Understanding Bleeding Disorders

Disorders of the hemostatic system can manifest in numerous ways, and it is important for clinicians to be able to recognize and adequately evaluate hemostatic problems.This article provides an extensive review of normal hemostasis, testing of the hemostatic system, and interpretation of results.

Hemostatic disorders may be classified as primary or secondary, which can occur simultaneously. In primary hemostasis, damage to the endothelium results in formation of a platelet plug via interactions between vascular endothelium and platelets. Primary hemostatic disorders therefore occur when a qualitative and/or quantitative defect occurs in platelets or vessels. Secondary hemostasis is the process of formation of a stable fibrin clot over the primary platelet plug and involves sequential activation of multiple clotting factors.Thus, secondary hemostatic disorders occur as a result of qualitative and/or quantitative defects in clotting factors. Hemostasis is also amplified via a number of different substances, the major one of which is thrombin. Inhibitors of coagulation help maintain the balance between coagulation and anticoagulation. In addition, fibrinolysis (mediated by plasmin) is necessary to dissolve fibrin clots and restore normal blood flow through injured blood vessels.

When blood is collected for hemostatic testing, the goal is to perform a clean venipuncture and collect a free-flowing blood sample with a syringe predrawn with anticoagulant—the standard being 3.2% or 3.8% sodium citrate at a 1:9 citrate–blood ratio. Multiple venipuncture attempts increasingly stimulate the coagulation system and make test interpretation difficult. Blood can also be collected in a clean syringe (without anticoagulant) and placed in a commercial citrate tube using the exact amount of blood specified on the tube.Using an incorrect citrate– blood ratio can alter test results. Heparin or EDTA are not acceptable substitutes for citrate.Tests for primary hemostatic disorders include platelet counts, buccal mucosa bleeding time (BMBT), and various tests for quantity and functional integrity of von Willebrand factor (vWf) in plasma. Specialized platelet function tests can also be used in cases where there are clinical signs of a primary hemostatic disorder or a prolonged BMBT but platelet counts and vWf tests are normal.Tests for secondary hemostasis include activated clotting time (ACT), activated partial thromboplastin time (aPTT), and prothrombin time (PT).The fibrinogen and fibrinolytic systems can be tested by measuring fibrinogen levels, fibrin degradation products, D-dimers, and/or prothrombin time. A minimum database for any patient with a suspected hemostatic disorder should include a complete blood count (including platelets), a BMBT, and either an ACT or both an aPTT and a PT. A flow chart summarizing the use of screening tests when a patient with a suspected bleeding disorder is being worked up is included in this article.

COMMENTARY: This article will remind the practitioner of that painful process of memorizing coagulation pathways in vet school, but it provides an excellent and illustrated in-depth review of this very important clinical subject. Particularly helpful are the sections on laboratory testing and interpretation, and the concise table of inherited factor deficiencies.—*Bess P. Brosey, MZS, DVM, Diplomate ABVP & ACVIM*

Diagnosing bleeding disorders. Smith JW, Day TK, Mackin A.COMPEND CONTIN EDUC PRACT VET 27:828-843, 2005.