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1) The heart.

 The heart is a muscular organ roughly the size of a closed fist. It sits in the chest, slightly to the left of centre.

As the heart contracts, it pumps blood around the body. It carries deoxygenated blood to the lungs where it loads up with oxygen and unloads carbon dioxide, a waste product of metabolism.

The heart, blood, and blood vessels combined are referred to as the circulatory system. An average human has around 5 litres (8 pints) of blood, which is constantly pumped throughout the body.

The heart consists of four chambers:

1. **Atria**: the two upper chambers (they receive blood).
2. **Ventricles**: the two lower chambers (they discharge blood).

The left atria and left ventricle are separated from the right atria and right ventricle by a wall of muscle called the septum.

The wall of the heart consists of three layers of tissue:

1. **Epicardium** — protective layer mostly made of connective tissue.
2. **Myocardium** — the muscles of the heart.
3. **Endocardium** — lines the inside of the heart and protects the valves and chambers.

These layers are covered in a thin protective coating called the pericardium.

How the heart works

The heart contracts at different rates depending on many factors. At rest, it might beat around 60 times a minute, but it can increase to 100 beats a minute or more. Exercise, emotions, fever, diseases, and some medications can influence heart rate.

**The left and right side of the heart work in unison. The right side of the heart receives deoxygenated blood and sends it to the lungs; the left side of the heart receives blood from the lungs and pumps it to the rest of the body.**

The atria and ventricles contract and relax in turn, producing a rhythmical heartbeat:

**Right side**

 The right atrium receives deoxygenated blood from the body through veins called the superior and inferior vena cava (the largest veins in the body).

The right atrium contracts and blood passes to the right ventricle.

Once the right ventricle is full, it contracts and pumps the blood through to the lungs via the pulmonary artery, where it picks up oxygen and offloads carbon dioxide.

**Left side**

 Newly oxygenated blood returns to the left atrium via the pulmonary vein.

The left atrium contracts, pushing blood into the left ventricle.

Once the left ventricle is full, it contracts and pushes the blood back out to the body via the aorta.

Each heartbeat can be split into two parts:

1. **Diastole**: the atria and ventricles relax and fill with blood.
2. **Systole**: the atria contract (atrial systole) and push blood into the ventricles; then, as the atria start to relax, the ventricles contract (ventricular systole) and pump blood out of the heart.

When blood is sent through the pulmonary artery to the lungs, it travels through tiny capillaries on the surface of the lung’s alveoli (air sacs). Oxygen travels into the capillaries, and carbon dioxide travels from the capillaries into the air sacs, where it is breathed out into the atmosphere.

The muscles of the heart need to receive oxygenated blood, too. They are fed by the coronary arteries on the surface of the heart.

Where blood passes near to the surface of the body, such as at the wrist or neck, it is possible to feel your pulse; this is the rush of blood as it is pumped through the body by the heart.

The valves

The heart has four valves that help ensure that blood only flows in one direction:

1. **Aortic valve**: between the left ventricle and the aorta.
2. **Mitral valve**: between the left atrium and the left ventricle.
3. **Pulmonary valve**: between the right ventricle and the pulmonary artery.
4. **Tricuspid valve**: between the right atrium and right ventricle.

Most people are familiar with the sound of a human heartbeat. It is often described as a “lub-DUB” sound. The “lub” sound is produced by the tricuspid and mitral valves closing, and the “DUB” sound is caused by the closing of the pulmonary and aortic valves.

The heart’s electrical system

To pump blood throughout the body, the muscles of the heart must be coordinated perfectly — squeezing the blood in the right direction, at the right time, at the right pressure. The heart’s activity is coordinated by electrical impulses.

The electrical signal begins at the sino-atrial (or sinus, SA) node — the heart’s pacemaker, positioned at the top of the right atrium. This signal causes the atria to contract, pushing blood down into the ventricles.

The electrical impulse travels to an area of cells at the bottom of the right atrium called the atrioventricular (AV) node. These cells act as a gate; they slow the signal down so that the atria and ventricles do not contract at the same time — there needs to be a slight delay.

From here, the signal is carried along special fibres called Purkinje fibres within the ventricle walls; they pass the impulse to the heart muscle, causing the ventricles to contract.

Blood vessels

There are three types of blood vessels:

1. **Arteries**: carry oxygenated blood from the heart to the rest of the body. Arteries are strong and stretchy, which helps push blood through the circulatory system. Their elastic walls help keep blood pressure consistent. Arteries branch into smaller arterioles.
2. **Veins**: these carry deoxygenated blood back to the heart and increase in size as they get closer to the heart. Veins have thinner walls than arteries.
3. **Capillaries**: they connect the smallest arteries to the smallest veins. They have very thin walls, which allow them to exchange compounds with surrounding tissues, such as carbon dioxide, water, oxygen, waste, and nutrients.

Functions of the heart -

1. It transports blood around the body
2. It transports oxygen around the body
3. It transports nutrients around the body

2) A congenital heart defect is a problem with your heart that you’re born with.

They’re the most common kind of birth defect.

5 Examples are:

1). **Hole in the Heart (Septal Defect)**

 This means you’re born with a hole in the wall, or septum, that separates the left and right sides of your heart. The hole lets blood from the two sides mix.

2). **Atrial Septal Defect (ASD)**

 An ASD is a hole in the wall between the upper chambers, or the right and left atria, of your heart. A hole here lets blood from the left atrium mix with blood in the right atrium. Some ASDs close on their own. Your doctor may need to repair a medium or large ASD with open-heart surgery or another procedure. He might seal the hole with a minimally invasive catheter procedure. He inserts a small tube, or catheter, in your blood vessel all the way to your heart. Then he can cover the hole with a variety of devices.

3). **Ventricular Septal Defect (VSD)**

 A VSD is a hole in the part of your septum that separates your heart’s lower chambers, or ventricles. If you have a VSD, blood gets pumped back to your lungs instead of to your body. A small VSD may also close on its own. But if yours is larger, you may need surgery to repair it.

4). **Complete Atrioventricular Canal Defect (CAVC)**

 This is the most serious septal defect. It’s when you have a hole in your heart that affects all four chambers. A CAVC prevents oxygen-rich blood from going to the right places in your body. Your doctor can repair it with patches. But some people need more than one surgery to treat it.

5). **Pulmonary valve stenosis. This** is the most common valve defect in newborns. Babies with severe cases often have strained right ventricles. Your doctor can usually treat it with a catheter procedure. She will use a catheter, or thin tube, with a balloon on the end to inflate and stretch open the strained valve.