Coagulation: The Basics of PT and APTT

The laboratory tests-PT…prothrombin time, and APTT (frequently shortened to PTT), activated partial thromboplastin time—are so commonly ordered that it is easy to overlook the complexity of the tests. Below are some simple starting guidelines.

The Specimen: It all starts with the properly collected specimen. Anything in the process, a traumatic stick or a very small needle (21-19 works best) that activates the clotting process or results in hemolysis will severely shorten the PT and APTT. If the results are “artificially” shortened, you may not detect a prolonged value of interest. Heparin contamination from a line draw will prolong the APTT and in extreme situations it may contaminate the PT. This is why we ask for that information on the order. We can inactivate the heparin in the lab if it is appropriate. The blue top tube, which is used, has a defined amount of the anticoagulant, sodium citrate. If the tube is under-filled by more then 10%, the excess sodium citrate will lead to inaccurately high results. This is because the calcium we add to activate the test will bind to the excess citrate and will not properly activate the test. If the hematocrit is > 55%, then the amount of plasma present is less than normal, and ratio of a sodium citrate to plasma is sufficiently altered to prolong the results. Please call the lab and we will make a special tube for you, which contains less sodium citrate.

Basic Principles of Mixing Studies: In mixing studies, the patient’s plasma is mixed with an equal volume of purchased, pooled, and normal plasma. Although it can be quite complicated, the general principle is if the mixing corrects the prolongation, the patient has a deficiency. If the mixing fails to correct, you may be looking at an inhibitor.

Normal PT and APTT - but with a bleeding problem
1. Von Willebrand disease
2. Platelet disorder
3. Mild DIC
4. Mild Factor XI, VIII (males) or IX (males) or XIII deficiency

Elevated PT with a normal APTT
1. Early effect of coumadin or liver disease
2. Early effect of Vitamin K deficiency – this can occur with some antibiotics
3. Hereditary Factor VII deficiency – very rare
4. Inhibitor of Factor VII – very, very rare
5. Hypo or disfibrinogenemia

Elevated APTT with normal PT
1. If mixing studies correct the PTT, consider a deficiency of Factor VIII (males), IX (males) or XI, or von Willebrand disease
2. If mixing does not correct the APTT value, consider heparin, lupus anticoagulant (usually no bleeding problems) or a Factor VIII inhibitor or non-specific inhibitor

Elevated APTT and PT
1. Liver disease
2. Coumadin
3. Vitamin K deficiency
4. DIC
5. Lupus Anticoagulant
6. Hypofibrinogenemia or Disfibrinogenemia
7. Factor X, V, or II deficiency
News from Chemistry/Toxicology/Critical Care Lab

Urine Drug Screens:
The Toxicology Laboratory frequently has problems with incorrect orders for urine drug screens. There are three drug screens that can be ordered, and it is important to use the correct one so that the Lab performs the correct test. It is very important for the ordering health care provider to specify "Comprehensive urine drug screen" or "Urine drug screen for drugs of abuse" when ordering the test. If the order is simply for "urine drug screen," there is room for confusion and the person who puts the order in the computer should clarify what is really wanted before entering the order. Following are the order entry codes and comments:

<table>
<thead>
<tr>
<th>Order Entry Code</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>UDRSA</td>
<td>Urine Drug Screen Abuse (Includes Amphetamine, Barbiturates, Benzodiazepines, Cannabinoids, Cocaine, Ethanol, Opioids, Methadone, Phencyclidine, and Propoxyphene).</td>
</tr>
<tr>
<td>UDRSC</td>
<td>Urine Drug Screen Comprehensive (in addition to drugs of abuse listed above, it includes screen for &gt;100 additional over-the-counter and prescription drugs).</td>
</tr>
<tr>
<td>UDRSS</td>
<td>Urine Drug Screen Single Drug</td>
</tr>
</tbody>
</table>

The commonly asked question is, “what is included in the Comprehensive Drug Screen?” The drugs included in this screen are listed in the Meditech Library. In order to access this list, go to the Meditech Library and then to the Laboratory folder.

Reminder Regarding Change in PTH Assay:
Since May 20, the laboratory has been using a new PTH assay. The old assay had a significant cross reactivity with an inactive PTH fragment called 7-84 peptide.

The new PTH assay has less cross reactivity with this peptide and thus, is considered a better assay. The following are the two changes that took place:

* The sample should be kept on ice and sent to the laboratory on ice. Not putting the sample on ice falsely increases the PTH values.
* The reference ranges changed from 12-72 to 7-53.

The computer system reflects these changes.

Availability of Glucose in the Critical Care Laboratory:
The laboratory has validated the whole blood glucose assay on the Blood Gas Analyzers in the Critical Care Laboratory, and the test is now available. The Order Entry Code is GLUW. When ordering along with blood gases, no additional sample is required.

Do not confuse 17-Hydroxypregnenolone with 17-Hydroxyprogesterone:
Sometimes we get orders for 17-Hydroxypregnenolone when 17-Hydroxyprogesterone is desired. The order entry codes for these tests are:

HYPD for 17-Hydroxyprogesterone
PREG17OH for 17-Hydroxypregnenolone

Since 17- Hydroxypregnenolone is not a commonly ordered test, we have added the comment; “Do you really want to order 17-OH Pregnenolone not 17-OH Progesterone, mnemonic HYDP?” will pop up when ordering 17-Hydroxypregnenolone. You have to type “Y” for yes if you really want to order the test.

Organic Acids are now done in-house:
The organic acids tests were send-out tests but are now being done in-house. In Meditech, the results appear under the Biochemical Genetics section of the Laboratory instead of Reference Testing.