AIDS InfoNet **www.aidsinfonet.org** **Fact Sheet Number 123**

Blood Sugar and Fats

See Fact Sheet 121 for information on the Complete Blood Count, and Fact Sheet 122 for tests included in the Chemistry Panel. For information on normal laboratory values, see fact sheet 120.

SIDE EFFECTS OF ANTIRETROVIRAL MEDICATIONS (ARVs)?

Standard blood tests measure blood sugar (glucose), but not blood fats. People with HIV are testing their blood sugar and blood fat levels more frequently because ARVs seem to cause abnormally high levels. This is especially true for the ARVs called protease inhibitors. For more information, see Fact Sheet 553 on lipodystrophy (body shape changes).

BLOOD SUGAR

Glucose is sugar. It is broken down in the cells to provide energy. Blood sugar increases after you eat or drink anything besides water. A high glucose level (hyperglycemia) can be a sign of the disease diabetes mellitus. High blood sugar levels can eventually damage your eyes, nerves, kidneys, or heart. High blood sugar can be a side effect of the HIV protease inhibitors.

Low blood sugar (hypoglycemia) can cause fatigue, but there are other more common causes of fatigue for people with HIV.

In a healthy person, blood sugar is controlled by insulin. Insulin is a hormone produced by the pancreas. It helps glucose move from your blood into your cells to produce energy.

High blood sugar levels could mean that your pancreas is not making enough insulin. However, some people make plenty of insulin, but their bodies don't respond normally. This is called "insulin resistance." In either case, the cells don't get enough glucose to use for energy, and glucose builds up in your blood.

Some people who take HIV protease inhibitors develop insulin resistance and can have high blood glucose levels. This condition is sometimes treated with the same medications used to treat diabetes. There is no simple blood test for insulin resistance.

There are three ways to test for blood glucose levels:

- A ***random blood glucose*** test. This measures the glucose in a sample taken when you have been eating on your usual schedule.
- A ***fasting glucose*** test. This uses a blood sample taken when you have not had anything to eat or drink (except water) for at least 8 hours.
- A ***glucose tolerance test.*** This starts with a fasting glucose test. Then you are given a measured amount of glucose in a sweet drink. Glucose is measured in several more blood samples taken at specific time intervals.

If your blood glucose is too high, you might have diabetes. Treatment for diabetes involves weight loss, diet, and exercise. It can also involve medications or insulin shots.

BLOOD FATS

Fat is a source of energy. It carries some vitamins around the body. It is used to make hormones and cell membranes, to protect organs, and to lubricate some moving body parts. However, too much fat in the blood increases the risk of heart disease or pancreatitis.

Triglycerides are the most common form of fat in the body. Cholesterol is another form of fat. In order for fats to be carried in the blood, they are wrapped in protein molecules. These bundles of protein-wrapped fat are called lipoproteins.

Lipoproteins come in different sizes. Smaller ones are called low-density lipoproteins (LDL) or very-low-density lipoproteins (VLDL). These molecules carry fats from the liver to other parts of the body. Too much LDL or VLDL can cause fat to build up on the walls of your arteries. This can reduce the oxygen supply to your heart muscle and cause heart disease or a heart attack.

Larger lipoproteins are called high-density lipoproteins (HDL). These are called "good" lipoproteins because they remove fats from your arteries and return them to the liver for more processing. High levels of HDL seem to protect people from heart disease.

Blood fats are measured as the amount (in milligrams) contained in one tenth of a liter (a deciliter) of blood, or mg/dL.

Measuring Triglycerides

Triglyceride levels in the blood rise quickly after you eat. You cannot eat for at least 8 hours before you give a blood sample. Many people with HIV disease have unusually high levels of triglycerides. This is especially true for people taking protease inhibitor drugs. Triglyceride levels under 150 are considered normal. Levels greater than 1000 mg/dL can cause pancreatitis.

Measuring Cholesterol

Total cholesterol includes the "bad" low-density and the "good" high-density lipoproteins. Total cholesterol does not change too quickly after you eat, so you can give blood any time for this test. Total cholesterol levels below 200 are considered good, and levels over 240 are considered bad.

HDL Cholesterol is good cholesterol. It can be measured in a non-fasting blood sample. Higher levels of HDL cholesterol are better, and levels over 40 are considered good.

LDL Cholesterol is bad cholesterol. LDL levels are calculated using a formula that includes the level of triglycerides. You need a fasting blood sample to measure triglycerides or to calculate LDL cholesterol. Levels below 100 are good, and levels over 160 are considered a high risk for heart disease. A recent analysis of clinical trials found that, for very high risk patients, LDL should be lowered to no more than 70.

HIV health care providers are treating more of their patients with high cholesterol levels, especially if the patients have a family history of heart disease. If your cholesterol level is high, discuss treatment options with your health care provider.

Reviewed June 13, 2009

A project of the New Mexico AIDS Education and Training Center. Partially funded by the National Library of Medicine
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