

## A NEW LOOK FOR AVERA LABORATORY NETWORK

Avera Laboratory Network's newsletter has seen some changes over the past year. First it had a new name, and now it has a new look.

Avera Laboratory Network continues to grow and expand. Our test menu is ever-changing, and the technology we provide is cutting-edge. We want this to be evident in the materials we present to our customers. This new look coincides with a revised look for our display booth and marketing materials.

The entire newsletter will be available on the Web at [www.averalabnet.com](http://www.averalabnet.com). Sign up to receive this newsletter electronically by e-mailing [lori.murray@avera.org](mailto:lori.murray@avera.org). Likewise, anyone who would prefer not to receive the printed version should notify Lori at the above e-mail address.

Avera Laboratory Network *Lab Links* is published every other month to provide the latest updates on services from labs of the Avera Laboratory Network.

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## CALENDAR OF EVENTS

### Nebraska/Iowa Spring Meeting

April 18–20, 2007

More info at: <http://www.ascls-ia.org/annualmeeting.htm>

### South Dakota Spring Meeting

May 2–4, 2007

More info at: <http://www.ascls-sd.org/id4.html>

### Minnesota Spring Meeting

May 16–18, 2007

More info at: <http://www.mnscls.org/y2007/2007CLCSpringMeetingFlier2007.pdf>

## NORMAL LABORATORY VALUES CHANGE DURING PREGNANCY

Most commonly, laboratory personnel associate testing pregnant women with HCG levels. But they may not realize that the pregnant patient may have numerous routine laboratory results that fall outside the normal reference ranges.

The pregnant patient undergoes many dramatic physiological changes during gestation, and these changes may cause transient abnormal lab results. It is important to understand that while these results are not necessarily clinically significant, we must be able to detect any truly abnormal laboratory results. The following information provides the clinician with normal laboratory tests that may be found in pregnant patients and the reasons why they occur.



### ■ RBC/HGB/HCT:

RBC/HGB/HCT values decrease due to hemodilution. The RBC mass increases during pregnancy, as well as the plasma volume. The plasma volume expands slightly more than the RBC's, causing relative hemodilution, especially in the last trimester.

■ **Platelets:** Platelets are more reactive and are subject to enhanced destruction. In response, the platelet production is increased.

■ **ESR:** The aggregability of red blood cells is increased during pregnancy, causing elevated ESR results.

■ **Fibrinogen:** During pregnancy the coagulation system is thrown into a hypercoagulable state, which causes elevated fibrinogen levels.

■ **Protein S:** Estrogen acts to markedly decrease protein S levels.

■ **D-dimer:** The hypercoagulable state of the body increases thrombin activity and fibrinolysis, in turn elevating d-dimer levels.

■ **FT4:** HCG possesses weak thyroid-stimulating activity and will slightly decrease the TSH levels in the first trimester. The body reacts by increasing the production of FT4.

■ **Thyroid Binding Globulin:** TBG is stimulated by estrogen and its clearance is decreased, causing an elevated level.

■ **T3/T4:** These are both increased as the level of TBG increases, which increases binding capacity. Also, the increasing blood plasma volume causes an elevated T3 and T4 pool size.

■ **T3U:** T3U is decreased as the level of serum proteins increase.

■ **Cholesterol:** Cholesterol production is increased to meet the demand of usage by the placenta for steroid synthesis, fatty acid production, placental oxidation and membrane formation. Lipid metabolism in general also changes to promote accumulation of maternal fat stores.

■ **HDL:** HDL is increased by 12-weeks gestation in direct response to estrogen.

■ **Albumin:** Albumin levels demonstrate a decrease, which is dilutional relative to the increased plasma volume.

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## U.S. BLOOD BANKS SWITCH TO MALE-DONATED PLASMA FOR USE IN TRANSFUSIONS

In an effort to decrease the incidence of transfusion-related acute lung injury (TRALI), the Red Cross and other blood bank services are beginning to use plasma collected almost exclusively from male donors for use in transfusions. TRALI is a type of reaction in which fluid rapidly builds up in the lungs of patients causing breathing difficulties and even death.

TRALI tops the list of adverse reactions that can be experienced following transfusion, although it affects only a few hundred patients a year and kills about 10 percent of those affected. No one knows for sure what causes TRALI, but it is now believed that some antibodies produced in women who have been pregnant have a role in the process. Pregnant mothers produce antibodies to their baby's foreign-father cells, which cause no harm to the mother or the child. However, in certain situations yet to be more clearly defined, the antibodies appear to react with the transfusion recipient's cells.

Only about a quarter of the plasma donated is used in direct transfusions to patients. The rest of the plasma is used in the manufacture of products such as clotting factors and immune globulins.

Three years ago, researchers in Britain reserved male-donated plasma for transfusions, and the study resulted in a dramatic decrease of TRALI incidences. After the researchers reported their findings at a meeting last fall, blood banks in the United States began to follow suit. It is estimated that the change could prevent about 150 cases of TRALI a year, and 15 deaths.

However, women should not be discouraged from donating since only 25 percent of plasma is used for transfusions. Women's plasma will be needed to help when there is a shortfall in the supply and for use in manufacturing. Also, the entire picture of TRALI is not clear. If common antibodies were the only cause, then TRALI would be common. Instead, it occurs only in about 1 in 5,000 units of transfused products. Platelets also contain a small amount of the antibodies, and platelets are in such short supply that blood banks could never stay supplied if only men donated.

Blood banks also are searching for ways to test donors that have high antibody levels as an alternative to keep their inventories adequate in the face of rising blood usage. The blood bank community feels that although the solution is not yet perfect, they are taking care of the biggest problem first.

## MANAGING PATIENTS WHO LOSE CONSCIOUSNESS

Those who draw blood specimens must constantly be aware of the signs and symptoms of an impending loss of consciousness and be prepared to react. Signs can include pallor, perspiration, hyperventilation and anxiety. A proper response to such signs is key to protecting the patient from falling and the injuries that can result. However, collectors can prevent an injury before it happens if they take the following precautions.

- Make sure that all outpatients are drawn from chairs with armrests that can stop a fainting patient from falling to the floor.
- Inpatients should be drawn while recumbent or sitting in armchairs. When patients state that they have a tendency to pass out during a blood draw, it is best to draw them while they are in a recumbent position.
- Never turn your back on a patient after you have completed the draw. Many patients give no warning before passing out.
- Should a patient become dizzy or lose consciousness during a collection, release the tourniquet and remove



the needle at once. Presence of mind must be maintained so that you don't sustain an accidental needlestick in the process.

- If the patient loses consciousness, support him/her from falling to the floor and summon assistance. Lower the patient's head below the level of the heart to facilitate blood flow to the brain. This also can be accomplished by carefully, and with assistance, lowering the patient's head between the knees or by lowering the patient to the floor, being careful not to allow the patient to fall and sustain an injury.
- Avoid the use of ammonia inhalants. Patients who are asthmatic may develop respiratory distress as a result.

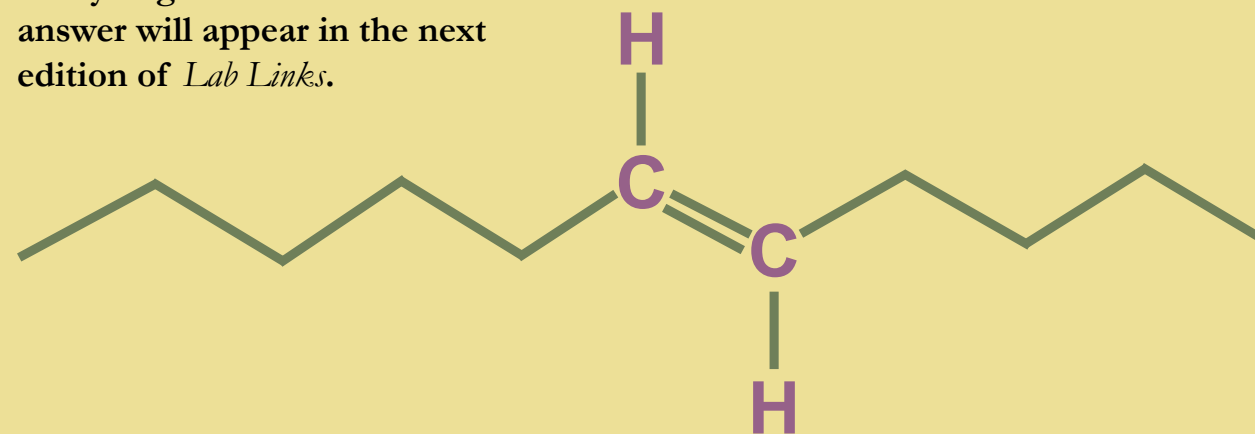
## LABOPOLY

Looking for a new game? Then plan to attend the Siouxland CLMA/ASCLS-SD Spring Conference May 2–4, 2007, at the Ramkota Convention Center in Aberdeen, S.D. The joint planning committee has secured a line-up of many interesting and knowledgeable speakers on a variety of subjects. Don't forget Avera Laboratory Network's hospitality event followed by the return of Bowling Night on May 2, and the Labopoly Exhibitor Night on May 3. Don't miss it!



## Mystery Molecule

In a controversial move, New York City officials recently voted to ban this molecule from restaurants. Can you guess what it is? The answer will appear in the next edition of *Lab Links*.



## PREGNANCY

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- **Alkaline Phosphatase:** While ALP is normally produced primarily in the bones and liver, in pregnancy the placenta also produces ALP causing an increased level.
- **BUN/Creatinine:** The renal plasma flow is increased by 50–70 percent, increasing the glomerular filtration rate. The result is decreased BUN/CRE results.
- **Calcium:** Calcium levels can be decreased as pregnancy progresses. This is a time of high calcium intake and usage by the mother and fetus.

- **Glucose:** Glucose levels are increased in early pregnancy from increased insulin secretion and decreased insulin sensitivity, and also from increased hepatic glucose production. In late pregnancy, there is increased carbohydrate usage.
- **Total Protein:** Total protein levels dilutional decrease as a result of increased plasma volume.
- **Iron:** Iron levels decrease as RBC mass increases and from hemodilution. This, in turn, causes an increased TIBC.
- **Transferrin:** Transferrin levels increase along with increased erythropoiesis.

- **Ferritin:** Ferritin levels will decrease as iron is removed from the iron stores for usage in increased RBC production.
- **ACTH:** The placenta produces corticotropin-releasing hormone, which stimulates ACTH. ACTH in turn increases the production of aldosterone and cortisol.
- **Urine Glucose:** Small amounts of glucose may “spill over” into the urine without any clinical significance.
- **Urine Protein:** As with glucose, small amounts in the urine can be normal.