains DNA and solymes essential for controlling

**Nucleus**) usually he largest and a concorspicuous structure in a cell. It is the control center for cellular operations. A nucleus cannot repair uself so it will degenerate in 3 or 4 months.

**Nuclear envelop)** surrounds the nucleus and separates it from the cytosol. It has a double membrane separated by a narrow **perinuclear space** 

**Nuclear pores**) where chemical communication takes place between the nucleus and the cytoplasm. These pores cover 10% of the nucleus's surface.

### **Contents of the Nucleus**

**Nuclear matrix)** a network of fine filaments that provide structural support and may be involved in the regulation of genetic activity. The fluid of the nucleus is called the *nucleoplasm*. The nucleoplasm contains the nuclear matrix.

**Nucleoli**) dark staining areas of the nuclei. They are transient nuclear organelles that synthesis ribosomal RNA.

Nucleoli are composed of RNA, enzymes, and proteins called-----histones

**Nucleosome)** a complex.....DNA strands that wind around the histones that allow DNA to be packaged in a small place.

## Interphase, Mitosis, and Cytokinesis

### Interphase:

- The nondividing period
  - **G-zero** (G<sub>0</sub>) phase specialized cell function only •
  - G1 phase cell growth, organelle duplication, protein synthesis •
  - **S phase** DNA replication and histone synthesis •
  - G2 phase finishes protein synthesis and centrole replication

## **Mitosis**

- Divide duplicated DNA into 2 sets of chromosomes
  - DNA coils tightly into chromatids •
  - Chromatids connect at a centromere •
  - Protein complex around centromere is kinetochore that attaches to the spindle fibers

### **Mitosis phases:**

- Prophase
  - · Nucleoli disappears
  - Centriole pairs me
- tesale.co.uk o ce Microtuble (pindle fibers) extend by tween pairs
  - tu ile renvelope disa pars
- Previev Spindle fiberenttach to transtochore
  - taphase
    - Chromosomes align in a central plane (metaphase plane)

### Anaphase

- Microtubules pull chromosomes apart
- chromatids separate into Daughter chromosomes and group near centrioles

### **Telophase**

- Nuclear membranes re-form
- Chromosomes uncoil
- Nucleoli reappear
- Cell has 2 complete nuclei

### Cytokinesis

- Division of cytoplasm
  - Cleavage furrow around metaphase plate
  - Membrane closes, producing daughter cells •