

### Interesting facts

- Longest cells in humans are motor neurons 1.37 meters
- Every square inch in human average 32 billion bacteria
- Human shed 600,000 particles of skin every hour
- Humans regrow outer skin cells about every 27 days
- Largest cell is female egg
- Smallest cell in male body is sperm
- Three hundred cells die every minute

### Evolution of cells, Cell theory, Structure

#### Evolution of Cells

- 4.5 billion years ago
- 0.5 billion years ago

#### Cell theory

- All living things are made up of cells
- cell is the functional unit of life

All living cells come from pre-existing cells

#### Cell structure

the cell is the basic unit of life and contains internal structures called organelles

### Nucleus

#### Nucleus

- Dark granule in the center of the cell
- Stores genetic information
- Controls cell activities through protein synthesis
- Controls cell division
- It is the site of DNA replication and transcription

#### Nucleolus

- This is the dark stained area in the nucleus
- Made up of RNA
- It has no membrane
- Makes rRNA (ribosomal RNA) which then makes ribosomes

#### Nuclear Membrane/Envelope

- Double layer of cell membrane, which contains very large pores
- Pores allow RNA and proteins in and out of the nucleus

#### Chromatin

- Densely coiled DNA wrapped around histone proteins
- Contains the blueprint for all proteins in the body
- Condensed into chromosomes before cell replication

### Nucleus (cont)

#### Nucleoplasm

- Cytoplasm of the nucleus
- Supports and suspends the contents of the nucleus

#### Mitochondria

#### Furnace of the cell

Has double membrane, inner membrane is very folded = CIRISIAE (Increased surface area)

Have their own DNA

Used to convert chemical energy in food into ATP

Performs Cellular respiration

#### Ribosome

Small dark granules made of rRNA

Site of protein synthesis

Make sure the correct order of amino acids in the protein chain

Sometimes attached to the rough er, so that proteins made can be easily exported

#### Polysome

Join up to make copies of the same protein

Produce proteins to only be used inside the cell

### Types of Cells

#### Prokaryotic

- Pro=before
- Karyotic=nucleus

These were the first cells

Were primitive small had no defined nucleus (no nucleus membranes) and no membrane bound cell organelles

They have ribosomes

#### Eukaryotic

- eu=true
- karyotic=nucleus

modern cells

Have nucleus and membrane bound organelles

Much larger up to 1000 longer.

### Organelles

#### Organelles

#### Plasma Membrane

Universal structure same in each organism

Composed of a bilayer of phospholipids proteins embedded in it

## Organelles (cont)

Most organelles inside cell also have bilayer membrane

Model used to explain cell membrane is called fluid mosaic model

Selectively permeable control what comes in and out of cell

does not let large, charged, or polar things through

Fluid Mosaic Model: The phospholipids move thus allowing small non-polar molecules to slip through

Phospholipid Bilayer = Double layered membrane

Glycolipids: Carbs attached to phospholipids. act as receptors

Glycoproteins: Carbs attached to proteins. Act as receptors.

Integral Proteins: assists specific larger and charged molecules to move in and out of cell. Can act as tunnels and change shape

Peripheral proteins: Only go through a part of the membrane or sit on top of another protein

Cholesterol: Reduces membrane fluidity reducing phospholipid movement. Stops membrane from becoming solid at room temperatures.

Cytoskeleton: Acts as framework gives cell shape. Serves as monorail to transport organelles around the cell.

## Rough Smooth ER

### Endoplasmic Reticulum

Network of sheets of cell membrane.

ER connects the nuclear membrane to the plasma membrane

Transport system

Two types of ER

Rough ER

Smooth ER

Rough ER

Attached ribosomes

Sometimes connected to nuclear membrane

Ribosomes make proteins put them in rER

Sometimes modified here

rER packages proteins in a vesicle and sends them to the Golgi Body

Smooth ER

## Rough Smooth ER (cont)

No ribosomes

Makes lipids and steroids

Detoxifies harmful material or waste products

Lots of sER in liver cells and glands that make hormones

## Golgi Apparatus Vesicles Vacuole Lysosome Cytoskeleton

### Golgi Apparatus

Made up of flattened saccules of cell membranes which are stacked loosely on top of each other

One side faces the ER and other faces plasma membrane

Usually vesicles at the edges of the golgi

To receive modify and temporarily store proteins and fats from the rough and smooth ER

These proteins are packaged into vesicles which pinch off from the edges, and are distributed within the cell or shipped to the cell membrane for excretion

### Vesicles

Storage sacks of the cell membrane

Smaller and are formed by pinocytosis (Cell drinking) at the plasma membrane or are made by the golgi body

Used to move substances around the cell that need to be separate from the cytoplasm

Stores food water and/or waste.

### Vacuole

Larger and formed by phagocytosis (Cell eating)

### Lysosome

Double membraned vacuoles with hydrolytic (digestive) enzymes

Made by golgi body

Known as suicide sacs

### Lysosome--Hydrolysis

Attach to food vacuoles and digest their contents

Destroy old or malfunctioning cell parts

Capable of destroying bacteria

### Cytoskeleton

Gives cell its shape and form anchors and supports cell organelles

Serves as monorail to transport organelles around the cell

## GolgiApparatusVessVacuoleLysosomeCytoskeleton (cont)

Two components of cytoskeleton microtubules microfilaments

Microtubule

Larger than microfilaments

Cylinder shaped and made of a coiled protein called tubulin

they are used to make cilia, flagella, centrioles and spindle fibers

### Cilia & Flagella

Are hair like projections, which use energy to produce movement/locomotion

Move as the pairs of tubules slide against each other

Cilia are short and there are many of them. Flagella are long and few

Made up of microtubules

Anchored to cell by a basal body

Centriole

Pair of basal bodies(microtubules) that grow spindle fibers

They attach to and move chromosomes during mitosis

Found in animal cells only

Microfilaments

Long and extremely thin protein fibres that occur in bundles made of 2 proteins called actin and myosin

Organelles move around the cytoplasm with the help of these

Cytoplasm

Watery gel it supports all organelles to provide water for all of the cells  
biochemistry

Mainly water with dissolved salts, proteins and other organic compounds.

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