

## Introducing the Cardiovascular system

### Your cardiovascular health

A constant supply of oxygen is needed to keep the body functioning. The cardiovascular system - made up of heart, lungs and blood vessels, and the blood that circulates through these - is responsible for getting oxygen into your body, and circulating it everywhere it's needed.

### How does the system work?

Oxygen enters the body through your mouth and nose, and is breathed into the lungs, where it's absorbed into the blood. The heart then pumps this oxygen-rich blood through a network of blood vessels, your arteries, to tissues - organs, muscles and nerves - all around the body.

When blood reaches these tissues, it releases the oxygen, which is then used to produce energy. In exchange, the tissues give up waste products - including carbon dioxide and water - which are, in turn, absorbed and carried away by blood.

This used - or 'deoxygenated' - blood then travels along veins, back towards your heart. Your heart pumps this blood back to your lungs, where it picks up fresh oxygen, and starts the cycle once again.

### The heart

An adult human's heart weighs about 300g, and is roughly the size of a clenched fist. It lies in the centre of the chest, surrounded by a protective membrane called the pericardium. In an average day, it pumps nearly 8,000 litres of blood.

It's a muscular organ, divided vertically into left and right sides. The left side is slightly larger because it has more work to do. The right side of the heart receives deoxygenated blood from elsewhere in your body. It pumps this blood to the lungs, to pick up more oxygen. This oxygenated blood then returns to the left side of the heart, which pumps it out to the rest of your body. Each side of the heart is further divided into an upper chamber - or atrium - and larger lower chamber, called a ventricle. Blood flows from the atria to the ventricles through a one-way valve. Your heart works like a pump, with its muscular walls contracting to force the movement.

### The lungs

At rest, a healthy adult breathes between six and seven litres of air into the lungs every minute. These lungs consist of spongy tissue - that flank the heart in the chest cavity (thorax).

The diaphragm - a sheet of muscle, which separates the chest from the abdominal cavity - forms the floor of the thorax. It's responsible for inflating and deflating the lungs as you breathe.

From the nose and mouth, air passes into the trachea (windpipe) - through the larynx - or voice box - and into each lung, through two airways called your bronchi. These divide into smaller airways - called bronchioles - which divide again, into alveoli. These are air sacs with walls just one cell thick - it's here that the gases oxygen and carbon dioxide can filter into and out of the blood. This process - known as gaseous exchange - involves molecules of oxygen and carbon dioxide binding to haemoglobin, one of the components of your blood.

There are about seven million alveoli in your lungs, providing a vast surface area - around the size of a tennis court if opened out - where gas exchange can take place.

### Circulation

This whole system depends on a process of circulation.

Basically, deoxygenated blood flows towards your heart through two large veins, called the venae cavae. As your right atrium contracts - with the beating of your heart - your tricuspid valve opens, and this deoxygenated blood flows straight into your right ventricle. Your right ventricle then contracts - the second phase of a heart beat - and the tricuspid valve shuts, while the pulmonary artery opens.

The deoxygenated blood is pumped out of your right ventricle, and down your pulmonary artery towards your lungs. Before your next heart beat, your pulmonary valve closes to prevent this blood flowing back into your heart.

When it reaches your lungs, your blood is replenished with oxygen, before being sent back towards your heart, through your pulmonary vein and into your left atrium. On this side of your heart, it's the mitral valve which controls blood flow.

This shuts behind the blood, and then your bicuspid valve opens to allow the blood to be pumped from your left ventricle into your aorta, and off on its way round the rest of your body.

From your aorta, numerous arteries divide into smaller arterioles. Eventually, the blood arrives in the smallest vessels - the capillaries. These allow exchange of oxygen, carbon dioxide and other waste products between the blood and the tissues.

Deoxygenated blood is then conveyed in small, then larger, veins back towards your heart for the whole cycle to begin again. All along the way, one-way valves prevent the backflow of blood in your veins.

## Blood pressure

As blood travels around the body, it is under pressure. This pressure can be measured - usually in the brachial artery in your arm. Blood pressure is expressed. The top figure - or systolic reading - is a measure of the pressure in your artery when the heart is contracting and squeezing blood out. The bottom figure - the diastolic reading - is the pressure when your heart is filling.

## What goes wrong?

Like all muscles, your heart requires a regular supply of blood. This is delivered by your left and right coronary arteries. It's when these become furred up with a fatty deposit called plaque that your heart muscle stops receiving enough blood to work properly.

The result can be:

- angina
- high blood pressure
- heart attack
- heart failure

See separate facts sheets on these topics.

## Looking after your cardiovascular health

Your lifestyle over the long term plays an essential part in maintaining cardiovascular health. Follow our tips for keeping the risks to a minimum:

- if you smoke, give up - smoking causes serious damage to your heart and blood vessels
- exercise regularly - preferably, most days. This doesn't mean you have to join a gym - moderate intensity activity, such as brisk walking, should be enough
- eat healthily - a healthy diet is high in complex carbohydrates (bread, pasta, potatoes, rice) and fruit and vegetables, and low in saturated fat

## Further information

### American Heart Association

<http://www.americanheart.org/presenter.jhtml?identifier=770>

### Healthwise (Health Information Resource Centre)

Tel : (852) 2849 2400  
Fax : (852) 2849 2900  
Email : [info@healthwise.org.hk](mailto:info@healthwise.org.hk)  
Homepage : [www.healthwise.org.hk](http://www.healthwise.org.hk)

*This leaflet is for information only. For a detailed opinion or personal advice, please consult your own doctor.*

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