Leukapheresis is a medical procedure that involves the separation and collection of white blood cells (leukocytes) from a patient's blood. The term "leukapheresis" is derived from "leuko," which means white, and "apheresis," which refers to the process of removing or collecting a specific component of the blood.

The primary purpose of leukapheresis is to harvest a large number of white blood cells for various medical purposes, including:

Stem Cell Transplantation: Leukapheresis is commonly used to collect hematopoietic stem cells (HSCs) from a donor's or a patient's blood for transplantation. These stem cells can replenish the bone marrow and are essential for treating conditions like leukemia, lymphoma, and certain genetic disorders.

Immunotherapy: In some cases, white blood cells are collected for use in immunotherapy. These cells can be modified or engineered to target and destroy cancer cells, as seen in CAR-T cell therapy.

Research and Clinical Studies: Researchers may collect white blood cells from individuals to study immune system function, develop new therapies, or conduct clinical trials.

The leukapheresis process typically involves the following steps:

Vein Access: A large-bore intravenous (IV) catheter is inserted into a vein, usually in the arm, and connected to a leukapheresis machine.

Blood Collection: Blood is withdrawn from the patient's body and enters the leukapheresis machine, which separates the different blood components. These machines use centrifugation or filtration to isolate white blood cells from other blood components like red blood cells and plasma.

White Blood Cell Collection: The machine collects the desired quantity of white blood cells and returns the remaining blood components, such as red blood cells and plasma, back to the patient's circulation. This process is known as apheresis.

Monitoring: Throughout the procedure, the patient's vital signs, including blood pressure, heart rate, and oxygen saturation, are closely monitored by medical staff to ensure safety.

Completion: Once an adequate number of white blood cells have been collected, the procedure is stopped, and the IV catheter is removed.

Leukapheresis is generally considered safe, with minimal risks or side effects. However, some patients may experience temporary discomfort, mild side effects, or low blood cell counts immediately after the procedure. These effects are usually short-lived and resolve on their own.

Leukapheresis is a valuable technique in medical practice, particularly in the fields of hematology, oncology, and immunology, where the isolation and manipulation of white blood cells are essential for patient care, research, and the development of novel treatments.

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