The Structure and Function of the Human Heart

The human heart is a pump. It pumps blood around the body at different speeds and at different pressures according go the body's needs. It can do this because the wall of the heart is made from **cardiac muscle**.

Blood is moved through the heart by a series of **contractions** and **relaxations** of **cardiac muscle**in the walls of the **four chambers.** These events form the **cardiac cycle**

The Cardiac Cycle

When a chamber of the heart is **contracting**, we say it is in **systole**.  
When it is **relaxing**, we say it is in **diastole**.

The Structure of the Heart is adapted to its function in several ways:

* It is divided into a left side and a right side by the **septum**. The right ventricle pumps blood only **to the lungs** while the left ventricle pumps blood **to all other parts of the body**. This requires much more pressure, which is thy the wall of the left ventricle is much **thicker** than that of the right ventricle.
* **Valves** ensure that blood can flow only in **one direction**through the heart.
* The walls of the**atria** are **thin**. They can be stretched **to receive blood** as it returns to the heart but can contract with enough force to push blood through the **bicuspid**and **tricuspid** valves into the **ventricles**.
* The walls of the heart are made of **cardiac muscle** which can contract and then relax continuously, without becoming fatigued.
* The **cardiac muscle** has its own blood supply called the **coronary circulation**.
* Blood reaches the muscle via **coronoary arteries**. These carry blood to cappilaries that **supply** the heart muscle with **oxygen and nutrients**. Blood is returned to the **right atrium** via **coronary veins**.

Heart Rate

The heart beats about 70 times a minute, but this can change according to circumstances.  
When we exercise, muscles must **release** more energy. THey need and **increased supply of oxygen** for **aerobic respiration. TO deliver the extra oxygen,**both the number of beats per minute (**heart rate**), and the volume of blood pumped with each beat (**stroke volume**) increase.  
These changes in the heart rate are brought about by nerve impulses from a part of the brain called the **medulla**. When we start to exercise, our muscles produce more carbon dioxide in **aerobic respiration**. **Sensors** in the **aorta** and the **carotid artery**(the artery leading to the head) detect this increase. They send nerve impulses to the medulla. The medulla responds by **sending nerve impulses** along the **accelerator nerve**. When carbon dioxide production returns to normal, the medulla receives fewer impulses. It responds by sending nerve impulses along a **decelerator nerve**.  
  
The **accelerator nerve increases** the heart rate. It also **causes the heart to beat**with**more force**and so **increases** **blood pressure**.  
The **decelerator nerve decreases** the heart rate. It also **reduces** the **force of the contractions**. **Blood pressure** then returns to **normal.**

The precise region of the medulla that controls heart functions is called the **cardiac centre**.