



What is adherence? Adherence means sticking to something. It is often used to describe taking medicine without missing doses for as long as needed. Good adherence helps to maintain—or improve—your health.

This fact sheet is about adherence to hepatitis C treatment. It may be helpful for other medications, whether you are taking them for a short time, or for the rest of your life.

With hepatitis C treatment, the most important thing a person can do to be cured is not to miss taking any of their medication—and to finish all of it.

Knowing how hepatitis C treatment works—instead of just being told to take all of your medication—makes it easier to understand why adherence matters so much.

How does hepatitis C virus (HCV) treatment work? Just like people, viruses do not live forever; they are constantly reproducing. Hepatitis C drugs work by blocking different steps in the virus life cycle; this prevents HCV from making more of itself. Once the virus stops reproducing, it dies off. After both of these things happen, a person is cured.

People need to stay on HCV treatment for a certain amount of time to make sure that drugs can get the job done. Hepatitis C treatment lasts from eight to 24 weeks. (Researchers are looking at even shorter treatment.)

Why is adherence important? For drugs to work, there have to be enough of them in a person's body. If drug levels get too low, the drugs won't work; if they get too high, side effects can be worse.

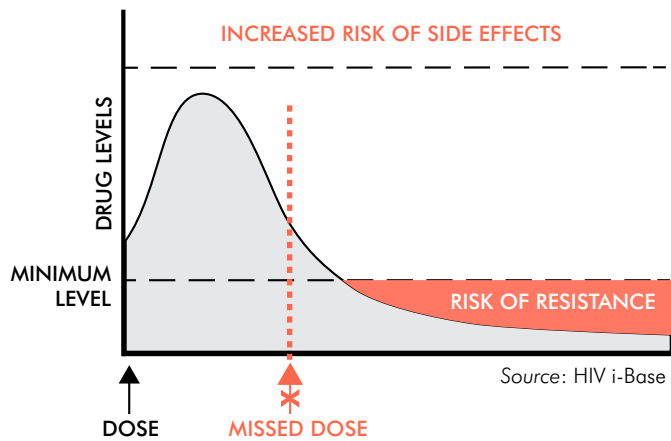
What is drug resistance? Each day, HCV makes billions of copies of itself. Some of these copies are not the same as the original virus. They have changes, called *mutations*. Some mutations are harmless, but others can stop hepatitis C drugs from working (called *drug resistance*).

When people miss doses of their hepatitis C treatment, the virus gets a chance to reproduce. Some of the copies it makes might have mutations that cause drug resistance. Drugs can stop working if changes in the hepatitis C virus make it resistant to the drugs.

Some people have drug resistance even though they have never been on hepatitis C treatment. Many of them have been cured anyway. But most people who are not cured will have resistance to one or more of the hepatitis C drugs they took. Resistance to certain hepatitis C drugs can disappear within months. But resistance to other drugs can last for years and might prevent re-treatment from working.

Why does dosing matter? Some drugs linger in a person's body for weeks, while others pass through it in a few hours. Researchers can see how long drugs stay in a person's body and whether food changes this. They use this information to figure out how often drugs need to be taken. Some drugs need to be taken on an empty stomach. Other drugs need to be taken with food to work. It's a good idea to ask whether this means with a snack or a full meal.

Some HCV drugs need to be taken only once a day. It is important to take them around the same time each day to keep enough of the drug in your system. For HCV drugs that need to be taken twice a day, it is best to take them every 12 hours—or as close to it as possible.



Drug interactions: Some medications should not be used together. Combining them can change drug levels (called *drug-drug interactions*). Higher drug levels can worsen side effects. When drug levels are too low, drugs cannot do their job. Low drug levels put people at risk for drug resistance or not being cured.

Before you start hepatitis C treatment, talk with your health care provider about starting, using, or stopping any medications, supplements, or herbal remedies to avoid drug-drug interactions.

How is adherence measured? In clinical trials, adherence is checked often, usually in more than one way. Methods used in research include:

- taking a blood sample to check medication levels;
- keeping a written record of when medication is taken;
- bringing pill bottles or blister packs to clinic visits for pill counts;
- using pill bottles with caps that track each time bottles were opened (called MEMS);
- using blister packs that track each time a pill is removed—this information can be sent to a smart phone;
- using new pill bottles that light up, buzz, and send text and voice mail messages. These can also track how many times a pill bottle has been opened and shut, and how many pills are left; and
- using edible “smart pills” to see when medication was taken.

“Smart pills” work with a patch that is worn on a person’s torso. Each smart pill has a sensor that becomes activated after it enters the stomach. When the smart pill is activated, it sends a wireless signal to the patch. Then the patch sends information (including when the pill was taken, heart rate, and how active you are) to a mobile app. The smart pills come in regular packaging or in blister packs. Depending on the pharmacy and type of medication a person uses, it may be possible to combine a smart pill with a person’s regular medication. In the future, the technology that goes with smart pills will change.

There are other, less complicated ways to support adherence. Some people leave their medication in a familiar spot (such as the bathroom or by the coffee pot). Others use pillboxes to make sure that they are taking medication at the right time. People also use alarms on their smart phones or mobile applications to support adherence.

What makes adherence difficult? Adherence can be difficult for many reasons. Often people simply forget to take medication or refill their prescriptions. Sometimes people have other reasons for missing their medication, including:

- having side effects from medication—especially if you don’t feel sick;
- feeling better, even though you haven’t finished treatment;
- not wanting to think about why you need to take medication;
- being tired of taking medication every day;
- not wanting other people to know why you are taking medication;
- having to take several different medications, at different times, with or without food;
- loss of or change in employment and insurance;
- difficulty getting prescriptions refilled or delivered;
- money problems;
- responsibilities, including work and childcare;
- being arrested;
- having a busy or chaotic life;
- moving;
- traveling, especially when time zones are different;
- becoming homeless; and
- untreated mental illness.

It’s important not to be too hard on yourself if you forget a dose of your medication—nobody is perfect! Sometimes talking to another person who is going through a similar experience, a health care provider, or a pharmacist can help you with adherence tips and support.



Hepatitis C Virus (HCV) Diagnostics

What is screening? Screening looks to see whether someone might have a disease. For hepatitis C virus (HCV), screening means looking for **antibodies** instead of the virus.

What are antibodies? Antibodies are Y-shaped proteins made by a person’s immune system. They are part of the immune system’s response to viruses, bacteria, and other harmful substances (called **antigens**).

Antibodies attach themselves to antigens or infected cells and tag them so that other immune cells can find and disable them. Antibodies stay in a person’s body long after the antigen that triggered them disappears (this is called **immunological memory**). If the same antigen enters a person’s body again, even years later, the immune system will remember it—and send antibodies to destroy it.

When HCV enters a person’s bloodstream, it triggers an immune response. The immune system makes HCV-fighting antibodies. Sometimes, the immune system gets rid of hepatitis C virus by itself (this is called **spontaneous viral clearance**). About a quarter of people with hepatitis C will spontaneously clear the virus. This is more likely in young people (especially women), people who do not have HIV, and people with the IL28B CC genotype (refer to TAG’s **Hepatitis C and the IL28B Gene** fact sheet).

Even when a person has cleared HCV or been cured by treatment, HCV antibodies remain in a person’s blood for years.

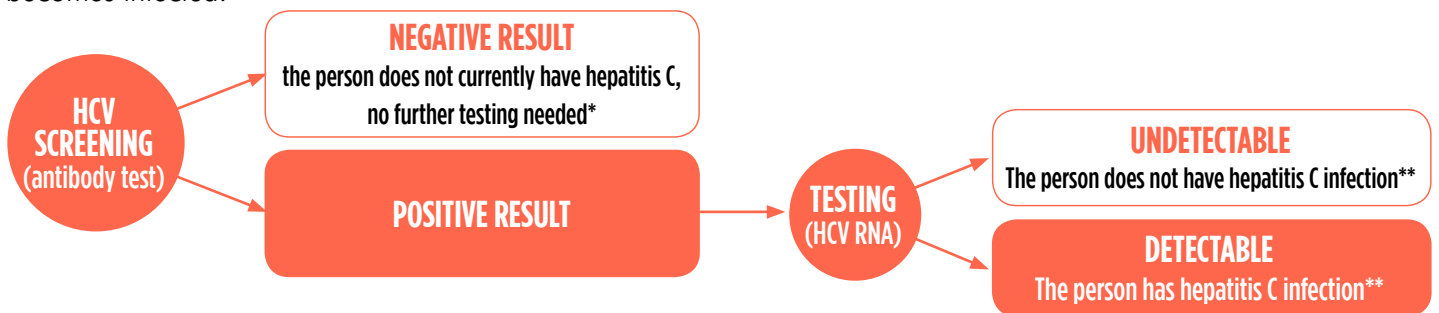
What does a negative HCV antibody test result mean? A negative antibody test result usually means that the person has not been infected with hepatitis C (unless they were infected very recently or have a weakened immune system).

The body needs at least two months (and sometimes up to nine months) to make antibodies. People with weakened immune systems (from an illness or certain medications) are not always able to produce antibodies. This might happen in people with autoimmune disorders (when a person’s immune system attacks his or her own organs or tissues), HIV-positive people with a CD4 cell count below 200 cells/mm^3, and people taking immunosuppressants.

What does a positive HCV antibody test result mean? A positive antibody test result means that a person has been infected with hepatitis C. It does not mean that the person still has hepatitis C. A different test, to look for the actual hepatitis C virus, is needed to make a diagnosis.

What is testing? Testing will confirm—or rule out—whether someone has a disease.

How is a person tested for hepatitis C? A viral-load test (called **HCV RNA**) is used to check for hepatitis C in the bloodstream. Usually, hepatitis C virus can be found in a person’s bloodstream two weeks after he or she becomes infected.



*Except in case of recent risk (within six months) or in people with a weakened immune system

**During the first six months after HCV infection, a person may spontaneously clear the virus; if there was a recent risk, repeat viral-load testing to confirm chronic hepatitis C infection

There are two types of **viral-load tests**: *qualitative* and *quantitative*.

Qualitative testing checks whether there is hepatitis C virus in the bloodstream (detectable or undetectable).

Quantitative testing measures the amount of hepatitis C virus in the bloodstream. These tests are used during and after HCV treatment to see if it is working and whether a person is cured.

HCV Qualitative Testing

WHAT THE RESULT SAYS	Undetectable, the lower limit of detection (LLOD) varies; it can be as low as <5 IU/mL	Detectable, below the lower limit of quantification (LLOQ); the lowest amount of hepatitis C virus that the test can measure	Detectable
WHAT THE RESULT MEANS	No hepatitis C virus was found in the bloodstream (this means that a person either spontaneously cleared HCV or that they were cured)	Hepatitis C was found in the bloodstream, but the amount of the virus was too small for the test to measure	Hepatitis C was found in the bloodstream; the amount of virus is reported in international units per milliliter (IU/mL). A person with a positive antibody test result and detectable HCV RNA has chronic hepatitis C (unless they were recently infected)

HCV Core Antigen Testing

The hepatitis C core antigen is a viral protein. Since the core antigen is part of hepatitis C virus, it can usually be found in the bloodstream two weeks after infection.

Since HCV core antigen testing is simpler and less expensive than viral-load testing, some experts suggest using it in resource-limited settings. Core antigen testing can be used—often with HCV antibody testing—to detect acute HCV or to confirm chronic HCV infection. HCV core antigen testing can also be used to measure treatment outcome. Although it does not detect low levels of HCV (<1,000 IU/mL), usually the hepatitis C viral load is much higher in people who relapse after HCV treatment.

HCV Genotyping

There are at least six known hepatitis C genotypes, numbered in the order that they were discovered. Each genotype has many subtypes, each given a letter in the order that they were discovered. People can be infected with more than one HCV genotype (called **mixed infection**). This is most likely to happen to people who got blood products or blood transfusions many years ago or in a place where the blood supply is not checked for HCV; people on kidney dialysis; or people who inject drugs with shared, unsterilized equipment.

Currently, the type and length of HCV treatment depend on which genotype a person has. Soon, it might be possible to use one HCV regimen for everyone (called **pangenotypic**), making HCV genotyping unnecessary.

Liver Disease Staging

The type and length of HCV treatment sometimes depend on how much liver damage a person has (for example, people with cirrhosis are often given ribavirin and treated longer than people who have less liver damage).

There are different methods to determine how much liver damage a person has (called **staging**). Although noninvasive tests are not always as precise as a liver biopsy, they are safer, less expensive, and easier to perform and undergo. It is becoming more common to use routine blood tests or ultrasound imaging to see whether a person has cirrhosis.

New HCV Diagnostics

Now that HCV treatment is simpler, safer, and more effective, diagnostics need to become simpler and less expensive.

Ideally, HCV will soon be diagnosed with a single rapid point-of-care test and cured with a pangenotypic regimen.



What are genotypes? A genotype is a way to put the hepatitis C virus (HCV) into categories based on similar genes. It's important to know and understand HCV genotypes because different genotypes respond differently to medicines that treat and cure HCV.

HCV has six genotypes, labeled 1 through 6. There are also subtypes labeled with letters, for example, genotypes 1a and 1b. Most people are infected by a single, dominant genotype, but it is possible to have more than one at the same time (called a **mixed infection**).

Why do genotypes matter for treatment? Knowing your HCV genotype is important information that can help patients and doctors find the most effective treatment.

All HCV genotypes cause the same amount of liver damage. However, people infected with genotype 1, particularly subtype 1b, may have a greater chance of developing **cirrhosis**, or severe liver scarring, than other genotypes. Genotypes 1b and 3 may increase the risk of liver cancer.

HCV can now be cured by all oral, direct-acting antivirals (DAAs), medications that prevent the hepatitis C virus from making copies of itself. DAAs do this by sticking to proteins in the virus and blocking steps in the virus' life cycle. This allows your immune system to clear the virus out of your body. How well a DAA works depends on where it sticks to the target proteins in the virus.

Some of the latest DAA treatments are **pangenotypic**, which means they can cure all genotypes at nearly the same rates.

Why do people have different genotypes? A person of any racial or ethnic group can carry any genotype or subtype. However, some may be more prevalent in some racial or ethnic groups than others. In the United States, over 90% of African Americans, compared to 67% of Caucasians, carry genotype 1.

People who travel between regions where different genotypes are more common can be exposed to different HCV genotypes, leading to a **mixed infection**. HCV is transmitted through contact with blood, such as through contaminated blood products or medical equipment, blood transfusions, kidney dialysis, or the sharing of drug injection equipment, such as syringes, or non-injection equipment, such as pipes, spoons, cotton balls, or straws for snorting drugs.

Do genotypes change over time? A virus's genotype usually stays the same. Genetic changes, or **mutations**, can occur at random or in response to the environment. Some mutations are harmless, but others can affect how well a patient responds to treatment. New HCV treatments include more than one drug to prevent drug resistance from happening by targeting more than one step in the virus' life cycle. However, if patients miss treatment doses, this can lead to genetic mutations, which cause resistance to HCV treatment (see TAG's **Adherence** fact sheet).

HARDER TO TREAT GENOTYPE 3

Genotype 3 is the second most common HCV subtype in the world, particularly in Northern Europe, South Asia, and Southeast Asia. It can pose more difficult health problems for people with HCV, including more rapid progression of liver disease, increased rates of **steatosis** (non-alcoholic fatty liver disease), and a higher risk for cancer (hepatocellular carcinoma). Genotype 3 has been associated with unique characteristics, such as how it creates resistance to insulin and how it causes the liver to break down fats, which make it harder to treat with DAAs.

People infected with genotype 3 are the most challenging to treat if they:

- have previously tried treatment (are treatment-experienced)
- have cirrhosis, and
- have **decompensated liver disease**, which is a life-threatening condition leading to liver failure.

Genotype 3 often requires longer treatment and does not achieve strong cure rates. There are lower cure rates in patients with cirrhosis.

What tests are needed for knowing my genotype? When screening for HCV, a patient takes several tests to make a diagnosis (see **HCV Diagnostics** fact sheet).

Once a patient has been diagnosed with HCV, the doctor will run viral load level and genotype tests before starting treatment. Knowing a patient's genotype determines the best treatment regimen.

Genotype tests use blood taken from fingersticks or simple blood draws. A patient might need to return to the doctor's office to confirm whether the infection is chronic or to confirm whether they have been cured of the virus.

Genotypes 1a and 1b may require a patient to take additional blood tests to determine whether the virus has any resistance (see **Adherence** fact sheet).

HCV treatment is now simpler, safer, and more effective, and diagnostics, including HCV genotyping, need to become simpler and less expensive.

The medications are available depending on the payer or what is available in a country or region.

Which treatment works for each genotype?

- All Genotypes: see **Epclusa** fact sheet
- Genotypes 1 through 4: see **Sovaldi, Viekira XR & Technivie, Harvoni, Olysio** fact sheets
- Genotypes 1 or 4: see **Zepatier** fact sheet
- Genotypes 2 or 3: see **Sovaldi, Daklinza** fact sheets
- Genotype 6: see **Harvoni** fact sheets

Ribavirin (RBV) causes birth defects and miscarriage. HCV treatment regimens that include RBV should not be used by pregnant women or by male partners of pregnant women. RBV stays in a person's body for months, so women and their male partners should avoid pregnancy until six months after stopping it (see **Ribavirin** fact sheet).

This fact sheet is current as of December 2016. It is recommended to be read alongside the **Adherence** and **HCV Diagnostics** fact sheets. Always check for updated information.

The goal of hepatitis C virus (HCV) treatment is a cure (when there is no HCV in a person’s bloodstream at least 12 weeks after treatment is finished).

What is Sovaldi? Sovaldi (sofosbuvir) is an HCV-fighting drug that must be used with other drugs. In the United States, Sovaldi is approved for people with hepatitis C genotypes 1, 2, 3, or 4 who are over 18 years old.

How is Sovaldi used? Sovaldi is taken once daily, with or without food, for 12 to 24 weeks. Some people will use Sovaldi with a drug called **ribavirin (RBV)**, which is taken twice daily with food. The type and length of treatment depends on HCV genotype, treatment history, whether a person has cirrhosis, and the other drugs used with it.

Harvoni is a combination of Sovaldi and ledipasvir (see TAG’s **Harvoni** fact sheet for more information).

Sovaldi and Olysio—another HCV-fighting drug—have been approved for use in people over 18 years old who have HCV genotype 1 (see TAG’s **Olysio** fact sheet for more information).

Sovaldi and Daklinza—another HCV-fighting drug—have been approved for use in people over 18 years old who have HCV genotype 3 (see TAG’s **Daklinza** fact sheet for more information).

Hepatitis C treatment is changing quickly. Sovaldi is being studied with, and used in, interferon-free combinations that have not been approved yet.

Sovaldi-Based Treatment Regimens and Cure Rates in HCV Clinical Trials and Real-World Settings*

(Sovaldi has been used with pegylated interferon and ribavirin—or ribavirin alone—but these regimens are no longer recommended for genotype 1)

Genotype 1, never treated for HCV, no cirrhosis	+ Cirrhosis
Sovaldi + Olysio (with or without RBV), 12 weeks: 95% to 97% (in a small trial; real-world: 88% to 92%)	Sovaldi + Olysio (with or without RBV), 24 weeks: 100% (real-world: 75% to 87%) Sovaldi + Olysio, 12 weeks: 88%
Genotype 1, treatment-experienced, no cirrhosis	+ Cirrhosis
Sovaldi + Olysio (with or without RBV), 12 weeks: 95% (real-world: 81% to 87%)	Olysio + Sovaldi, 12 weeks: 79% Sovaldi + Olysio (with or without RBV), 24 weeks: 95% (real-world: 76% to 79%)
Genotype 2, never treated or treatment-experienced (includes people with cirrhosis)	
Sovaldi + RBV, 12 weeks: 88% to 100% (real-world: in people with cirrhosis, 65% [never-treated] and 75% [treatment-experienced]) Sovaldi + RBV, 16 weeks: 87% Sovaldi + RBV, 24 weeks: 100%	
Genotype 3, never treated for HCV, no cirrhosis	+ Cirrhosis
Sovaldi + Daklinza, 12 weeks: 98% Sovaldi + Daklinza + RBV, 12 weeks: 100% Sovaldi + Daklinza + RBV, 18 weeks: 100% Sovaldi + PEG-IFN and RBV, 12 weeks: 96% Sovaldi + RBV, 16 weeks: 83% Sovaldi + RBV, 24 weeks: 90% to 94%	Sovaldi + Daklinza, 12 weeks: 58% Sovaldi + Daklinza + RBV, 12 weeks: 88% Sovaldi + Daklinza + RBV, 16 weeks: 86% Sovaldi + PEG-IFN and RBV, 12 weeks: 91% Sovaldi + RBV, 24 weeks: 82% to 92%
Genotype 3, treatment-experienced, no cirrhosis	+ Cirrhosis
Sovaldi + Daklinza, 12 weeks: 92% Sovaldi + Daklinza + RBV, 12 weeks: 100% Sovaldi + Daklinza + RBV, 18 weeks: 100% Sovaldi + PEG-IFN and RBV, 12 weeks: 94% Sovaldi + RBV, 24 weeks: 87%	Sovaldi + Daklinza, 12 weeks: 69% Sovaldi + PEG-IFN and RBV, 12 weeks: 86% Sovaldi + RBV, 24 weeks: 60% to 77%
Genotype 4, never treated for HCV, no cirrhosis (all information in genotype 4 is from small trials)	+ Cirrhosis
Sovaldi + PEG-IFN and RBV, 12 weeks: 96% Sovaldi + RBV, 24 weeks: 100%	Sovaldi + RBV, 24 weeks: 100%
Genotype 4, treatment-experienced, no cirrhosis	+ Cirrhosis
Sovaldi + RBV, 24 weeks: 87%	Sovaldi + RBV, 24 weeks: 67%

*Cure rates in clinical trials are higher than in real life since people in them are usually healthier and get extra monitoring and support. Some trials were small (fewer than 200 people).

The most important thing a person can do to be cured is not to miss taking doses of HCV treatment—called **adherence**. Adherence lowers the risk for drug resistance.

What is drug resistance? Each day, HCV makes billions of copies of itself. Some of these copies are not the same as the original virus. They may have changes (called **mutations**) that can stop hepatitis C drugs from working. If people miss doses of their treatment, the virus gets a chance to reproduce—and some of these copies can be resistant to HCV treatment.

Some people have drug resistance even though they have never been on hepatitis C treatment—but many can be cured anyway. Most people who are not cured have resistance to one or more of the HCV drugs they've taken. Resistance to certain hepatitis C drugs can disappear within months. But resistance to other drugs can last for years and might prevent re-treatment from working. Some people who were treated with—but not cured by—Sovaldi have been re-treated with—and cured by—a combination of drugs including Sovaldi.

Sovaldi and age, gender, and race/ethnicity: In clinical trials, there was no difference in cure rates by age (over 65 vs. under 65). Women were slightly more likely to be cured than men. There is not much information about cure rates by race or ethnicity because most people in the trials were white. Sovaldi and RBV are slightly less effective for black and Hispanic people versus nonblack and non-Hispanic people.

Side effects from Sovaldi: Talk with your health care provider about possible side effects and how they will be managed. In clinical trials of Sovaldi and RBV, headache and fatigue were most common. At least 15 percent of trial participants had one or more of these side effects: nausea, insomnia, itching, anemia, weakness, rash, diarrhea, and irritability; usually, these were mild.

Does Sovaldi work for HIV-positive people? Yes. In clinical trials, cure rates were the same for HIV-positive people.

Sovaldi and other medications: Combining medications can increase or lower drug levels (called **drug-drug interactions**). Increasing drug levels can make side effects from each drug worse. If drug levels get too low, a drug can stop working, putting people at risk for drug resistance or not being cured.

Sovaldi should not be used with a medication called amiodarone because it can cause life-threatening heart problems.

Talk with your health care provider before starting or stopping medications, supplements, or herbal remedies.

There are other drugs that should be switched, stopped, or avoided while using Sovaldi. More information is available in Sovaldi's prescribing information (https://www.gilead.com/~media/Files/pdfs/medicines/liver-disease/sovaldi/sovaldi_pi.pdf) and at: www.hep-druginteractions.org.

Sovaldi and HIV antiretrovirals: Sovaldi can be used with all HIV drugs **except** boosted Aptivus.

Storing Sovaldi: Keep Sovaldi below room temperature (86°F).

Sovaldi in people with kidney disease: Sovaldi can be used in people with mild or moderate kidney damage. People with severe kidney disease (eGFR < 30 mL/min/1.73 m²) and people on dialysis should consult a specialist.

Sovaldi in people with cirrhosis: HCV treatment guidelines recommend that people with serious liver damage (Child-Pugh Class B or C) be treated by a specialist. In clinical trials, Sovaldi and RBV have been used in people with Child-Pugh Class B or Class C cirrhosis or liver cancer.

Sovaldi during pregnancy, nursing, and in children: It is not known whether Sovaldi causes harm to unborn babies. If you are pregnant or planning pregnancy, talk with your health care provider about the risks and benefits of HCV treatment. It is not known whether Sovaldi passes into breast milk.

RBV causes birth defects and miscarriage. RBV should not be used by pregnant women or by male partners of pregnant women. RBV stays in a person's body for months, so women and their male partners should avoid pregnancy until six months **after** stopping RBV (for more information, see TAG's **ribavirin** fact sheet).

Sovaldi and RBV are under study in children (ages 3 to 17) with HCV genotypes 2 and 3. Harvoni (Sovaldi and another drug in one pill) is under study in children (ages 3 to 18).

Access to Sovaldi may be restricted by public and private payers. The criteria differ depending on the type of coverage and the state it is issued in. Support Path is Gilead's patient assistance program for Sovaldi. People with private insurance may be eligible for assistance with copayments. Uninsured people may be eligible for medication at no charge. Information about Support Path is available by phone at 1.855.769.7284, Monday through Friday between 9:00 a.m. and 8:00 p.m. (Eastern Time), or online at: <http://www.gilead.com/responsibility/us-patient-access/support%20path%20for%20sovaldi%20and%20harvoni>.

This fact sheet is current as of April 2016. Always check for updated information.

The goal of hepatitis C virus (HCV) treatment is a cure (when there is no hepatitis C virus in a person's bloodstream at least 12 weeks after treatment is finished).

What is Olysio? Olysio (simeprevir) is an HCV-fighting drug. It must be used with other drugs to treat hepatitis C. In the United States, Olysio is approved for people with hepatitis C genotype 1 who are over 18 years old.

How is Olysio used? Olysio is taken once daily, with food, for 12 or 24 weeks. The type and length of treatment depends on HCV treatment history, whether a person has cirrhosis, and the other HCV drugs used with Olysio.

Hepatitis C treatment is changing quickly. Although Olysio was approved for use with pegylated interferon (PEG-IFN) and ribavirin (RBV), it is being studied and used with other drugs in interferon-free combinations.

U.S. HCV treatment guidelines list Olysio and PEG-IFN, or Olysio and **Sovaldi**, with or without **RBV**, as alternative treatments for genotype 4 in people being treated for the first time.

Olysio: Treatment Length and Cure Rates from Clinical Trials and Real-World Settings*

Genotype 1, never treated for HCV, no cirrhosis	+ Cirrhosis
Olysio + Sovaldi (with or without RBV), 12 weeks: 95% (in a small trial; real-world: 88% to 92%)	Olysio + Sovaldi (with or without RBV), 24 weeks: 100% (real-world: 75% to 87%)
Genotype 1, treatment-experienced, no cirrhosis	+ Cirrhosis
Olysio + Sovaldi (with or without RBV), 12 weeks: 95% (real-world: 81% to 87%)	Olysio + Sovaldi (with or without RBV), 24 weeks: 95% (real-world: 76% to 79%)

*Cure rates in clinical trials are higher than in real life since the people in them are usually healthier and get extra monitoring and support. These results came from a small trial (fewer than 200 people); Olysio and Sovaldi are being studied in larger trials.

The most important thing a person can do to be cured is not to miss taking doses of HCV treatment—called **adherence**. Adherence lowers the risk for drug resistance.

What is drug resistance? Each day, HCV makes billions of copies of itself. Some of these copies are not the same as the original virus. They may have changes that can stop hepatitis C drugs from working (called **drug resistance**). If people miss doses of their treatment, the virus gets a chance to reproduce—and some of these copies can be resistant to HCV treatment.

Some people have drug resistance even though they have never been on hepatitis C treatment—but many can be cured anyway.

Most people who are not cured have resistance to one or more of the HCV drugs they've taken. Sometimes, resistance disappears within months. Resistance may pop back up if hepatitis C is re-treated with the same drug—or another drug from the same family. No one is sure how long HCV drug resistance lasts, or whether it will make it harder to re-treat hepatitis C.

Olysio and age, gender, and race/ethnicity: In real-world settings, cure rates did not differ by age (over 65 vs. under 65) in people treated with Olysio and Sovaldi (with or without RBV). Real-world cure rates were slightly higher in women than men. There is not much information from clinical trials of Olysio and Sovaldi by race or ethnicity because most people in the trials were white. In real-world reports, there was no difference in cure rates between black people and nonblack people. Drug levels of Olysio are higher in people of Asian ancestry; this may worsen their side effects.

Side effects from Olysio: Olysio can cause photosensitivity (severe sunburn, blistering). Limit exposure to sunlight, tanning beds, and sunlamps while using Olysio, and wear a hat, sunglasses, sunscreen, and protective clothing. If sunburn or rash occur, consult your health care provider immediately. In a clinical trial of Olysio and Sovaldi, the most common side effects were fatigue, headache, nausea, dizziness, diarrhea, insomnia, rash, and sensitivity to light. **Olysio can cause rash**, especially during the first four weeks of treatment. Consult your health care provider immediately if you have mouth sores or red and swollen eyes.

Does Olysio work for HIV-positive people? With PEG-IFN and RBV, Olysio was just as effective for people with HIV. There are no clinical trials of Olysio and Sovaldi (with or without RBV) in HIV/HCV, but cure rates have been the same among coinfecting people treated in real-world settings.

Olysio can be used with these HIV drugs: Isentress (raltegravir), Selzentry (maraviroc), Fuzeon (enfuvirtide), Edurant (rilpivirine), Epivir (lamivudine), Ziagen (abacavir), Viread (tenofovir), Emtriva (emtricitabine), and Truvada (emtricitabine and tenofovir disoproxil fumarate).

Olysio and other medications: drug-drug interactions: Olysio should not be used with certain drugs. Combining medications can increase or lower drug levels (called **drug-drug interactions**). Increasing drug levels can make side effects from each drug worse. If drug levels get too low, a drug can stop working, putting people at risk for drug resistance or not being cured. **Talk with your health care provider about starting or stopping any medications, supplements, or herbal remedies.**

Some drugs should be switched, stopped, or avoided while using Olysio. More information is available in Olysio's prescribing information (<https://www.olsyio.com/shared/product/olsyio/prescribing-information.pdf>) and at:

www.hep-druginteractions.org.

Storing Olysio: Store Olysio at room temperature (under 86°F). Keep Olysio in the same bottle it came in to protect it from light.

Olysio in people with kidney disease: Olysio can be used by people with mild or moderate kidney disease. People with severe kidney disease should consult with a specialist before using Olysio. It has not been studied in people on dialysis.

Olysio in people with cirrhosis: Hepatitis C treatment guidelines recommend that people with serious liver damage (Child-Pugh Class B or C cirrhosis) be treated by a specialist. Olysio is **not recommended** for people with Child-Pugh Class C cirrhosis.

Olysio during pregnancy, nursing, and in children: In animal studies, high doses of Olysio caused birth defects. Since it is not known whether Olysio will harm unborn babies, it should be used during pregnancy only if the potential benefits of HCV treatment outweigh the risks.

In animal studies, Olysio was found in breast milk—and it harmed breast-fed baby rats. It is not known whether Olysio passes into human breast milk, but nursing mothers should decide whether to stop breast-feeding or discontinue treatment with Olysio to avoid potential risk to their infants.

RBV causes birth defects and miscarriage. RBV should not be used by pregnant women or by male partners of pregnant women. RBV stays in a person's body for months, so women and their male partners should avoid pregnancy until six months **after** stopping it. Using two forms of birth control to prevent pregnancy while taking RBV—and for six months afterward—is recommended (for more information, see TAG's **ribavirin** fact sheet).

It is not clear whether RBV passes into breast milk. Nursing is not recommended while taking RBV.

Olysio has not been studied in children, and it is not approved for people under 18 years old.

Access to Olysio may be restricted by public and private payers. The criteria differ depending on the type of coverage and the state it is issued in. People with private insurance may be eligible for assistance with copayments. Uninsured people may be eligible for medication at no charge.

Janssen's patient assistance program is called Olysio Support. Information is available by phone, at 1.855.565.9746, Monday through Friday between 8:00 a.m. and 8:00 p.m. (Eastern Time), or online at: <http://www.janssenprescriptionassistance.com/olsyio-cost-assistance>.

This fact sheet is current as of November 2015. Always check for updated information.

The goal of hepatitis C virus (HCV) treatment is a cure (when there is no HCV in a person’s bloodstream at least 12 weeks after treatment is finished).

What is Viekira XR? Viekira XR is a combination of hepatitis C virus–fighting drugs (paritaprevir/ritonavir/ombitasvir and dasabuvir) that block different steps of the virus life cycle. In the United States, Viekira XR is approved for people with hepatitis C genotype 1 who are over 18 years old. Viekira XR was previously approved and prescribed as a twice a day formula known as Viekira Pak. XR contains the same drugs, in the same amounts, as Viekira Pak, now in a once daily package.

What is Technivie? Technivie is a combination of paritaprevir/ritonavir and ombitasvir. Technivie is approved for people over 18 years of age who have hepatitis C genotype 4 without cirrhosis.

How is Viekira XR used? Viekira XR is taken once daily, with food, for 12 or 24 weeks. Viekira XR comes in a box of 4 (weekly) cartons of daily-dose packs with three beige tablets in each pack. The tablets should be swallowed whole (they should not be split, chewed or crushed). Some people will need to take another drug, called **ribavirin (RBV)**, twice daily when taking Viekira XR.

How is Technivie used? Technivie is taken once daily, with food, for 12 weeks. Technivie comes in a box of 28 daily-dose packs with two pink tablets. Both pink tablets are taken in the morning. It should be used with another drug, called **ribavirin (RBV)**, which is taken twice daily. Using Technivie by itself can be considered for people who cannot take RBV if they are being treated for the first time.

It is important to make sure that you have gotten the right treatment (with or without RBV) for the recommended length of time (12 or 24 weeks).

Viekira XR and Technivie with Cure Rates*

Genotype 1a (including mixed or unknown subtypes), never treated or treatment-experienced, no cirrhosis	+ Cirrhosis
Viekira XR + RBV, 12 weeks: 94% to 97%**	Viekira XR + RBV, 24 weeks: 95% Viekira XR + RBV, 12 weeks: 89% (consider 12 weeks of treatment according to HCV treatment history)
Genotype 1b, never treated or treatment-experienced, no cirrhosis	+ Cirrhosis
Viekira XR, 12 weeks: 100%	Viekira XR, 12 weeks: 99%
Genotype 4, never treated, no cirrhosis	+ Cirrhosis
Technivie + RBV, 12 weeks: 100% (90.9% without RBV)	N/A
Genotype 4, treatment-experienced, no cirrhosis	+ Cirrhosis
Technivie + RBV, 12 weeks: 100%	N/A

*Cure rates in clinical trials are higher than in real life since the people in them are usually healthier and get extra monitoring and support. **Cure rates are from clinical trials of the components of Viekira XR (administered as Viekira Pak).

The most important thing a person can do to be cured is not to miss taking doses of HCV treatment—called **adherence**. Adherence lowers the risk for drug resistance.

What is drug resistance? Each day, HCV makes billions of copies of itself. Some of these copies are not the same as the original virus. They may have changes (called **mutations**) that can stop hepatitis C drugs from working. If people miss doses of their treatment, the virus gets a chance to reproduce—and some of these copies can be resistant to HCV treatment. Some people have drug resistance even though they have never been on hepatitis C treatment—but many can be cured anyway.

Most people who are not cured have resistance to one or more of the HCV drugs they’ve taken. Resistance to certain hepatitis C drugs can disappear within months. But resistance to other drugs can last for years and might prevent re-treatment from working.

Viekira XR or Technivie and age, gender, and race/ethnicity: In clinical trials, cure rates did not differ by age (over 65 vs. under 65). Cure rates were the same for women and men. There is not much information about how well Viekira XR or Technivie work by race or ethnicity because most people in the trials were white. But researchers noticed two things: adding RBV to Viekira XR increased cure rates for African Americans with HCV genotype 1a (100% vs. 84%), and people with a common genetic factor among African Americans (called the IL28B TT genotype) were less likely to be cured by Viekira XR (see TAG’s **Hepatitis C and the IL28B Gene** fact sheet).

Side effects from Viekira XR and Technivie: Talk with your health care provider about possible side effects and how they will be managed. In clinical trials, the most common side effects from Viekira XR or Technivie were nausea, itching, and insomnia. People taking RBV also experienced fatigue, weakness, rash, and other skin reactions (see TAG's **RBV** fact sheet for more information). Most of these side effects were mild.

Liver enzyme levels may increase while taking Viekira XR or Technivie. Your health care provider should check your liver with blood tests during the first four weeks of treatment—and afterward as needed.

Do Viekira XR and Technivie work for HIV-positive people? Yes, but Viekira XR or Technivie should not be used by coinfecting people unless they are also being treated for HIV. This is because one of the drugs in Viekira XR and Technivie can cause resistance to some HIV drugs. In a clinical trial of 63 people with HIV and hepatitis C genotype 1, 93.5% were cured after 12 weeks of Viekira Pak plus RBV. Technivie has not been studied in people coinfecting with HIV and hepatitis C genotype 4.

Viekira XR or Technivie can be used with these HIV drugs: Isentress or Reyataz (300 mg), which should be taken in the morning, *without ritonavir (Norvir)*, plus Truvada or Viread with Epivir or Emtriva.

Viekira XR or Technivie and other medications: Viekira XR or Technivie should not be used with certain drugs. Combining medications can increase or lower drug levels (called **drug-drug interactions**). Increasing drug levels can make side effects from each drug worse. If drug levels get too low, a drug can stop working, putting a person at risk for drug resistance or not being cured. **Talk with your health care provider about starting or stopping any medications, supplements, or herbal remedies.**

Some drugs should be switched, stopped, or avoided while using Viekira XR or Technivie. More information is available in the prescribing information for Viekira XR and Technivie (http://www.rxabbvie.com/pdf/viekiraxr_pi.pdf and http://www.rxabbvie.com/htm/technivie/technivie_pi.htm) and at: www.hep-druginteractions.org.

Viekira XR or Technivie and hormonal contraception (birth control): Viekira XR and Technivie cannot be used with medications containing ethinyl estradiol (women can use progestin-only birth control). Medications containing ethinyl estradiol can be restarted two weeks after stopping Viekira XR or Technivie.

Viekira XR or Technivie during pregnancy, nursing, and in children: It is not known whether Viekira XR or Technivie cause harm to unborn babies. If you are pregnant or planning pregnancy, talk with your health care provider about the risks and benefits of HCV treatment. It is not known whether Viekira XR or Technivie pass into breast milk.

Viekira XR and Technivie have not been studied in children and are not approved for people under 18 years old.

Ribavirin causes birth defects and miscarriage. Ribavirin should not be used by pregnant women or by male partners of pregnant women. Ribavirin stays in a person's body for months. Women and their male partners should avoid pregnancy for six months **after** they have stopped taking ribavirin. Using two forms of birth control to prevent pregnancy while taking ribavirin—and for six months afterward—is recommended. Nursing during treatment with ribavirin is not recommended. There is a ribavirin pregnancy registry at: <http://www.ribavirinpregnancyregistry.com>.

Storing Viekira XR: Keep Viekira XR or Technivie at room temperature (below 86°F).

Viekira XR or Technivie in people with kidney disease: Viekira XR or Technivie can be used by people with mild or moderate kidney disease. People with severe kidney disease should consult with a specialist before using Viekira XR or Technivie. They have not been studied in people on dialysis.

Viekira XR or Technivie in people with cirrhosis: Hepatitis C treatment guidelines recommend that people with serious liver damage (Child-Pugh Class B or C cirrhosis) be treated by a specialist. Technivie has not been studied in people with HCV genotype 4 and cirrhosis. Viekira XR and Technivie should **not** be used in people with Child-Pugh Class B or Class C cirrhosis.

Access to Viekira XR and Technivie may be restricted by public and private payers. The criteria differ by type of coverage and the state it is issued in. ProCeed is AbbVie's Viekira XR patient assistance program. ProCeed may help people with private insurance with copayments. Uninsured people may be eligible for free medication through proCeed.

Information about proCeed is available by phone at 1.844.2PROCEED (1.844.277.6233), Monday through Friday between 8:00 a.m. and 5:00 p.m. (Eastern Time), or online at: <https://www.viekira.com/patient-support/financial-resources>.

Information about the Technivie patient assistance program is also available by phone at 1.844.2PROCEED (1.844.277.6233), Monday through Friday between 8:00 a.m. and 5:00 p.m. (Eastern Time).

This fact sheet is current as of January 2017. Always check for updated information.

The goal of hepatitis C virus (HCV) treatment is a cure (when there is no hepatitis C virus in a person's bloodstream at least 12 weeks after treatment is finished).

What is Harvoni? Harvoni is two HCV-fighting drugs (sofosbuvir and ledipasvir) in one pill. In the United States, Harvoni is approved for HIV-negative and HIV-positive people with hepatitis C genotypes 1, 4, 5, and 6 who are over 18 years old. Harvoni is also approved for people with HCV genotype 1 who have advanced (called *decompensated*) cirrhosis, and for liver transplant recipients who have HCV genotype 1 or 4.

How is Harvoni used? Harvoni is taken once daily, with or without food, for 8 to 24 weeks. Treatment length depends on HCV treatment history, whether a person has cirrhosis, and the amount of hepatitis C virus in a person's bloodstream (called *HCV RNA* or *viral load*). Some people will need to add another drug, called **ribavirin (RBV)**, twice daily with Harvoni.

FDA Recommended Treatment Length and Cure Rates in Clinical Trials*

Genotype 1, never treated for HCV, no cirrhosis	+ Cirrhosis
12 weeks (recommended): 96% to 99% (if HCV RNA is less than 6 million copies IU/mL, consider 8 weeks) 8 weeks: 94% (if HCV RNA is less than 6 million copies IU/mL: 97%)	12 weeks: 94%
Genotype 1, treatment-experienced, no cirrhosis	+ Cirrhosis
12 weeks + RBV: 95%	If past treatment with an HCV protease inhibitor: 12 weeks + RBV If past treatment with Sovaldi: 24 weeks + RBV Treatment-experienced (PEG-IFN + RBV): 100%
Genotype 1, never treated or treatment-experienced + decompensated cirrhosis (Child-Pugh Class B or Class C)	
12 weeks + RBV. Class B: 87% (45/52); Class C: 88% (35/40)	
Genotype 1, posttransplant, for all stages of cirrhosis	
12 weeks + RBV. No cirrhosis: 95% (94/99); + Child-Pugh Class A cirrhosis: 98% (55/56); + Child-Pugh Class B cirrhosis: 89% (41/46); + Child-Pugh Class C cirrhosis: 57% (4/7)	
Genotype 4, 5, and 6, never treated or treatment-experienced, with or without cirrhosis	
12 weeks. Genotype 4: 93%; Genotype 5: 93%; Genotype 6: 96%	
Genotype 4, posttransplant, with or without compensated cirrhosis	
12 weeks + RBV. Cure rates are similar to those in genotype 1	

*Cure rates in clinical trials are higher than in real life since the people in them are usually healthier and get extra monitoring and support.

The most important thing a person can do to be cured is not to miss taking doses of HCV treatment—this is called **adherence**. Adherence lowers the risk for drug resistance.

What is drug resistance? Each day, HCV makes billions of copies of itself. Some of these copies are not exactly the same as the original virus. They may have changes (called **mutations**) that can stop hepatitis C drugs from working. If people miss doses of their treatment, HCV gets a chance to reproduce—and some of the copies it makes may not respond to HCV treatment.

Some people have drug resistance even though they have never been on hepatitis C treatment—but many can be cured anyway.

Most people who are not cured have resistance to one or more of the HCV drugs they've taken. Resistance to certain hepatitis C drugs can disappear within months. But resistance to certain drugs, including Harvoni, can last for years and may limit re-treatment options.

Harvoni and age, gender, and race/ethnicity: In clinical trials, cure rates did not differ by age (over 65 vs. under 65). Cure rates have been the same for women and men. There is not much information about how well Harvoni works by race or ethnicity because most of the people in the trials were white. With HCV alone, black (99%, or 89/90) versus nonblack (96%, or 431/448) people were just as likely to be cured by 12 weeks of Harvoni. In ION-4, a trial in HIV/HCV coinfection, the overall cure rate was higher (96%, or 321/335) than among black participants (90%, or 105/115).

Side effects from Harvoni: Talk with your health care provider about possible side effects and how they will be managed. In clinical trials of Harvoni, the most common side effects were fatigue, headache, nausea, diarrhea, and insomnia; usually, these were mild. Some people have reported skin swelling, rash, or blisters.

Does Harvoni work for HIV-positive people? Yes. In clinical trial of 335 HIV/HCV-coinfected people, 321 (96%) were cured after 12 weeks of Harvoni. Harvoni cannot be used with certain HIV drugs (see [Harvoni and other medications](#), below).

Harvoni and other medications: Harvoni should not be used with certain drugs. Combining medications can increase or lower drug levels (called *drug-drug interactions*). Increasing drug levels can make side effects from each drug worse. If drug levels get too low, a drug can stop working, putting people at risk for drug resistance or not being cured.

Harvoni should not be used with a medication called amiodarone because sofosbuvir can cause life-threatening heart problems. For people who must take amiodarone, intensive heart monitoring in a hospital is recommended for 48 hours after starting Harvoni and daily monitoring for at least two weeks afterward.

Talk with your health care provider before starting or stopping any medications, supplements, or herbal remedies.

Some drugs should be switched, stopped or avoided while using Harvoni. More information is available in Harvoni’s prescribing information (www.accessdata.fda.gov/drugsatfda_docs/label/2015/205834s006lbl.pdf) and online at: www.hep-druginteractions.org.

Harvoni and HIV Antiretrovirals

HIV Integrase Inhibitors	
Stribild (elvitegravir/cobicistat/emtricitabine/tenofovir DF)	Stribild is not recommended during treatment with Harvoni
HIV Non-Nucleoside Reverse Transcriptase Inhibitors	
Atripla (efavirenz/emtricitabine/tenofovir DF)	Harvoni can increase tenofovir concentration; renal monitoring for tenofovir-associated adverse events is recommended; efavirenz may lower the level of ledipasvir, one of the drugs in Harvoni
HIV Protease Inhibitors	
Boosted Aptivus (ritonavir/tipranavir)	Do not use boosted Aptivus with Harvoni
Kaletra (ritonavir/lopinavir), boosted Prezista (ritonavir/darunavir), boosted Reyataz (ritonavir/atazanavir), with Viread (tenofovir DF) or Truvada (emtricitabine/tenofovir DF)	Consider a different HCV or HIV regimen to avoid increased tenofovir concentration; renal monitoring for tenofovir-associated adverse events is recommended

Storing Harvoni: Keep Harvoni at room temperature (below 86°F).

Harvoni in people with kidney disease: Harvoni can be used in people with mild or moderate kidney disease. It is not recommended for people with severe kidney disease (eGFR < 30 mL/min/1.73 m²) or people on dialysis.

Harvoni in people with cirrhosis: HCV treatment guidelines recommend that people with serious liver damage (Child-Pugh Class B or C) be treated by a specialist. In clinical trials, people with Child-Pugh Class B or C cirrhosis have been treated with Harvoni and ribavirin.

Harvoni during pregnancy, nursing, and in children: It is not known whether Harvoni causes harm to unborn babies. If you are pregnant or planning pregnancy, talk with your health care provider about the risks and benefits of HCV treatment. It is not known whether Harvoni passes into breast milk. Harvoni is under study in children (ages 3 to 18).

Ribavirin causes birth defects, and it can be fatal to unborn babies. Ribavirin should not be used by pregnant women or by male partners of pregnant women. Ribavirin stays in a person’s body for months. Women and their male partners should avoid pregnancy for six months after they have stopped taking ribavirin. Using two forms of birth control to prevent pregnancy while taking ribavirin—and for six months afterward—is recommended. Nursing during treatment with ribavirin is not recommended (see TAG’s [ribavirin](#) fact sheet for more information).

There is a ribavirin pregnancy registry at: <http://www.ribavirinpregnancyregistry.com>.

Access to Harvoni may be restricted by public and private payers. The criteria differ depending on the type of coverage and the state it is issued in. Support Path is Gilead’s patient assistance program for Harvoni. People with private insurance may be eligible for assistance with copayments. Uninsured people may be eligible for medication at no charge. Information about Support Path is available online at: <http://www.gilead.com/responsibility/us-patient-access/support-path-for-sovaldi-and-harvoni>. Information about Support Path is also available by phone at 1.855.769.7284, Monday through Friday between 9:00 a.m. and 8:00 p.m. (Eastern Time), or online at: <https://www.harvoni.com/support>.

This fact sheet is current as of April 2016. Always check for updated information.

What is Daklinza? Daklinza (daclatasvir) is an HCV-fighting drug that blocks different steps of the virus life cycle. In the United States, Daklinza is approved for people over 18 years old who have HCV genotype 1 or genotype 3 (although it has been used in other genotypes).

How is Daklinza used? Daklinza is taken once daily with another drug, called **Sovaldi**. These drugs can be taken with or without food, for 12 or 24 weeks. Daklinza and Sovaldi have been used in HCV genotypes 1, 2, 3, and 4 (including in people with HIV/HCV coinfection) and before and after liver transplantation.

People with cirrhosis may need longer treatment with Daklinza and **Sovaldi**, or a third drug called **ribavirin (RBV)**, which is taken twice daily with food.

Pretreatment resistance testing is recommended for people with genotype 1a and cirrhosis to make sure that Daklinza and Sovaldi will be effective (see What is drug resistance?, below).

Resistance testing is also recommended for all people with HCV genotype 1 who were not cured by Daklinza (or other drugs from the same family, such as **Harvoni** or **Zepatier**); treatment should be tailored to the results.

Daklinza: Recommendations from the FDA, and Cure Rates*

(Recommendations from the AASLD/IDSA HCV Treatment Guidelines Panel for the use of Daklinza and Solvadi can be found at www.hcvguidelines.org)

Genotype 1, treatment-naïve or -experienced, no cirrhosis or compensated (Child-Pugh Class A) cirrhosis
Daklinza + Sovaldi, 12 weeks. HCV: 100% ; HIV/HCV: G1a: 96.7% ; G1b: 100% ; Posttransplant: 95% (39/41)
Genotype 1, decompensated† (Child-Pugh Class B or Class C) cirrhosis or posttransplant
Daklinza + Sovaldi + RBV, 12 weeks. HIV/HCV: G1a: 97% ; G1b: 100%
Genotype 3, treatment-naïve or -experienced, no cirrhosis
Daklinza + Sovaldi, 12 weeks. HCV: 98% HIV/HCV: 100% ‡
Treatment-experienced: HCV: 92% HIV/HCV: 100% ‡
Genotype 3, treatment-naïve or -experienced, compensated (Child-Pugh Class A) or decompensated† (Child-Pugh Class B or C) cirrhosis or posttransplant
Daklinza + Sovaldi + RBV, 12 weeks. HCV: 58%
Treatment-experienced: HCV: 69% HIV/HCV: 100% ‡

*In people with decompensated cirrhosis or transplant recipients, start RBV at 600 mg/day; increase to 1,000 mg/day as tolerated.

†Cure rates in clinical trials are higher than in real life since the people in them are usually healthier and get extra monitoring and support.

‡Studied in fewer than 10 people

The most important thing a person can do to be cured is to not miss taking doses of HCV treatment—this is called **adherence**. Adherence lowers the risk for drug resistance.

What is drug resistance? Each day, HCV makes billions of copies of itself. Some copies are not exactly the same as the original virus. They may have changes (called **mutations**) that can stop hepatitis C drugs from working. If people miss doses of their treatment, hepatitis C gets a chance to reproduce—and some of the copies it makes may be resistant to HCV treatment.

Some people have drug resistance even though they have never been on hepatitis C treatment—but many can be cured anyway. Certain mutations make Daklinza less effective, including one called Y93H.

Daklinza and Sovaldi in Genotype 3, with and without the Y93H Mutation

	With Y93H	Without Y93H
Overall	54%	92%
No cirrhosis	67%	98%
Cirrhosis	25%	68%

Most people who are not cured by HCV treatment have resistance to one or more of the drugs they've taken. Resistance to certain hepatitis C drugs can disappear within months. But resistance to certain drugs, including Daklinza, can last for years—and might limit re-treatment options.

Daklinza and age, gender, and race/ethnicity: In clinical trials, cure rates did not differ by age (over 65 vs. under 65). Cure rates have been the same for women and men. In ALLY-2, a trial of Daklinza and Sovaldi in people with HIV/HCV, the overall cure rate was the same regardless of race/ethnicity. Information about how well Daklinza works by race or ethnicity is limited since most people in the clinical trials were white.

Side effects from Daklinza: Talk with your health care provider about possible side effects and how they will be managed. In clinical trials of Daklinza and Sovaldi, the most common side effects were fatigue and headache; usually, these were mild.

Does Daklinza work for HIV-positive people? Yes. In ALLY-2, a clinical trial in 153 HIV/HCV-coinfected people, 149 (97%) were cured after 12 weeks of Daklinza and Sovaldi.

Daklinza and other medications: drug-drug interactions: Daklinza should not be used with certain drugs. Combining medications can increase or lower drug levels (called *drug-drug interactions*). Increasing drug levels can make side effects from each drug worse. If drug levels get too low, a drug can stop working, putting people at risk for drug resistance or not being cured.

Talk with your health care provider before starting or stopping any medications, supplements, or herbal remedies.

Some drugs should be switched, stopped, or avoided while using Daklinza.

Sovaldi—which is used with Daklinza—should not be used with a medication called amiodarone because it can cause life-threatening heart problems.

More information is available in Daklinza’s prescribing information (www.accessdata.fda.gov/drugsatfda_docs/label/2015/206843Orig1s000lbl.pdf) and at: www.hep-druginteractions.org.

Daklinza and HIV antiretrovirals: Daklinza can be used with most HIV drugs. A lower or higher dose of Daklinza may be needed when it is used with certain antiretrovirals.

HIV Integrase Inhibitors	
Stribild (elvitegravir/cobicistat/emtricitabine/tenofovir DF)	Lower Daklinza dose from 60 mg to 30 mg
HIV Non-Nucleoside Reverse Transcriptase Inhibitors	
Atripla (efavirenz/emtricitabine/tenofovir DF)	Increase Daklinza dose from 60 mg to 90 mg
Intelence (etravirine)	Increase Daklinza dose from 60 mg to 90 mg
Viramune (nevirapine)	Increase Daklinza dose from 60 mg to 90 mg
HIV Protease Inhibitors	
Boosted Reyataz (atazanavir/ritonavir or atazanavir/cobicistat)	Lower dose of Daklinza from 60 mg to 30 mg

Storing Daklinza: Keep Daklinza at room temperature (between 59°F and 86°F).

Daklinza in people with kidney disease: Daklinza can be used without dose adjustment in people with mild, moderate, or severe kidney disease.

Daklinza in people with cirrhosis: HCV treatment guidelines recommend that people with serious liver damage (Child-Pugh Class B or C cirrhosis) be treated by a specialist. Daklinza can be used in mild, moderate, or severe hepatic impairment without dose adjustment. In clinical trials, people with Child-Pugh Class B or Class C cirrhosis have been treated with Daklinza and Sovaldi, with or without RBV. Daklinza-based treatment is less effective for people with Child-Pugh Class C cirrhosis.

Daklinza and Sovaldi have also been used to treat people for hepatitis C after liver transplantation.

Daklinza during pregnancy, nursing, and in children: It is not known whether Daklinza causes harm to unborn babies. In animal studies of pregnant rats and rabbits, very high doses of Daklinza caused birth defects, miscarriage, and maternal death. No harm was seen at lower doses.

If you are pregnant or planning pregnancy, talk with your health care provider about the risks and benefits of HCV treatment. It is not known whether Daklinza passes into human breast milk (in animal studies using much higher doses, it was found in the breast milk of rats).

Daklinza has not been studied in children, and it is not approved for people under 18 years old.

Access to Daklinza: Access may be restricted by public and private payers. The criteria differ depending on the type of coverage and the state it is issued in. Patient Support Connect is BMS’s patient assistance program for Daklinza. People with private insurance may be eligible for assistance with copayments. Uninsured people may be eligible for medication at no charge. Information and enrollment forms are available online at: <https://bmsdm.secure.force.com/patientsupportconnect/patient> and <http://www.bmspf.org/documents/bmspf-enrollment-form.pdf> or by phone at 1.800.736.0003.

This fact sheet is current as of April 2016. Always check for updated information.

The goal of hepatitis C virus (HCV) treatment is a cure (when there is no hepatitis C virus in a person’s bloodstream at least 12 weeks after treatment is finished).

What is Zepatier? Zepatier is two hepatitis C virus-fighting drugs in one tablet. These drugs block different steps of the virus lifecycle. In the United States, Zepatier is approved for people who are over 18 years old with hepatitis C genotype 1 or genotype 4.

How is Zepatier used? Zepatier is a beige pill, taken once daily, with or without food, for 12 or 16 weeks. Some people will need to take another drug with Zepatier, called **ribavirin (RBV)**, twice daily.

Zepatier comes in a 14-pill blister pack; each pill is individually packaged to protect Zepatier from moisture. Keep Zepatier in the packaging until you take it.

Drug resistance testing is recommended for people who have hepatitis C genotype 1a before starting treatment with Zepatier. Some people with genotype 1a will need 16 weeks of treatment and RBV (see **What is drug resistance?**, below). It is important to make sure that you have gotten the right treatment (with or without RBV), for the recommended length of time (12 or 16 weeks).

FDA Recommendations and Cure Rates for Zepatier in HCV Genotypes 1 or 4

Hepatitis C Genotype and Subtype (with or without Cirrhosis)	Recommended Treatment and Cure Rates in Clinical Trials*
Genotype 1a, never treated or past treatment (with PEG-IFN and RBV), no NS5A resistance	Zepatier for 12 weeks Never treated: 92% (144/157); HIV/HCV: 94% (136/144) Treatment-experienced: 90% (55/61)
Genotype 1a, never treated or past treatment (PEG-IFN and RBV), with NS5A resistance	Zepatier + RBV for 16 weeks: 100% (6/6)
Genotype 1b, never treated or past treatment (with PEG-IFN and RBV)	Zepatier for 12 weeks Never treated: 98% (129/131); HIV/HCV: 96% (43/45) Treatment-experienced: 100% (35/35)
Genotype 1a or 1b, never treated or past treatment (with PEG-IFN, RBV and Incivek or Olysio or Victrelis)	Zepatier + RBV for 12 weeks 100% (55/55) if treatment-experienced, no resistance to HCV protease inhibitors 88% (21/24) if treatment-experienced, with resistance to protease inhibitors
Genotype 4, never treated	Zepatier for 12 weeks 97% (64/66) HIV/HCV: 96% (27/28)
Genotype 4, past treatment (PEG-IFN and RBV)	Zepatier + RBV for 16 weeks: 100% (8/8)

*Cure rates in clinical trials are higher than in real life since the people in them are usually healthier and get extra monitoring and support.

The most important thing a person can do to be cured is not to miss taking doses of HCV treatment—this is called **adherence**. Adherence lowers the risk for drug resistance.

What is drug resistance? Each day, HCV makes billions of copies of itself. Some of these copies are not exactly the same as the original virus. They may have changes (called **mutations**) that can stop hepatitis C drugs from working. If people miss doses of their treatment, HCV gets a chance to reproduce—and some of the copies it makes may not respond to HCV treatment.

Some people have drug resistance even though they have never been on hepatitis C treatment—but many can be cured anyway.

Pretreatment resistance testing is recommended for people with HCV genotype 1a because they may have certain mutations that make Zepatier less effective. This can be overcome by taking Zepatier for 16 weeks with RBV.

Cure Rates in HCV Genotype 1a

	Zepatier, 12 weeks	Zepatier + RBV, 16 weeks
No NS5A resistance	98% (441/450)	100% (49/49)
With NS5A resistance	70% (39/56)	100% (6/6)

Most people who are not cured have resistance to one or more of the HCV drugs they’ve taken. Resistance to certain hepatitis C drugs can disappear within months. But resistance to other drugs can last for years and might prevent re-treatment from working.

Side effects from Zepatier: Make sure to talk with your health care provider about possible side effects and how they will be managed. In clinical trials, the most common side effects from Zepatier were fatigue and headache, nausea, insomnia, and diarrhea. People taking RBV also experienced anemia, shortness of breath, rash, itching, depression, irritability, and achy joints (see TAG’s **ribavirin (RBV)** fact sheet for more information). Most of these side effects were mild.

Liver enzyme levels may increase while taking Zepatier. Your health care provider should check your liver with blood tests before you start taking Zepatier and 8 weeks after starting treatment. For people taking Zepatier for 16 weeks, another blood test is recommended at 12 weeks after starting treatment.

In clinical trials, people over 65 years old, women, and people of Asian ancestry had higher levels of Zepatier in their bloodstream and were more likely to have liver enzyme elevations.

Zepatier and age, gender, and race/ethnicity: In clinical trials, cure rates did not differ by age (over 65 vs. under 65). Cure rates have been the same for women and men, and in all races. Information is limited because most of the people in the trials were white.

Does Zepatier work for HIV-positive people? Zepatier works just as well for coinfecting people. In C-EDGE Coinfection, a 189-person trial, 95% (179/189) of people being treated for the first time were cured. In the C-EDGE Treatment-Experienced trial, cure rates among people with HIV/HCV were 100% (11/11) after 12 weeks of Zepatier (with or without RBV). Cure rates among people treated with 16 weeks of Zepatier were 83% (5/6) without RBV and 100% (4/4) with RBV.

Zepatier and other medications: Zepatier should not be used with certain drugs. Combining medications can increase or lower drug levels (called *drug-drug interactions*). Increasing drug levels can make side effects from each drug worse. If drug levels get too low, a drug can stop working, putting people at risk for drug resistance or not being cured. **Talk with your health care provider about starting or stopping any medications, supplements, or herbal remedies.**

Some drugs should be switched, stopped, or avoided while using Zepatier. More information is available in prescribing information for Zepatier online at: http://www.accessdata.fda.gov/drugsatfda_docs/label/2016/208261Orig1s000lbl.pdf and www.hep-druginteractions.org.

Zepatier and HIV antiretrovirals: Zepatier can be used with these HIV drugs: Complera/Edurant, Emtriva, Epivir, Isentress, Tivicay, Triumeq, Truvada, Viread, and Ziagen.

Zepatier during pregnancy, nursing, and in children: It is not known whether Zepatier causes harm to unborn babies. If you are pregnant, or planning pregnancy, talk with your health care provider about the risks and benefits of HCV treatment.

It is not known whether Zepatier passes into breast milk or whether nursing during treatment with Zepatier causes harm to infants and children.

Zepatier has not been studied in children and is not approved for people under 18 years old.

Ribavirin causes birth defects, and it can be fatal to unborn babies. Ribavirin should not be used by pregnant women or by male partners of pregnant women. Ribavirin stays in a person's body for months. Women and their male partners should avoid pregnancy for six months **after** they have stopped taking ribavirin. Using two forms of birth control to prevent pregnancy while taking ribavirin—and for six months afterward—is recommended. Nursing during treatment with ribavirin is not recommended. There is a ribavirin pregnancy registry at: <http://www.ribavirinpregnancyregistry.com>.

Storing Zepatier: Keep Zepatier at room temperature (below 68°F to 77°F).

Zepatier in people with kidney disease: Zepatier can be used without dose adjustment in mild, moderate, or severe kidney disease, including people on dialysis. In C-SURFER, a clinical trial of people with stage 4 and stage 5 kidney disease, 94% (115/122) were cured by 12 weeks of Zepatier.

Zepatier in people with cirrhosis: Hepatitis C treatment guidelines recommend that people with serious liver damage (Child-Pugh Class B or C cirrhosis) be treated by a specialist. People with Class B and Class C cirrhosis **should not use Zepatier.**

Zepatier can be used by people with mild liver impairment (Child-Pugh Class A cirrhosis).

Access to Zepatier may be restricted by public and private payers. The criteria differ by type of coverage and the state it was issued in. Merck's Access Program may help people who have private insurance. Information is available at: <http://www.merckhelps.com/ZEPATIER>. Enrollment forms are available online at: http://www.merckhelps.com/docs/MAP_Enrollment_Form_INFC-1161739_English.pdf or by phone at 1.866.251.6013, Monday through Friday, from 8 a.m. to 8 p.m. (Eastern Time).

Some uninsured people may be eligible for free medication through the Merck Patient Assistance Program; information is available online at: <http://www.merckhelps.com/programs.aspx?tab=MAP> and by phone at 1.800.727.5400, Monday through Friday from 8 a.m. to 8 p.m. (Eastern Time).

This fact sheet is current as of April 2016. Always check for updated information.

The goal of hepatitis C virus (HCV) treatment is a cure (when there is no HCV in a person’s bloodstream 12 weeks after treatment is finished).

What is Epclusa? Epclusa is a fixed-dose combination of two HCV-fighting drugs (sofosbuvir and velpatasvir) in one pill. In the United States, Epclusa is approved for people with all hepatitis C genotypes (1–6) who are 18 years of age and older.

How is Epclusa used? Epclusa is taken once daily, with or without food, for 12 weeks. People who have advanced (called decompensated) cirrhosis will need to add another drug, called **ribavirin**, twice daily. The effectiveness of the treatment depends on whether a person has cirrhosis, their virus genotype, and previous HCV treatment history.

U.S. Food and Drug Administration–Recommended Treatment Length and Cure Rates in Clinical Trials*

Genotype 1, 2, 4, 5 and 6, no cirrhosis	+ Decompensated Cirrhosis
Epclusa, 12 weeks: 99%	Epclusa + ribavirin, 12 weeks: 94%
Genotype 3, no cirrhosis	+ Decompensated Cirrhosis
Epclusa, 12 weeks: 95%	Epclusa + ribavirin, 12 weeks: 85%

*Cure rates in clinical trials are higher than in the general population because the people in trials are usually healthier and receive extra monitoring and support.

The most important thing a person can do to be cured is never miss a dose of HCV treatment—this is called **adherence**. Adherence lowers the risk for drug resistance.

What is drug resistance? Each day, HCV makes billions of copies of itself. Some copies are not the same as the original virus. They may have changes (called **mutations**) that can stop hepatitis C drugs from working. If people miss doses of their treatment, HCV gets a chance to reproduce—and some of the copies may be resistant to HCV treatment.

Some people have drug resistance even though they have never been on hepatitis C treatment—but many can be cured anyway.

Most people who are not cured have resistance to one or more of the HCV drugs they’ve taken. Resistance to some hepatitis C drugs can disappear within months, but it can also last for years and may limit re-treatment options.

Epclusa and age, gender, and race/ethnicity: In clinical trials, cure rates did not differ by age (over 65 vs. under 65) or by gender. There is not much information about how well Epclusa works by race or ethnicity because most of the people in the trials were white. With HCV genotypes 1, 2, 4, 5, and 6 alone (no cirrhosis), black patients (98% or 51/52) were as likely as nonblack patients (99% or 564/569) to be cured with 12 weeks of Epclusa (results from the ASTRAL-1 clinical trial). Similar cure rates were also seen in black patients (3/3 or 100%) and nonblack patients (95% or 261/274) with the harder to treat genotype 3 (results from the ASTRAL-3 clinical trial).

Side effects from Epclusa: **Talk with your health care provider about possible side effects and how they can be managed.** In clinical trials of Epclusa, the most common side effects were headache and fatigue, usually mild. In patients with decompensated cirrhosis, who need to take ribavirin along with Epclusa, the most common side effects were mild to moderate fatigue, anemia, nausea, headache, insomnia, and diarrhea.

Does Epclusa work with HIV drugs? Epclusa cannot be taken with certain HIV drugs. See **Epclusa and HIV Treatments** (Antiretrovirals) below for more information.

Epclusa and other medications: Epclusa should not be used with certain drugs. Combining medications can increase or decrease drug levels (called **drug-drug interactions**). An increase can make side effects worse. A decrease can prevent a drug from working, putting people at risk for resistance or not being cured.

Epclusa should not be used in people taking the heart rhythm medication amiodarone because sofosbuvir, a key ingredient, can cause life-threatening heart problems. Do not take St. John's Wort herbal supplements with Epclusa, and tell your doctor if you are taking medications for cancer, seizures, bacterial infections, heartburn/acid reflux, or statins.

Talk with your health care provider before starting or stopping any medications, supplements, or herbal remedies.

More information is available in Epclusa's prescribing information (http://www.gilead.com/~media/files/pdfs/medicines/liver-disease/epclusa/epclusa_pi.pdf).

Epclusa and HIV Treatments (Antiretrovirals)

HIV Protease Inhibitors	
Boosted Aptivus (ritonavir/tipranavir)	Do not use boosted Aptivus with Epclusa
HIV Non-Nucleoside Reverse Transcriptase Inhibitors	
Atripla (efavirenz/emtricitabine/tenofovir DF) Sustiva (efavirenz)	Do not use Epclusa with medications containing efavirenz
HIV Nucleotide Reverse Transcriptase Inhibitors	
Viread (tenofovir DF) Truvada (emtricitabine/tenofovir DF) Atripla (efavirenz/emtricitabine/tenofovir DF) Stribild (elvitegravir/cobicistat/emtricitabine/tenofovir DF) Complera (emtricitabine/rilpivirine/tenofovir DF)	Renal monitoring for tenofovir-associated adverse events is recommended

Storing Epclusa: Keep Epclusa at room temperature (below 86°F).

Epclusa in people with kidney disease: Epclusa can be used by people with mild or moderate kidney disease. No studies have been conducted in people with severe kidney disease (eGFR <30 mL/min/1.73 m²) or people on dialysis. Patients with severe kidney disease, or on dialysis, who also have cirrhosis should ask their doctor whether Epclusa and ribavirin are right for them.

Epclusa in people with cirrhosis: HCV treatment guidelines recommend that people with serious liver damage (Child-Pugh Class B or C) be treated by a specialist. People with Child-Pugh Class B or C can be treated with Epclusa and ribavirin.

Epclusa during pregnancy, nursing, and in children: It is not known whether Epclusa causes harm to unborn babies or passes into breast milk. If you are pregnant or breast feeding, or planning for either, talk with your health care provider about the risks and benefits of HCV treatment. Epclusa has not been tested in children younger than 18 years old.

Ribavirin causes birth defects and miscarriage. It should not be used by pregnant women or by male partners of pregnant women. The drug stays in a person's body for months. Women and their male partners should avoid pregnancy for six months **after** they have stopped taking ribavirin. Using two forms of birth control to prevent pregnancy while taking ribavirin—and for six months afterward—is recommended. Nursing during treatment is not recommended. For more information, visit the ribavirin pregnancy registry at: <http://www.ribavirinpregnancyregistry.com/>.

Access to Epclusa may be restricted by public and private payers. The criteria differ depending on the type of coverage and the state in which it is issued. Support Path is Gilead's patient assistance program for Epclusa. People with private insurance may be eligible for assistance with copayments. Uninsured people may be eligible for medication at no charge. Information about Support Path is available online at: <http://www.mysupportpath.com/>. Information about Support Path is also available by phone at 1-855-7-MYPATH or 1-855-769-7284.

This fact sheet is current as of August 2016. Always check for updated information.



The goal of hepatitis C virus (HCV) treatment is a cure (when there is no hepatitis C virus in a person's bloodstream at least 12 weeks after treatment is finished).

What is ribavirin? Ribavirin (RBV) is an HCV-fighting drug. RBV does not work by itself. Adding RBV to other drugs can increase the chance of being cured from HCV. In the United States, ribavirin is approved for children (3 to 18 years of age) and adults.

RBV is made by Merck (sold as Rebetol), Genentech (sold as Copegus), and Kadmon Pharmaceuticals (sold as Ribasphere).

How is ribavirin used? RBV is taken twice a day with food; the dose is based on weight.

Is there anyone who cannot use ribavirin? People with sickle cell disease or thalassemia cannot use RBV. People who have serious heart disease cannot use RBV since it increases the risk for heart attacks.

Ribavirin and pregnancy: RBV causes birth defects and miscarriage. RBV should not be used by pregnant women or by male partners of pregnant women. RBV stays in a person's body for months, so women and their male partners should avoid pregnancy until six months **after** stopping it. Using two forms of birth control to prevent pregnancy while taking RBV—and for six months afterward—is recommended. There is an RBV pregnancy registry at: <http://www.ribavirinpregnancyregistry.com>.

Ribavirin and nursing: It is not clear whether RBV passes into breast milk. Nursing is not recommended while taking RBV.

Side effects from RBV: Talk with your health care provider about possible side effects and how they will be managed. Some people develop **anemia** (low red blood cell count) from RBV, usually within the first few weeks of treatment. It is important to have blood tests before and during RBV treatment to check for anemia and other side effects. Anemia is usually treated by lowering RBV dose.

When RBV was used without interferon in clinical trials, side effects included: aching muscles, anxiety, back pain, colds, constipation, coughing, diarrhea, dizziness, fever, headaches, insomnia, irregular periods, irritability, itchy skin, nausea, night sweats, rash, stomach pain and swelling, stuffy nose, tiredness, vomiting, and weakness.

Ribavirin and bilirubin levels: **Bilirubin** is left over from the breakdown of red blood cells. RBV can increase the amount of bilirubin in the bloodstream. **Jaundice** (yellow skin and eyes), dark urine, and pale stool are common signs of increased bilirubin.

Does ribavirin work for HIV-positive people? Yes. RBV can temporarily lower CD4 cell count (but not the percentage of CD4 cells)—even for people on HIV drugs. This usually returns to normal after finishing HCV treatment.

HIV-positive people should not use RBV with Retrovir, Videx, or Zerit. Using Reyataz and RBV may cause jaundice.

Ribavirin and other medications: RBV should not be used with certain drugs. Combining medications can increase or lower drug levels (called **drug-drug interactions**). Increasing drug levels can worsen side effects. Decreasing drug levels may cause a drug to stop working; this can lead to drug resistance or treatment failure.

Talk with your health care provider about starting or stopping any new medications, supplements, or herbal remedies.

More information about drug-drug interactions is available in ribavirin's prescribing information (http://www.accessdata.fda.gov/drugsatfda_docs/label/2011/021511s023lbl.pdf or <http://kadmon.com/files/ribasphere-tablets-pi.pdf> or http://www.merck.com/product/usa/pi_circulars/r/rebetol/rebetol_pi.pdf) and at: www.hep-druginteractions.org.

Storing ribavirin: Keep RBV at room temperature (between 59°F and 86°F).

Ribavirin and age, gender, and race/ethnicity: RBV is always used with other drugs, so it is not known whether there are differences in how well it works by age, gender, or race/ethnicity. The risk for anemia from RBV is higher for people over 65 and women. There is no information on ribavirin side effects according to race/ethnicity.

Ribavirin and kidney disease: RBV is filtered out through the kidneys. People with moderate or severe kidney disease, and people on dialysis, are treated with lower RBV doses. People with severe kidney disease should consult with a specialist before using RBV.

Ribavirin and advanced liver disease: Hepatitis C treatment guidelines recommend that people with serious liver damage (Child-Pugh Class B or C cirrhosis) be treated by a specialist.

Access to ribavirin: Kadmon's Keys Program provides patient assistance. People with private insurance may be eligible for assistance with copayments. Uninsured people may be eligible for medication at no charge. Information about the Keys Program is available by phone, at 1.888.668.3393, Monday through Friday between 9:00 a.m. and 5:00 p.m. (Eastern Time), or online at: https://www.pparx.org/prescription_assistance_programs/kadmon_patient_assistance_program.

This fact sheet is current as of November 2015. Always check for updated information.