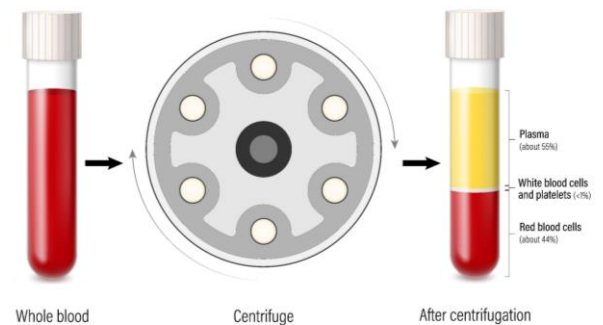


A Look inside the Lab: Centrifuges A Roller Coaster for Your Cells

When was the last time you had to give a sample of blood? Blood tests are an important tool that doctors use to understand your health. For example, they can use blood tests to diagnose an infection. They can test for certain genetic diseases or check the levels of salts, fats, hormones or proteins in your blood. Some common examples of the types of tests that rely on blood samples include pregnancy or cholesterol tests.

Although we often think of blood as being one substance, it is actually made up of several different components. The four major ones are:

- Plasma is the liquid component of blood. It mainly consists of water, salts, and enzymes, but it also contains some proteins, such as albumin. Albumin is the most prevalent protein in plasma; it thickens your blood to make sure blood does not leak out of vessels into other areas of the body where it does not belong. People who have serious infections or burns may be given plasma transfusions.
- Red blood cells give blood its characteristic color. Red blood cells carry oxygen from the lungs to tissues throughout the body.
- White blood cells are part of our immune system. They fight bacteria, viruses, and other foreign invaders during infections. If someone has elevated levels of white blood cells, they probably have an infection.
- Platelets help form blood clots to control bleeding. Someone with elevated platelets may have an internal or external wound.



For many tests, a blood sample will be separated into different parts to focus on the most relevant component based on what test is being done. Additionally, donated blood samples are separated into different components, so the donation is not wasted. For example, sometimes a recipient only needs a specific component from blood, such as platelets, to address their need. By only giving that person platelets, other parts of the donation can be used for other patients.

The lab equipment most commonly used to separate blood into its component parts is a centrifuge. By spinning the samples at high speed, components with different weights will naturally separate.

Centrifuges are also commonly used to separate substances other than blood. In fact, the centrifuge was invented in 1864 by Anthony Prandtl to separate milk and cream for large-scale dairy processing. The tool only began to be used in laboratory settings in 1869 by Friedrich Miescher, when he was seeking to separate nucleic acids from nuclei to study them. In the 1920's, Theodor Svedberg advanced the tool, inventing a new centrifuge, called the ultracentrifuge. This newer version could spin much faster, generating more force and enabling him to study colloids and proteins more efficiently. He was awarded the Nobel Prize in Chemistry in 1926 for "his work on disperse systems," including his studies related to colloids and his invention of the ultracentrifuge.

Today, centrifuges are used in most scientific and medical labs where they are employed in a variety of ways, such as for urine separation, chemical purification, and DNA or RNA extraction. They are also used in other settings, such as for removing the pulp from fruit juices and treating wastewater.