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CHAPTER

COAGULATION LABORATORY CONSIDERATIONS

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INTRODUCTION

Coagulation testing is used in a variety of settings: as a screen for factor deficiencies (commonly with the prothrombin time [PT] and activated partial thromboplastin time [aPTT]), in monitoring drug efficacy, and identifying antibodies or excluding disease states (e.g., D-dimer for venous thromboembolism). A new class of anticoagulants called *direct-acting oral anticoagulants* (DOACs) is now available, and methods are being identified to measure the anticoagulation intensity with these agents. Variables affecting coagulation testing include preanalytical (e.g., timing of blood collection, processing, suitability) and analytical (e.g., instrument and reagent systems), which may impact the accuracy of the reported result.[1,2] These variables can lead to notable differences in reported results between laboratories and should be taken into consideration when using observations in the literature or from an outside hospital, and in developing or adjusting the anticoagulant management plan. Lastly, the laboratory evaluation/testing should be interpreted as a surrogate marker of the hemostasis process, as these data may not be an absolute reflection of in vivo coagulation or clinically meaningful outcomes.

COAGULATION TESTING: METHODS

Coagulation testing typically measures either the functional or amount (antigen) of coagulation protein(s) present using four basic testing principles:

1. Clotting endpoint (functional test)—addition of patient plasma to reagent(s), then determining the time to clot formation.
2. Chromogenic testing (functional test)—addition of patient plasma to reagent(s), then determining the amount of color formation.
3. Immunologic (mostly antigenic, occasionally functional)—addition of patient plasma or serum to beads or microwells containing target antigen or antibody, then assessing color changes, changes in agglutination, hemagglutination, etc.
4. Aggregation (other functional)—addition of patient plasma (platelet poor or containing platelets) to platelets and/or agonist(s) and measuring light scattering (agglutination) or platelet clumping (aggregation).

Most clotting, chromogenic, and aggregation studies use 3.2% sodium citrate anticoagulant. Immunologic testing can be done using either citrate anticoagulated

blood or serum. Consult testing laboratory for specific sample requirements (e.g., collection tube type).

TABLE 21-1: **Available Tests and Methods for Coagulation-Related Assays**

	PT/INR	aPTT	ACT	Fbg	Fx	TT	Heparin Level (anti-Xa activity)	XDP	HIT	AT	PLT Function
Clotting	•	•	•	•	•	•					
Chromogenic					•		•			•	
Immunologic				•	•			•	•	•	
Aggregation									•		•
Point-of-care	•	•	•	•			•	•	•		•

ACT: activated clotting time, aPTT: activated partial thromboplastin time, AT: antithrombin, Fbg: fibrinogen, Fx: factor activity, HIT: heparin-induced thrombocytopenia, INR: international normalized ratio, PLT: platelet, PT: prothrombin time, TT: thrombin time, XDP: D-dimer

Clinical Pearls

- *Different testing approaches can occur between laboratories, leading to different reported values or target ranges. Observations in clinical trials may also be different. Clinicians should be aware of the method used and the potential differences in reported values between methods when interpreting results or comparing target values to the literature.*