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# BLOOD COMPOSITION & CIRCULATION

Research on blood circulation began in the Renaissance era and has continued to present day, revealing connections to your overall health.

# the historical significance OF BLOOD CIRCULATION

The Renaissance Era lasted from the 14th century to the 17th century and was a period marked by a “rebirth” of the fields of art and science in Europe. For most, when the term “Renaissance” comes to mind, they think of Leonardo da Vinci or Michaelangelo, however many do not know about the medical Renaissance that was simultaneously occurring. For this reason, the era is also characterized by its advancements in cardiovascular research that altered the course of medicine worldwide.

This period is unique in that the fields of art and science went hand in hand to further knowledge of human anatomy. In efforts to create anatomy textbooks, da Vinci and other artists were allowed to perform human dissections, which enabled them to study the movement of blood throughout the body. He created detailed illustrations of arteries, veins, and the heart, which helped physicians understand how to do bloodletting and various procedures.

William Harvey, one of the most notable physicians of the era, published a book that detailed the anatomy and physiology of the circulatory system and was the first person to come up with the idea of blood circulation.

**Nearly 50% of American adults experience high blood pressure in any given year.**

**Artherosclerosis presents in over 40% of American adults with no history of heart disease.**

**These numbers show the importance of understanding the role blood plays in human function & how to maintain efficient blood circulation.**

# what is the THE CIRCULATORY SYSTEM?

The circulatory system is made up of the heart, arteries, veins, capillaries, and blood. The system circulates blood from the heart to the lungs for oxygenation, then directs the oxygenated blood to body tissues. Veins return oxygen-depleted blood to the heart to restart the process. The main function of the system is to provide oxygen, nutrients, and hormones to muscles, tissues, and organs in order to keep the body alive and healthy.

- Heart
  - A muscular organ that pumps blood throughout the body, and maintains proper blood circulation by ensuring oxygen and nutrients are delivered to various organs and tissues.
- Arteries
  - Arteries are narrow, muscular tubes that transport oxygenated blood from the heart to all parts of the body.
- Veins
  - Veins return the oxygen depleted blood back to the heart.
- Capillaries
  - Capillaries connect the smallest arteries to the smallest veins. They have very thin walls which allow the passage of oxygen, CO<sub>2</sub>, nutrients, and waste products between cells.



## Blood is made up of...

- Red Blood Cells (RBCs)
  - Carry oxygen from lungs to the rest of the body
- White Blood Cells (WBCs)
  - Help fight off infections and diseases
  - Also part of immune system
- Platelets
  - Blood cell fragments that stick together and help clot the blood
  - Work to heal cuts on blood vessel walls to stop the bleeding
- Hemoglobin
  - Iron-rich protein found in RBCs that carry oxygen

# common conditions & PREVENTATIVE MEASURES

Many potential health complications can arise as a result of poor blood circulation throughout the body:

- **High Blood Pressure**
  - This condition occurs when the force of blood against the walls of the blood vessel gets too high. This can cause blood vessels to become less flexible, which leads to a reduction in the amount of blood, and therefore oxygen, that reaches organs.
- **Atherosclerosis**
  - High levels of cholesterol, diabetes, and other conditions can cause fat and other substances to collect in the blood, which can be deposited as plaque around arteries. This condition increases the risk of heart attacks, blood clots, strokes, and coronary heart disease.
- **Venous Diseases**
  - Venous diseases, including varicose veins and chronic venous insufficiency, typically impact veins in the lower body. These conditions occur when blood cannot be transported back up to the heart and pools in veins in the legs, which can lead to health complications.

Getting routine blood tests are of great importance as they help doctors check for certain diseases and conditions. There are various blood tests that detect different health statuses.

- **Complete Blood Count (CBC)**
  - This is the most common blood test, and is typically done during routine checkups. CBC's tests blood glucose, calcium, and electrolyte levels.
- **Blood Chemistry Test**
  - This test measures the naturally occurring chemicals found in the blood, and provides information on the heart, kidneys, and liver.
- **Blood Enzyme Test**
  - Blood enzyme tests are used to detect heart damage from a heart attack.
- **Lipoprotein Panel**
  - This test measure HDL and LDL cholesterol and triglyceride levels in the blood, and may reveal coronary heart disease.
- **Blood Clotting Test**
  - This test measures proteins found in the blood that impact the blood clotting process and may determine whether an individual is at risk for developing blood clots in vessels.

# common conditions & PREVENTATIVE MEASURES

There are many ways that you can improve your blood circulation and blood composition, to improve your overall health and well-being:

- **Engage in at least 150 minutes of physical activity every week**
  - Exercise relaxes blood vessels, which improves blood flow.
  - This can look like
    - 30 minutes of walking, 5 days a week
    - 50 minutes of bicycling, 3 days a week
    - 75 minutes of playing tennis, 2 days a week
- **Eat a heart healthy diet that is rich in vegetables and fiber, and lower in processed foods and saturated fats**
  - Cutting back on red meat and full-fat dairy products can prevent or treat heart conditions. Consuming less salt is also essential because higher levels of salt can cause fluid retention in the body, which contributes to blood pressure and swelling.



- **Maintain a healthy weight**
  - Veins already work against gravity to transport blood back up to the heart. Carrying extra weight contributes to greater resistance that veins have to work against.
- **Avoid smoking**
  - Nicotine use, in any form, tightens blood vessels, thereby restricting blood flow. It may also damage the walls of arteries and cause inflammation.
- **Keep your legs elevated**
  - When not moving around, try to find something to prop your legs up on. Creating an incline with your legs can enable gravity to work in your favor and help move the blood back up to the heart.

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