



## **Fluid systems are the body's transport mechanism**

### Vascular System

Vascular System transports oxygen, nutrients and carbon dioxide throughout the body.

Blood is 55%plasma = 90%water, 8% protein and 2% acid and salts

Blood pH for homeostasis is 7.36-7.41

- Blood cells arise from bone marrow and make up the other 45%
- Red blood cells (99%) pick up oxygen from the lungs and release it through the capillaries to tissue and cells.
- Platelets (0.6 to 1.0%) adhere to injured endothelium and assist in blood clotting
- White blood cells (0.2%) are the hunter-killer group. They attack foreign bodies that invade the body.

Heart pumps oxygenated blood through the arteries, arterioles and capillaries.

Carbon dioxide loaded blood returns to the lungs via capillaries and veins.

In pulmonary circulation deoxygenated blood passes through the pulmonary artery to the lungs where the blood picks up oxygen and then returns to the heart via the pulmonary vein then it is bumped through the system.

### Urinary System

Urinary system is the pathway for elimination of metabolic by-products, toxins and other non-essential molecules. All are dissolved in water, urine.

Kidneys function as a filter system but also conserve water and help maintain acid-base balance in the blood. Less than one percent of the filtered plasma is excreted.

The kidneys lie behind the parietal peritoneum of the abdominal cavity and connect via two ureters to the urinary bladder in the pelvis.

### Lymphoid System

The lymph or immune system is the body's defense against invading microorganisms. Its other function is to destroy cells that are no longer recognizable as the "self". Lymphocytes are produced in red bone marrow and the thymus. These cells enter the blood stream via venous flow and are stored in secondary organs like the spleen, regional lymph nodes, the mucosal inner lining of organs, tonsils and appendix.

Some fluid and lymphocytes leave the circulatory system and enter tissue space. Some of this fluid along with cells is recovered in closed-end lymphatic capillaries. These merge into larger vessels or trunks that drain regions of the body. Trunks converge into sacs that turn into lymph ducts that flow into veins.



### **Interesting facts about water...**

- Seventy-two percent of the earth's surface is water. The global sea is the earth's thermostat.
- The average depth of the ocean is nearly 2 miles. Ninety-seven percent of life on the planet lives in water.
- Sixty percent of the human body is water. We are born into this world 70 percent water.
- Water is a simple compound yet quite unique. Two hydrogen (+) atoms bond with an oxygen (-) atom to form the polar molecule of H<sub>2</sub>O. Water molecules are attracted to one another by an electrical (polar) bond. This polar bond gives water its cohesive quality, without it water would be a gas at room temperature. The polar bond allows water to form a skin. Surface tension is what holds a drop of water together and enables the tides to rise and fall.
- Water is a universal solvent. More substances dissolve in it than any other common liquid.
- Water has a high heat capacity. It takes a lot of heat to break the polar bond so it loses and gains heat slowly, crucial for stabilizing global temperatures.
- Water has a high heat of vaporization.
- Water condenses when cooled until it reaches 39 degrees. Then the polar molecules align themselves as a crystal and take up more space. This unique density-temperature relationship is what allows ice to float and insulate the water below it.

Water is the basis of all cellular life.

**There is a growing shortage of fresh water on the planet.**

Water is a wonderful teacher.

~Dennis Eagan