

## Monitoring LMW Heparin (enoxaparin-Lovenox, dalteparin-Fragmin) therapy:

- ❖ How do you monitor LMW Heparin anticoagulation?
  - **THE PT and PTT are not useful for monitoring LMW Heparin**
  - An anti-Factor Xa level is the **ONLY** reliable way to monitor LMW Heparin
  - The anti-Xa level should be drawn 4 hours after the 2<sup>nd</sup> or 3<sup>rd</sup> dose, and the drug specified (We have separate curves for each drug)
- ❖ Which patients receiving LMW heparin should be monitored using the anti-Xa assay?
  - **Not every patient requires therapeutic monitoring!** In fact, most patients do not require any monitoring.
  - **Comorbid conditions that increase bleeding risk should be monitored:** Renal failure (CrCl < 30 mL/min), recent or impending surgical procedures, trauma, ischemic stroke, or history of GI bleeding
  - **Monitoring may be warranted for patients receiving recent or concurrent anticoagulants if clinical judgement indicates a high bleeding risk:** Aspirin, Warfarin (Coumadin), Ticlopidine (Ticlid), Clopidogrel (Plavix), Thrombolytics (Activase, Retavase), Gp IIb/IIIa antagonists (ReoPro, Integrilin), and NSAIDs (Ibuprofen, ketorolac, etc.)
  - **Large or Obese Patients:** The upper limits of dosing have not been well established. Patients weighing up to 150 kg have been included in trials that used 1 mg/kg Q12 hr and 1.5 mg/kg Q24 hr dosing regimens
  - **Pregnant Patients and Children:** Optimal dosage has not been established, therefore if LMW heparin is used, anti-Xa monitoring is warranted.
- ❖ What is the therapeutic range for anti-Factor Xa when monitoring LMW Heparin?
  - The mechanism of action for all heparins is to enhance the ability of Antithrombin to proteolytically inactivate activated Factor X (Factor Xa).
  - Thus the higher the dose of heparin, the lower the level of Factor Xa
  - This inverse relationship is calculated and converted to anti-Xa units
  - Although no prospective therapeutic range trials were performed and recommendations remain controversial, the generally accepted therapeutic range for anti-Xa is:
    - **When weight-adjusted doses are used for treatment:**
      - 0.5-1.1 U/mL for patients dosed BID
      - 1.0-2.0 U/mL for patients dosed QD
    - **When fixed doses are used for prophylaxis:**
      - 0.2-0.6 U/mL for patients dosed QD or BID
    - **Values below the therapeutic range suggest inadequate LMW Heparin effect for anticoagulation**
    - **Values above the therapeutic range suggest over-anticoagulation**
- ❖ How do you reverse over-anticoagulation with LMW Heparin?
  - Enoxaparin (Lovenox): Only **partial** reversal possible. Give 1 mg Protamine IV for every 1 mg of enoxaparin. May repeat in 2-4 hours if needed at a dose of 0.5 mg Protamine for every 1mg of enoxaparin
  - Dalteparin (Fragmin): Only **partial** reversal possible. Give 1 mg Protamine IV per 100 IU of dalteparin. May repeat in 2-4 hours, if needed at a dose of 0.5 mg per 100 IU of dalteparin