Clinical Hematology

ERYTHROCYTE SEDIMENTATION RATE (ESR) PROCEDURE

A. **PRINCIPLE:** The ‘sed rate’ is a **non-specific** indicator of disease and is commonly performed. ESR refers to the rate red cells settle in a vertical tube and is expressed as the distance the red cells fall in mm/time. This test is primarily used to monitor patients with inflammatory disease particularly rheumatoid arthritis.

B. **SPECIMEN:** EDTA anticoagulated whole blood that is less than 4 hours old; the EDTA tube must be at least half full.

C. **EQUIPMENT:** Sediplast system including sedivals (with 0.2 ml sodium citrate), autozero Westergren tubes and Sediplast rack; plastic pipets.

D. **CONTROLS:** Both normal and abnormal ESR control samples are run daily and must fall within established limits.

E. **PROCEDURE:**
   1. Mix EDTA whole blood sample or control vial. LABEL sedivial and remove sedivial cap. Using a transfer pipet, obtain an aliquot of blood and fill the sedivial with blood (0.8 ml) to the fill line. Recap and mix thoroughly.
   2. Place sedivial in rack on a level surface. Insert the autozero tube into the sedivial (either with cap removed or directly through cap). Continue inserting until the tube rests at the bottom of sedivial.
   3. **Verify that the blood is at the zero mark and that there are no bubbles in the tube.**
   4. Allow the sample to stand undisturbed for exactly one hour and then read the results of the sed rate in millimeters (distance the red cells have fallen in one hour).

F. **SIGNIFICANCE:**
   ■ In normal individuals, sedimentation or falling of the red cells is slow.
   **NORMAL Reference Ranges:**
   - Males 0-10 mm/hr >50yo 0-20 mm/hr
   - Females 0-20 mm/hr >50yo 0-30 mm/hr

   ■ In conditions with increased concentrations of certain plasma proteins that promote rouleaux (such as FIBRINOGEN, an acute phase reactant), red cell falling is accelerated causing an abnormal (increased) ESR.

   ■ Abnormal/increased ESR results are seen in acute and chronic infections, chronic inflammatory disorders (RA), malignancies especially multiple myeloma, tissue necrosis and pregnancy.

G. **SOURCES OF ERROR:** Erroneous results occur if the blood is clotted or over four hours old; if the blood tube is not at least 1/2 full; if the tube is slanted or there are bubbles in the tube.

WHOLE BLOOD CLOTTING TIME (WBCT) and CLOT RETRACTION PROCEDURES

Obtain blood by venipuncture using a syringe. Draw 5 ml of blood and slowly place 1 ml of blood into each of two 12x75mm glass tubes. Put the other 3 ml of blood into an EDTA tube, mix and label [for use later].

A. Whole blood clotting time (WBCT) - Tilt one glass tube every 30 secs until the blood clots = WBCT. The glass contact activates coagulation; it will take longer for the other tube to clot. After the blood in both tubes has clotted, place the tubes in a 37°C waterbath for the clot retraction test.

B. Clot Retraction - Evaluate tubes at 1 hour for retraction of the clot from the sides of the tubes. Although rarely performed, the clot retraction test measures the ability of platelet contractile proteins (actomyosin, thrombasthenin) to reduce clot size.