Section 7

PLATELETS AND HEMORRHAGIC DISORDERS

LEARNING OBJECTIVES

When you complete this section, you will be able to:

1. **Describe platelets**
2. **Indicate the functions of platelets**
3. **Recognize hemorrhagic disorders involving platelets**

DESCRIPTION AND FORMATION

Platelets (thrombocytes) are small, granulated bodies with various shapes (round, oval, spindle, discoid). Megakaryocytes, giant cells in the bone marrow, form platelets by pinching off and extruding pieces of cytoplasm.

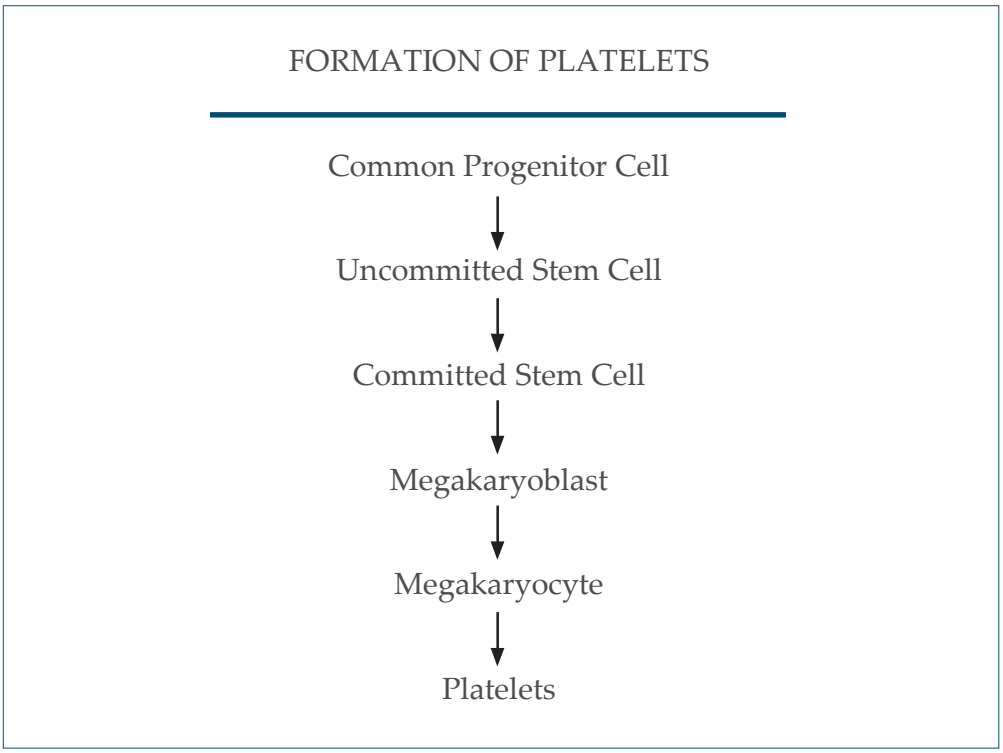

Figure 8. Formation of platelets.

Functions. Hemostasis, the process of stopping bleeding, is the primary function of platelets. To accomplish this, platelets contain lysosomes (chemicals capable of breaking down other substances), clotting factors, and a growth factor that stimulates healing. Traveling in the circulation, platelets join with other blood components to limit blood loss.

Platelets may also help maintain the integrity of the vascular lining and stimulate proliferation of vascular smooth muscle.

Coagulation. Blood coagulation is a complex process.

Activated by factors at the site of an injured blood vessel, platelets aggregate (collect) to form a plug, change shape, discharge their granules, and initiate the generation of thrombin, an enzyme that converts fibrinogen to fibrin. Thrombin causes them to become sticky and adhere irreversibly to each other, as well as to the break in the vessel wall. The granules attract more platelets, and thrombin begins formation of a true clot with a net of fibrin.

At the same time, anti-clotting factors act on the interior of the blood vessel to ensure that the clot will not block blood flow. When healed, the vessel releases factors that lyse the fibrin network. Failure of anti-clotting factors can lead to thrombosis (clot formation in the circulation) or to disseminated intravascular coagulation (DIC), a serious condition in which fibrin is generated in the circulating blood.

HEMORRHAGIC DISORDERS

These are disorders of hemostasis, that is, patients with these disorders have a tendency to bleed. Some hemorrhagic disorders involve blood vessels, but most involve the body's ability to stop or contain bleeding.

Thrombocytopenia is a reduced platelet count. **Table 6** lists the types and causes of this condition.

THROMBOCYTOPENIA	
Types	**Causes Include**
Decreased production of platelets	Toxic agents, infection, radiation, anemias, genetic disorders
Abnormal distribution of platelets	Enlarged spleen (which traps platelets), various cancers
Dilution loss of platelets	Massive blood transfusion
Abnormal destruction of platelets	Disseminated intravascular coagulation (DIC), vasculitis (blood vessel inflammation), thrombotic thrombocytopenia purpura (TTP), heparin, quinine, some antibiotics, leukemia, lymphoma

Table 6. Causes of thrombocytopenia.

Thrombocytosis, elevated platelet count, may cause hemorrhage or thrombosis. It occurs in cancers, inflammation, splenectomy, iron deficiency, and qualitative disorders of platelets.

The pattern of bleeding often indicates the type of problem to investigate. Types of bleeding include:

- Ecchymosis (bruising), diffuse bleeding into the skin
- Petechiae, pinpoint bleeding into the skin without trauma
- Mucosal bleeding: epistaxis (nosebleed), menorrhagia (excessive menstrual bleeding), bleeding gums, or gastrointestinal bleeding

Note: Hemophilia is a bleeding disorder due to hereditary deficiencies in the blood clotting factors; it is not a disorder of platelets.