

THE LUNGS

(Collated by Michelle Wilkinson www.movingnaturally.co.uk)

The lungs lie on the left and right of the thoracic cavity either side of the heart.

Thoracic cavity (the upper burner) extends from the diaphragm to a little above the collar bones (clavicles).

Each lung is divided into lobes with three in the right side and making room for the heart two on the left.

Each lobe receives a tube (bronchus) in which air can pass. These tubes (bronchi) divide into smaller tubes (bronchioles) like the branch division of trees.

The bronchioles lead into tiny air sacs (alveoli). Alveoli means a bunch of grapes in Italian and provides an image of how these air sacs hang off the tubes of the lungs.

In healthy lungs there are around 300 million alveoli surrounded by blood vessels. Three-fifths of the lungs is composed of blood and their vessels.

It is in the alveoli that oxygen from inhaled air diffuses into the blood to become red oxygenated blood which enters the left side of the heart to be transported via the arterial blood flow to the cells of the body.

In exchange waste products such as carbon dioxide created from cellular activity travel back to the right side of the heart in the deoxygenated blood via the venous blood flow and returned to the alveoli in the lungs to diffuse into the air that is expelled.

In contrast to the arterial and venous blood flow around the body in the lungs it is the pulmonary vein which takes oxygenated blood to the heart and the pulmonary artery which sends deoxygenated blood from the heart back to the lungs.

The air coming in and out of the body is referred to as external respiration.

The carriage of oxygen and waste products in the blood is known as intermediate respiration.

The diffusion of oxygen and waste products into and out of cells is called internal respiration.

The external respiratory tract starts at the nose and mouth where air passes into the windpipe (trachea) and subsequently the bronchi of the lungs.

The trachea is on average 12 cm long and like the bronchi is formed of muscle kept wide open by rings of cartilage.

The principal muscle of respiration is the diaphragm which divides the thoracic cavity from the abdomen.

It attaches to the breastbone at the xiphoid process, the lower six ribs and spinal vertebrae.

The diaphragm's centrally attached Crus muscles extend down to the coccyx while the attached psoas muscles connect to the inside of the upper leg bone (femur).

The diaphragm contracts and descends to expand the lungs thus drawing oxygen rich air in through the nose and trachea (inhalation).

When the diaphragm relaxes it domes upwards expelling air containing waste products back out of the respiratory tract (exhalation).

A tight diaphragm will limit the amount of in and out take of air as will restriction in the ribs (intercostal) and neck (sternocleidomastoid & scalene) muscles.

A slumped posture with rounded shoulders and concaved chest limits the body's ability to breathe deeply and easily.

Suppressed emotions can be seen in the unconscious holding of breath.

A human takes around 14 in and out breaths per minute, 20,000 per day and possibly half a billion in an average lifetime.

There are four phases to the external respiration cycle; between each inhale and exhale there is a pause.

With the relaxation of the diaphragm the outbreath gives weight to the body and a yield to the earth. As a pause it provides time and space for response rather than habitual reaction to external stimuli. Moving on the out breath can create spontaneous movement.

The rhythm of the breath is automatically set by the lower brain stem (pons) at the top of the spinal cord.

Although breath occurs automatically underneath consciousness it is possible to have conscious control of breathing such as following yogic breathing exercises (pranayama) or holding the breath to submerge in water.

The pleura is a lubricated lining on the underside of the ribs and the outside of the lungs. It holds a thin layer of fluid, enough to make a seal between the outside of the lungs and the ribcage and diaphragm.

On the inner surfaces of each lung where each the bronchus enters the pleura it folds back on itself making a sealed bag.

The fluid seal inside the pleura sticks to the lungs, diaphragm and ribs and as the lungs expand, they are pulled out wards in all directions; up and down, front and back and side to side.

Breathing is three dimensional and when the lung volume is increased it decreases the air pressure within the lungs allowing air from outside to rush in and fill the gap.

Conversely, on the out breath the elastic lungs pull back in and with a domed diaphragm, increased air pressure pushes the air back out.

Because the lungs are the only yin organ to be exposed to the external environment they need to be protected from external pathogens.

Nose hair acts as a filter so that large particles are kept out of the lungs.

There is a constant mucus secretion in the breathing tubes which trap small particles. The mucus is swept up towards the throat by tiny hairs called cilia which line the tubes. Once in the throat the mucus can be swallowed or expelled through the mouth.

If an irritant enters the lungs a cough can forcibly expel it quicker than the cilia are able to.

After birth when the baby takes its first breath a hole called a foramen between the left and right side of the heart usually closes. It marks a fundamental change in nourishment reception as blood from the placenta no longer enters the right side of the heart and then passes directly to the left side. There is no constant internal maternal nurture, but the needs of the newly independent baby must be met from the external world.

In traditional Chinese Medicine (TCM) the lungs are viewed as the Breath of Heaven and the ultimate source of life on earth. It is our postnatal qi connecting the animal-self with the spiritual-self and how the spirit lands in the physical body.

The ancient Chinese saw breath as sacred with the ability to be in awe or inspired by aspects of life such as a view out of a window; humans can take in beauty as they do air and discover inspiration.

In TCM the energy (Postnatal Qi) that humans take in is 70% from food and drink and 30% from air. It is the lungs which are responsible for distributing this energy (vital substance) around the body.

There is a circuit of energy (qi) directly under the skin known as defensive or protective qi. If the lungs are weak then the body becomes vulnerable to pernicious influences such as wind and cold producing colds, flu and infections.

In TCM the lungs control the skin creating its fullness and suppleness while maintaining its integrity as a defensive barrier.

The skin, often referred to in TCM as the third lung, is a direct reflection of the health of the lungs. Lung imbalances can produce dry, rough, thin and broken skin.

Perspiration and sweat through the skin are one of the ways in which the body removes toxins and waste products.

Movement makes the sweat glands work thus cleansing the body via the skin.

The pathway of the lung meridian begins at the upper part of the chest in each pectoralis major muscle and ascend to the collar bone (clavicle) before crossing the shoulder joint. From here it travels down the lateral edge of each arm to end at the outside (lateral) corner of the thumbnail.

Central Palace is a lung acupuncture point (LU1) which lies in approximately 1 inch below the hollow under the lateral end of the clavicle. It stimulates the descent of Lung Qi and supports asthma and other breathing difficulties.

Great Abyss is a lung acupuncture point (LU9) which can be found at the lateral end of the wrist crease on the thumb (radial) side of the radial artery between the radius and scaphoid bones. It tonifies the lungs, resolves phlegm, promotes blood circulation and improves vitality.