



CBCSF Newsletter

Issue 11, September 2007

A Publication of Community Blood Centers of South Florida Inc.

Donor Centers

Call for Directions
and Appointments
(Walk-ins Welcome)

Boca Raton
(561) 451-4389

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(954) 680-9410

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Miami Lakes
(305) 362-9713

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(954) 491-9397

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(305) 256-1660

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(954) 747-3921

REMINDER!
Pre-Register
online prior to
your donation.

Platelets – What Are They and How Are They Used?

This is the first of a three part series on the functions of plasma and platelets and how donated blood is used to help patients with bleeding problems. Most blood donors know that red blood cells carry oxygen to tissues and packed red cell units are used to treat anemia. But there's more to a donation of blood than just giving red cells. If the donor is giving whole blood then platelets and plasma are being given as well. Some donors give plasma and/or platelets only by utilizing special equipment in a process called "apheresis" and can do so more frequently than whole blood donors.

The ability to stop bleeding is a requirement for survival.

Introduction

Platelets are fragments of a large cell found in the bone marrow called a megakaryocyte. At maturity megakaryocytes break apart forming platelets similar to the way a dropped dinner plate breaks into many pieces. Platelets freely circulate in the blood stream where they are inactive. Platelet counts vary widely but most people have between 140,000 and 400,000 in a cubic millimeter (ul) of plasma.

A platelet count of just 50,000/ul is usually sufficient to stop bleeding, so platelets are circulating in most people in large excess. A platelet has an average lifespan of 8-10 days in circulation.

Circulating platelets are always associated with a large protein molecule call Von Willebrand's Factor (VWF) which is made by the lining cells of arteries, veins, and capillaries. VWF is bound to the surface of platelets and does not affect how platelets circulate. Both platelets and VWF have a receptor which binds to collagen which is the molecule that makes up connective tissue. Connective tissue is the tough gristle like material that holds organs and blood vessels together.

Megakaryocyte - the bone marrow cell which fragments producing platelets.

*Mega = Large or giant
Karyo = Nucleus
Cyte = Cell*

A megakaryocyte is therefore a giant sized cell with a large nucleus.

Collagen is never exposed inside healthy arteries, veins, or capillaries so platelets and the associated VWF never under normal circumstances come into contact with it.

(continued on next page)

Remember!

Be sure that we have your e-mail address so you can receive notification that your cholesterol results are available online at www.cbcsf.org

Blood Donors who are on our mailing list will also receive four to five newsletters annually, so be sure to give the registrar your e-mail address when you give blood

Users should also add webmaster@cbcsf.org to their list of safe contacts.

Confidentiality Statement:
Community Blood Centers Of South Florida is committed to respecting your privacy. We will not share, rent or sell personal information provided by you, including your e-mail address, to other parties. The information you provide will only be used to support your relationship with us as a blood donor or potential donor.

Community Blood Centers Of South Florida is a non-profit organization serving donors and patients in Monroe, Miami-Dade, Broward and Palm Beach Counties.

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If an injury occurs accompanied by bleeding, platelets and VWF are poured out into the wound in huge quantities and come into contact with the collagen exposed at the site of injury. Platelets and VWF bind to the collagen and to each other forming the first part of a clot called a "Platelet Plug." The next step in clot formation involves the proteins found in plasma and will be the subject of the next CBCSF Newsletter.

Platelet Replacement and the role of blood donors

Blood donors are able to give platelets without risk because of their super abundance in circulation. There are two ways to donate platelets. The first is by giving whole blood and the second is by automation in a

process called "apheresis." Regardless of the donation type, platelets are separated from whole blood by centrifugation.

Donated whole blood is spun down in centrifuges in which the heavier red cells are forced to the bottom of the plastic bag in which the whole blood was drawn. The platelets are lighter than RBCs and stay in the clear, fluid part of blood called plasma. The platelet rich plasma is then separated from the red cells and the platelet rich plasma is concentrated to reduce the volume of the platelet unit. Four to 5 units of platelets from whole blood donations are pooled together to produce one transfusable adult dose of platelets.

Platelets collected by apheresis are separated from whole blood in a continuous flow process through a centrifuge which collects the platelets in one bag and returns the red cells and plasma to the donor. This process takes 1-2 hours but an apheresis donation can usually result in collecting 5 to 10 times the number of platelets found in one unit of whole blood.

Apheresis platelet donors can give every 2 weeks so donor platelet counts are monitored carefully. A wide margin of safety exists as a platelet count of 50,000 will produce normal clot formation and platelets are not collected from donors with counts below 150,000.

Platelets are living cell fragments and cannot be stored at refrigerator temperatures without undergoing changes which render them inactive. Newer storage solutions are in development but in the meantime all platelets intended for transfusion are stored at room temperature. Bacterial contamination of platelets is a major concern in blood products stored at room temperature and so all platelet units are cultured before release for patient use.

Platelets are essential for clotting and are used to stop or prevent bleeding in cancer, transplant, trauma care, and surgery patients.

Platelets are used routinely by patients undergoing

cancer chemotherapy, transplantation, or open heart surgery. Chemotherapy and transplant patients do not have adequate populations of megakaryocytes in their bone marrow and so do not produce an adequate number of platelets. The heart pumps used in open heart surgery damage circulating platelets. The longer an open heart procedure takes the more likely the patient is going to need to receive a platelet transfusion when the surgery is finished.

The demand for platelets has risen dramatically in the recent past as millions of patients with coronary artery stents are given drugs which inhibit platelet function to prevent clot formation in the stents. If these patients subsequently need surgery or suffer trauma their own platelets have to be supplemented with donor platelets in order to stop further bleeding. For this and other reasons platelet usage is likely to continue to rise as medical care becomes more complex.

*****The next issue of the CBCSF Newsletter will deal with function of plasma in clot formation.*****