Breathing is the most important thing our body does. Without lungs to breathe, we can't live. It sounds simple, but how lungs work — in fact, our entire respiratory system — is very complex.

1. A person usually breathes an average of 13 pints of air every minute.

2. Lungs aren't the same size. To accommodate the heart, the right lung is larger than the left lung — for humans, that is.

3. Lungs float on water. It's not something most people are aware of but, actually, the lungs are the only organs in the human body that are capable of floating on water.

4. Lungs and tennis courts can be the same size. What do lungs and a tennis court have in common? Their size! It seems pretty impossible, but if the lungs were opened flat they would be so big that they would cover the size of a tennis court!

5. Oxygen only plays a small part in breathing. The air we breathe contains 21 percent oxygen, but our bodies only use 5 percent — the rest is exhaled.

6. Seventy percent of waste is eliminated through your lungs just by simply breathing.

7. Children and women breathe faster. Children and women have a higher breathing rate than men.

8. Humans exhale up to 17.5 milliliters of water per hour.

Why is Breathing Important to Organisms?

By Daryn Edelman; Updated April 24, 2017

Animals Need Oxygen and Need to Get of Carbon Dioxide

Breathing is important to organisms because cells require oxygen to move, reproduce and function. Breath also expels carbon dioxide, which is a by-product of cellular processes within the bodies of animals. If carbon dioxide built up in a body, death would result. This condition is called carbon dioxide poisoning.

How People and Animals Breathe

A human breathes about 20 times per minute, taking in 13 pints of air during that time. Breathing brings air (oxygen, nitrogen and traces of carbon dioxide) into the blood, which circulates it throughout the body. Most animals breathe in through one type of nose or another. Air then passes through the larynx and trachea, where it is directed to the chest cavity. Other animals have more or less similar organs or a simplified system to do the same thing. In the chest, the trachea splits into two bronchi, which lead to the lungs. Within the lungs are small sacs called alveoli. Oxygen passes into the alveoli and diffuses through capillaries into the bloodstream. Red blood cells take needed oxygen to all parts of the body. At the same time, blood from the veins, rich in carbon dioxide, releases the carbon dioxide into the alveoli, which is discharged out of the body by this system going in the opposite direction.

The Diaphragm: The Power Source

The diaphragm is a sheet of muscles across the bottom of the chest. Its task is to contract, which pulls oxygen into the lungs, and relax, which pushes carbon dioxide out of the lungs. At contraction, the diaphragm lowers a body's internal air pressure and creates space for the lungs to expand. When the diaphragm relaxes, the lungs collapse and carbon dioxide is expelled.

Plants Too

In a way, one can say that plants breathe as well. Grass, trees, flowers and shrubs all take the carbon dioxide from humans and animals, absorb it into their system through leaves and stems, and then use it for cellular energy. The waste by-product of a plant's "breathing" is oxygen, which is used again by animals.

How Your Circulatory System Works

By Craig Weber, MD
Updated July 28, 2018

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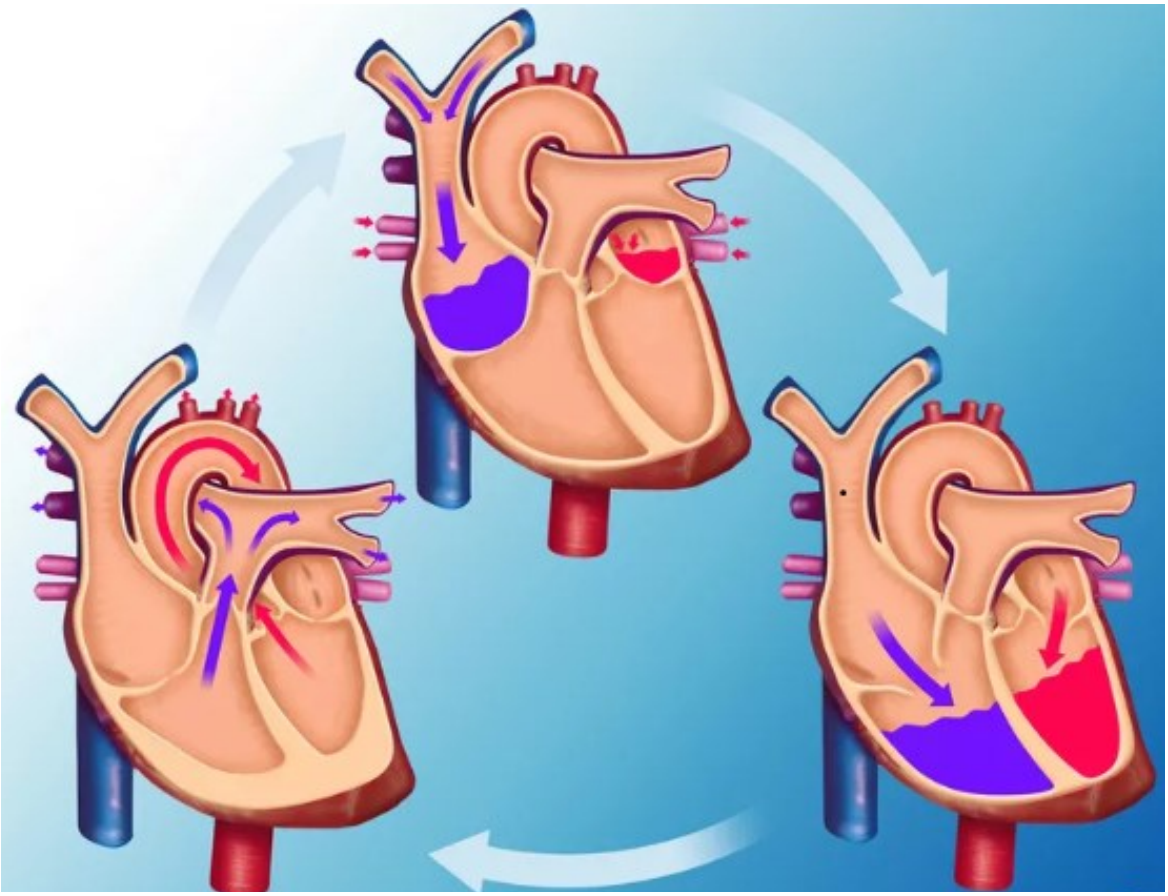


The circulatory system, also known as the cardiovascular system, is a simple loop which starts, and ends, with your heart. It is a closed system, meaning blood does not enter or leave the system during its journey from your heart to your body and back again. In such a system, a continuous flow of the same liquid can be pumped through the loop again and again.

Blood is circulated throughout your body via your arterial system—arteries, arterioles, and capillaries—and returned to your heart via the venous system—veins and venules. Your blood is vital to your well-being and circulates nutrients including electrolytes, oxygen, carbon dioxide and amino acids throughout your body. Your heart is responsible for the majority of the circulatory system's function and is where the process begins.

From Your Aorta to Your Capillaries

Your blood travels from your aorta through a series of smaller blood vessels until it reaches your capillaries. Before reaching your capillaries, however, blood must travel through the arterioles, where its speed and pressure are constantly adjusted as different segments of the arterioles change diameter in response to pressure and chemical sensors positioned nearby. These sensors adjust blood flow via the arterioles in response to changing conditions in your body.

Because of arteriole action, by the time your blood reaches your capillaries, it is no longer traveling in a pulsing fashion. Blood flows continuously through the capillaries, it does not "squirt" and "pause" as your heart beats. This continuous flow is necessary because there is a constant exchange of oxygen and nutrients happening in the capillary walls. No cell in the body is far from a capillary.

Back to Your Heart and All Over Again

As blood travels through the capillaries, its supply of oxygen is reduced and has picked up waste products as well. From the capillaries, blood enters the venules, the veins, and then travels back to the heart to be refreshed and sent out once again.

In conclusion, your heart works like a pump which provides nutrients to every organ, tissue, and cell throughout your body. In turn, your cells dump waste products, like carbon dioxide, back into your blood to be returned to your heart.

HOW DOES SPACE AFFECT THE HUMAN BODY?

Space has tremendous effects on the human body! As we prepare for journeys to more distant destinations like Mars, humankind must tackle these risks to ensure safe travel for our modern explorers.

The impacts of microgravity mirror aging and the complications of a sedentary lifestyle. By studying astronauts' health, we also help people on Earth.

BRAIN

Astronauts' sense of perception and orientation can become confused. They sometimes misinterpret the direction and speed of their movements. Some even experience "space sickness."

HEART & BLOOD VESSELS

Blood vessels stiffen and age faster, and astronauts can develop insulin resistance, which may lead to Type 2 diabetes. These factors increase the risk of cardiovascular disease.

BLOOD

Blood cell production in the bone marrow is affected. Reduced red blood cells can cause anemia. Low white blood cell count leaves the body vulnerable to infection and is also linked with increased sensitivity to radiation.

MUSCLES & NERVOUS SYSTEM

Muscles lose mass and strength. Reflexes slow down and exercise tends to be less effective in space.

RADIATION

Radiation doses are much higher. Overexposure can cause cataracts in the eyes, damage DNA, and increase the risk of cancer.

BONES

When they don't bear weight, bones lose density and strength. While adults past age 50 typically lose about 1% each year, astronauts in space can lose up to 1.5% of their bone mass each month.

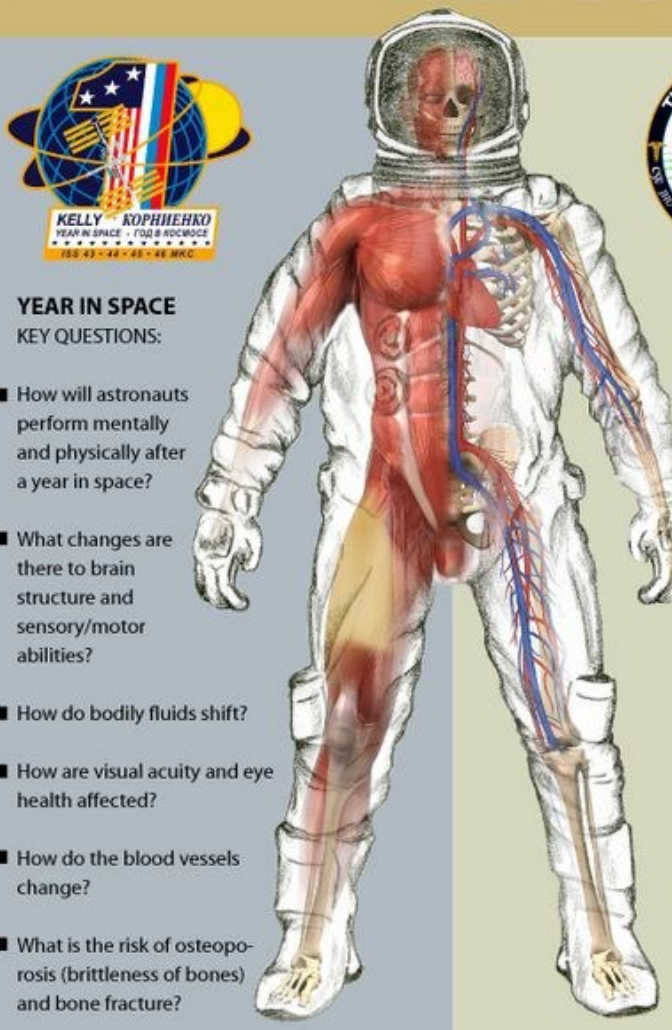
Canadian Space Agency | Agence spatiale canadienne

Canada

ENDURANCE MISSION

Astronaut Scott Kelly (left) and Russian cosmonaut Mikhail Kornienko are spending a year living aboard the International Space Station to help NASA learn more about the effects of long-term space travel on the human body.

Meanwhile, Scott's brother and fellow astronaut, Mark Kelly (far right), will be monitored on Earth, in a first-ever twins study of health effects comparing space flight to living on Earth.



YEAR IN SPACE
KEY QUESTIONS:

- How will astronauts perform mentally and physically after a year in space?
- What changes are there to brain structure and sensory/motor abilities?
- How do bodily fluids shift?
- How are visual acuity and eye health affected?
- How do the blood vessels change?
- What is the risk of osteoporosis (brittleness of bones) and bone fracture?
- How do microorganisms within the body change?

TWINS STUDY
KEY QUESTIONS:

- Does space travel accelerate atherosclerosis?
- How do an individual's genes affect fluid shifts and vision degradation?
- How does space travel affect the genes, chromosomes, DNA and RNA?
- How does space travel affect the immune system?

ARTWORK: NATIONAL SPACE BIOMEDICAL RESEARCH INSTITUTE

SOURCES: NASA; THE PLANETARY SOCIETY

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