

We're taking care of you



A Helpful Guide to HIV and Metabolic Complications



U.S. DEPARTMENT OF HEALTH
AND HUMAN SERVICES
National Institutes of Health

National Institute of Allergy
and Infectious Diseases



PARTNERSHIP
FOR ACCESS TO
CLINICAL TRIALS

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Introduction





Introduction

How Can This Book Help Me?

This book is written for people who have human immunodeficiency virus (HIV) and are at risk for developing **metabolic complications** that could lead to **heart disease**. We have included a definition of terms, or glossary, in the back of this book to help you become more familiar with all of the medical words that you will come across. The terms that are included in the glossary will appear in **bold** the first time they appear in the book.

You will learn about metabolic complications, which are illnesses such as **diabetes**, **hyperlipidemia**, and **lipodystrophy**. These illnesses have to do with your blood sugar or how you process and store fats in your body.

Specifically, you will learn about:

- How these conditions relate to heart disease
- What you can do to lower your risk of developing metabolic complications and heart disease
- Testing and treatment options for metabolic complications
- How metabolic complications may influence your antiretroviral therapy

While this book provides helpful information, it may not answer all of your questions about the metabolic complications of HIV treatment. You should visit your doctor regularly and talk with others on your health care team (nurse, case manager, outreach worker) about treatment options as your needs change and as new research uncovers other treatment options. In addition, there are many groups, hotlines, Web sites, and other helpful resources that you can use to learn more about metabolic complications – often at low or no cost. Please see Resources and Additional Information, beginning on page 29, for a more complete listing.

What metabolic complications are associated with HIV treatment?

The use of highly active **antiretroviral therapy** (HAART) has increased in recent years, leading to an extended survival rate and significant reductions in infections.

However, drug reactions associated with long-term use of HAART include metabolic complications such as:

- Lipid abnormalities such as hyperlipidemia (too much fat in your blood)
- Lipodystrophy (abnormal body fat distribution)
- **Hyperglycemia**
- Diabetes
- **Lactic acidosis**
- **Decreased bone mineral density**

The long-term impact of these complications is unknown, but they can affect your daily life and pose a threat to your cardiovascular health. While the metabolic complications of HAART have been shown to increase the risk of developing heart disease, this risk is considerably less than the risk of heart disease associated with smoking, for example. Studies have also shown that the benefits of HAART far outweigh the risks – and there are steps you can take to decrease any potential metabolic complications.

This book will focus on metabolic complications of HAART involving diabetes, lipids, and body fat as they relate to cardiovascular disease. We will explain each potential complication and provide you with information so that you can talk to your health care provider and take steps that could benefit the health of your heart.

Why is a healthy heart so important?

Heart disease is the number one cause of death and disability in the United States and most European countries. By the time heart problems are detected, the underlying cause is usually quite advanced, having progressed for decades. That's why it's important to prevent heart disease with healthy lifestyle choices, such as healthy eating, exercise, and not smoking.

What is cardiovascular disease?

Cardiovascular disease refers to the types of diseases that involve the heart and/or blood vessels (arteries and veins). While the term technically refers to any disease that affects the **cardiovascular system**, it is usually used to refer to those related to **atherosclerosis** (arterial disease) – a "hardening" of the arteries. It is dangerous because it can lead to **heart attack** or **stroke**. Cardiovascular disease is usually treated by doctors known as internists, cardiologists, thoracic surgeons, vascular surgeons, neurologists, and interventional radiologists, depending on the part of the body being treated.

In addition to the possibility of HAART contributing to the risk of heart disease, there are risk factors that may make it more likely for you to develop heart disease:

RISK FACTOR	RESULT
Age	Your risk for heart disease increases as you get older
Diabetes	If you have diabetes, you are at a greater risk for heart disease
Exercise	If you do not exercise, you are at a greater risk for developing heart disease
Gender	Normally, men under the age of 64 are more likely to develop serious heart disease than are women; however, this difference declines as you get older and heart disease is the number one health problem for women as well as men in industrialized countries
Genetics	If you have a family history* of heart disease, you are at a greater risk for developing it too
High blood pressure	The higher your blood pressure, the harder your heart has to work to pump your blood
High cholesterol and abnormal lipid profiles	Increased cholesterol in your blood can build up in your arteries, leaving less space for your blood to pass through
Obesity	The higher the amount of unhealthy weight your body has to carry, the harder your heart has to work
Smoking	Smoking increases blood pressure, decreases the amount of time you are able to exercise, and increases the tendency for blood to clot (which makes it more difficult for it to flow properly)
Stress and depression	Stress may affect your blood pressure and cholesterol levels, and when you are stressed you may be more likely to smoke, exercise less, and overeat

* "Family history" is defined as any members of your immediate family (mother, father, sisters, brothers) having developed coronary heart disease (angina or heart attack) at a young age (females under 65 and males under 55).

How can I prevent **Heart Disease?**

Some risk factors cannot be changed, such as your family history, age, and gender. But here are some positive changes you may be able to make:

- **Quit smoking. It's one of the most effective ways to decrease your risk of developing heart disease.**
- **Maintain a healthy, low fat diet, and exercise for just 30 minutes a day most days of the week. These simple lifestyle changes can improve your cholesterol levels and increase the health of your heart.**
- **Keep your total cholesterol under 150. This is a powerful way to decrease your risk of developing heart disease.**

Diabetes





Diabetes

If you have diabetes, your body is either not producing or not using **insulin** as effectively as it should. Insulin is a **hormone** produced by one of your internal organs called the pancreas. Insulin signals the body to take up and store **glucose** as energy. When you have diabetes, glucose builds up in your blood stream and, if left untreated, this glucose can damage your heart, kidneys, nerves, and eyes. High blood sugar, or hyperglycemia, may be one of the first warning signs that you may be developing diabetes.

There are two main forms of diabetes – type 1 and type 2. Type 1 diabetes is usually found in children and young adults and is an **autoimmune disease** that causes the body's immune system to attack the insulin-producing cells in your pancreas. Type 2 diabetes is much more common and is usually diagnosed in adults over the age of 30. However, because childhood obesity is increasing, more children are being diagnosed with type 2 diabetes. If you have type 2 diabetes, your body may be able to produce the right amount of insulin, but not use it effectively. Eventually, your body may stop being able to produce the right amount of insulin and your blood sugar will become high.

Studies have shown that HIV-infected patients taking HAART may be at risk for type 2 diabetes. Antiretroviral medications may interfere with the body's ability to store and/or process blood sugar and are associated with the development of insulin resistance. If you are also infected with **hepatitis C**, then the risk of developing type 2 diabetes is greater. If you have a family history of diabetes, this also places you at risk. Luckily, type 2 diabetes can be treated with diet, exercise, and medication. However, if it is not treated, it can lead to more serious complications such as heart disease.

The symptoms of diabetes can include:

- Blurred vision
- Being thirsty all or most of the time
- Flu-like symptoms including excessive fatigue (you may feel tired because the glucose is not being converted into energy)
- Increased urination (because the body is trying to get rid of excess glucose in the urine)
- Unexplained weight loss or gain
- Tingling or numbness in hands and feet (this can be caused by nerve damage)

The complications of diabetes can include:

- Decreased or loss of vision
- Kidney disease
- Poor wound healing
- Decreased sensation and blood flow in the extremities
- Heart and blood vessel disease
- Stroke

If you have any of these symptoms – or if you are overweight or have a family history of type 2 diabetes – you should talk to your doctor about being tested for diabetes before starting any new HIV medications.

Doctors can diagnose type 2 diabetes after listening to you describe your symptoms, conducting a physical examination, and performing tests such as a blood glucose test, an Oral Glucose Tolerance Test (OGTT), and random urine tests. Your doctor also may perform a liver function test, which can assess the presence of liver damage – a possible factor in HIV-related diabetes.

Common diabetes tests

Plasma glucose test

This test measures the amount of sugar in your plasma, which is the fluid part of your blood. The best way to test for diabetes is with a fasting plasma glucose test, but your doctor also may take random samples of your plasma. If you are getting a fasting plasma glucose test, you will not be able to eat for 8 hours before your test. If your fasting glucose level is greater than 126 mg/dl or your random glucose levels are greater than 200 mg/dl, this is consistent with a diagnosis of type 2 diabetes.

Oral Glucose Tolerance Test (OGTT)

This is a test to see how well your body can process sugar. You would be asked to go to your doctor's office after 8 hours of fasting and then given something sweet to drink. Your blood glucose level is checked before the drink and then 1 to 3 hours after the drink. The test typically lasts 2 hours. If your blood glucose is over 200 mg/dl at 2 hours, this is consistent with a diagnosis of type 2 diabetes.

Random urine test

This test checks to see if glucose, protein, and ketones are in your urine. This is a simple test in which your doctor will put a "dipstick" into a cup of your urine. If glucose, protein, or ketones are present, the dipstick indicator strip will change color. If the strip does change color, then you may need to have further tests done to see if you may have diabetes.

What can I do?

In many cases, type 2 diabetes can be controlled by simple lifestyle changes including diet and exercise. A healthy diet – low in saturated fat, sugar, and salt; high in fiber, vegetables, and fruit – is very important in managing type 2 diabetes. **Carbohydrates** should be spread throughout the day to prevent high blood sugar levels after a meal. Also, exercising just half an hour most days of the week can help your body use insulin more effectively.

If diet and exercise alone are not enough to manage your type 2 diabetes, your doctor may prescribe medications. Your doctor will know the best medication for you based on your current HIV treatments.

Talk with your health care team

If you feel you are at risk for developing diabetes, you should talk with your doctor or health care provider about possible testing.



Questions to Ask Your Doctor

- **Does my HAART put me at risk for developing type 2 diabetes?**
- **Does my family history put me at risk for developing type 2 diabetes?**
- **Do I have any other risk factors for developing type 2 diabetes?**
- **What steps can I take in my daily life to decrease my risk of developing type 2 diabetes?**
- **When should I have a test for diabetes?**

Lipid Abnormalities





Lipid Abnormalities

The most common lipid abnormality associated with HAART is hyperlipidemia – an increase in the amount of fat, such as **cholesterol** and **triglycerides**, in your blood. If untreated, this increase in fat can lead to heart disease and **pancreatitis**. Studies have shown that some **protease inhibitors** (PIs) such as ritonavir, lopinavir, and nelfinavir, can raise blood lipid (fat) levels, having a negative effect on triglycerides, total cholesterol, and **low-density lipoprotein (LDL) cholesterol levels**. Also, efavirenz, a non-protease inhibitor drug, has been shown to raise certain blood lipid levels. Remember, the benefits of HAART have been shown to greatly outweigh the risks, but you still need to be aware of the health of your heart.

Factors that can increase your risk of developing hyperlipidemia include:

- Alcohol use
- Family history
- Diabetes
- A high-fat, high-carbohydrate diet
- Lack of exercise
- **Hypertension** (high blood pressure)
- **Hypothyroidism**
- Obesity
- Smoking

Unlike diabetes, hyperlipidemia has no symptoms. The only way your doctor will know if you develop hyperlipidemia is through laboratory tests. When you begin HAART, your doctor should conduct a **lipid profile** to determine your baseline lipid levels. Your doctor should then monitor your lipid levels at least once a year or after any changes in your HAART regimen.

What can I do?

You can take simple steps in your daily life to control your cholesterol and triglyceride levels.

For example, you could:

- Switch to or maintain a low-fat diet (particularly low in saturated fat) to control your weight; low-fat diets have more fresh fruits, vegetables, and whole grains and less animal fat, butter, margarine, mayonnaise, and fried foods, for example
- Begin an exercise routine – exercising just 30 minutes most days of the week can greatly increase the health of your heart
- Quit smoking and limit how much alcohol you drink¹

If lifestyle changes are not enough, you and your doctor may decide to use medication to lower your cholesterol and triglyceride levels. The most common medications for treating high cholesterol are a group of drugs called “statins.” The statins form a class of **hypolipidemic** agents used to lower cholesterol levels in people who have or are at risk for developing heart disease. Because there is a risk of drug interaction between statins and your HAART, your doctor will help you choose the medication that works best with your HIV treatment.

Triglyceride levels can often be improved with dietary changes alone. However, many patients who have high levels of triglycerides will need to take medication. If you have high triglyceride levels without high cholesterol, your doctor may recommend taking medication called a fibric acid derivation. Fibric acid derivatives, or fibrates, work by reducing the production of triglycerides and increasing **high-density lipoprotein (HDL)** cholesterol (the good cholesterol). They also reduce LDL levels (the bad cholesterol). If you experience high triglycerides and high cholesterol, your doctor may recommend taking a statin or fibrate. Again, your doctor will know the best medication for you based on your HIV treatment.

¹ Refer to the “Resources and Additional Information” section, beginning on page 29, to identify help and support groups in your area.

If your hyperlipidemia is severe, not improving with these approaches, or thought to be related to your antiretroviral medication, you and your doctor may decide to change your HAART. If possible, you may be able to change your medications in a way that improves your cholesterol without decreasing the effectiveness of your HIV treatment.

Talk with your health care team

A healthy heart can make you feel better, reduce your need for emergency treatment, save you money, and help give you peace of mind. A good first step would be to talk with your doctor or health care provider about hyperlipidemia. Ask about your baseline lipid levels and tell your doctor that you would like to make healthy lifestyle changes to decrease the possibility of developing heart disease.



Questions to Ask Your Doctor

- **Do I have high levels of cholesterol or triglycerides?**
- **What lifestyle changes should I make to maintain a healthy heart?**
- **Can you recommend a dietician that will speak with me about a heart-healthy diet?**
- **Can you recommend an exercise program that is right for me?**
- **Can you recommend a smoking cessation program that is right for me?**
- **Would you explain the possible impact of my HAART medications on the health of my heart?**

My Notes and Questions Throughout Treatment

Use this space to write down any questions that you have while reading this book or undergoing your treatments. Be sure to take this book with you to your medical appointments to get answers to these questions.

A series of 12 horizontal light green bars, stacked vertically, providing space for writing notes and questions.

Body Fat Complications





Body Fat Complications

The most common body fat complication associated with HIV treatment is called lipodystrophy, or changes in fat distribution. Lipodystrophy is a disturbance in the way your body produces, uses, and stores fat. You can either lose fat from particular areas of your body – called lipoatrophy – or accumulate fat in certain areas – called increased adiposity. Studies suggest that lipodystrophy is associated with taking antiretroviral medications.

The most common areas where fat is lost are:

- Face – your cheeks, temples, and eyes may appear sunken
- Arms and legs – your veins may become more visible; this is called “roping”
- Buttocks

The most common areas where fat accumulates are:

- The back of your neck and your upper shoulders – often described as “buffalo hump”
- Abdomen – also called “protease paunch” or “Crixivan potbelly”
- Breasts – in both men and women
- Different parts of your body may develop fatty growths called **lipomas**

In addition to taking NRTIs and PIs at the same time, there are some other risk factors for developing lipodystrophy. They include:

- Age – older people are at a higher risk
- Race – Whites have the highest risk
- Gender – men are more likely to experience fat loss in their arms and legs, while women tend to have an increase in abdominal and breast fat
- Length and severity of HIV infection – the longer and more severe your HIV infection, the higher your risk

As with other metabolic complications of HAART, lipodystrophy has been linked to cardiovascular disease – the more severe your lipodystrophy, the greater your risk for heart disease. Lipodystrophy has also been linked to diabetes.

Tests for lipodystrophy

Unlike the symptoms of diabetes and hyperlipidemia, you and your doctor will be able to see the signs of lipodystrophy. Usually, your doctor will diagnose lipodystrophy by examining your body for changes in fat distribution. Your doctor may measure around your arms, thighs, waist, hips, and neck before you begin your HAART and monitor any changes throughout the course of your treatment. **Computed tomography (CT) scanning** and **magnetic resonance imaging (MRI)** are generally considered the most accurate tests for abnormalities in body fat. CT scanning is a medical imaging method that uses two-dimensional x-rays to generate a three-dimensional image inside a certain area of the body. An MRI produces computerized images inside your body tissue by causing the atoms within your body to “stand up and dance” to a certain radio wave frequency. However, neither test is practical for routine monitoring because they are expensive, but they continue to be research tools for studying lipodystrophy.

Other possible tests for measuring body fat include **bioelectrical impedance analysis (BIA)**, **dual energy x-ray absorptiometry (DEXA) scans**, and anthropometric measurements. The use of anthropometric measurement (girth and skinfold thickness) is a quick, easy, and inexpensive way to estimate body composition. For example, using a standard measuring tape, girth and length measurements are taken from specific points on the body. Your health care provider can follow these measurements over time.

What can I do?

Unfortunately, there are no simple lifestyle changes to completely counteract the effects of lipodystrophy on your body. However, a healthy

diet and a daily exercise routine may help to build muscle and reduce fat accumulation. There are currently no clearly effective treatments for lipodystrophy.

Several factors should influence your decision to attempt to reverse its effects:

- The severity of the lipodystrophy
- How much you are bothered by the changes in your body
- How strongly you want to reverse the effects
- If you are uncomfortable with the way your body looks and the fact that it may “broadcast” your HIV diagnosis

Talk with your health care team

If you have visible signs of lipodystrophy, you may feel that your quality of life has decreased. If you are self-conscious about the changes in your body or if you have questions or concerns, you should speak with your doctor or health care provider about lipodystrophy.



Questions to Ask Your Doctor

- **Can changing my antiretroviral therapy help reverse lipodystrophy?**
- **What are my risks of developing lipodystrophy?**
- **If I develop lipodystrophy, what are your recommendations for treatment?**
- **How does lipodystrophy impact my overall health?**

My Notes and Questions (continued)

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Keep Your Heart Healthy



Keep Your Heart Healthy

Keep Your Heart Healthy



Keep Your Heart Healthy

Although some metabolic complications, especially if they are severe, may require you to take medication, there are some easy lifestyle changes you can make to help ensure a healthier heart. The most important things you can do for your heart are to maintain a healthy diet, exercise regularly, and avoid smoking.

Maintain a healthy diet

The American Heart Association recommends eating a variety of nutritious foods from all of the food groups. You should eat more low-calorie, nutrient-rich foods that contain vitamins, minerals, and fiber and less nutrient-poor foods that may fill you up without providing any health benefits. Smart, healthy choices include vegetables, fruits, whole-grain foods, and low-fat dairy products. Fresh fruits and vegetables are high in vitamins, minerals, and fiber – and they are low in calories.

Eating fruits and vegetables can help control your weight, your blood pressure, and your cholesterol. Whole-grain foods are high in fiber and also can help control your cholesterol. They also can make you feel full, which may help you control your weight. Also, studies have shown that eating fish twice a week – oily fish containing **omega-3 fatty acids** such as salmon and trout – may help lower your risk of coronary artery disease.

In addition to eating foods high in vitamins, minerals, and fiber, you should limit the foods you eat that are high in saturated fat, trans fat, cholesterol, and sodium. Be sure to read food labels carefully – the nutrition information listed on the package can help you make healthy choices.

The American Heart Association recommends these healthy eating patterns:

- Choose lean meats and poultry without skin and prepare them without added saturated and trans fat. For example, try making broiled chicken instead of fried chicken and sweet potatoes instead of French fries.
- Select low-fat dairy products such as skim milk or 1% milk, low-fat sour cream, and low-fat cottage cheese.
- Reduce trans fat in your diet by cutting back on food such as store-bought cookies, cakes, crackers, and snack foods containing partially hydrogenated vegetable oils. Check the ingredients for the words "partially hydrogenated" or "shortening" and avoid these foods.
- Cut back on foods that are high in cholesterol. Foods from animals (especially egg yolks, meat, poultry, fish, seafood and whole-milk dairy products) have cholesterol. Foods from plants (fruits, vegetables, grains, nuts and seeds) don't.
- Cut back on beverages and foods with added sugars, such as regular soft drinks, fruit juice, energy drinks, candy, cakes, cookies, and pies. Try to avoid foods containing high fructose corn syrup.
- Choose and prepare foods with little or no salt. Your grocery store probably has a salt substitute that tastes very much like the real thing.
- If you drink alcohol, drink in moderation – that means one drink per day for women and two drinks per day for men.

Get moving

Most of us lead very busy lives and often do not make time to exercise regularly. However, exercising just 30 minutes a day most days of the week is an extremely important step to take for the health of your heart. You don't have to use expensive equipment or go to a gym to get the daily exercise you need – you can incorporate physical activity into your daily life at home, at the office, and at play.



There are plenty of things you can do at home to increase your physical activity even if you don't own exercise equipment.

For example, you can:

- Work in the garden or mow the grass with a push mower
- Go for a walk before breakfast and after dinner – you can start slow with a 10-minute walk and work up to a 30-minute walk
- Walk or bike to the store instead of driving
- Increase your normal walking pace from leisurely to brisk
- Stand up and walk around while talking on the telephone
- Walk your dog
- Park farther away when going to the store
- Wear your sneakers to the mall and do a few extra laps while shopping



If you work sitting down most of the day, there are still things you can do during the workday to increase your physical activity.

You can:

- Brainstorm projects and ideas while taking a walk with co-workers
- Stand up while talking on the phone
- Walk to someone's office to speak with them instead of calling them on the phone
- Take the stairs instead of the elevator
- Stay at locations with fitness centers if you travel for work

- Take a jump rope with you when you travel so you can use it in your room
- Participate in recreational sports at your company
- Take walks during your lunch break – schedule and treat them like any other important appointments
- Get off the bus or subway a few stops early and walk the rest of the way
- Park farther away from work



Exercise can be fun. You can get in shape while having a good time.

For example:

- Take family trips that include physical activities such as hiking or skiing
- See new cities by walking or bicycling
- Set a date with a friend to enjoy activities such as tennis, swimming, or dancing
- Listen to your favorite music while exercising
- Take dancing lessons
- Join a recreational club
- Go bowling instead of to the movies
- Bike to your friend's house instead of driving



Quit smoking

According to the American Heart Association, almost one-fifth of deaths from heart disease are caused by smoking. Cigarette smoking puts you at such high risk for heart disease that the Surgeon General has called it “the leading preventable cause of disease and deaths in the United States.” Cigarette smoking is the single most important risk factor for

How much
can you save
if you don't
buy cigarettes
every day?

heart disease in young men and women. When paired with other risk factors, it greatly increases your overall risk. Smoking cigarettes can increase your blood pressure, decrease your tolerance for exercise, increase the tendency for your blood to clot, and decrease your HDL (good) cholesterol. All of these factors increase your risk of developing heart disease.

Even if you have been smoking for a long time, your risk of developing heart disease decreases as soon as you quit. Over time, it will be like you never smoked at all. Although quitting will be tough, it is a very important step for you to take to protect your heart. Luckily, there are many resources available to help you quit smoking. You should talk with your doctor to help make a “quit plan” or to find out about medications proven to be useful in helping people to quit smoking.



The American Heart Association recommends following these steps to quit smoking:

STEP

- List the reasons why you should quit and read them several times a day
- Wrap your cigarette pack with paper and rubber bands; each time you smoke, write down the time of day, how you feel, and how important that cigarette is to you on a scale of one to five

STEP

- Keep reading your list of reasons to quit and add to it
- Do not carry matches or a lighter and keep your cigarettes out of easy reach
- Try to smoke fewer cigarettes each day and try not to smoke the ones that are most important

STEP

- Do not buy a new pack until you've finished the one you are currently smoking
- Change brands twice during the week, decreasing the amount of tar each time
- Try to stop for 48 hours in a row

STEP

- Stop smoking completely
- Get rid of all your smoking-related items such as ashtrays and lighters
 - Avoid situations that will cause you to want to smoke
 - Use healthy substitutes for cigarettes such as sugar-free gum, or carrot and celery sticks
 - Do deep breathing exercises when you get the urge to smoke

Next Steps





Next Steps

Now that you know a little more about metabolic complications that could lead to heart disease, what steps can you take to keep your heart as healthy as possible?

Know your risk for heart disease

Your HAART therapy may increase your risk for heart disease, but it's still a good idea to know about all of your major risk factors. Some risk factors can't be changed, while others can be modified, treated, or controlled.

Major risk factors that can't be changed

- Increasing age
- Male sex (gender)
- Heredity (including race)

Major risk factors you can modify, treat, or control by changing your lifestyle or taking medicine

- Tobacco smoke
- High cholesterol
- High blood pressure
- Physical inactivity
- Obesity and overweight
- Diabetes

Other factors that may contribute to heart disease risk

- Stress
- Alcohol

Source: American Heart Association

Get screened

Your health care provider will probably check your weight and blood pressure at your routine physical. However, because you are taking HAART, you should also ask your provider for a screening assessment to take a closer look at all of your risk factors for heart disease.

Your screening assessment should include:

- Family history
- Smoking status
- Diet
- Level of alcohol intake
- Level of physical activity
- Blood pressure
- Weight
- Waist circumference
- Pulse
- Cholesterol
- Blood glucose (sugar)



Be sure to keep in touch with your health care team

Your health care team knows what strategies will work best with your HAART and your body. If you have any questions or concerns about your health and the health of your heart, speak with your health care provider directly. Your team is there for you, so don't be afraid to ask for help. It's up to you to take control of your health.

It's important to keep taking your HAART medication—don't stop taking your medication without talking with your doctor or health care provider first.

Let your health care provider know if:

- You experience side effects from your HAART medications. Because there are many different kinds of HAART—and each has its own side effects—you should check the drug label and ask about side effects and warnings
- Your side effects disappear—or if a symptom changes or comes back
- Your use of alcohol or other non-prescribed drugs increases
- You are planning to change your diet
- You are planning to begin an exercise program
- You are planning to quit smoking

Consider joining a clinical trial

In addition to answering your questions, your providers also will have access to valuable resources such as clinical trial information and the latest health information.

All drugs that are currently available have been studied in clinical trials, because that's the only way to find out if a drug works well. Clinical trials are studies that look at how well the drug is going to work in people like you. Clinical trials give you the chance to receive new, potentially effective medical treatments. They don't cost you anything and still involve visits to your regular doctor. If you develop metabolic complications from your HAART, you may be eligible for a clinical trial.

There are a number of clinical trials currently under way and many specialists in different fields work together on these studies. You should discuss this option with your doctor to see if you are eligible to participate in any ongoing studies in the treatment of your disease.

For more information on clinical trials, see the Resources and Additional Information section beginning on page 29.

In Closing

We hope that this booklet has helped to answer some of your questions about metabolic complications associated with HIV—such as diabetes, hyperlipidemia, and lipodystrophy—that may lead to heart disease. Our aim is to provide you with a good reference tool that can help you make more informed decisions about your medical treatment.

Researchers continue to pursue new treatment options—and your health needs may change over time—so once again we encourage you to bring your questions and concerns to your doctor and health care team for discussion.

Resources and Additional Information





Resources and Additional Information

Clinical Trials

To find out more about clinical trials in your area for which you might qualify:

- Talk with your health care provider
- Contact the NIH (National Institutes of Health) Patient Recruitment and Public Liaison Office at 1-800-411-1222
- Review NIAD's HIV and Emerging Infectious Diseases Program information at www.niaid.nih.gov/clinicalstudies/HIVandInfectious
- View the listing of current clinical trials seeking patient volunteers at www.clinicaltrials.gov and www.CenterWatch.com

Smoking Cessation

Smokefree.gov

Telephone: 1-800-QUITNOW (1-800-784-8669)

<http://smokefree.gov>

[National Network of Tobacco Cessation Quitlines](http://NationalNetworkofTobaccoCessationQuitlines.org)

1-800-QUITNOW (1-800-784-8669) / TTY 1-800-332-8615

http://cancercontrol.cancer.gov/TCRB/national_quitlines.html

[American Cancer Society \(ACS\)](http://AmericanCancerSociety.org)

1-800-ACS-2345 (1-800-227-2345)

<http://www.cancer.org>

[American Lung Association](http://AmericanLungAssociation.org)

1-800-LUNG-USA (1-800-586-4872)

<http://www.lungusa.org>

American Legacy Foundation's Great Start
Quitline for Pregnant Smokers
1-866-START (1-866-667-8278)
<http://www.americanlegacy.org/greatstart/>

More Information Sources

AIDSInfo

P.O. Box 6303
Rockville, MD 20849-6421
Telephone: 1-800-HIV-0440 (1-800-448-0440)
<http://www.aidsinfo.nih.gov>

American Diabetes Association

1701 North Beauregard Street
Alexandria, VA 22311
Telephone: 1-800-DIABETES (1-800-342-2383)
<http://www.diabetes.org>

American Dietetic Association

Washington, D.C. Office
1120 Connecticut Avenue, NW
Suite 480
Washington, DC 20036
Telephone: 1-800-877-0877
<http://www.eatright.org>

American Heart Association

Greater Washington Region
4301 North Fairfax Dr., Suite 530
Arlington, VA 22203
Telephone: 703-941-8500 or 1-800-242-8721
<http://www.americanheart.org>

American Lung Association of the District of Columbia
530 7th Street, SE
Washington, DC 20003
Telephone: 202-546-5864
<http://www.aladc.org>

National AIDS Treatment Advocacy Project (NATAP)
580 Broadway, Suite 1010
New York, NY 10012
Telephone: 1-888-26-NATAP (1-888-266-2827) or
212-219-0106
<http://www.natap.org>

NHLBI (National Heart, Lung, and Blood Institute)
NHLBI Health Information Center
P.O. Box 30105
Bethesda, MD 20824-0105
Telephone: 301-592-8573
<http://www.nhlbi.nih.gov>

NIAID (National Institute of Allergy and
Infectious Disease)
Office of Communications and Public Liaison
6610 Rockledge Drive, MSC 6612
Bethesda, MD 20892-6612
Telephone: 1-866-284-4107
<http://www.niaid.nih.gov>

NIDDK (National Institute of Diabetes & Digestive
& Kidney Disorders)

Office of Communications & Public Liaison

NIDDK, NIH

Building 31, Room 9A06

31 Center Drive, MSC 2560

Telephone: 301-496-3583

Bethesda, MD 20892-2560

<http://www.niddk.nih.gov>

NIH (National Institutes of Health)

9000 Rockville Pike

Bethesda, MD 20892

Telephone: 1-800-448-0440

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Frequently Asked Questions (FAQs)





Frequently Asked Questions (FAQ)

What are metabolic disorders?

Metabolic disorders occur when something interferes with the body's ability to process nutrients. Most metabolic disorders are genetic, but some can be acquired. For example, the use of highly active antiretroviral therapy (HAART) can, in some people, increase the risk for metabolic complications such as diabetes, hyperlipidemia, and lipodystrophy.

Can my HIV medication give me diabetes?

Studies have shown that HIV patients taking HAART may be at a greater risk for type 2 diabetes because the medication may interfere with the body's ability to absorb blood sugar. Type 2 diabetes can be treated with diet, exercise, and medication. More serious complications, such as heart disease, can result if type 2 diabetes is not treated.

What are lipids and what do they have to do with my HIV medication?

Lipids are the fat—such as cholesterol and triglycerides—in your blood. Some HIV patients taking HAART may experience an increase in their blood's lipid levels. Although the benefits of HAART have been shown to greatly outweigh the risks, you still need to be aware of this risk and have your lipid levels monitored at least once a year.

My doctor tells me that some of my labs are abnormal, especially the ones measuring sugar and fat levels. What causes this? Is it harmful?

Changes in your sugar and fat levels can be linked to drug reactions associated with long-term use of HAART. The long-term impact of these complications is unknown, but they can affect your daily life and pose a threat to your cardiovascular health. While the metabolic complications (including changes in your sugar and fat levels) have been shown to increase the risk of developing heart disease, studies have shown that the benefits of HAART far outweigh the risks.

What can I do to help keep my heart healthy?

You can make simple lifestyle changes that can greatly decrease the risk of heart disease and other complications associated with an increase in sugar and fat levels. These changes include:

- Quitting smoking
- Maintaining a healthy, low-fat diet
- Exercising for just 30 minutes a day
- Limiting the amount of alcohol you drink

I look different since I started HIV medication. Are the medications responsible for my change in appearance?

You may notice that parts of your body look like they have lost or gained weight. The most common areas where fat is lost include your face, arms, legs, and buttocks. The most common areas where fat accumulates include the back of your neck, upper shoulders, abdomen, and breasts. This change in fat distribution is called lipodystrophy. Studies suggest that lipodystrophy is associated with taking antiretroviral medications.

What can I do about these changes?

Unfortunately, there are no simple lifestyle changes to completely counteract the effects of lipodystrophy on your body. However, a healthy diet and a daily exercise routine may help to build muscle and reduce fat accumulation.

Are these changes reversible?

There are currently no clearly effective treatments for lipodystrophy. In some cases, plastic surgery can be performed to lessen the signs of your lipodystrophy. However, this surgery can be expensive and may not be covered by your insurance.

Do I need to stop or switch my HAART because of these changes?

If you have visible signs of lipodystrophy, you may feel that your quality of life has decreased. If you are self-conscious about the changes in your body or if you have questions or concerns about your HAART, you should speak with your doctor.

Some possible questions to ask your doctor include:

- Can changing my antiretroviral therapy help reverse lipodystrophy?
- What are my risks of developing lipodystrophy?
- What are your recommendations for treating lipodystrophy?
- How does lipodystrophy impact my overall health?

This is a lot of information. Is there someone I can talk with who will walk me through it?

You may want to start with AIDSinfo, an organization that offers on HIV/AIDS treatment, prevention, and research. Their toll-free number is 1-800-448-0440 or you can visit them online at <http://aidsinfo.nih.gov>. There is also a list of other organizations and resources in this booklet, starting on page 29.

My Notes and Questions (continued)

A series of 14 horizontal light blue bars, stacked vertically, providing space for writing notes and questions. Each bar is uniform in color and width, and they are separated by small gaps.

Glossary

(Definition of Terms)





Glossary (Definition of Terms)

Antiretroviral therapy	A combination of drugs that inhibit the replication of HIV, delay immune deterioration, and improve survival and quality of life.
Atherosclerosis	A disease affecting arterial blood vessels (blood vessels that carry oxygen-rich blood to your body) that is caused by the formation of fatty deposits (plaques) in the arteries – it is commonly referred to as a "hardening" of the arteries.
Autoimmune disease	A disease in which the body puts out an immune response to attack its own cells.
Bioelectrical impedance analysis	A commonly used process for estimating body composition by showing the ability of an electrical current to move through body tissues, which provides an estimate of total body water (TBW). TBW can be used to estimate fat-free body mass and body fat.
Carbohydrates	Sugars and starches that the body breaks down into glucose and uses for energy.
Cardiovascular system (or circulatory system)	The organ system that moves substances to and from cells; a network including the heart, lungs, and blood vessels that supplies nutrients and oxygen to the body.

<p>Cholesterol</p>	<p>A waxy, odorless substance made by the liver that is an essential part of cell walls and nerves. Cholesterol plays an important part in many of the body's processes, but is best known for its association with cardiovascular disease. Cholesterol comes from two sources: your body and food. Some foods that may contribute to high cholesterol levels include eggs, shellfish, and saturated animal fat.</p>
<p>Clinical trial</p>	<p>A research study that evaluates new drugs, medical devices, or other medical interventions on patients in a scientifically controlled setting.</p>
<p>Computed tomography (CT) scan</p>	<p>A medical imaging method that makes a three-dimensional image of the inside of objects (such as bone and organs) from a large series of two-dimensional x-ray images.</p>
<p>Decreased bone mineral density</p>	<p>Occurs when minerals are taken away from your bones and they become lighter and less dense, which makes them weaker and increases their risk of fracture.</p>
<p>Diabetes (or diabetes mellitus)</p>	<p>A metabolic disorder characterized by hyperglycemia (high glucose or blood sugar), among other signs. Type 1 diabetes is an autoimmune disease in which the body's immune system attacks the insulin-producing beta cells in the pancreas and destroys them.</p>

Diabetes (Cont.)

The pancreas then produces little or no insulin. A person who has type 1 diabetes must take insulin daily to live. Type 2 diabetes is the most common type and is associated with HAART. When type 2 diabetes is diagnosed, the pancreas is usually producing enough insulin, but for unknown reasons, the body cannot use the insulin effectively – a condition called insulin resistance. After several years, insulin production decreases. The result is similar for type 1 diabetes – glucose builds up in the blood and the body cannot make efficient use of it.

Dual energy x-ray absorptiometry (DEXA) scan

A test that uses two different low-dose x-ray beams to estimate the bone density of your spine and hip. This test can also measure your body fat.

Glucose

A simple sugar found in the blood – your body's main source of energy.

Heart attack

Occurs when the blood supply to a part of the heart is interrupted and the resulting oxygen shortage causes damage and potential death of heart tissue. It is a medical emergency and the leading cause of death for both men and women all over the world.

Heart disease
(or cardiovascular disease)

Refers to diseases that involve the heart and/or blood vessels (arteries and veins). Usually, the term "heart disease" relates to coronary artery disease – a "hardening" of the arteries that supply blood to the heart. Over 71.3 million Americans have cardiovascular problems. It is the number one cause of death and disability in the United States and most European countries. You can decrease your chances of developing heart disease by eating healthy, exercising, and not smoking.

Hepatitis C

An infectious, viral disease caused by a virus called Hepatitis C virus (HCV) – the infection can cause liver inflammation that often has no symptoms, but can result later in cirrhosis (scarring of the liver) and liver cancer.

High-density lipoprotein cholesterol (HDL-C)

Lipoproteins of different density that carry cholesterol to and from the body's tissues and the liver. It is thought that HDL-C removes cholesterol from arteries and transports it back to the liver – the main reason why HDL-C is sometimes called "good cholesterol." A high level of HDL-C seems to protect against cardiovascular diseases, and low HDL-C levels increase the risk for heart disease.

Hormone

A product of cells that circulates in the blood and acts as a messenger between cells or groups of cells.

<p>Hyperglycemia (high blood sugar)</p>	<p>A condition in which an excessive amount of glucose (blood sugar) circulates in the bloodstream. It is one of the classic signs of diabetes.</p>
<p>Hyperlipidemia</p>	<p>An increase in the amount of fat, such as cholesterol and triglycerides, in your blood.</p>
<p>Hypertension (high blood pressure)</p>	<p>A medical condition where the blood pressure is elevated most of the time.</p>
<p>Hypolipidemic agents</p>	<p>Drugs that lower total cholesterol and triglycerides, and/or increase HDL (good cholesterol).</p>
<p>Hypothyroidism</p>	<p>Caused by insufficient production of thyroid hormone by the thyroid gland.</p>
<p>Insulin</p>	<p>A hormone that regulates the way your body breaks down and uses carbohydrates and helps the body use glucose for energy.</p>
<p>Lactic acidosis</p>	<p>Caused by the buildup of lactic acid in the body. Cells produce lactic acid when they use glucose for energy if there is not enough oxygen. The signs of lactic acidosis are deep and rapid breathing, vomiting, and abdominal pain. Some anti-HIV drugs (antiretrovirals) may increase the risk of developing lactic acidosis.</p>

Lipid profile

A blood test that measures lipids in the bloodstream. Lipids include cholesterol, triglycerides, high-density lipoprotein (HDL), and low-density lipoprotein (LDL) cholesterol.

Lipodystrophy

A medical condition characterized by abnormal distribution of the body's fat ("Lipo" means "fat" and "dystrophy" means "abnormal or degenerative condition"). The term "lipoatrophy" is used when describing the loss of fat from one area (usually the face) and "hyperadiposity" is used to describe fat accumulation.

Lipoma

A common, benign (not life-threatening) tumor composed of fatty tissue. Lipomas are soft to the touch, sometimes movable, and generally painless. They grow very slowly and have not been found to become cancerous.

Low-density lipoprotein (LDL) cholesterol

Lipoproteins that carry fatty acid molecules in the blood and around the body. It is commonly referred to as bad cholesterol because high LDL levels can lead to cardiovascular disease.

Magnetic resonance imaging (MRI)

A non-invasive method used to make images of the inside of an object. MRIs do not use any radiation, but instead use strong magnets to make your body's atoms "stand up and dance."

Metabolic complications	Metabolism occurs when chemical compounds in your body are changed so that nutrients can be processed correctly. Complications occur when something interferes with this process.
Omega-3 fatty acids	Benefit the heart of healthy people and those who have heart disease or are at risk of getting heart disease.
Pancreatitis	Inflammation of the pancreas.
Protease inhibitor Pancreatitis	A class of medication used to treat or prevent infection by viruses, such as HIV and Hepatitis C.
Stroke	A serious brain injury in which the blood supply to a part of the brain is interrupted. Stroke is a medical emergency and can cause permanent brain damage or even death if not diagnosed and treated right away. It is the third leading cause of death and the leading cause of adult disability in the United States and industrialized European nations.
Triglycerides	Formed from fatty acids as the result of a diet high in fat and sugar.

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