

2.2.5

Blood Clot Regulation

If the mechanisms governing platelet plug formation and coagulation were allowed to proceed unchecked, undesirable clots would form, ultimately resulting in death. The reason that undesirable clots would spontaneously arise is because small amounts of thrombin are always being formed accidentally. Also, there are constant rough areas and small breaks on blood vessels. If clots formed in an unchecked manner, then a clotting cascade could be initiated that would end up in positive feedback and the clotting would grow and develop through the entire vascular system of a person. Just as there are built-in forces that prevent platelet activation that we discussed early in this section, there are also forces that help prevent blood clot formation. Blood plasma contains naturally occurring molecules known as **anticoagulants** which restrict clot formation to locations of damaged vessels.

A plasma protein called **antithrombin** works in conjunction with **heparin** to deactivate thrombin. Heparin is produced on the surface of endothelial cells and released from granules in mast cells. Another anticoagulant produced by endothelial cells is a lipid known as **Prostacyclin** which opposes local concentration of clotting factors by acting as a vasodilator and also targets platelet plug formation by inhibiting platelet activation.

Vitamin K plays an important role in coagulation, as the production of various clotting factors within the liver depends upon this cofactor. A common prescription anticoagulant known as Warfarin (Coumadin) manipulates blood clotting efficiency by inhibiting the activity of an enzyme that participates in recycling vitamin K. The consumption of leafy green vegetables (ie., kale, spinach, Swiss chard, mustard greens, parsley, romaine, and green leaf lettuce) containing high levels of vitamin K interferes with the expected outcomes of this drug.



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