**Lecture 2**

**GENERAL PATHOLOGY**

**CELL INJURY**

**OVERVIEW OF ANATOMY AND PHYSIOLOGY OF THE HUMAN CELL**

All known living things are made up of cells. All cells come from preexisting cells by division. The cell is structural and functional unit of all living things. Many cells make up tissues and many tissues make up organs. Different specialized organs make up systems and the systems make up the organism, the human person.

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**Cell Structure**

**Overview:** 

The major parts of a cell are the cell membrane, cytoplasm, and nucleus:

**Cell membrane:** A selectively permeable structure that envelops the cell and protects the cell’s internal environment.

* Plasma Membrane, the cell’s membrane is made of phospholipids, which have carbohydrate heads and lipid tails.
* Embedded proteins are anchored to the cell membrane.
* Exterior of the plasma membrane touches water; polar heads touch water on the inside of the cell and water on the outside of the cell.
* Interior Blocks Passage However, water and other molecules cannot pass through to either side because of the nonpolar tails.
* Provides a stabilized environment, which protects and maintains the cell’s internal environment, separate from the environment outside.
* Proteins embedded into the membrane send and receive signals to communicate with other cells.

**Nucleus:**

* The nucleus contains a nucleolus and is separated from the cytoplasm by the nuclear envelope.
* The nucleus contains the cell’s DNA, a type of nucleic acid.
* The nucleolus is like a “tiny nucleus” inside the actual nucleus. It contains RNA, a type of nucleic acid.
* The nucleus communicates through holes in the envelope called nuclear pores.
* The nucleus decides what the cell needs and uses DNA to print out instructions for the rest of the cell to produce that need.

**Chromosomes:**

Chromosome is a long DNA molecule with part or all of the genetic materials.

Humans have 23 pairs of chromosomes (22 pairs of numbered chromosomes-autosomes + one pair os sex chromosome---X & Y---allosome)

* Hold the cell’s DNA in the nucleus.
* The nucleus contains genetic information in the form of DNA (the universal genetic code).
* The DNA does not hang around loosely in the nucleus. The DNA is packaged with proteins and wound up.
* Recall that the role of nucleic acids is to carry genetic information, which is inherited by an organism’s offspring.
* These wound up DNAprotein structures are called chromosomes.

**Cytoplasmic Organelles:** Are compartmentalized structures that perform a specialized function within a cell.

**Golgi apparatus:** ships packages around the cell.

* The golgi is made up of flattened, folded sacs.
* Packages (e.g. containing proteins) are carried to the golgi in vesicles.
* The golgi receives an incoming vesicle, tags th
* e package, and sends the vesicle to its final destination.

**Lysosome:** destroy waste to clean up the cell.

* Lysosomes contain an environment made to destroy waste.
* Vesicles carry the waste (bacteria, old organelles, etc.) into the lysosome.  
  Once inside, the waste is destroyed and its parts recycled.

**Smooth endoplasmic reticulum:** The two types of ER make different building blocks for the cell.

* Smooth ER is NOT attached to the nucleus and DOES NOT have attached ribosomes (thus smooth).
* Smooth ER synthesizes carbohydrates (sugars) and lipids (fats).

**Mitochondria:** produce energy to power the cell.

* The mitochondria convert carbohydrates (sugar) taken from food into ATP.
* The mitochondria are unique in that it has two protective shells.

**Ribosomes:** make proteins for the cell by linkinh amino acids together

* The ribosome reads the DNA strand instructions to make proteins for the cell to use in its normal activities.
* The units clasp around a strand of nucleic acid instructions from the nucleus.  
  Each ribosome is made of two protein subunits.

**Rough endoplasmic reticulum:** The two types of ER make different building blocks for the cell.

* Rough ER is found attached to the outside of the nucleus. It appears rough because of the ribosomes on its surface.
* Rough ER helps the attached ribosomes in finishing protein synthesis.