

# Body Detoxifiers according to [www.Kidshealth.org](http://www.Kidshealth.org)

## **Blood Plasma: Transport Vehicle for nourishment AND waste**

Plasma is a yellowish liquid that is mostly water. But it also carries important nutrients, hormones, and proteins throughout the body. Nutrients are chemicals from the food you eat that give your body Plasma also carries away cell waste — chemicals that the cell doesn't want anymore. Nutrients, hormones, proteins, and waste are dissolved in the plasma — kind of like the cocoa mix that dissolves in a cup of hot water. What are the marshmallows? The blood cells — they float in the plasma.

Reviewed by: [Steven Dowshen, MD](#) Date reviewed: August 2009

## **A Look Inside the Lungs**

From the outside, lungs are pink and a bit squishy, like a sponge. But the inside contains the real lowdown on the lungs! At the bottom of the **trachea** (say: **tray**-kee-uh), or windpipe, there are two large tubes. These tubes are called the main stem **bronchi** (say: **brong**-kye), and one heads left into the left lung, while the other heads right into the right lung.

Each main stem bronchus (say: **brong**-kuss) — the name for just one of the bronchi — then branches off into tubes, or bronchi, that get smaller and even smaller still, like branches on a big tree. The tiniest tubes are called **bronchioles** (say: **brong**-kee-oles), and there are about 30,000 of them in each lung. Each bronchiole is about the same thickness as a hair.

At the end of each bronchiole is a special area that leads into clumps of teeny tiny air sacs called **alveoli** (say: al-**vee**-oh-lie). There are about 600 million alveoli in your lungs and if you stretched them out, they would cover an entire tennis court. Now that's a load of alveoli! Each **alveolus** (say: al-**vee**-oh-luss) — what we call just one of the alveoli — has a mesh-like covering of very small blood vessels called **capillaries** (say: **cap**-ill-er-ees). These capillaries are so tiny that the cells in your blood need to line up single file just to march through them.

## **Inhale...Thank You, Alveoli!**

The air finally ends up in the 600 million alveoli. As these millions of alveoli fill up with air, the lungs get bigger. It's the alveoli that allow oxygen from the air to pass into your blood. All the cells in the body need oxygen every minute of the day. Oxygen passes through the walls of each alveolus into the tiny capillaries that surround it. The oxygen enters the blood in the tiny capillaries, hitching a ride on red blood cells and traveling through layers of blood vessels to the heart. The heart then sends the oxygenated (filled with oxygen) blood out to all the cells in the body.

## **Waiting to Exhale**

When it's time to exhale (breathe out), everything happens in reverse: Now it's the diaphragm's turn to say, "Move it!" Your diaphragm relaxes and moves up, pushing air out of the lungs. Your rib muscles become relaxed, and your ribs move in again, creating a smaller space in your chest.

By now your cells have used the oxygen they need, and your blood is carrying carbon dioxide and other wastes that must leave your body. The blood comes back through the capillaries and the wastes enter the alveoli. Then you breathe them out in the reverse order of how they came in — the air goes through the bronchioles, out the bronchi, out the trachea, and finally out through your mouth and nose.

Reviewed by: [Steven Dowshen, MD](#)

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## **Immune System**

To be immune (say: ih-**myoon**) means to be protected. So it makes sense that the body system that helps fight off sickness is called the immune system. The immune system is made up of a network of cells, tissues, and organs that work together to protect the body.

White blood cells, also called leukocytes (say: **loo**-kuh-sytes), are part of this defense system. There are two basic types of these germ-fighting cells:

phagocytes (say: **fah**-guh-sytes), which chew up invading germs

lymphocytes (say: **lim**-fuh-sytes), which allow the body to remember and recognize previous invaders

Leukocytes are found in lots of places, including your spleen, an organ in your belly that filters blood and helps fight infections. Leukocytes also can be found in bone marrow, which is a thick, spongy jelly inside your bones.

Your lymphatic (say: lim-**fah**-tik) system is home to these germ-fighting cells, too. You've encountered your lymphatic system if you've ever had swollen "glands" on the sides of your neck, like when you have a sore throat. Although we call them "glands," they are actually lymph nodes (say: **limf nohdz**), and they contain clusters of immune system cells. Normally, lymph nodes are small and round and you don't notice them. But when they're swollen, it means your immune system is at work.

**Lymph nodes work like filters to remove germs that could hurt you.** Lymph nodes, and the tiny channels that connect them to each other, contain lymph, a clear fluid with leukocytes (white blood cells) in it. Beside your neck, where else do you have lymph nodes? Behind your knees, in your armpits, and in your groin — just to name a few. So you have this great system in place. Is it enough to keep you from getting sick? Well, everyone gets sick sometimes. But your immune system helps you get well again. And if you've had your shots, your body is extra-prepared to fight off serious illnesses that your immune system alone might not handle very well. If you get the shot that covers measles, for instance, it can protect you from getting measles, if you're ever exposed to it.

## Lymphatic System

The lymphatic system is an extensive drainage network that helps keep bodily fluid levels in balance and defends the body against infections. It is made up of a network of lymphatic vessels that carry lymph — a clear, watery fluid that contains protein molecules, salts, glucose, urea, and other substances — throughout the body. **The spleen**, which is located in the upper left part of the abdomen under the ribcage, works as part of the lymphatic system to protect the body, **clearing worn out red blood cells and other foreign bodies from the bloodstream to help fight off infection.**

## About the Spleen and Lymphatic System

One of the lymphatic system's major jobs is to collect extra lymph fluid from body tissues and return it to the blood. This process is crucial because water, proteins, and other substances are continuously leaking out of tiny blood capillaries into the surrounding body tissues. If the lymphatic system didn't drain the excess fluid from the tissues, the lymph fluid would build up in the body's tissues, and they would swell.

The lymphatic system also helps defend the body against germs like viruses, bacteria, and fungi that can cause illnesses. **Those germs are filtered out in the lymph nodes, small masses of tissue located along the network of lymph vessels.** The nodes house lymphocytes, a type of white blood cell. Some of those lymphocytes make antibodies, special proteins that fight off germs and stop infections from spreading by trapping disease-causing germs and destroying them.

The spleen also helps the body fight infection. **The spleen contains lymphocytes and another kind of white blood cell called macrophages, which engulf and destroy bacteria, dead tissue, and foreign matter and remove them from the blood passing through the spleen.**

## Basic Anatomy

The lymphatic system is a network of very small tubes (or vessels) that drain lymph fluid from all over the body. The major parts of the lymph tissue are located in the bone marrow, spleen, thymus gland, lymph nodes, and the tonsils. **The heart, lungs, intestines, liver, and skin also contain lymphatic tissue.**

One of the major lymphatic vessels is the thoracic duct, which begins near the lower part of the spine and collects lymph from the pelvis, abdomen, and lower chest. The thoracic duct runs up through the chest and empties into the blood through a large vein near the left side of the neck. The right lymphatic duct is the other major lymphatic vessel and collects lymph from the right side of the neck, chest, and arm, and empties into a large vein near the right side of the neck.

**Lymph nodes are round or kidney-shaped, and can be up to 1 inch in diameter. Most of the lymph nodes are found in clusters in the neck, armpit, and groin area. Nodes are also located along the lymphatic pathways in the chest, abdomen, and pelvis, where they filter the blood.** Inside the lymph nodes, lymphocytes called T-cells and B-cells help the body fight infection. Lymphatic tissue is also scattered throughout the body in different major organs and in and around the gastrointestinal tract.

**The spleen helps control the amount of blood and blood cells that circulate through the body and helps destroy damaged cells.**

## How A Healthy Lymph System Typically Works

### Carrying Away Waste

Lymph fluid drains into lymph capillaries, which are tiny vessels. The fluid is then pushed along when a person breathes or the muscles contract. **The lymph capillaries are very thin, and they have many tiny openings that allow gases, water, and nutrients to pass through to the surrounding cells, nourishing them and taking away waste products.** When lymph fluid leaks through in this way it is called interstitial fluid.

Lymph vessels collect the interstitial fluid and then return it to the bloodstream by emptying it into large veins in the upper chest, near the neck.

### Fighting Infection

**Lymph fluid enters the lymph nodes, where macrophages fight off foreign bodies like bacteria, removing them from the bloodstream. After these substances have been filtered out, the lymph fluid leaves the lymph nodes and returns to the veins, where it re-enters the bloodstream.**

When a person has an infection, germs collect in the lymph nodes. If the throat is infected, for example, the lymph nodes of the neck may swell. That's why doctors check for swollen lymph nodes (sometimes called swollen "glands" — but they're actually lymph nodes) in the neck when your throat is infected.

Reviewed by: [Steven Dowshen, MD](#)

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## **LIVER**

Have you ever seen liver and onions on a diner menu? If you're a kid, we're guessing you said "yuck" to beef liver and ordered something else. But did you know that there's one liver you don't have to order? It's always right inside your abdomen, up under your rib cage, and it's very important to your health.

Your liver is the largest solid organ in your body. By the time you're grown up, it will be about the size of a football. The liver does many jobs, but here are three big ones:

1. It cleans your blood.
2. It produces an important digestive liquid called **bile**.
3. It stores energy in the form of a sugar called **glycogen**.

### **The Liver Cleans Blood**

The liver helps you by taking toxins out of your blood. Wait! Why do you have toxins in your blood in the first place? Sometimes your body produces them as part of its normal function, like breaking down **protein**, a component in foods such as meat and nuts.

The liver also cleans blood that has just been enriched with vitamins and minerals during digestion. After you've eaten something, the vitamins, minerals, and other nutrients from the food pass from the intestine into the blood. Before going out to the rest of the body, the nutrient-rich blood makes a stop at the liver.

The liver processes the good stuff into forms that the rest of the body can use. Any waste or stuff your body doesn't need can be carried by bile back into the intestine and out of the body when you poop.

And, if you ever accidentally ate something that was harmful, your liver would try to break it down and clear it out of your system. But don't put your liver to the test! Steer clear of poisons and other harmful stuff.

### **The Liver Makes Bile**

As you probably know, the digestive system does more than just move food through your body until it's time for a trip to the bathroom. During digestion, your body takes the food you ate and removes everything your body needs. Fat is one of those things in food.

Bile, a digestive juice produced by the liver, helps the body absorb fat into the bloodstream. You'll find this thick, yellow-green substance in the gall bladder, where it's stored until the body needs some to digest fats.

### **The Liver Stores Glycogen**

The liver also helps the body use carbohydrates, another important component in food. Carbohydrates are found in lots of foods, such as bread, fruit, and milk. The body breaks down most carbohydrates into a type of sugar called glucose, which is the main source of fuel for our cells. Glucose stored in the liver is called glycogen.

Glycogen is like your backup fuel. When the body needs a quick energy boost or when a person's blood glucose level drops the liver breaks down glycogen and releases glucose into the bloodstream.

### **And That's Not All!**

Your liver doesn't stop there. It has a hand in making cholesterol, which you might think of as bad, but your body needs some of it. And the liver helps with blood clotting, which means that it's able to stop bleeding not long after you get a cut.

You should thank your liver next time you take some medicine, too. For example, when you take a pain reliever for a headache, the liver takes the active ingredient and breaks it down so your body can use it to make your headache go away!

### **Loving Your Liver**

Now that you know how much your liver does for you, you're probably wondering what you can do for it. It's easy, really. Staying healthy is the best way to care for your liver. The liver can be damaged if a person is very overweight or drinks too much alcohol. So be active, eat right, and your liver will keep on loving you back!

Reviewed by: [Mary L. Gavin, MD](#)

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### **The Kidneys and What They Do**

That's kind of what your **kidneys** do for you. Your kidneys are fist-sized organs, shaped like beans. They're below your ribs, toward the back.

When waste that's left over from breaking down food and your body's other activities naturally builds up in your blood, your kidneys act like a filter to clean waste from your blood. Then they mix the waste with a little water. That's

what urine is — body waste mixed in water. The urine goes to your bladder, which you empty when you pee. Goodbye, waste!

## When Kidneys Don't Work Right

In addition to removing wastes from your bloodstream, the kidneys also make and regulate [hormones](#) and other chemicals in your body. When the kidneys aren't working correctly, your body can develop several problems, including:

- joint problems

- body aches and pains

- fatigue

- bone problems

- itchy skin

- sleep problems

- [anemia](#) (say: uh-**nee**-mee-uh), a problem in which the number of red blood cells or hemoglobin in the blood is too low

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