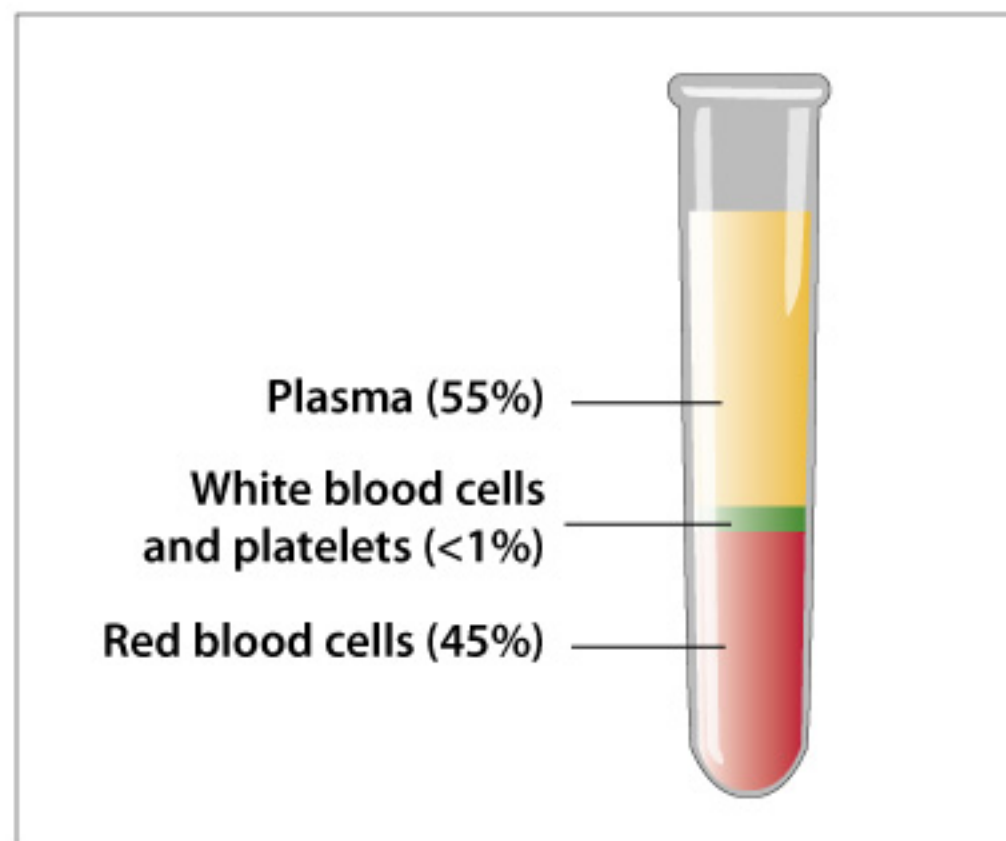


Green Tea & Our Blood

1. About Blood

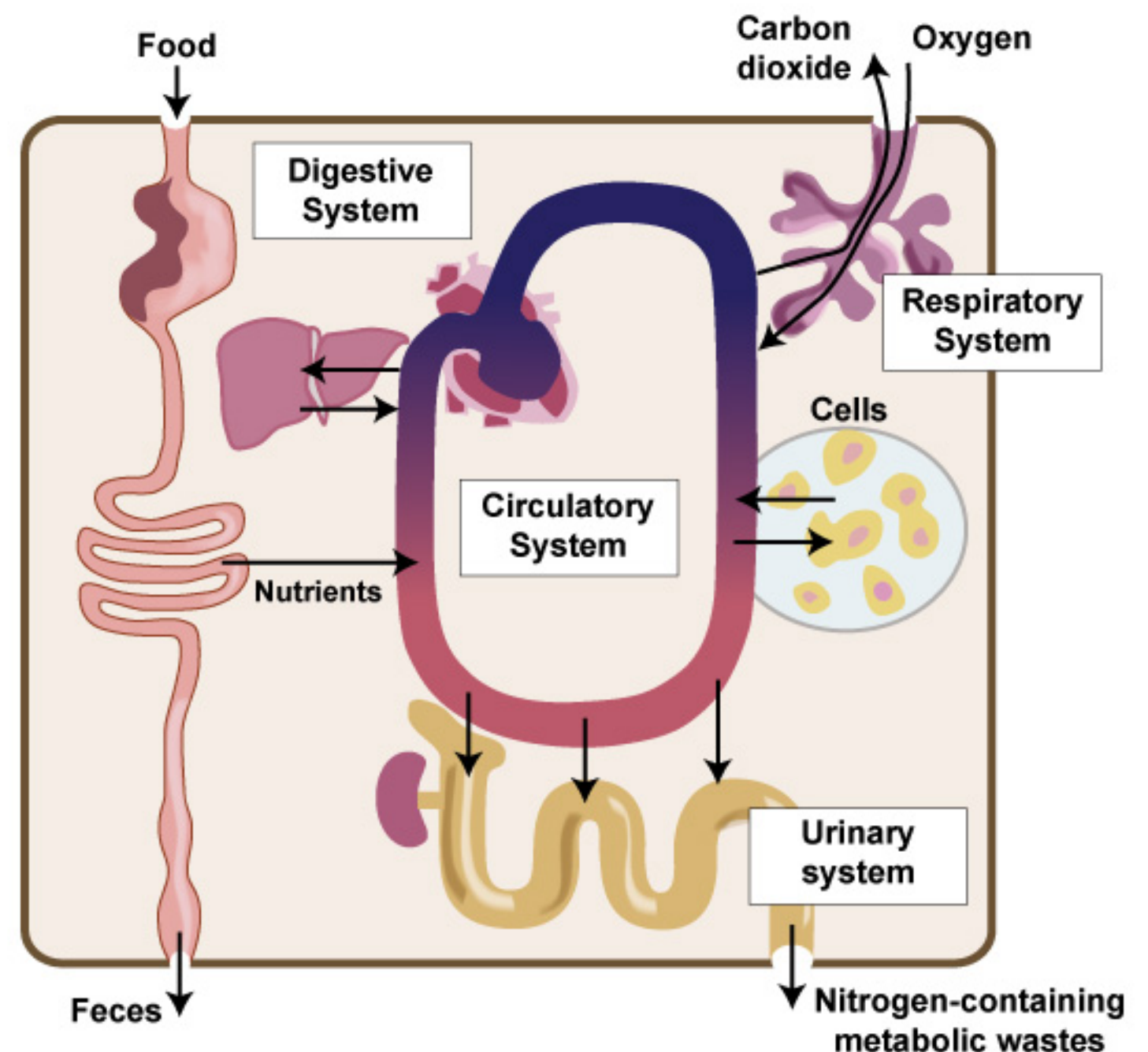
Components of Blood

- Blood takes up 1/12th of body weight (about 8%). In other words, an average male weighing 70 kg (150 lbs.) carries about 6 kg (13 lbs.) of blood. In volume, an average person carries about 5L (1.3 gallons) of blood.
- People are most familiar with the three major cells in blood: red blood cells, white blood cell and platelets. Each component plays a significant role in the human body, but one must understand that the other half of blood (55%) is composed of plasma.
- 92% of plasma is made up of water mixed with a number of important substances and nutrients such as hormones, immunoglobulins, lipoproteins, mineral ions, and gases. Plasma is responsible for carrying these substances with other blood cells to different parts of the body.



Blood and Our Body Organs

- The most important task of blood is circulation. While each component of the blood has its own role, the role of the blood itself is to circulate through out the body as it carries various components to proper locations of the body. The lungs work to provide oxygen to blood, the liver works to remove toxic materials from the blood, the kidneys filter blood to remove toxins in the blood, and the organs of the digestive system work to provide nutrients to the blood.

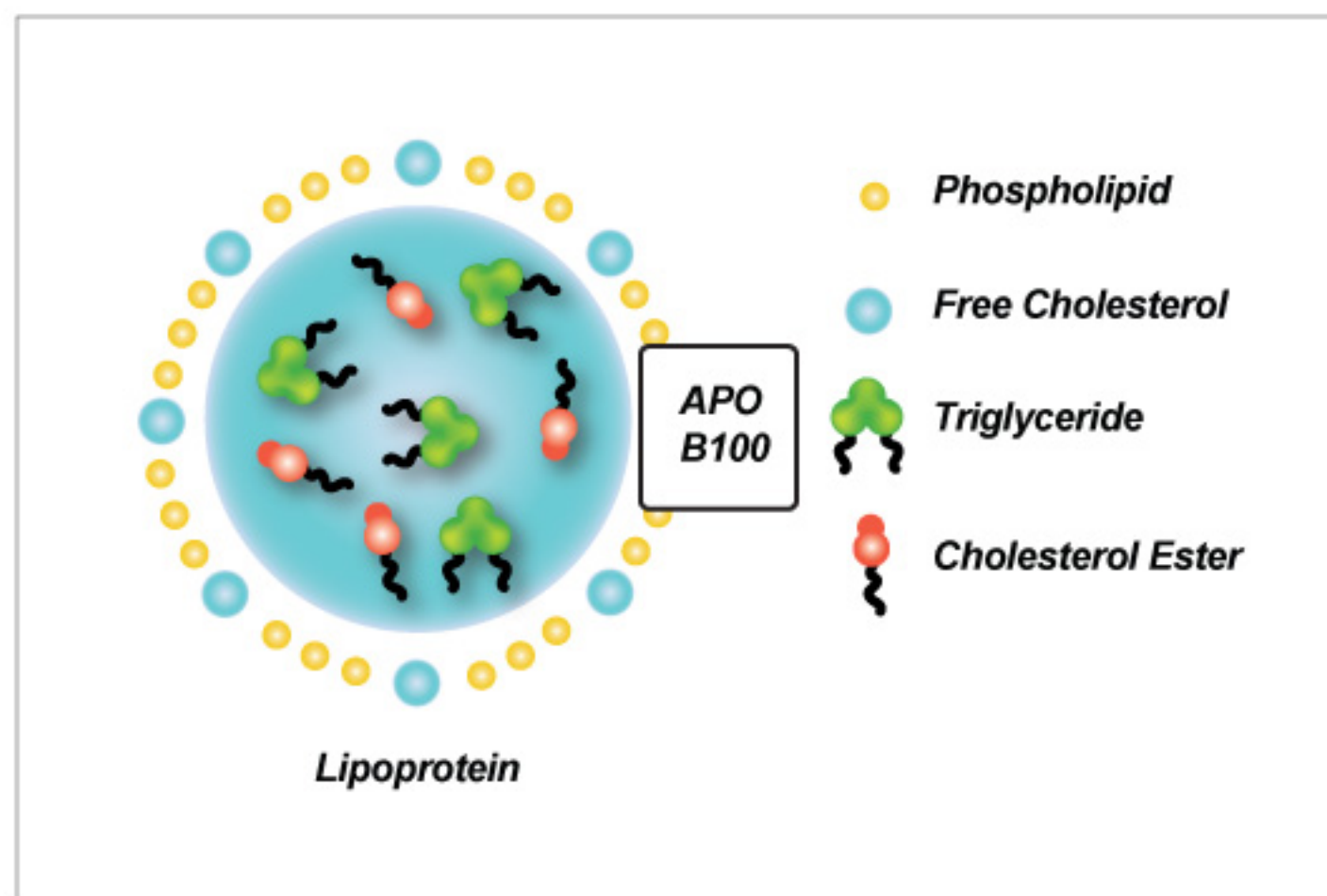


• Did you know?

- Each kidney filters about 67 L (17.5 gallons) of blood per hour
- The heart pumps about 300 L (80 gal) of blood per hour
- Blood travels about 800 km (500 miles) in an hour
- 2L (0.5 gal) of blood loss will cause immediate death

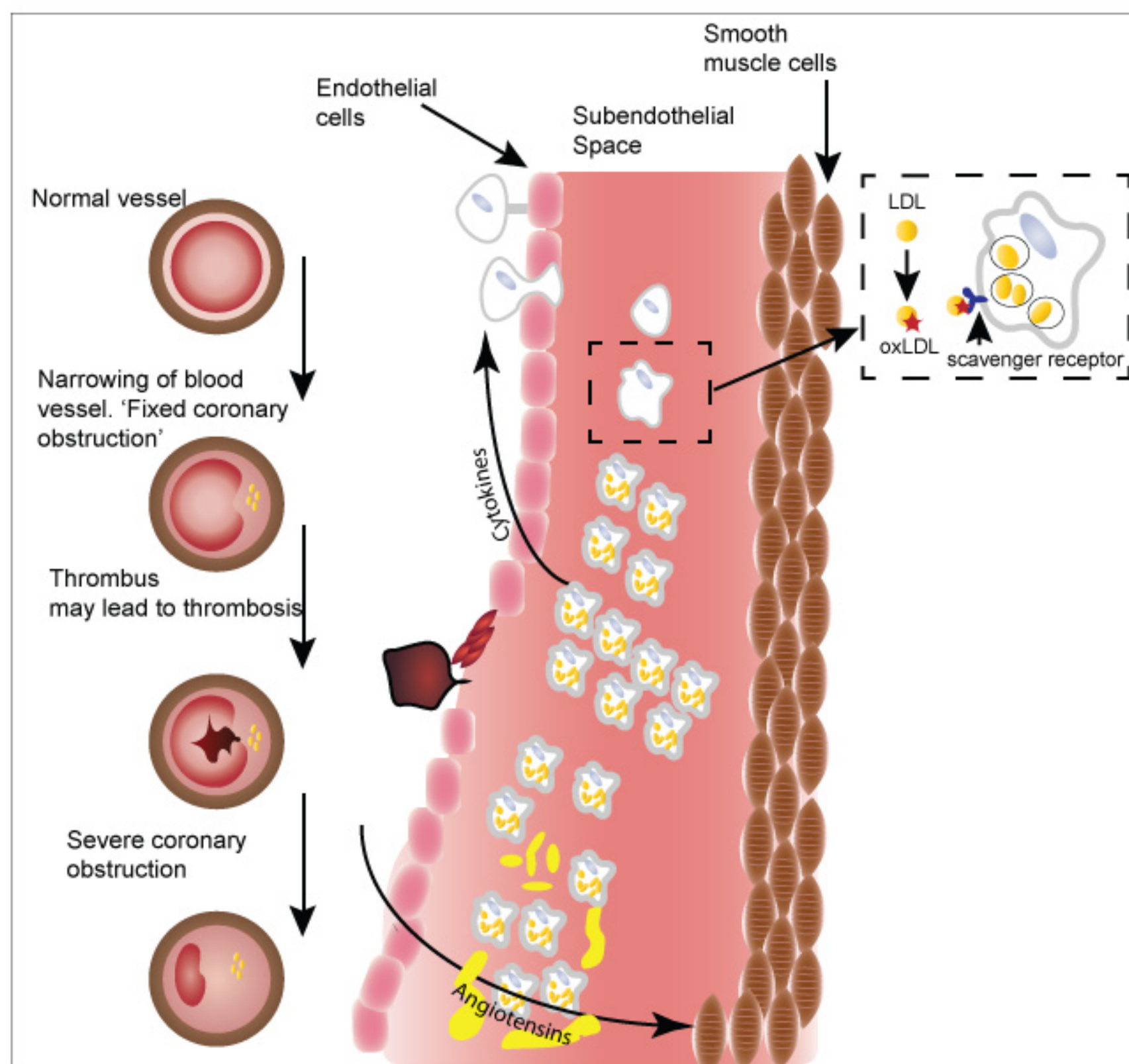
2. Antioxidant Effect of Green Tea

- Green tea has abundant compounds that benefit our health. Notable compounds include catechins, theanine, vitamins, essential oil, minerals and caffeine. Catechins (tea polyphenols) act as antioxidants by scavenging reactive oxygen species (ROS) in the blood. This protects cells and plasma constituents against oxidative damage to blood.



- Research has shown that green tea can help prevent the peroxidation of lipids and the rupturing of red blood cells. These studies examined the antioxidants in the blood, the evidence of lipid peroxidation, and changes in the membrane of red blood cells caused by oxidation in order to see how green tea might affect the oxidation of blood plasma and red blood cells. Lipid peroxidation occurs when oxidation in the blood steals away electrons from the lipids in red blood cell membranes, weakening them. Drinking green tea was found to reduce this process of lipid peroxidation. This may be the result of green tea boosting the antioxidant defense system. By blocking lipid peroxidation, the catechins in green tea can prevent red blood cell membranes from being damaged by oxidation and keep red blood cells healthy and strong.

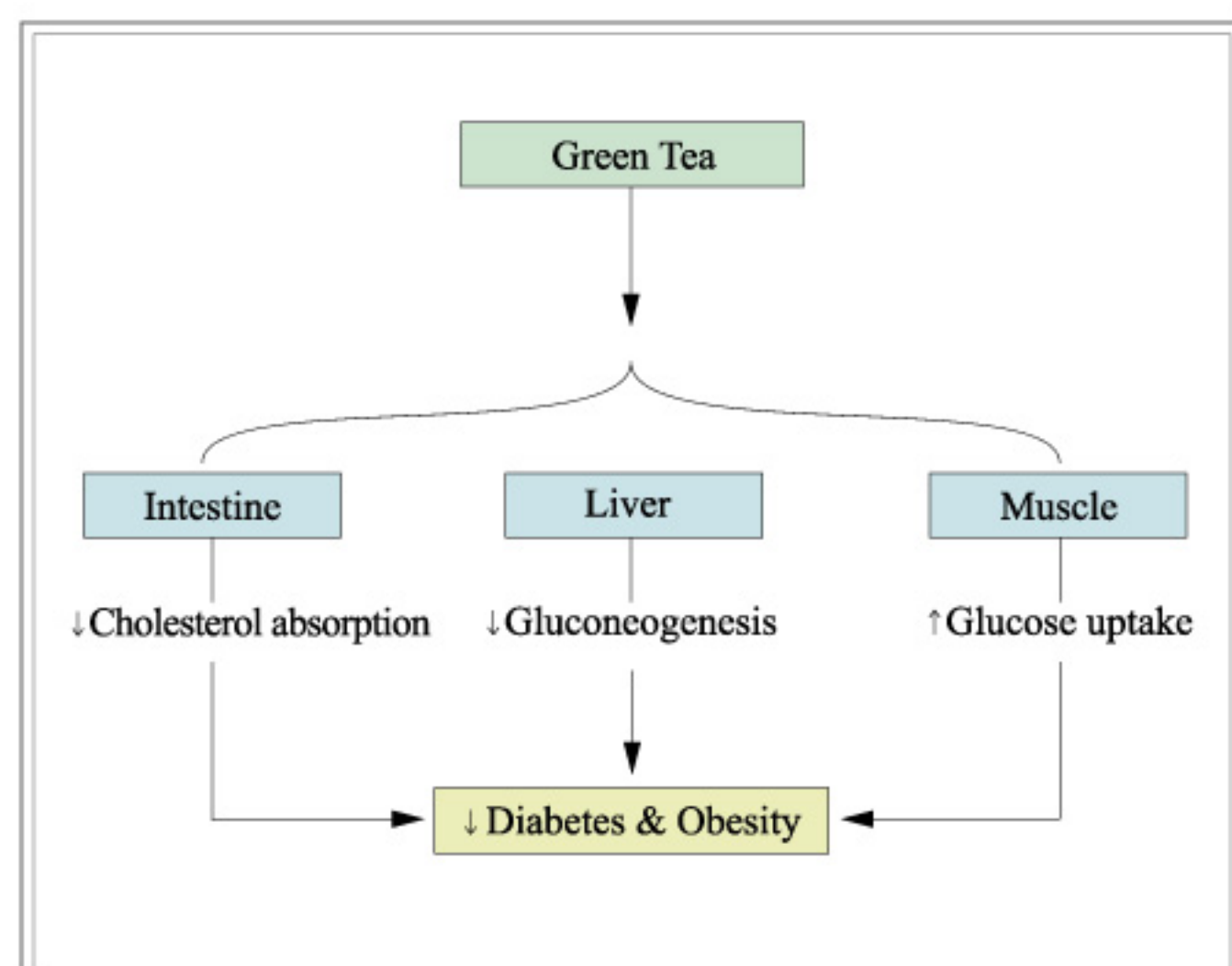
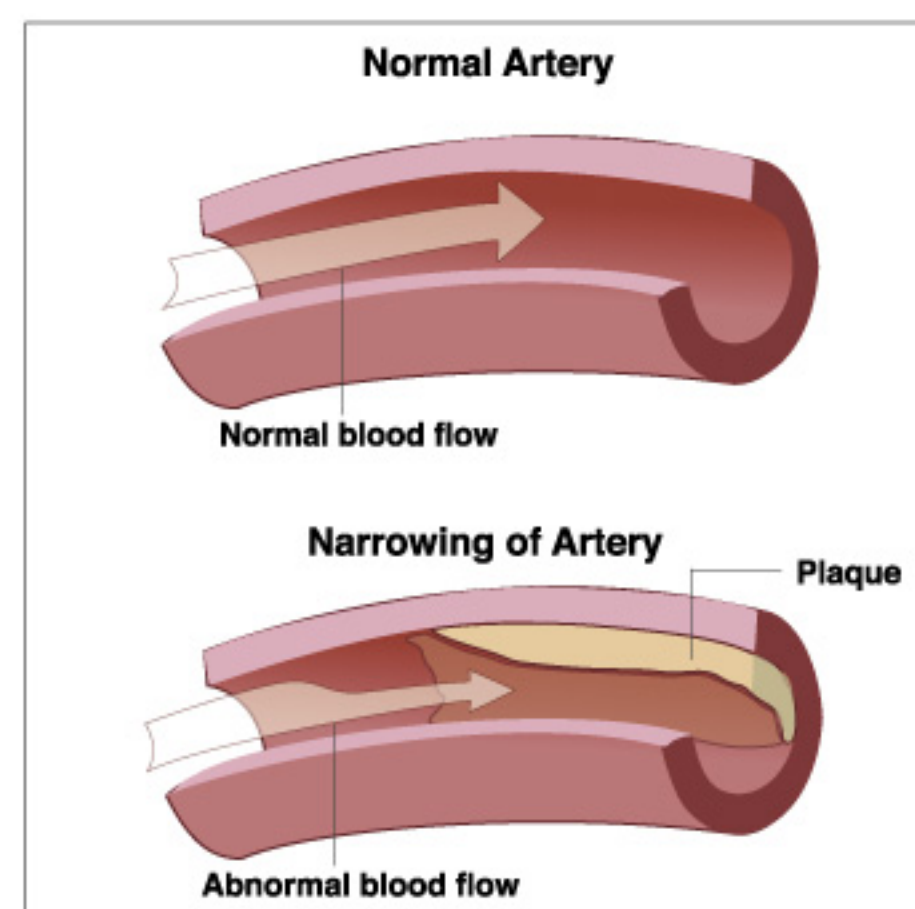
- Green tea can also reduce the oxidation of low-density lipoprotein, or LDL. The oxidation of LDL particles can cause the formation of atherosclerotic lesions, which is the thickening of artery walls caused by the accumulation of fatty materials under the blood vessel wall. This can increase the risk of cardiovascular diseases such as strokes and heart attacks. LDL particles that oxidize inside the wall of the artery can begin a cycle of cell damage and inflammation. This worsens the atherosclerotic lesions, further choking off the blood vessel. Studies have shown that antioxidants in green tea can bind with the oxygenated molecules in blood, which prevents them from reacting with the LDL. This prevents the oxidation of LDL, thereby reducing the possibility of damage to blood vessels.



3. Green Tea and Cardiovascular Diseases

Cholesterol

- Although cholesterol is one of the essential substances necessary for the normal function of a human body, excessive level of cholesterol, or more precisely, excessive level of LDL may have a severe impact on blood vessels and eventually on human health.
- Green tea has been shown to be beneficial by lowering blood cholesterol levels, including total cholesterol and further decrease of LDL levels.

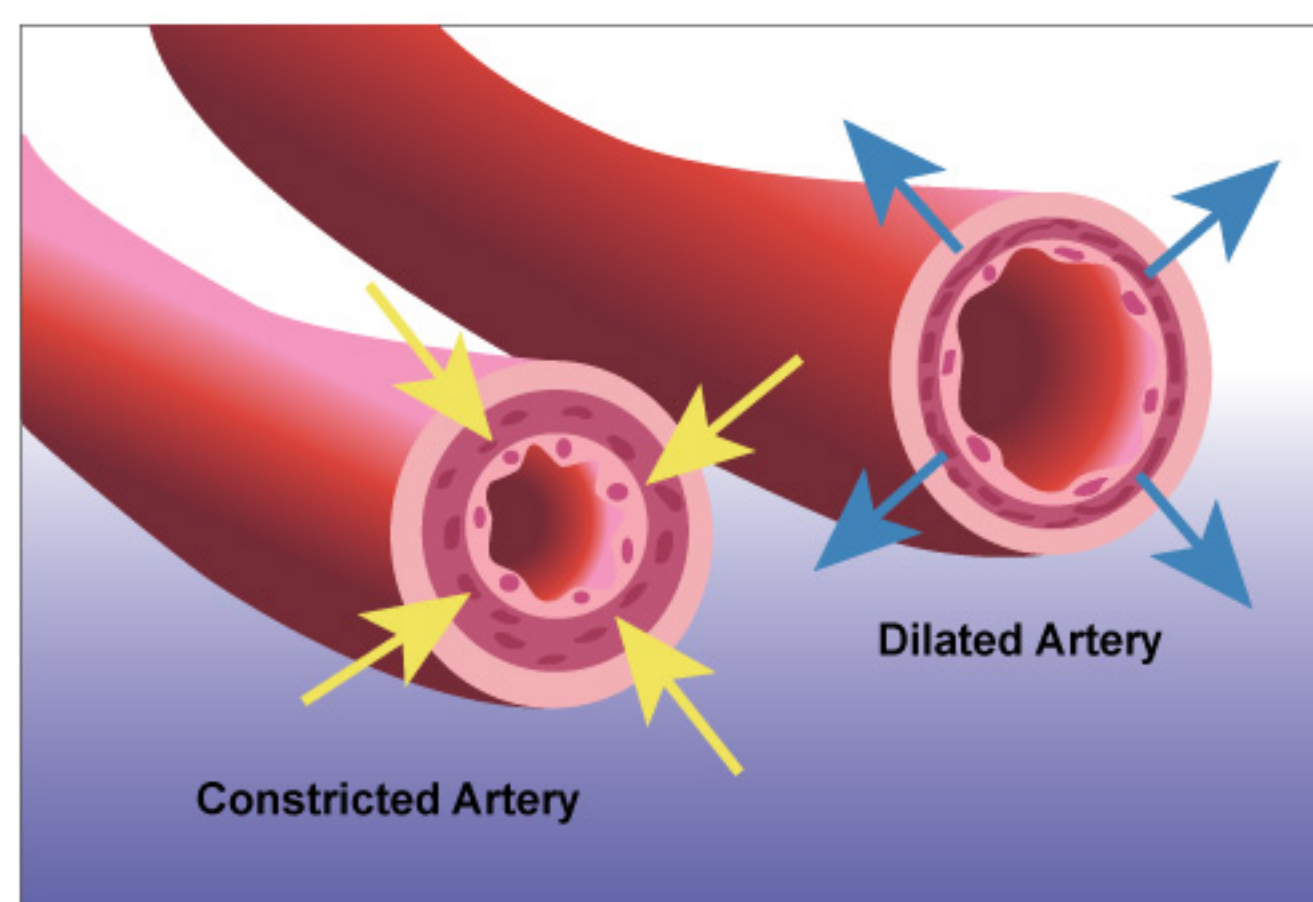


Diabetes

- Diabetes is a condition of having too much sugar in blood, which may be due to a lack of insulin or problems with insulin sensitivity. It is considered as one of the major causes that can impact human health.
- Lack of physical activity and obesity are the biggest causes of diabetes in that they may lead to insulin resistance and an eventual lack of insulin production in the long run.
- Many studies show that drinking green tea increases the sensitivity of insulin, which means our bodies can recognize insulin better. In addition, drinking green tea has been shown to lower glucose production in the liver and decrease glucose absorption in the intestines. All of these effects can reduce the risk of diabetes and obesity.

High Blood Pressure

- High blood pressure, which may be due to excessive levels of cholesterol and sugar and other related factors, is considered as one of the major risk factors of developing cardiovascular diseases such as a heart attack and stroke.
- Long-term untreated high blood pressure may damage blood vessels and eventually damage organs such as the kidney, stomach and intestines.
- A lifestyle of regular green tea consumption has been associated with lowering blood pressure. Catechins in green tea have been shown to dilate and relax the blood vessels, which can lower blood pressure. Antioxidants in green tea may reduce free radical damage to blood vessels and help maintain the normal function of blood vessels.



Glossary

Antioxidant	a molecule that prevents other molecules from being oxidized
Atherosclerosis	a condition where arterial walls become thickened due to fat accumulation such as cholesterol
Catechin	a natural antioxidant compound primarily found in tea, categorized under polyphenols
Cholesterol	an organic chemical substance classified as a steroid of fats
Diabetes	a chronic medical condition referring to a high level of sugar in blood. Symptoms include blurry vision, excessive thirst, fatigue, frequent urination, hunger and weight loss.
Endothelial	the innermost wall of a blood vessel
Glucose	a type of sugar in blood used for energy
HDL	High-Density Lipoprotein. The “good” cholesterol that removes the “bad” cholesterol
Hemolysis	the breakdown of red blood cells, literally meaning “blood (hemo-) releasing (-lysis)” in Greek.
High blood pressure	a chronic medical condition referring to an elevated blood pressure in the arteries at or above 140/90 mmHg. There are often no visible symptoms.
Insulin	hormone produced by the pancreas. It is a type of signal for cells to take in sugar from blood to generate energy.
LDL	Low-Density Lipoprotein. The “bad” cholesterol that causes the hardening and narrowing of blood vessels
Lesion	any form of damage in the tissue of an organism. E.g., oxidative lesion means damage caused by oxidation.
Lipoprotein	a particle that allows lipids (fats) to move around the body in the blood by binding to specific proteins
Obesity	a medical condition referring to excessive body fat that may lead to many health problems
Oxidation	a chemical reaction that produces free radicals, which will start chain reactions and eventually cause damage or death to the cell
Plasma	a fluid in the blood that contains and transports water, proteins, sugar, nutrients, and other essential substances to different parts of the body
Platelet	a type of blood cell that forms “blood clots” to prevent and stop bleeding
Reactive Oxygen Species (ROS)	highly reactive molecules containing oxygen that may cause significant damage to cell structures; they are also known as free radicals.
Red blood cell	a type of blood cell that carries and delivers oxygen to each cell in the body
White blood cell	a type of blood cell that fights against infections in the body