Cardiovascular disease (CVD) is a general term used to describe medical conditions that affect the heart and blood vessels. Examples of conditions include high blood pressure, atherosclerosis (hardening of arteries), coronary heart disease, heart attacks, heart failure and strokes.

CVD is the leading cause of death in the U.S., and is a growing concern for people living with HIV. This is partly because people with HIV generally are living longer than ever before. And just like their HIV-negative peers, their risk of CVD increases once they enter their 50s and 60s.

HIV itself can further increase the risk. Ongoing, untreated HIV has been linked to CVD: one of the reasons the Federal guidelines recommend starting HIV treatment as soon as possible—to help prevent cardiovascular damage caused by ongoing inflammation. However, many HIV drugs can also contribute to CVD, notably by raising cholesterol and triglyceride levels.

The good news is that many steps can be taken to help prevent and manage CVD. Decades of research in HIV-negative and HIV-positive people have shown that lifestyle changes such as diet, exercise and quitting smoking can greatly reduce this risk. When these aren’t enough, many effective medications and other approaches are available. It’s also important to take cardiovascular risk factors into account when choosing which HIV meds to use.

What are the different types of cardiovascular diseases?

Some diseases directly affect the heart’s structure and ability to function. Others indirectly affect the heart by making it harder for blood to circulate through blood vessels. Other conditions are genetic, but most problems are due to disease, lifestyle or age.

Some of the major cardiovascular diseases include:

- **Aneurysms**: This is a bulge in the wall of a blood vessel. They usually get bigger over time and can burst.
- **Angina**: Chest pain resulting from reduced oxygen to the heart.
- **Arrhythmias**: An irregular heartbeat. The heart can sometimes beat too slowly or too quickly or irregularly.
- **Cardiomyopathy**: Disease or damage to the heart muscle, reducing its ability to pump blood.
- **Congestive Heart Failure (CHF):** CHF is when your heart does not pump as strongly as it should, reducing the amount of blood and oxygen to the rest of your body.

- **Coronary Artery Disease (CAD) / Coronary Heart Disease (CHD):** This is the most common form of heart disease. It occurs when fat and scar tissue block arteries in the heart, increasing the risk of angina and heart attacks.

- **Heart Attack:** A heart attack, or myocardial infarction (MI), is an injury to the heart muscle due to a loss of blood caused by a blood clot.

- **High Blood Pressure (Hypertension):** This is an excessive force of pressure as your blood pumps through the vessels. This can lead to heart attacks, strokes, heart failure and kidney damage.

- **Peripheral Arterial Disease (PAD):** This occurs when the blood vessels in the legs and arms become clogged, leading to limb pain and risk of a heart attack or stroke.

- **Stroke:** This occurs when blood flow to the brain is interrupted, usually by a blood clot or when a blood vessel in the brain ruptures. Both can cause the death of brain cells.

- **Valve Problems:** The heart valves keep blood pumping in one direction in and out of the heart. They can become narrowed or unable to close properly, or they can leak.

**What causes CVD in people with HIV?**

Many factors can influence your risk of heart disease. Some can be controlled, while others cannot. Some factors greatly increase the risk, whereas others may exert only a mild influence. Knowing all your risk factors can help you and your health provider determine your overall risk for CVD.

**Risk Factors You Can’t Control:**

- **Gender and age:** Both strongly influence cardiovascular health. Generally, men have a greater risk than women and at an earlier age. For men, risk begins to increase by age 45 and continues to grow each year. For women, the risk generally doesn’t start to climb until after menopause. By age 65, however, the CVD risk in women escalates greatly.

- **Race:** Isn’t entirely clear why race plays a role in heart health. In general, African Americans have a higher risk for heart-related problems, such as high blood pressure and diabetes. Both of these greatly increase a person’s risk for CVD.

- **Genetics:** CVD may be more likely in some families compared with others. If your parents,
grandparents or aunts and uncles suffered heart attacks or strokes at an early age, then your risk is also higher than if your relatives remained healthy.

Risk Factors You Can Control:

- Diet, exercise and smoking all profoundly affect heart health, and are often called lifestyle factors. Though a healthy diet and regular exercise both help cardiovascular health, smoking is one of the worst offenders. It increases blood pressure, contributes to hardening of the arteries, and increases the risk for lung cancer and emphysema.
- One very common risk factor for many people is having unhealthy levels of blood fats, or lipids. This usually means that your total cholesterol, “bad” cholesterol (LDL), or triglycerides are too high, or that your “good” cholesterol (HDL) is too low. Poor diet, smoking, HIV meds (see next section) and a lack of exercise can all contribute to lipid problems. If your levels are unhealthy, most doctors will first recommend lifestyle changes perhaps combined with changes to your HIV regimen or starting drugs that reduce cholesterol and triglycerides.
- High blood pressure is another risk factor that most people can control. When changes in lifestyle habits don’t do the trick, doctors often prescribe drugs to control blood pressure.
- Diabetes is also a major risk factor for CVD. In particular, every time your blood sugar climbs and stays too high, it contributes to cardiovascular disease. If you have diabetes, a healthy diet and regular exercise are even more important, as are regularly monitoring your blood sugar and using the diabetes medication(s) your doctor prescribes.
- HIV infection itself may also be a risk factor. Studies show that people with HIV who are not on treatment have lower “good” HDL cholesterol and higher triglycerides than HIV-negative people. Also, the ongoing inflammation in the body due to the presence of HIV—especially untreated HIV—can gradually damage the heart and blood vessels. However, people living with HIV have options to help manage many of the health problems that HIV can cause.

Does HIV treatment increase the risk of a heart attack?

Studies show that certain HIV meds can increase heart disease. Many protease inhibitors (PIs), some non-nucleoside reverse transcriptase inhibitors (NNRTIs), and a few nucleoside reverse
Transcriptase inhibitors (NRTIs) have been found to affect cholesterol and triglyceride levels in people with HIV. PIs and NRTIs have also been tied to diabetes. Some HIV drugs have also been linked to an increased risk of heart attacks, for reasons that are not yet clear.

However, other studies such as SMART (Strategies for Management of Antiretroviral Therapy) show in general that taking HIV meds actually protects against CVD. There were more heart attacks among those who delayed or stopped treatment, compared to those who started and stayed on therapy.

In the end, there are ways to maintain a favorable balance when using these medications. This involves working closely with a health provider to make sure that all heart-related risks—smoking, diet, exercise, family history, blood pressure, current lipid levels—are considered when choosing and monitoring HIV meds.

The following is a guide to the various drug classes and their impact on CVD:

**Nucleoside Reverse Transcriptase Inhibitors**

- Stavudine (*Zerit*) is rarely used but can increase lipids, and most clinicians don’t recommend using it.
- Zidovudine (*Retrovir, Combivir, Trizivir*) can increase the risk of diabetes and, in rare cases, can damage heart muscle.
- A couple of studies have linked abacavir (*Ziagen, Epzicom, Triumeq, Trizivir*) and didanosine (*Videx, Videx EC*) to an increased risk of heart attacks. Several other studies found no such risk. The biological explanation has not been found for either drug.

**Non-Nucleoside Reverse Transcriptase Inhibitors**

- Efavirenz (*Sustiva, Atripla*) can modestly increase triglycerides as well as raise healthy HDL.
- Nevirapine (*Viramune*) has no impact on lipids, except for HDL increases.
- Delavirdine (*Rescriptor*), rarely used, can modestly increase cholesterol and triglycerides.
- Etravirine (*Intelence*) and rilpivirine (*Edurant, Complera, Odefsey*) appear to have a minimal effect on cholesterol or triglycerides.

**Protease Inhibitors**

- Most drugs in this class can raise total and LDL cholesterol and triglycerides. Using *Norvir* (ritonavir) to boost blood levels of these meds can exacerbate this effect.
However, neither atazanavir (Reyataz) nor darunavir (Prezista) appears to raise lipid levels on their own.

Entry Inhibitors
- Enfuvirtide (Fuzeon) does not appear to impact lipids, though it is rarely used.
- Maraviroc (Selzentry) does not appear to impact lipids.

Integrase Inhibitors
- Raltegravir (Isentress) does not appear to impact lipids.
- Elvitegravir (Viteka, Stribild, Genvoya) modestly increases LDL and triglycerides.
- Dolutegravir (Tivicay, Triumeq) slightly increases lipids.

How is cardiovascular disease diagnosed and monitored?
Some of the tests to diagnose or monitor heart disease are quite basic, and your doctor probably already checks these:

- **Blood Pressure**: According to the American Heart Association, the top number (systolic) should ideally be less than 120 and the lower number (diastolic) should be less than 80. It’s usually stated as, “120 over 80.” A result of 140/90 or higher is considered high blood pressure, or hypertension.
- **Lipid Levels**: The amounts of fats in your blood. These should be checked regularly, preferably in a fasted state (a blood draw after 12 hours with no food or drinks other than water).
- **Total Cholesterol**: Your total mix of good and bad cholesterol. Ideal is below 200 mg/dL of blood. Borderline is 201–239 mg/dL, and high is 240 mg/dL and higher.
- **LDL Cholesterol**: One of the two “bad” types of cholesterol. The ideal is below 100 mg/dL, while 160 mg/dL or more is considered high.
- **VLDL Cholesterol**: The other “bad” cholesterol. It is calculated as a percent of your triglycerides. A normal VLDL is usually between 5–40 mg/dL.
- **HDL Cholesterol**: The “good” type of cholesterol. The ideal is 60 mg/dL or higher. Normal is 40–59 mg/dL. Below 40 mg/dL is too low.
• HDL/LDL Ratio: This ratio compares good cholesterol to bad cholesterol. To get the number, divide the LDL level (for example, 50 mg/dL) into the HDL (150 mg/dL). The result would be 0.33. The goal is to keep the HDL/LDL ratio above 0.3, with the ideal ratio being above 0.4.

• Triglycerides: Less than 150 mg/dL is ideal, while greater than 200 mg/dL is high.

• Glucose: This test measures the amount of sugar in the blood. Normal is below 100 mg/dL in a fasted state while pre-diabetes is 100–125 mg/dL fasted and diabetic is 126 mg/dL or higher. A different blood test measures your blood sugar while in a fasted state before and after drinking a sugary beverage.

• Kidney Function: Kidney damage can be a cause or an effect of CVD. BUN (blood urea nitrogen), creatinine and uric acid are three common blood tests of kidney function.

Your health provider may order other tests. These may include an electrocardiogram (EKG or ECG), echocardiogram, chest X-ray, computerized tomography (CT) scan, magnetic resonance imaging (MRI) scan, stress testing or cardiac catheterization.

Am I at risk for cardiovascular disease?

As stated above, many factors contribute to CVD. However, not all factors carry the same risk—some are much more serious than others. For example, smoking and diabetes have been proven to greatly increase the risk of heart disease. Being 30 pounds overweight can also increase your risk, but not to the same degree. While these factors have been well established in studies with HIV-negative people, most experts agree that the same applies to people with HIV as well.

How can I reduce my risk of cardiovascular disease?

It is possible to dramatically reduce your risk of CVD. Here are some options to consider:

• Treat HIV infection. Federal guidelines recommend that all people with HIV should start treatment. HIV treatment reduces ongoing inflammation, which in turn reduces the risk of damage to the blood vessels and heart.

• Choose the Right HIV Meds. When it comes to heart disease risk, not all HIV drugs are created equal. Some can raise cholesterol and triglycerides, while others may increase the risk of diabetes. For more information, click here.

• Quit Smoking. If you quit smoking, within 10 years your heart attack and stroke risk drops by nearly 300 percent. Smoking causes chronic inflammation of the blood vessels and the heart,
negatively affects cholesterol, increases blood pressure and can lead to emphysema and lung cancer. For more information and tips on quitting, click here.

- **Watch Your Diet.** Eating a lot of saturated fat and processed sugars increases your risk of both heart disease and diabetes. Conversely, people who eat lots of fresh vegetables, fruits, whole grains, nuts and healthy fats—from fish, for example—appear to be protected from heart disease. For more information on diet and nutrition, click here.

- **Get Active.** Exercise strengthens your heart, reduces blood pressure, improves cholesterol and enhances your mood. For more information on exercise, click here.

- **Reduce Stress.** Chronic stress can increase your blood pressure and raise stress hormones. Click here to learn more about keeping stress levels in check.

- **Consider Medication.** When lifestyle changes don’t do the trick—or aren’t enough to bring your lipid levels under control—a number of drugs can improve cholesterol and triglycerides.

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