Ask Weber

Session 1: 24/04/2020

Lecture 1

Lecture 2: The Body Normal

- What proportion of the human body is fluid?
- What total body mass is blood?

– What are the compartments of fluid in the human body?

– What is the tissue interstitium?

– **How does fluid and nutrients transfer from the blood/plasma to the cells?**

- **Hard Q: What medical condition indicates for a faecal transplant? Why is it necessary?**

– **What is the mechanism of an autologous bone marrow transplant? Why do we do it?**

– **Given a heart beats 70x/min, how many times would it beat in a year?**

– **How long does cell metabolism continue for after death?**

- **Name 2 structures with a high surface area-volume ratio**
- **What is the biological importance of a high surface area:volume ratio? What are these structures/surfaces typically used for?**

- **What is the causative agent of tetanus? How does it act?**
  - What are the signs of tetanus?
  - What is the reason for reducing rates of tetanus (essentially eradicating this disease?)

– **What is the causative agent of diphtheria, and how is it transferred? What is the primary reason for its low occurrence?**

Lecture 3: Let's start with this one?

- **Describe the function of the following (in 1 sentence), as well as any substructures contained within them**
  - Nucleus
  - Nucleolus
  - Rough endoplasmic reticulum
  - Smooth endoplasmic reticulum
  - Golgi complex
  - Mitochondria
  - Lysosomes
  - cytoskeleton

– What is a hormone?

– What is particularly important about the structure of the mitochondrial membrane?

– **When a neutrophil phagocytes an extracellular bacteria, what substructure of the neutrophil is primarily responsible for the destruction of the bacteria?**

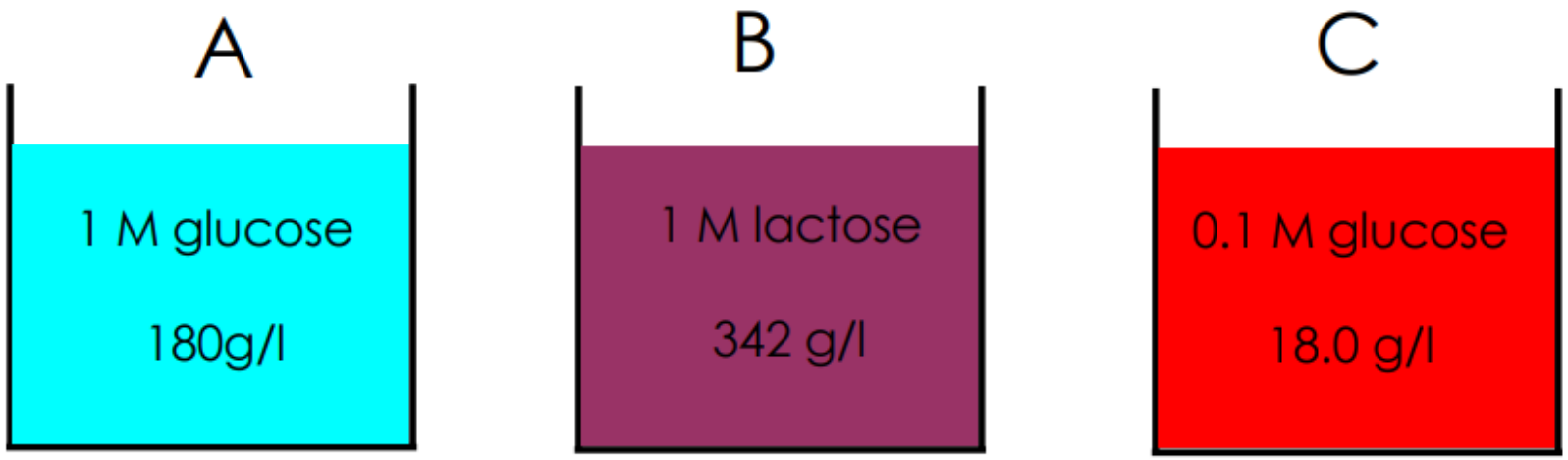
– **When a cell signals for apoptotic destruction, what substructure of the cell is primarily responsible for initiating the response?**

– **Which specific ion is important in cellular signalling following fertilisation of an oocyte?**

– **How many layers of phospholipids exist between two separate cells? Between plasma and within an alveolar cell?**

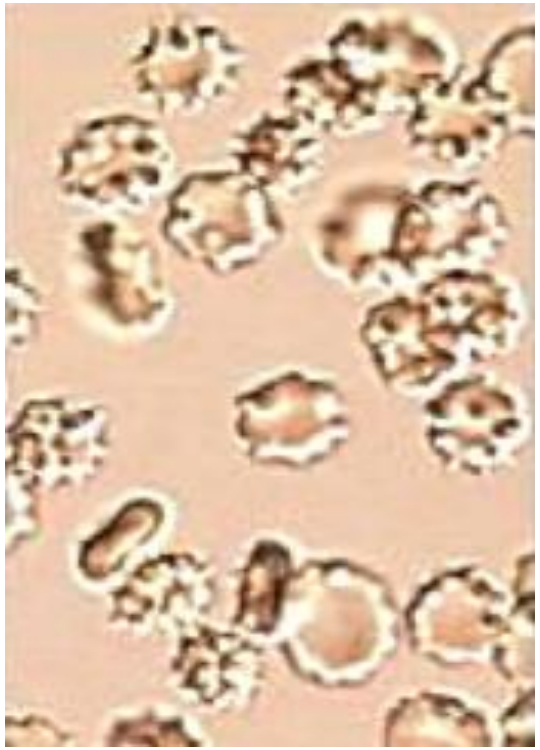
– **What substances are lipid bilayers NOT permeable to? How do these particles get through?**

– **How may layers will a molecule of oxygen have to pass through to get from the alveoli of the lung into a red blood cell?**



- **Which direction would water flow if a semipermeable membrane were to be placed between solution B and C?**

– **What type of solution (hypotonic, hypertonic, isotonic) would a red blood cell be placed into for the following blood smear to appear?**



– **Does the Na+-K+-ATPase ion channel/transporter act in a passive or active fashion?**

– **True/false: CO2 enters and exits a cell through an active transporter?**

– **What device/technique is used in physiology to experiment with the function of a single ion channel?**

– **Which ion (Na+/ K+) is higher inside the cell, and which is higher outside the cell? How are these electrochemical gradients maintained?**

– **Which direction does the Na+-K+-ATPase typically pump the Na+ and the K+?**

– **Draw a voltage-time graph of the action potential and label which channels are open/close during each phase of the A-P cycle (Hodgkin cycle)**

– **What protein coats the vesicle formed from receptor mediated endocytosis?**

– **By what mechanism can particles the size of glucose (and larger) get in and out of a cell?**

- **How does the Na+-K+-ATPase maintain both an:**
  - Electrical gradient
  - Chemical gradient

– **What is the role of the aquaporin channel, and where is it found?**

L4: Powering it all up (DC)

– 4 hours after a meal, in what form is energy stored as within the body?

– What are the main sources of energy for cells?

– **How does the source of energy differ between brain tissue and heart muscle?**

– **What physiological signs and symptoms occur when a type 1 diabetic injects too much insulin and experiences a hypoglycaemic attack?**

– **Compare the processes of indirect and direct calorimetry for energy usage measurement**

– **What is the first substrate fatty acids must form in the process of producing ATP?**

- **What is the primary product produced when undergoing unrestrained anaerobic respiration?**
  - Where is anaerobic respiration used rather than aerobic?
  - What is the benefit of each?

– **Where in the cell does the electron transport chain occur? What is the purpose of the electron transport chain?**

– **Approximately how much ATP is produced per gram of fatty acid, and per g of glucose?**