Lectures # 2 – Wednesday August 28, 2002

You will need to know the following terms:

DIRECTIONAL TERMS

– Superior
– Inferior
– Anterior/Ventral
– Posterior/Dorsal
– Medial
– Lateral
– Proximal
– Distal

PLANES OF THE BODY

• Transverse plane
• Frontal plane
• Median (mid-sagittal) plane

Medical Imaging

• X-rays – radiographs (hard tissue e.g. bone)
• CT – Computerized tomography (hard tissue e.g. bone)
• MRI – Magnetic resonance Imaging (soft tissue e.g. muscle)
  • Ultrasound – fluid filled cavities

This lecture’s learning objectives are:

• Name & describe the three main parts of a cell
• Describe the structure and functions of the plasma membrane
• Describe the processes that transport substances across the plasma membrane

CYTOLOGY

Cyto = cell

• Basic living structural and functional unit of an organism
• Building blocks of the organism

Cell Characteristics

• Nucleus
  • chromatin; chromosomes
• Organelles
• Cytosol
• Cytoplasm (Plasm = fluid) = organelles + cytosol
• Plasma membrane

**General Functions**
• Metabolism
• Cellular division
• Specific functions

**Questions:**
• How does each cell maintain its individual structure?
• How does the cell get what it needs to do its job and get rid of waste material?

**Plasma Membrane Structure**
(see diagram)

**Plasma Membrane Functions**
• Flexible Barrier
• Receptor sites
• Regulates entrance & exit of materials => SELECTIVELY PERMIABLE MEMBRANE (SPM)

**Selective Permeability**
• Different concentrations of substances on either side of the membrane => CONCENTRATION GRADIENT

**Membrane Potential**
• Inner surface of the plasma membrane more negatively charged and the outer surface more positively charged

**Movement of materials across the plasma membrane**
• Active transport:
— Energy expenditure

• Passive transport

— No energy expenditure
Substances move from areas of high concentration to low concentration

Diffusion

• Net movement of molecules from HIGH concentration to LOW concentration until EQUILIBRIUM

Diffusion across the SPM

• Lipid soluble
  —E.g. O2 & CO2; ALCOHOL; some hormones
• Small lipid-insoluble
  —Through channel pores
  —E.g. Sodium, potassium

• Facilitated diffusion of large lipid-insoluble solutes
  —E.g. GLUCOSE
• Water (aquaporins)

Osmosis

• The net movement of water molecules across a selectively permeable membrane from an area of higher water DILUTION (less solutes) to an area of more CONCENTRATION (more solutes)

Osmotic Pressure

• Pressure required to prevent the movement of pure H2O into a solution containing solutes when the two fluids are separated by SPM

Osmolarity
  = the total solute concentration of a solution increased concentration of solutes in a solution will create an increase in osmolarity.
Decrease in concentration of solutes in a solution (making it more dilute) will reduce osmolarity.

Osmotic Equilibrium: The equal distribution of water across the body compartments.