Qualitative Factor XIII Assay

Factor XIII is also termed *fibrin stabilizing factor*. During polymerization of fibrinogen, fibrin strands are first held together by weak hydrogen bonds. The clot is unstable. Factor XIII, activated by thrombin to $XIII_a$, is a transpeptidase that catalyzes the formation of lateral covalent bonds between fibrin strands. Clots acted on by Factor $XIII_a$ are stable. Patients with congenital or acquired absence of Factor XIII experience a variety of hemorrhagic symptoms like poor wound healing, ecchymoses, hematomas, menorrhagia, and umbilical bleeding. Routine coagulation screening tests do not detect Factor XIII deficiency; the TT, PT, and APTT results are all normal, provided that the remainder of the coagulation system is intact. Thus the decision to perform the Factor XIII assay must be based on clinical symptoms. Factor XIII inhibitors have been reported.

The unstable clot that forms in the absence of Factor XIII or in the presence of Factor XIII inhibitor dissolves in a 5M urea solution or a 2% solution of monochloracetic acid. A Factor XIII–stabilized clot will remain intact for at least 24 hours.[17]

Three tubes are prepared. The first tube receives 0.3 ml of test plasma. The third tube receives 0.3 ml of PNP. Tube #2 receives 0.2 ml of test plasma and 0.1 ml of PNP. Then, 0.1 ml of 0.025M $CaCl_2$ is transferred to each of the three tubes. After clot formation, all three are incubated at 37°C for 30 minutes. Now 3 ml of 5M urea solution is transferred to each of the three tubes, and the tubes are tapped gently to dislodge the clots from the sides. The tubes are capped and incubated at ambient temperature for 24 hours but are observed for evidence of clot dissolution at 1, 2, 4, and 24 hours. Decreasing size of clot, fragmentation, and increasing turbidity of the urea solution are evidence for clot dissolution. The test plasma tube (tube #1) is compared to the PNP (#3) in

detection of dissolution, and results are reported as "Factor XIII present" or "Factor XIII absent." If a Factor XIII inhibitor is present in the test plasma, dissolution will be seen in both the first and the second tubes, the one in which patient plasma and PNP were mixed.

Factor XIII deficiencies are usually acquired in metastatic carcinoma, leukemia, hypergammopathy, collagen disease, and liver disease, but congenital Factor XIII deficiencies have been described.