The hemostatic system includes the cells (endothelial cells) which line the blood vessels, small corpuscles (platelets) which circulate with the white cells, and proteins (clotting factors) which circulate in the blood plasma. When all these components work together properly, the hemostatic system seals leaks in blood vessels by forming a blood clot at the injury site while remaining fluid everywhere else. When this system malfunctions, either no clot forms to seal the leak, resulting in hemorrhage, or clots form in vessels to the brain or heart where they are not required, resulting in thrombosis. The hemostatic system fulfills the complex task of forming clots in very specific areas while remaining fluid elsewhere. It does this by striking a balance between four basic functions: blood clot formation and prevention of blood clot formation; blood clot dissolution and the prevention of blood clot dissolution.

**BLOOD CLOT FORMATION**

Under normal circumstances, blood vessels are lined with an uninterrupted layer of endothelial cells. However, when an injury occurs, these cells are damaged or stripped away at the site of injury. Blood leaks from this area until a clot is formed.

First, small round or oval disc-like corpuscles in the blood, called platelets, stick to the site of injury but do not stick to the normal endothelial cells. These platelets accumulate to form a platelet clot and seal the wound temporarily. The platelets in the clot become sticky, causing other platelets and clotting factors in the plasma to stick to them. These clotting factors use the platelet surface as a stage for generating a small amount of the enzyme, thrombin. Thrombin then acts on the platelets to make them even stickier, causing more clotting proteins to stick to the platelets and producing more thrombin. Finally, when the level of thrombin is high enough, it converts another clotting factor, fibrinogen, into fibrin to form a
Platelets stick to site of injury. Then clotting factors react with platelets to produce thrombin and form a stable growing blood clot consisting of platelets, clotting factors and fibrin.

**BLOOD CLOT FORMATION**

(Clotting, coagulation)

Figure 1.

fibrin clot. This fibrin net holds the platelet clot in place and results in a more stable seal in the form of a red scab. Six plasma factors (enzymes), two cofactors, calcium and fatty surfaces are required to generate the clotting enzyme, thrombin. This process of generating thrombin and forming a blood clot is called COAGULATION (Fig. 1).

Clinical research has shown that the platelets and the two cofactors are the key components and organizers of the clotting process. Since they organize the activities of the seven other clotting factors, the most serious of the hemorrhagic illnesses, such as hemophilia and von Willibrand's disease, result from deficiencies of these components. Through the discovery of the enzymes involved in the coagulation process, research scientists have been able to explain the mechanism by the large amounts of thrombin, necessary for clot formation are generated quickly. Other questions, however, remain