## Homeostasis: Acid-Base Balance

- Homeostasis is the condition of equilibrium in the body's internal environment
  - This is done through the **constant interactions between the body's regulatory systems**
  - In response to a changing condition, the body can shift along points in a narrow range that is compatible with maintaining life
    - Glucose in the blood, for example, must be kept between 70 and 100mg per 100ml of blood

- **Water** is a very important component when maintaining homeostasis
  - **It can stabilise your body temperature**
    - Water can absorb large amounts of heat and remain at a stable temperature. This is because heat energy causes the **movement of water molecules and disrupts hydrogen bonds**
    - Blood, which is mostly water, is warmed deep within the body, and then flows to the surface where heat is released in the form of sweat
  - **It can act as protection against other surfaces**
    - Water is an **effective lubricant**; tears protect the surface of the eye from rubbing the eyelids
    - Water also forms a cushion around organs to protect them from damage, such as cerebrospinal fluid in the brain
  - **It can facilitate chemical reactions**
    - Most of the reactions that take place in the body require the molecules to be dissolved in water
      - **NaCl must dissociate in water before the $Na^+$ and $Cl^-$ ions can react with other ions**
      - Water also participates in reactions directly, such as the digestion of food
  - **Finally, water is needed to transport substances**
    - Once a substance is dissolved in water it can be transported from place to place was the water moves



- An important aspect of homeostasis is its ability to maintain the volume of bodily fluids and to dilute solutions et
  - Fluid within a cell is termed **intracellular fluid** (40% of body weight / 25L)
  - Fluid outside is termed **extracellular fluid** (20% of body weight / 12L)
    - The fluid that fills the gaps between cells is known as **interstitial fluid**
    - The ECF within blood vessels is termed **plasma**
    - The ECF within lymphatic vessels is called **lymph**
    - The ECF in and around the brain and spinal cord is **cerebrospinal fluid**
    - The ECF is joints is **synovial fluid**
    - The ECF in the eyes is called **aqueous humour** and **vitreous body**

- Homeostasis in the body is continually being disturbed from the **external and internal** environments
  - External examples include intense heat or a lack of oxygen
  - Internal examples include a fall in glucose level etc.
  - Homeostasis can also be disturbed due to **psychological stresses**

- The body regulates the internal environment using a number of feedback systems which includes a **receptor, a control centre and an effector**
  - The **receptor picks up a change in a variable**
  - The **information is sent along the afferent pathway to the control centre**
  - The **effector then sends the necessary information to the effector**
  - The **effector uses the information to change the variable to within the correct limit**