



HIV and KIDNEY DISEASE

WHY SHOULD PEOPLE WITH HIV CARE ABOUT KIDNEY DISEASE?

HIV disease can result in kidney failure due to HIV infection of kidney cells or other causes. Health care providers have been paying attention to people with HIV who have risk factors for kidney disease. These include diabetes, high blood pressure, being African-American, or taking various antiretroviral medications (ARVs) suspected of causing kidney problems. One term for HIV-related kidney problems is HIVAN or HIV-Associated Nephropathy. Kidney problems can lead to end-stage renal disease (ESRD) or kidney failure. This can require dialysis or a kidney transplant.

WHAT IS NORMAL KIDNEY FUNCTION?

The main job of the kidneys is to filter waste products and excess sodium and water from the blood. They are eliminated from the body in the urine. Each kidney contains about a million filtering units called nephrons. Their chief function is to regulate water and other substances by filtering the blood. They reabsorb what is needed and excrete the rest as urine. Nephrons eliminate wastes from the body, regulate the volume and pressure of blood, and control levels of electrolytes and blood acidity.

HOW DO I KNOW IF THERE ARE PROBLEMS WITH MY KIDNEYS?

Unfortunately, most symptoms of kidney disease only show up when a large part of kidney function has already been lost. Swelling of the legs or face or changes in urination may occur. Other symptoms, such as fatigue and loss of appetite, can be confused with other health problems.

The most common test of kidney function is a urine test. A simple "dipstick" is used to check levels of protein (proteinuria or albuminuria), sugar, ketones (formed when the body breaks down fat,) blood, nitrites (which increase when bacteria are present), and red and white blood cells. Even small amounts of protein in the urine

show up before kidney disease has caused a loss of kidney function.

Nearly one-third of all HIV-positive people have high levels of protein in their urine. This is a sign of possible kidney trouble.

More detailed kidney tests include the blood urea nitrogen or BUN, creatinine clearance, Cockcroft-Gault and MDRD tests.

Blood Urea Nitrogen (BUN) is nitrogen in the blood. This is a waste product that is normally removed by the kidneys in the urine. High BUN levels can be due to a high-protein diet, dehydration, or kidney or heart failure.

Creatinine is produced when muscle is broken down. Blood levels of creatinine are a measure of kidney function. High levels are usually due to kidney problems. Doctors use the creatinine level to see how well the kidneys are working.

Normal laboratory levels of creatinine have to be adjusted in order to be helpful. The most common formula for adjusting creatinine values is the Cockcroft-Gault formula, which considers race, age, weight, and gender. Another adjustment formula is the MDRD or Modification in Diet in Renal Disease Study equation. Doctors use these to get a better picture of what your creatinine level really means.

Higher levels of protein in the urine and of creatinine are linked to higher risk of AIDS-defining illness or death. However, the best way to diagnose kidney disease is by taking a small sample (biopsy) of the kidney.

WHAT ARE THE RISK FACTORS FOR KIDNEY DISEASE?

Kidney disease is more likely in people who:

- Are African-American
- Have diabetes
- Are older
- Have high blood pressure
- Have a lower CD4 count
- Have a higher viral load

- Have hepatitis B or C

HIV MEDICATIONS AND THE KIDNEYS

The protease inhibitor indinavir (Crixivan, see fact sheet 441) was the first HIV medication clearly linked to kidney problems. When taken unboosted, indinavir could cause a painful buildup of drug crystals in the kidneys. This was especially true of people did not drink enough water. This was often called indinavir "sludge" or kidney stones, although true stones were sometimes not present. This is much less of a problem when indinavir is boosted with ritonavir.

More recently, the nucleotide analog tenofovir has been suspected of causing kidney problems. However, repeated research studies have not shown consistent problems with this drug.

The dosages of several ARVs that are cleared through the kidneys need to be reduced for people who have impaired kidney function as measured by creatinine clearance. Be sure your doctor knows if you have any kidney problems.

DIALYSIS AND KIDNEY TRANSPLANTATION

People with HIV have gone onto dialysis and some have received a kidney transplant. There are concerns about suppressing the immune system following transplant, so most transplant centers only accept people with over 200 CD4 cells and an undetectable viral load. The outcomes for these people appear to be the same as for other people getting kidney transplants.

THE BOTTOM LINE

HIV infection can cause kidney problems that may become serious. Also, people with kidney problems may need to lower the amount of some ARVs that they take.

Kidney problems don't really show up as symptoms of disease. It's important to get

the urine checked regularly for signs of trouble.