

## CHAPTER 3

# BASIC ANATOMY AND PHYSIOLOGY

### SURFACE ANATOMY

Surface anatomy is the identification of landmarks on the surface of the skin which allows us to compare our knowledge of our own surface anatomy with that of an injured person.

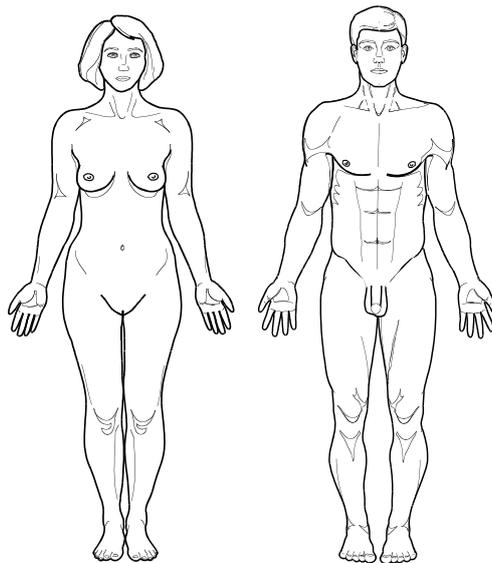


Fig 1-3: Male and female adults in the anatomical position

The best way to learn about surface anatomy is to look at and examine your own body. What you learn from this will help you find injuries on others.

### THE SKELETON

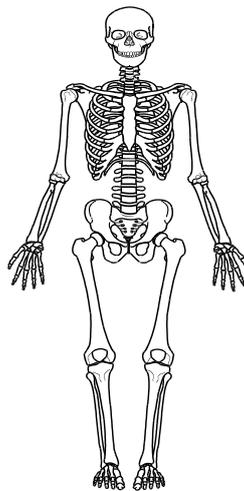


Fig 1-4: The skeleton

The skeleton is made up of bone, which is living tissue that requires a blood supply. The larger bones in the body, such as the pelvis and the femurs, have a greater blood supply because the blood is made in their marrow.

## THE NERVOUS SYSTEM

The nervous system is divided into three parts:

1. The **Central Nervous System** of the brain, cranial nerves and spinal cord;

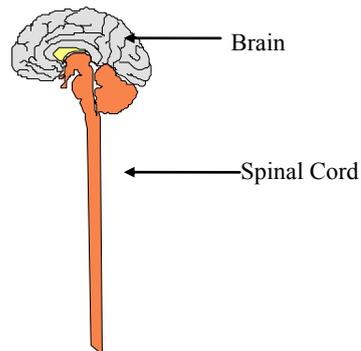


Fig. 1-5: The Central Nervous System

2. The **Peripheral Nervous System**, which is comprised of motor (voluntary) nerves and sensory nerves. For example, the brain uses motor (voluntary) nerves to transmit commands to the muscles so when you wish to pick up a glass the motor nerves tell the muscles of the hand, arm, shoulder and chest to move.

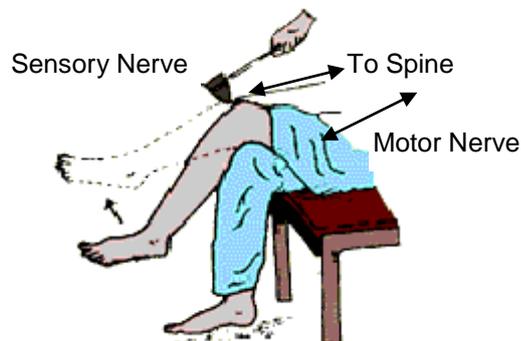


Fig.1-6: Peripheral Nervous System including Motor (Voluntary) Nerve and Sensory Nerves

3. The **Autonomic (involuntary) Nervous System** controls activity in the body without involving the conscious mind. Most of the functioning of the body is controlled by the autonomic or involuntary nervous system.

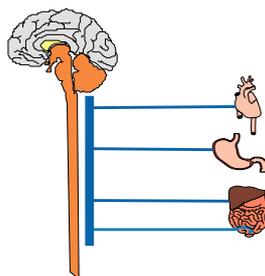


Fig 1-7: Autonomic Nervous System

## THE RESPIRATORY SYSTEM

The respiratory system consists of the airway, lungs and the ribs and muscles of respiration.

### THE AIRWAY

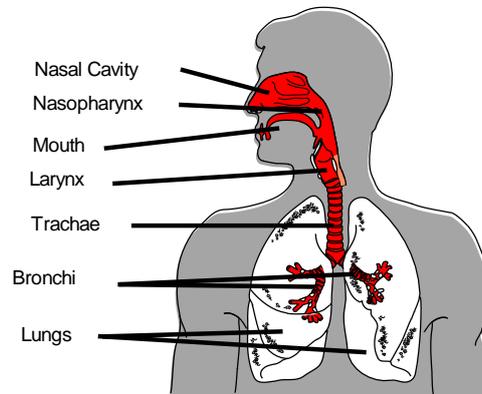


Fig 1-8: The airway

The airway extends from the lips and nostrils, through the nasal and oral cavities to the naso-pharynx and pharynx, through the larynx, tracheae, bronchi and down to the surface of the air sacs in the lungs. The airway can be blocked at any point along its length. The most common causes of such blockage are our own position, vomit, food, saliva, and blood.

### THE LUNGS

The air sacs (alveoli) in the lungs are structures one cell thick. They are thin so as oxygen and other gasses can easily pass into and out of the blood stream.

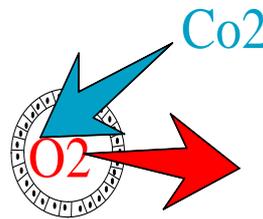


Fig 1-9: Air sac (Alveolus) with walls one cell thick

The lungs themselves are therefore made up of the tubes of the airway and the millions of alveoli that enable oxygen to move into the blood stream.

### The Lungs and Chest Cavity

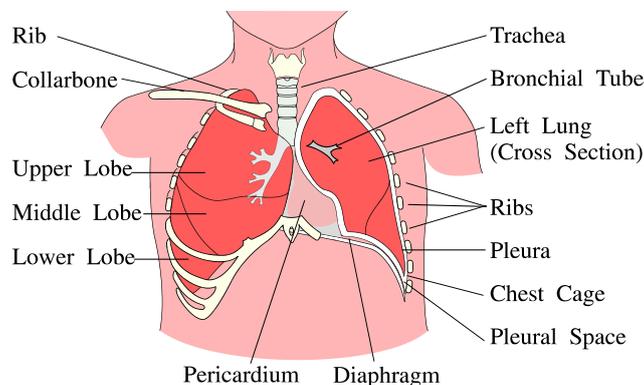


Fig 1-10: The lungs and chest cavity

The lungs are contained within the chest and are protected by the chest wall and a layer of tough tissue called the pleurae.

## THE CIRCULATORY SYSTEM

The circulatory system comprises the blood, heart, arteries, veins and capillaries. The function of the circulatory system is to transport oxygen, food,  $\text{CO}_2$  and waste products to and from the cells of the body.

## THE HEART

The heart is a muscular organ that pumps blood to the body and the lungs. It consists of four chambers, two collecting chambers (atria) and the pumping chambers (ventricles).

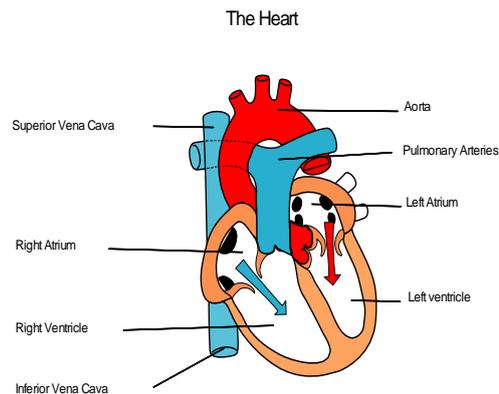


Fig. 1-11: The heart showing the flow of blood from the atria to the ventricles

## THE BLOOD VESSELS

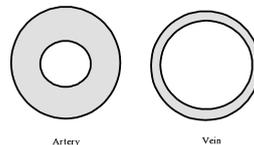


Fig. 1-12: Cross section of an artery and vein showing the difference in thickness.

Both arteries and veins have three layers of tissue and in both the layers are a tough outer coat, a middle muscle layer and a smooth lining. The difference between the two is that the muscle layer is much thicker in the artery than in the vein. The artery requires a thick muscular wall so that it can assist in pumping blood around the body. The vein is soft so that blood can be squeezed along it by other muscles.

The capillary is similar to the air sacs in the lungs in that its walls are only one cell thick. This is because, like the air sacs oxygen and  $\text{CO}_2$ , water and food have to pass through its walls to get to the cells of the body and to the outside.

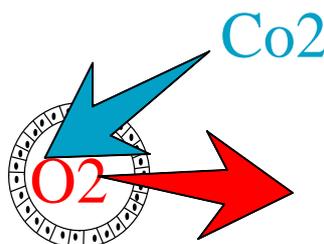


Fig. 1-15: Cross section of a capillary.



Fig. 1-13: The major blood vessels of the body.

## THE ABDOMEN

The abdomen contains the spleen, stomach, intestines, liver and pancreas, kidneys, bladder, female reproductive system and the blood vessels which supply them and the legs.

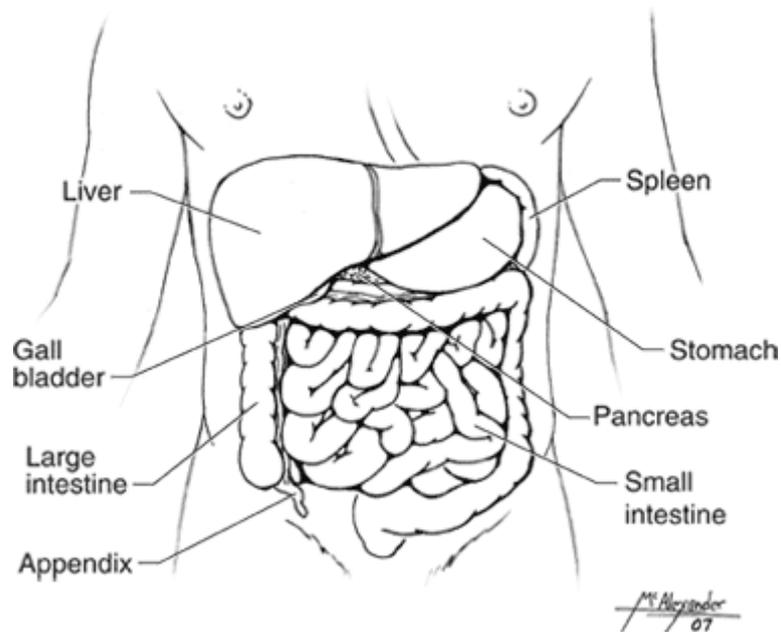


Fig. 1-14: The organs of the abdomen.

## THE SKIN

The skin comprises a number of layers and structures which protect the body from temperature change, damage, fluid loss and infection. What we see as skin is in fact the outermost layer which is dead.

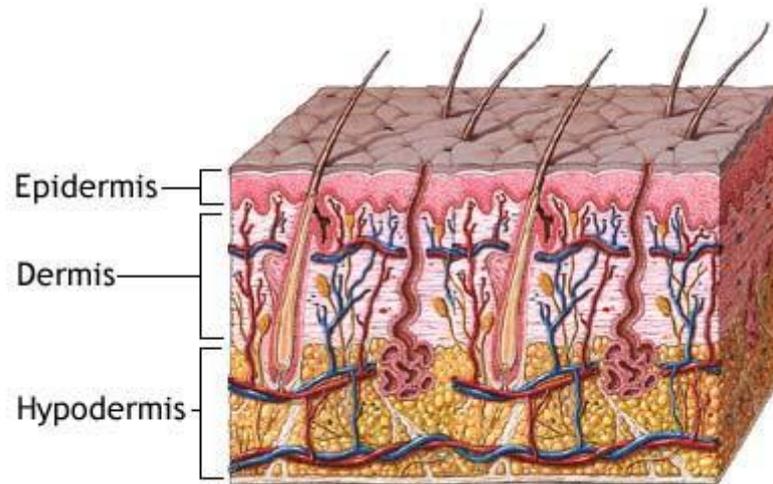


Fig. 1-15: Layers of the Skin