Lovely Labs

Sean Strub's standard blood work suggests good health

May 1, 1997 By Ross Slotten, MD, MPH

Laboratory analyses of blood and other medical measurements, which help health practitioners make diagnoses and detect toxic effects of medication, can also help people with HIV track their health. Ross Slotten, MD, MPH, is a Chicago physician who has treated thousands of PWAs during the past 13 years. He analyzes some of the standard blood values of POZ *founder Sean O. Strub.*

Sean has advanced HIV infection, which you'd never guess based on his latest routine labs. But we know this from his medical history: At one point, his CD4 count was one and his viral load 3.3 million. Thanks to his drug cocktail of indinavir (Crixivan), d4T (Zerit) and delavirdine (Rescriptor), his most recent CD4 count (listed here as *helper*) is 127 and his viral load is below the level of detection. If we exclude the immune-system measures (listed under *lymph subset III)*, only 15 of his 55 tests are abnormal (grouped in a segregated section for values *outside the established reference range).* Under the circumstances, that's not bad.

Seven of Sean's abnormalities are in his *complete blood count.* Both his *WBC* (white blood count) and his *RBC* (red blood count) are a little low. For HIV positive people, these deviations--called leukopenia and anemia, respectively--are, when this slight, simply accepted as a sign of chronic viral infection. However the *MCV* (the most important red blood cell index; others include *MCH, MPV,* and *RDW)* can be of more concern. Sean's *MCV* is elevated, meaning his cells are larger than average. Patients on AZT usually have high *MCV*s, but Sean took it only briefly years ago. Other causes could be a vitamin B-12 or folate deficiency, thryoid problems or chronic liver disease. Sean might want to have further blood tests to rule out these conditions.

Most of Sean's blood chemistries (grouped as the *chem-screen panel*) are in the normal range. The abnormals here are the *amylase, globulin, total* and *direct bilirubin, HDL cholesterol* and *triglycerides. Amylase* is an enzyme excreted by the pancreas and salivary glands to break down starches. In 1995, when Sean was taking ddI, he developed a very high *amylase* level, reflecting pancreatitis, a serious inflammation of the pancreas. His *amylase* level is still elevated, but he has no symptoms. The elevation may be due to d4T, also known to cause pancreatitis. If Sean develops severe upper abdominal pain, nausea and vomiting, he should call his physician to rule out pancreatitis.

Globulins are another component of the immune system. People with HIV often have high

globulins, reflecting chronic overstimulation of the immune system. So Sean's elevated reading requires no further evaluation.

Sean's *total* and *direct bilirubin,* two fo the liver function tests (see What This Means, *POZ*, April 1997), are elevated. This is a common result of Crixivan use and is not of concern.

Cholesterol is synthesized by the liver from food and helps to form cell membranes and synthesize hormones such as testosterone. This value represents the total of all types of cholesterol, including *LDL*, the "bad" artery-clogging form (not listed here), and *HDL*, the "good" form. *Triglycerides* are manufactured by the liver, but the majority are derived from food and stored as fat. In wasting syndrome, *cholesterol* is usually low. Oddly, triglycerides can be very high in PWAs due to an endocrine-system disturbance. Sean's *cholesterol* is near the high end of normal, his *HDL cholesterol* is just a hair below normal, and his *triglycerides* are just slightly above normal--in sum, nothing to worry about.

Note that ritonavir (which Sean took briefly last year) is known to raise cholesterol and triglycerides to sky-high levels. So far, no harmful effects have been reported. Someday, we may debate the risk of coronary artery disease from ritonavir. That would be a happy day, because it would mean that people were living significantly longer.

A few other observations: *total protein* is comprised of albumin and globulins; *albumin*, synthesized by the liver, helps transport chemicals and hormones throughout the body. Sean's OK on both. Low albumin is always worrisome--it's a sign of either malnutrition or chronic liver or kidney problems. If albumin is too low, the protein levels in the blood will fall, and fluid will leak out into the tissues, which is one reason people with cirrhosis of the liver have massive swelling.

Lastly, Sean's *sedimentation rate* and *beta 2 microglobulin* are elevated. These two tests are nonspecific indicators of infection or inflammation. In the past, they were often used as predictors of HIV disease progression--the higher the level, the worse the prognosis. Today, we rely more on the viral-load level.

Lab measures provide a useful tool for detecting disease and the impact of therapies. Not every test is relevant to every situation. In fact, sometimes there are more results than we need. However, if we understand the purpose of each test, and place normal and abnormal results in context, we can detect problems early and make the necessary changes to improve the quality and quantity of a person's life.

LAB LINGO

Markers for HIV Progression

Many markers measure the presence or absence of HIV in the human blood. HIV surrogate markers are measurements that reflect HIV activity; they are "surrogate" because they do no

measure the absolute amount of HIV. Instead they measure secondary effects of HIV on the body.

CD4 Count, also known as CD4+ lymphocyte count, T4 cell count or T-helper count, is the most commonly used marker to determine HIV progression. A significant drop reflects the amount of damage done to the immune system.

CD4 Percentage is a comparison of the number of CD4 cells to the total lymphocyte count (B- and T-lymphocytes). The CD4 percentage may be a more accurate measure of HIV disease progression than the CD4 count.

Complete Blood Count

The CBC examines formed elements (red blood cells, white blood cells and platelets) and plasma.

White blood cell count (WBC) is the count of white blood cells (leukocytes). WHCs defend the body against infection. A high WBC may mean there is a bone marrow problem either from chronic disease or from drugs like AZT or ganciclovir.

Red blood cell count (RBC) is a count of red blood cells, which carry oxygen throughout the body. A low RBC may signify anemia, a shortage of red blood cells or hemoglobin.

Hemoglobin is a protein that enables RBCs to carry oxygen from the lungs to the rest of the body.

Hematocrit is the volume of RBCs expressed as a percentage of the total blood volume. The hematocrit shows the oxygen-carrying capacity of the blood.

Mean corpuscular volume (MCM) is the average volume of the individal red blood cells. A low MCV indicates the cells are smaller than normal. This most commonly occurs because of an iron deficiency or chronic disease.

Mean corpuscular volume (MCV) and mean copuscular hemoglobin concentration (MCHC) are measures of the amount and volume of hemoglobin in the average cell.

Platelets, important for blood clotting, are formed in the bone marrow. People who are HIV positive may have low platelets or “thrombocytopenia.” Drug reactions may also be responsible for the destruction of RBCs or platelets.

Differential is a breakdown of the different types of white blood cells and is usually expressed as a percentage of the total WBCs.

Chemistry (Chem) Screening

A large part of your laboratory report examines chemicals in your blood and identifies whether

body processes are working correctly. Typically, 24 of these values are included in a "Chem 24 report."

Glucose is sugar in the blood, most commonly used to monitor diabetes melitus. Glucose levels may become abnormally high or low when pentamidine is given by vein.

Albumin is one of the major types of protein in the blood. Manufactured in the liver, albumin decreases in chronic liver disease. It also reflects one's general nutritional status.

Gamma GT, SGOT, SGPT and LDG are liver enzymes. Elevation in these tests is most common in liver disease, but may also rise from injuries, tumors and drug reactions.

Iron is an essential component of hemoglobin; its deficiency causes anemia. Iron loss may be due to chronic bleeding, for instance when Kaposi's sarcoma affects the intestines.

Cholesterol and Triglycerides are fatty substances found in the blood.

Sodium, Potassium and Chloride (electrolytes) must be monitored carefully in dehydration, kidney disease and during intravenous therapy. Sodium levels reflect salt/water balance. Potassium levels rise in kidney failure, and may be low after severe vomiting or diarrhea.

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