Monitoring Heparin Levels and the Role of Antithrombin
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Both Heparin Levels and Low Molecular Weight Heparin Levels will be done when they arrive in the Lab, 24/7.

An Antithrombin Level will be done automatically whenever a Heparin Level is requested.

The coagulation cascade is highly regulated and the net physiological effect represents a balance of procoagulant and anticoagulant activity. There are two major anticoagulant pathways. One involves Protein C and Protein S. The second involves Antithrombin.

This newsletter will address the effect of Antithrombin and specifically its role in heparin management. It used to be called Antithrombin III and is still frequently abbreviated as AT3. The more modern terminology is simply Antithrombin.

Antithrombin has some anticoagulant effect on its own. This activity is naturally enhanced on the endothelial cell surface by cell bound glycosaminoglycans. In the presence of heparin, antithrombin changes its confirmation and can inhibit most of the activated coagulation factors much more efficiently. This is particularly true for Thrombin, Factor IIa. The key here is that both the heparin and the antithrombin must be bound to the activated coagulation factor, thrombin, at the same time to affect inhibition.

Factor Xa (activated) is an exception. Inhibition of Factor Xa occurs when it is bound by Antithrombin after it has been activated by heparin, but there is no requirement for co-binding to heparin.

The presence of adequate Antithrombin is critical for the evaluation of heparin effectiveness as an anticoagulant. For this reason it has recently been decided that whenever a heparin level is requested the lab will automatically do an Antithrombin level. There is a Clinical Practice Guideline and a Power Plan for heparin management. This new process is only partially reflected in those guidelines but there are plans to modify them in the near future.
Monitoring heparin is based on three tests: PTT, heparin level and Antithrombin level. Frequently specimens for these tests are drawn through lines and, at times, even the same line being used to administer the IV heparin. This seems to adversely affect the reliability of the PTT value more than the heparin level. In addition, heparin binds to some of the material from which lines are made and this further exacerbates the reliability problem when looking at the results. This can occur even when heparin has not been administered through the line but has only gone through the line as part of blood collection.

Many adult hospitals will not accept specimens for coagulation testing drawn through a line. At CMH we realize that this may be impractical but it is very important to realize that a line draw may make the results more difficult to interpret. This can be true even if the line has never had heparin through it.

In the past the Lab did Heparin and Low Molecular Weight Heparin levels only 4 times per day. We have recently started doing the tests as they come into the lab, 24/7. However, these assays are quite complex. Should there be a technical problem the specimen will be frozen. This should avoid degradation of the specimen while the technologist trouble-shoots the assay. We have had one case where freezing the specimen markedly altered the values. We do not understand this unique case but continue to try to trouble-shoot this issue.

If you have any questions please feel free to call the lab.

CME Series
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Date: September 4, 2009
Time: 12:30pm-1:30pm
Location: Lab Conference Room 2206.10 WT
Speaker: Atif Ahmed, MD
Topic: “Immunohistochemistry: Basic Principles and Future Directions”