opening extract from

body

an amazing tour of human anatomy

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Hand

OUR SURVIVAL DEPENDS ON OUR ABILITY TO USE OUR HANDS. These complex structures of bone, tendon, muscle, and blood vessels allow us to eat, write and carry, and even to express our thoughts through gestures. The human hand has a wider range of movement than comparable structures in other animals (such as a cat's paws). This is due mainly to the thumb, which can grasp tools or pick up the tiniest objects.

DISTAL PHALANGE (last bone) of the thumb.

JOINT acts like a hinge to allow finger to bend.

Tendon attached to bone

DISTAL PHALANGE (last bone) of index finger.

DIGITAL artery carries blood to the finger.

FLEXOR TENDON tightens to bend joints of the finger.

COMMON PALMAR digital artery carries blood to the first two fingers.

FIRST LUMBRICAL MUSCLE helps point the index finger.

FLEXOR POLLICIS BREVIS MUSCLE bends the thumb and pulls it across the palm.

RADIAL ARTERY carries blood to the hand. This is the artery that is felt when your pulse is taken.

Branch of median nerve

ABDUCTOR POLLICIS BREVIS MUSCLE pulls the thumb away from the index finger.

FLEXOR RETINACULUM holds the flexor tendons in place as they cross from the forearm into the hand.

FLEXOR TENDON bends finger.

YOU USE SEVEN DIFFERENT MUSCLES TO MOVE YOUR INDEX FINGER

OVER THE ENTIRE HAND, THERE ARE ABOUT 17,000 TOUCH RECEPTORS

ON AVERAGE YOUR FINGERNAILS GROW ABOUT 3 MM A MONTH

DISTAL PHALANGE (last bone) of little finger.

VOLAR PLATE helps prevent fingers from being bent back too far.

DIGITAL NERVE gives sensation to finger.

NATATORY LIGAMENT limits how wide the fingers can be spread and strengthens the webbing between the fingers.

DIGITAL VEIN drains blood from finger.

PALMAR FASCIA (longitudinal fibres)

Branch of ulnar nerve

PALMAR FASCIA protects the underlying tendons, nerves, and blood vessels from injury.

FLEXOR DIGITI BREVIS MUSCLE bends the little finger.

PALMARIS BREVIS MUSCLE aids grip by wrinkling and supporting the skin on this side of the palm.

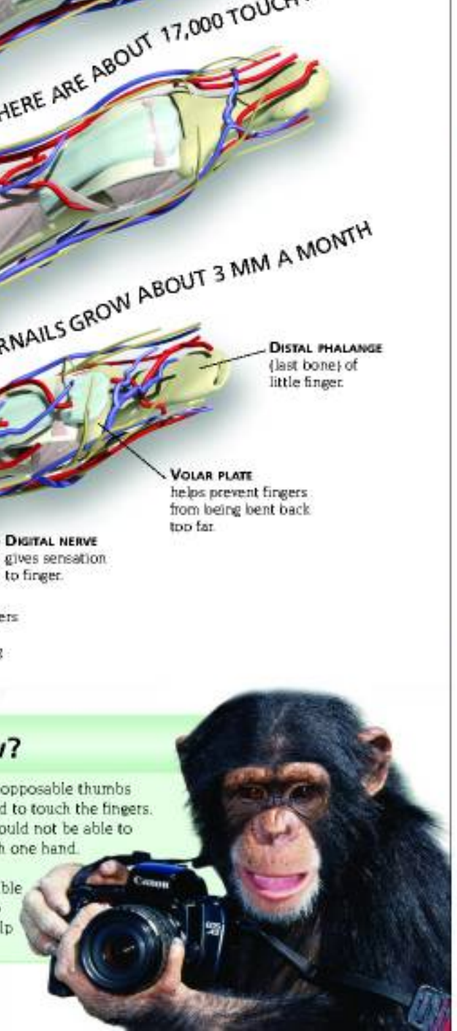
ULNAR ARTERY carries blood to the hand.

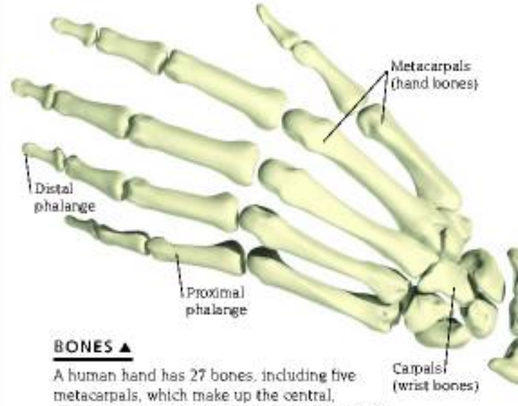
ULNAR NERVE gives sensation to this side of hand.

PALMAR (FRONT) VIEW OF HAND

Did you know?

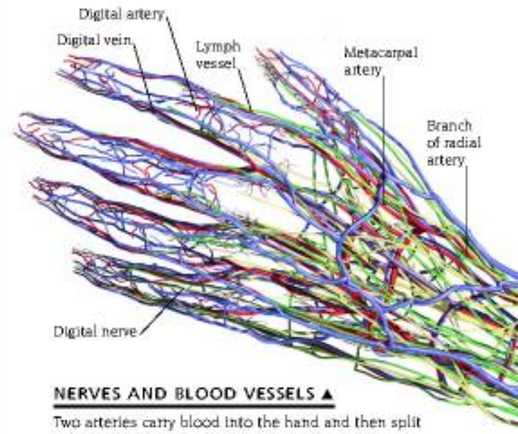
- Human thumbs are called opposable thumbs because they can be moved to touch the fingers. Without this ability, you would not be able to write with a pen or eat with one hand.
- Chimpanzees have opposable thumbs, too. But they also have opposable toes to help them grip branches.





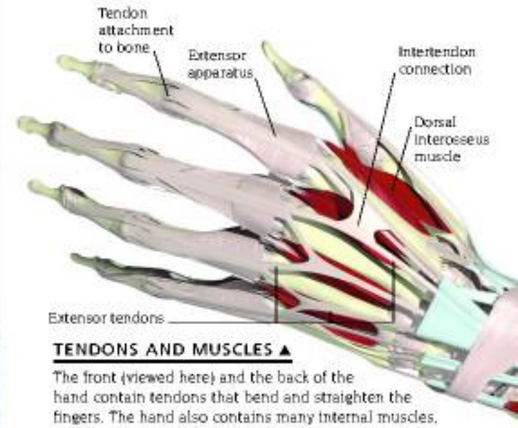
BONES ▲

A human hand has 27 bones, including five metacarpals, which make up the central, solid part of the hand, and 14 phalanges (finger bones). In addition, the wrist contains eight irregularly-shaped bones, called carpals.



NERVES AND BLOOD VESSELS ▲

Two arteries carry blood into the hand and then split into a network of smaller blood vessels. If either of these arteries is damaged, the other can still supply sufficient blood to the hand. Your hand also contains a complex network of nerves and lymph vessels.



TENDONS AND MUSCLES ▲

The front (viewed here) and the back of the hand contain tendons that bend and straighten the fingers. The hand also contains many internal muscles, which contract to produce other types of movement.

Heart

DURING YOUR LIFETIME, YOUR HEART WILL MOVE around 220 million litres of blood – the equivalent of hundreds of Olympic-sized swimming pools – around your body as a result of its strong pumping action. Your heart is about the size of an adult's fist and is composed mainly of a special type of muscle. To pump blood, this muscle contracts in a rhythmical fashion about 70 times a minute when you are at rest, faster when you exercise. The heart lies in the upper part of your chest, nestling between the two lungs. Numerous large blood vessels sprout from it. Some, called veins, carry blood into the heart. Others, called arteries, carry blood away from it.

LEFT COMMON CAROTID ARTERY carries oxygenated blood to the head.

RIBCAGE provides solid protection to the heart on all sides.

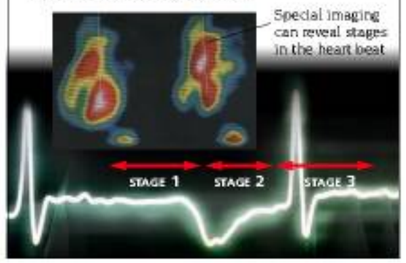
PERICARDIUM is a thick, fibrous layer of tissue that covers the heart's outer surface.

HEART is tilted towards the left side of the chest in 9,998 people out of every 10,000; in the other 2 in 10,000 it is tilted towards the right.

CORONARY ARTERY NETWORK is a system of arteries that spread over the surface of the heart muscle, providing it with a constant supply of oxygen and nutrients.

BEATING HEART

Your heart beat is controlled by a tiny area of tissue in the upper part of the heart. This produces regular electrical signals that spread through the heart muscle, causing it to contract. The varying strength of the signal can be measured and recorded as a repeating graph called an ECG trace. Different stages (1-3 below) in the signal's progress through the heart tie in with different parts of the trace.



TO UPPER, RIGHT SIDE OF BODY

TO UPPER LEFT SIDE OF BODY

LEFT LUNG

RETURN FLOW FROM UPPER LEFT SIDE OF BODY

AORTA is a massive artery through which the left side of the heart pumps all its output of oxygen-rich blood to the body.

RETURN FLOW FROM UPPER, RIGHT SIDE OF BODY

PULMONARY ARTERY is a large artery through which the right side of the heart pumps oxygen-poor blood to the lungs.

RIGHT LUNG contains millions of air sacs from which oxygen passes from inhaled air into blood.

ENTRY INTO TISSUES OF LEFT LUNG IN SMALL BRANCHES OF PULMONARY ARTERY

ENTRY INTO TISSUES OF RIGHT LUNG

RETURN FLOW FROM LEFT LUNG

SUPERIOR VENA CAVA

PULMONARY VEIN carries oxygen-rich blood from the lungs to the heart's left atrium.

RETURN FLOW FROM RIGHT LUNG VIA PULMONARY VEINS

LEFT ATRIUM is one of the smaller, upper, chambers of the heart.

PULMONARY VALVE prevents backflow of blood from pulmonary artery into right ventricle.

MITRAL VALVE prevents backflow of blood from left ventricle into left atrium.

RIGHT ATRIUM is one of the heart's smaller upper chambers.

FLOW FROM LEFT ATRIUM INTO LEFT VENTRICLE

FLOW INTO RIGHT ATRIUM

LEFT VENTRICLE is one of the heart's lower chambers and pumps oxygen-rich blood to all parts of the body.

TRICUSPID VALVE prevents backflow of blood from right ventricle to right atrium.

INFERIOR VENA CAVA

RETURN FLOW FROM LOWER BODY

TO LOWER HALF OF BODY

RIGHT VENTRICLE is one of the heart's lower, larger, chambers and pumps oxygen-poor blood to the lungs.

KEY

FLOW OF OXYGEN-RICH BLOOD

FLOW OF OXYGEN-POOR BLOOD

▲ INSIDE THE HEART

The heart is really a double pump, with its two halves performing separate, linked actions. The right side of the heart – at the bottom left here – receives oxygen-poor blood from the body. It pumps this blood into the pulmonary artery, which delivers the blood to the lungs. In the lungs, oxygen is added to the blood, which returns to the left side of the heart via vessels called pulmonary veins. The left side of the heart pumps the oxygen-rich blood to the body via a massive artery, the aorta.