

## READING A LAB REPORT: A BASIC PRIMER



Tim Teeter, RN

Alan Franciscus, Editor-in-Chief

Monitoring hepatitis C (HCV) treatment and managing HCV disease is a complex process that includes using blood tests. These include a complete blood count (CBC), chemistry panel, and liver function tests. This guide is intended to help you understand these kinds of blood tests, and is not intended as medical advice. All people with HCV should consult a medical provider for diagnosis and treatment of HCV.

It is important to remember that lab results can vary between labs so the same lab should be used whenever possible. Information gained from blood work over time and repeated tests shows a trend or pattern. In general, medical decisions should not be made on just one test result.

Three types of labs tests are used to monitor general health and liver health:

**1. Liver biochemical/function tests** measure various enzymes released by the liver into blood, and other liver functions. Liver enzymes may be elevated when damage occurs in the liver.

**2. Complete blood counts (CBC)** measure the three components of blood: red cells, white cells, and platelets.

**3. Chemistry panels** measure minerals (electrolytes), sugar (glucose) and fats (lipids) in the

blood, as well as liver and kidney functions.

Lab reports provide reference range information, often on the right side of the report. For each function measured, these ranges will tell you what is “normal” for that function. Many lab reports also contain a column which lists out-of-range values, making it easy to see problems quickly. It should be noted that an out-of-range function is an indication of a potential problem that warrants further investigation.

This guide provides information on the meaning of each section, with a brief discussion on what out-of-range values could mean.

### LIVER BIOCHEMICAL/ FUNCTION TESTS

**Alanine aminotransferase (ALT)**, previously called **SGPT**, is an enzyme produced in the liver cells (hepatocytes). The level of ALT in the blood increases when hepatocytes are damaged or die at higher than normal rates. Drugs, alcohol use, toxins, viruses, and other substances cause hepatocyte damage that can lead to elevations in ALT levels. Liver cell death also causes increased ALT levels. The level of ALT may correlate roughly with the amount of cell death or inflammation (the immune system’s response to irritation or



### IN THIS ISSUE

**HEALTHWISE**  
**Depression.....2**  
**An Introduction to the Liver.....4**  
**Coinfection Updates.....5**

injury) in the liver, but this is not always the case. For instance, some people with advanced HCV have relatively normal ALT levels.

Approximately 30% of people with HCV have normal ALTs. Most people with persistently normal ALT levels have mild or no fibrosis and their rates of HCV disease progression are slower compared to patients with high ALTs.

ALT levels are used to gauge inflammation and damage to the liver at any one point in time. Normal ALT levels, like “normal” values for every lab test, vary some from lab to lab but are commonly reported as 0-40 IU/L. Looking for a trend or pattern over time is more important than any single value. For instance, a repeated measure of 100 may be “normal” for someone who consistently tests within this range. However, a measurement of 225 for this person would indicate that there may be increased inflammation or cell death that would

*continued on page 6*

# Depression



Lucinda K. Porter, RN, CCRC  
Eric Dieperink, MD

*This three-part series has been excerpted from the Hepatitis C Support Project's newest publication, Coping with Depression and Hepatitis C*

Living with a chronic disease can be challenging. None of us ever think we will develop a chronic condition, so naturally it is not a situation for which we prepare. A diagnosis of chronic hepatitis C virus (HCV) infection can invoke a huge range of reactions. One common response is depression. This series will discuss various aspects of depression. Hopefully this information will provide you with tools to gain insight and control over depression. Life is indeed short, too short to spend it feeling depressed, especially since something can be done about this.

## WHAT IS DEPRESSION?

Depression is the most common serious psychiatric illness. It is also one of the most treatable. Depression is a disorder that may affect our feelings and outlook on life. Persistent feelings of sadness, a loss of interest in life, hopelessness, and pessimism are common warning signs of depression. The symptoms can vary among people. All of us can feel blue from time to time. However, a persistent or unexplained bout of malaise (the "blues") is not normal and needs to be evaluated.

### The following are some symptoms of depression:

- Feeling sad or "empty"
- Fits of crying with no reasonable explanation
- Feeling hopeless and pessimistic
- Feelings of guilt, worthlessness and helplessness
- Feeling anxious or irritable, or restless
- Loss of interest or enjoyment in hobbies, social activities and sex
- Fatigue or decreased energy
- Difficulty concentrating, sometimes accompanied by decision-making and memory problems
- Insomnia and other sleep-related problems
- Appetite loss and/or weight loss; overeating and weight gain
- Thoughts of death or suicide; suicide attempts

*(Adapted from the National Institute of Mental Health: Depression. Available at: [www.nimh.nih.gov/publicat/depression.cfm](http://www.nimh.nih.gov/publicat/depression.cfm))*

*Various research studies support the notion that depression is more common in those with HCV than in the general population.*

Depression can be accompanied by a number of other psychological as well as physical complaints. Persistent physical symptoms that do not respond to treatment, such as headaches, digestive disorders, and chronic pain may be related to depression. Other physical complaints that may be related to depression are:

- Panic attacks and phobias
- Tight chest or throat
- Dizziness
- Shaking or tremors
- Gastrointestinal complaints such as nausea, diarrhea, gas, and stomach pain
- Muscle aches and pains

## DEPRESSION AND HEPATITIS C

Depression is a common occurrence in people with HCV. Various research studies support the notion that depression is more common in those with HCV than in the general population. This seems to be true regardless of how a person contracted hepatitis C or the severity of the disease. Additionally, those coping with chronic illness are more likely to report depression as compared to the general population. A hepatitis C diagnosis can carry with it a number of issues and reactions. This article explores some of these common concerns.

## THE HEPATITIS C DIAGNOSIS

Any medical diagnosis can be a jolt. If you were feeling well at the time of your diagnosis, this new information can be especially shocking. An array of questions may be swimming around in your head, such as, what does this mean? Will I die from hepatitis C? What about my family? Is this contagious? If so, how?

Your questions will be answered over time. However, the period following initial diagnosis can be very stressful, emotional, and confusing. Fear, anxiety, anger, and denial are common reactions as well.

*continued on page 3*

## DEPRESSION

*continued from page 2*

### ISOLATION

Feeling isolated is a complicated problem because it can come from both internal and external factors. The part that comes from within can stem from “feeling infectious.” Invisible, pervasive, and hideous, this feeling of having the potential to infect another human being can be an incredible burden. Isolation can result from a preoccupation with potential infectiousness.

Society can reinforce this isolation. Sometimes people are ignorant of how to prevent transmission of HCV in particular, as well as viruses in general. Patients have reported stories of friends and family who would not let them in to their homes out of fear that their children would become infected. Hugs and kisses cease. Sexual relationships stop or are never initiated. In the extreme, marriages and partnerships have suffered.

It is tragic to witness this unnecessary and avoidable exclusion. Those struggling to live with a chronic disease need more support, not less. For some people with HCV, the isolation is worse than the virus. Just like other aspects of chronic hepatitis C, finding ways to manage these complexities is a key to learning how to live with HCV infection.

**Note:** The hepatitis C virus is a blood-borne virus. It is not passed casually or easily. For information about HCV transmission, visit [www.hcvadvocate.org](http://www.hcvadvocate.org) and click on “About Hepatitis.”

### DEATH

No one needs to be told that death is unavoidable. At the same time, none of us likes to be reminded of this fact. Sometimes a change in our health can be an unexpected reminder of our temporary existence on this planet. A common response upon hearing a diagnosis of HCV is “am I going to die from this?” This begs the question as to whether a person has mild disease or more advanced liver damage.

Thoughts and fears are common and normal. It is essential that we address these concerns so they do not become persistent. Most of our deepest fears can be soothed with facts. The majority of HCV-positive individuals will die *with* HCV, not *of* HCV.

Consider these suggestions if you find yourself wrestling with issues related to death:

**Talk about it.** Tell someone your fears and thoughts. Sometimes the act of saying the unspoken can be very powerful.

**Get the facts.** Talk to your doctor about your

particular situation. Be specific with your questions. What are my chances of dying from this? How much time do I have? Should I be concerned about the fact that I cannot remember things like I used to? Your physician may not know the answers to these questions, but should take your questions seriously. You have the right to not be dismissed or made to feel uncomfortable about your concerns.

**Compare notes.** The key here is to talk to other people *without* HCV. Choose people close to your age and lifestyle. Ask them how they feel. You might be surprised to learn that many people your age are feeling tired, achy, and find their memories slipping.

**Get support.** Talk to people *with* hepatitis C. People with HCV have more health complaints than those not infected with the virus. Many have also developed ways to cope with these problems. They know the best and the worst doctors. They can recommend web sites and literature. Best of all, when you attend a support group you do not have to try to look or act your best.

**Control what you can.** Although you do not have control over the fact that the virus has taken up residence in your liver, you do have control over facts such as alcohol use. Alcohol and HCV do not mix. Look at your lifestyle. Do you smoke, drive without a seatbelt, or misuse drugs? Do you exercise and are you careful about what you eat? These are areas that can be controlled. One caution: permanent change does not happen instantly. Success is more likely to occur if you are gentle with yourself while maintaining your commitment.

**Grieve.** Grief is a part of chronic illness. Sometimes grieving is the only way to move on.

**Live while you are alive.** Focus on the present, not the future. Until breathing stops, you are still alive. How are you going to spend today and the rest of your life?

### Next month: Part 2 HCV Treatment and Depression

*Lucinda K. Porter, RN, BA, CCRC, Clinical Research Nurse in Hepatology, Stanford University Medical Center*

*Eric Dieperink, MD, Assistant Professor of Psychiatry, University of Minnesota Medical School*

*A special thanks to Liz Highleyman for her editorial contributions to this article.*

*Copyright, August 2003 Lucinda Porter, RN, Eric Dieperink, MD and Hepatitis C Support Project / HCV Advocate [www.hcvadvocate.org](http://www.hcvadvocate.org) – All Rights Reserved.*

*Reprint is granted and encouraged with credit to the author and the Hepatitis C Support Project*

# AN INTRODUCTION TO THE LIVER

■ ■ ■  
Liz Highleyman

Alan Franciscus, Editor-in-Chief

The liver is the largest internal organ. It is reddish-brown, weighs approximately three pounds (in the adult male) and is about the size of a football. It is located behind the ribcage on the upper right side of the abdomen. The liver has the unique ability to regenerate its own tissue—as much as three-quarters of the liver can be lost, and the organ can grow back within several weeks. This allows people who need transplants to receive part of the liver of a living donor.

The liver is divided into four lobes; these are in turn composed of multiple lobules, which contain the hepatocytes, or working liver cells. The liver has an extensive blood supply. It receives oxygen-rich blood from the hepatic artery. The portal vein delivers blood containing nutrients, toxins, and other substances absorbed from the intestines to the liver. The liver filters this blood, then sends it on to the heart via the hepatic vein.

## FUNCTIONS OF THE LIVER

The liver is responsible for some 500 bodily functions. It plays a role in digestion, sugar and fat metabolism, and the body's immune defense. It processes almost everything a person eats, breathes, or absorbs through the skin. About 90% of the body's nutrients pass through the liver from the intestines. The liver converts food into energy, stores nutrients, and produces blood proteins. The liver also acts as a filter to remove pathogens and toxins from the blood. In the

developing fetus, blood cells are produced in the liver.

### Digestion

The liver plays an important role in the digestion and processing of food. Liver cells produce bile, a greenish-yellow fluid that aids the digestion of fats and the absorption of fat-soluble nutrients. Bile is delivered to the small intestine through the bile duct; when there is no food to digest, extra bile is stored in a small organ called the gallbladder located beneath the



*Leana Rosetti*

liver. By-products from the breakdown of drugs and toxic substances processed by the liver are carried in the bile and excreted from the body. A person with a damaged liver may experience impaired bile production and flow. When this happens, the body may not be able to properly absorb nutrients. Liver cells also convert heme (a component of hemoglobin that is released when red blood cells are broken down) into bilirubin. When the liver is damaged, bilirubin may build up in the blood, causing jaundice (yellowing of the skin and whites of the eyes).

### Metabolism

The liver carries out many metabolic functions, providing the

body with the energy it needs. It regulates the production, storage, and release of sugar, fats, and cholesterol. When food is eaten, the liver converts glucose (blood sugar) into glycogen, which is stored for later use. When energy is needed, the liver converts glycogen back into glucose in a process called gluconeogenesis. The liver regulates the storage of fats by converting amino acids from digested food into fatty acids such as triglycerides; when the body does not have enough sugar, the liver converts fatty acids into ketones, which can be used for fuel. The liver also controls the production, metabolism, and excretion of cholesterol, which is an important component of cell membranes and certain hormones.

### Storage

The liver stores several nutrients, including vitamins A, D, B9 (folate), and B12. It also stores iron and plays a role in converting iron into heme, a component of hemoglobin (the oxygen-carrying molecule in red blood cells).

### Protein Synthesis

The liver synthesizes (builds) several important proteins, including enzymes, hormones, clotting factors, and immune factors. Liver enzymes called aminotransferases or transaminases (ALT and AST) break down amino acids from digested food and rebuild them into new proteins needed by the body. When liver cells are damaged,

*continued on page 9*

# COINFECTION UPDATES:

## *from Recent Conferences and Journal Articles*



Liz Highleyman

Several reports of studies concerning HCV/HIV and HBV/HIV coinfection have been presented at conferences and in journal articles this summer.

### HCV PROGRESSION

New data continues to confirm that coinfection with HIV accelerates progression of chronic hepatitis C and B.

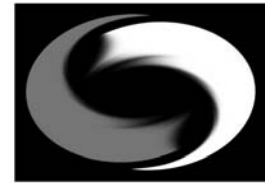
Two such reports were presented at the 2<sup>nd</sup> International AIDS Society (IAS) Conference on HIV Pathogenesis and Treatment, held July 13-16 in Paris. In a study of more than 4,700 U.S. veterans studied between 1991 and 2000, T.P. Giordano and colleagues found that people coinfecting with HCV and HIV are about ten times more likely to develop cirrhosis and about six times more likely to develop liver cancer than people with HCV alone.

P. Braitstein and colleagues found that coinfecting patients tended to experience only modest CD4 cell increases after starting anti-HIV therapy. Overall, the coinfecting patients gained an average of 50 cells after 18 months on anti-HIV treatment, compared with an average gain of 190 cells in those with HIV alone. Among patients with advanced immune system damage and low CD4 cell counts (below 200 cells), the coinfecting patients gained 30 cells compared with 78 for those with HIV alone.

T. Poynard and colleagues from France confirmed in the March 2003 issue of the *Journal of Hepatology* that liver fibrosis progresses more rapidly in HCV/HIV coinfecting people than in those with HCV alone. The researchers conducted a cross-sectional study of nearly 5,000 patients with different types of liver disease. HCV/HIV coinfection was associated with a high risk of progression at younger ages. "[E]xtraordinarily rapid rates of progression were observed even in these young patients," the researchers wrote. "Our data suggest that almost all of these patients will progress to cirrhosis if they do not die from another cause, and argues for the treatment of chronic hepatitis C in co-infected patients at the earliest possible stage."

### HCV TREATMENT

Two studies at the IAS conference looked at response to treatment with pegylated interferon in HCV/HIV coinfecting patients. E. Voight and colleagues from Germany found that 15 out of 58 patients (26%) treated with Peg-Intron plus ribavirin experienced a sustained response with undetectable HCV RNA after 24 weeks of follow up. As is the case with non-HIV-infected hepatitis C patients, those showing an early treatment response at 12 weeks were more likely to achieve a sustained



**HEPATITIS C  
SUPPORT PROJECT**

**Executive Director  
Editor-in-Chief,  
HCSP Publications**

Alan Franciscus  
e-mail:  
sfhepcat@hcvadvocate.org

**Managing Editor, Webmaster**

C.D. Mazoff, PhD  
cdmazoff@hcvadvocate.org

**Contributing Authors**

Eric Dieperink, MD  
Liz Highleyman  
Lucinda K. Porter, RN, CCRC  
Tim Teeter, RN

**Design and Production**

Paula Fener  
Blue Kangaroo Design  
blueroodesign@aol.com

**Contact information:**

Hepatitis C Support Project  
PO Box 427037  
San Francisco, CA 94142-7037

The HCV Advocate offers information about various forms of intervention in order to serve our community. By providing information about any form of medication, treatment, therapy or diet we are neither promoting nor recommending use, but simply offering information in the belief that the best decision is an educated one.

Reprint permission is granted and encouraged with credit to the Hepatitis C Support Project.

© 2003  
Hepatitis C Support Project

*continued on page 8*

## LAB REPORT

*continued from page 1*

warrant further evaluation.

**Aspartate aminotransferase (AST)**, previously called **SGOT**, is an enzyme similar to ALT but is less specific for liver disease. In many cases of liver inflammation, the ALT and AST levels are elevated. Normal ranges from 0-37 IU/L.

**Alkaline phosphatase** is an enzyme produced in the bile ducts and the bone, and found in the liver. Levels are increased in hepatitis, cirrhosis, and other illnesses. Some medications may also cause increased levels. Normal ranges from 30-120 IU/L.

**Gamma-glutamyl transpeptidase (GGT or GGPT)** is also an enzyme produced in the bile ducts which may be elevated in people with bile duct diseases. Hepatitis and heavy alcohol consumption also increase GGT. Normal ranges from 12-55 IU/L.

**Bilirubin** is the major breakdown product of old red blood cells. Hemoglobin is released from the red blood cells; the “heme” portion is further broken down into bilirubin. When liver function is impaired, as with acute hepatitis or end stage liver disease, bilirubin accumulates in the blood and causes yellowing of the skin and eyes, called jaundice. In chronic HCV, bilirubin levels are usually normal until a significant amount of liver damage has occurred.

Bilirubin is often reported as total, indirect (the amount of “unconjugated” bilirubin), and direct (the amount of “conjugated” bilirubin which is then excreted from liver cells). Normal range of total bilirubin is 0.1 – 1.2 mg/dL.

**Albumin** is a protein that is synthesized by the liver and circulates in the blood. Low albumin

levels indicate poor liver function and contribute to peripheral edema (accumulation of fluid in the feet and ankles) sometimes seen in very late stage liver disease. Albumin levels are usually normal in chronic liver disease until significant liver damage is present. Normal ranges from 3.5 – 5.3 g/dL.

**Prothrombin time (PT)** is a blood clotting test and it is prolonged (or elevated) when the blood concentrations of some of the blood clotting factors made by the liver are low. In chronic liver

*Information gained from blood work over time and repeated tests shows a trend or pattern. In general, medical decisions should not be made on just one test result*

disease, the PT is usually not elevated until cirrhosis is present and liver damage is fairly significant. Normal ranges from 10.4 – 12.9 seconds.

### CBC

**White cell (leukocyte) count** provides information on the body’s ability to fight infection. A high total white count means the body is actively fighting an infection; a low total white count means the body’s ability to fight infection is impaired. Low white blood count may be caused by advanced HCV disease or from HCV medications. In addition to total count, a CBC

gives the breakdown of each type of white cell. The types are neutrophils, lymphocytes, monocytes, eosinophils, and basophils. **Neutrophil** count is used to determine when a person’s ability to fight common infections is impaired. Low neutrophil count is called neutropenia. Interferon can also cause neutropenia. Chemotherapy definitely causes neutropenia. Normal white cell count ranges from 4,500 – 11,000/cu MM.

**Red cell count** provides information on the body’s ability to carry oxygen to cells, as well as the size of the red blood cells. The most important values are **hemoglobin** and **hematocrit** (together referred to as H&H), which measure the ability to provide the body with oxygen. Low H&H is known as **anemia**, a serious condition which produces fatigue. Advanced liver disease can produce anemia. Ribavirin can also cause anemia. Normal hemoglobin ranges from 13.9 – 16.3 g/dL; normal hematocrit ranges from 41.0 – 53.0%.

**Platelet count** provides information on the blood’s ability to clot. Low platelet count is called **thrombocytopenia** and is dangerous because of the risk of internal and external bleeding. Advanced liver disease and HCV medications can cause thrombocytopenia. Normal platelet count ranges from 150 – 350K/cu MM.

### CHEMISTRY PANEL

**Electrolytes** are minerals which are essential to life. Blood tests usually monitor the following electrolytes: sodium, potassium, chloride, calcium, iron, phosphorus, and sometimes magnesium. Chronic diseases may cause electrolyte abnormalities. If untreated,

*continued on page 7*

## Help Us Reach More People with Hepatitis C!

### SUPPORT US THROUGH EITHER A PAID SUBSCRIPTION OR DONATION

**YES! I'd like to subscribe**

NAME \_\_\_\_\_

\$18 one year—12 issues

ADDRESS \_\_\_\_\_

\$9 one year—12 issues  
(for those with fixed incomes)

CITY \_\_\_\_\_

Renewal

STATE \_\_\_\_\_ ZIP \_\_\_\_\_

*Please make checks payable to: HCSP/The Tides Center*

**YES! I'd like to donate**

*Please mail form to:*

*Please mail form to:*

\$10  \$25

HCV ADVOCATE

\$100  other

P.O. Box 427037

San Francisco, CA 94142-7037



*The Hepatitis C Support Project does not share its mailing list with any individual or organization. All subscribers' names and addresses are strictly confidential*

## LAB REPORT

*continued from page 6*

electrolyte imbalances may be life threatening.

**Glucose** is the measurement of **blood sugar**. High blood sugar is called hyperglycemia, and may be an indication of diabetes. Low blood sugar is called hypoglycemia and is uncommon. Normal glucose ranges from 60 – 109 mg/dL.

**Lipids** are fats. The most commonly measured lipids are **triglycerides** and **cholesterol**. High triglycerides and cholesterol can be an indication of damaged arteries and potential heart disease, which are serious medical problems.

**Kidney functions** measured by lab tests include blood urea nitrogen (BUN), creatinine, and uric acid. The kidneys are essential in eliminating body wastes and

regulating blood pressure, hence a disturbance in kidney function can be a life-threatening problem. Chronic diseases including HCV can cause kidney damage. **Creatinine** is the most common measurement of kidney function. Normal creatinine ranges from 0.6 – 1.3 mg/dL.

### WHAT'S THE BOTTOM LINE?

Get copies of your blood work tests, become familiar with the results, and always consult with a health care provider before drawing conclusions or making healthcare decisions. This is another piece of staying in charge of your health.



Medical Writers' Circle is a publication of the Hepatitis C Support Project. It consists of a series of articles written by medical professionals about the management and treatment of hepatitis C. The articles are available for printing at the Hepatitis C Support Project website.

[www.hcvadvocate.org](http://www.hcvadvocate.org)

## COINFECTION

*continued from page 5*

virological response.

Martin Pols from the National Institutes of Health and colleagues reported data from a small pilot study indicating that HCV/HIV coinfecting patients may respond more slowly to HCV treatment with Peg-Intron plus ribavirin. Study results so far suggest that in coinfecting people, the rate of viral load decline may be the best predictor of eventual sustained response, and that the 12-week cutoff may not be appropriate for these patients.

Finally, in the June 1, 2003 issue of the *Journal of Acquired Immune Deficiency Syndromes*, C. Uberti-Foppa and colleagues reported that taking anti-HCV therapy for six months prior to starting anti-HIV treatment reduces the chances that coinfecting patients will discontinue anti-HIV therapy due to drug-related liver toxicity. Six out of 39 (15.4%) patients who immediately started anti-HIV therapy dropped out of the study due to severe liver-related side effects, compared to 4 out of 66 (6.1%) who received six months of prior HCV therapy before starting anti-HIV treatment. "Our data allow us to suggest that anti-HCV therapy should be given before starting antiretroviral therapy [for HIV], because this may reduce the risk of severe anti-retroviral therapy-related liver toxicity and probably reduces the risk of progressing to liver failure," the researchers concluded.

### HEPATITIS B

Also at the IAS conference, F. Raffi and colleagues presented data from three studies showing that emtricitabine (FTC or Emtriva) was a safe and effective treatment for

hepatitis B in HBV/HIV coinfecting individuals. The drug is structurally similar to lamivudine (3TC or Epivir), but remains in the body longer and appears less likely to allow the emergence of resistant HBV. After 48 weeks of treatment, 56% of coinfecting patients receiving emtricitabine achieved undetectable HBV DNA. On July 2, the U.S. Food and Drug Administration approved the drug as a treatment for HIV, but it is not yet approved for hepatitis B.

In the July 4, 2003 issue of *AIDS*, M. Havekamp and colleagues reported on response rates to hepatitis B therapy in HBV/HIV coinfecting individuals. Those with CD4 cell counts above 200 experienced greater reductions in HBV DNA, were more likely to clear HBV, and were more likely to achieve normalized liver function when treated with lamivudine as part of their anti-HIV drug regimen.

### EFFECTS OF ANTI-HIV DRUGS

E. Phillips and colleagues from Toronto reported at the IAS conference on a study looking at which anti-HIV drugs are most strongly associated with liver damage in coinfecting people. Using retrospective data from more than 400 patients with HBV/HIV or HCV/HIV coinfection, the researchers found that ritonavir (Norvir), regimens that contain other protease inhibitors boosted by small doses of ritonavir, and high cumulative exposure to stavudine (d4T or Zerit) were associated with a higher risk of liver toxicity. Nelfinavir (Viracept), another protease inhibitor, was least likely to cause severe liver toxicity. As expected, drug-related liver problems were more common in coinfecting patients than in those with HIV alone; in fact, chronic hepatitis was the

major risk factor for severe liver toxicity in this study.

In the August 15<sup>th</sup> edition of the *Journal of Acquired Immune Deficiency Syndromes*, S.H. Mehta and colleagues from Johns Hopkins University reported on a retrospective study showing that HCV coinfection appears to increase the risk of hyperglycemia (high blood sugar) in people taking protease inhibitor drugs. High blood sugar is a potential indicator of insulin resistance and diabetes, which are among the metabolic side effects associated with anti-HIV medications. New-onset hyperglycemia appeared after starting anti-HIV therapy in 30 out of 517 coinfecting patients (5.8%) compared with 17 out of 611 patients with HIV alone (2.8%). These results suggest that HCV/HIV coinfecting people should have their blood sugar monitored regularly while on anti-HIV therapy.

Finally, at the 5<sup>th</sup> Lipodystrophy Workshop held in conjunction with the IAS conference, W. Powderly and colleagues reported on a study examining the relationship between anti-HIV therapy and fatty liver (steatosis) in patients coinfecting with hepatitis B or C. Based on the small number of patients studied to date, use of anti-HIV drugs was not associated with higher rates of fatty liver in people coinfecting with either HBV or HCV. Notably, participants in this study did not have elevated blood fat levels, a side effect of certain anti-HIV drugs that may promote the development of steatosis. However, patients who were overweight (a body mass index greater than 30) were more likely to have a fatty liver.



## THE LIVER

*continued from page 4*

these enzymes can leak out and build up to high levels in the blood; these enzymes can be measured using a simple blood test. Several of the proteins synthesized by the liver are needed for proper blood functioning. These include various binding proteins (which bind and transport substances such as vitamins, minerals, hormones, and fats) and albumin (a protein that helps maintain proper blood volume). Clotting factors produced by the liver include fibrinogen, prothrombin (Factor II), and Factor VII. These enable the blood to clot following an injury; low levels can lead to prolonged bleeding and easy bruising. Other proteins synthesized by the liver include alkaline phosphatase, gamma-glutamyl transferase (GGT), and insulin growth factor

### Detoxification

The liver plays a crucial role in detoxifying substances that are harmful to the body, including alcohol, drugs, solvents, pesticides, and heavy metals. When a person is exposed to high levels of these chemicals, the liver can become overwhelmed. Toxins are delivered to the liver by the portal vein. The liver processes these chemicals and excretes them in the bile. The liver also processes and excretes toxic byproducts of normal metabolism (such as ammonia) and excess hormones (in particular, sex hormones such as estrogen). Many drugs—including common over-the-counter drugs such as acetaminophen (Tylenol), most anti-HIV drugs, and certain herbal remedies—are processed by the liver and can cause liver damage.

People should be especially cautious about combining multiple drugs or herbs. If the liver is damaged it may not be able to break down and excrete drugs efficiently, which could potentially lead to dangerously high blood levels and intensified side effects.

### LIVER DAMAGE

Chronic hepatitis C or B, heavy alcohol use, and other factors can lead to serious liver damage. Given how many vital functions the liver performs, it is not surprising that liver injury can have an affect on almost all body systems, including the digestive, endocrine, cardiovascular, and immune systems. As the liver sustains damage, normal liver tissue becomes fibrous (fibrosis), fatty (steatosis), and scarred (cirrhosis). If the liver becomes too heavily damaged, it is no longer able to carry out its normal functions.

In **compensated cirrhosis**, the liver is scarred but can still function relatively normally. In **decompensated cirrhosis**, the liver has sustained so much damage that it is unable to function properly. Scar tissue may block the normal flow of blood through the liver, causing blood to back up. This can lead to portal hypertension (high blood pressure), the development of varices (stretched and weakened blood vessels) in the esophagus and stomach, and internal bleeding. People with severe liver damage may also develop ascites (fluid accumulation in the abdomen), edema (swelling, especially in the legs and ankles), and kidney damage. If the liver is unable to filter out toxins and metabolic byproducts such as ammonia, these chemicals may build up in the blood, leading to impaired mental functioning, personality changes,

and (in severe cases) coma. People with long-term liver damage may also develop liver cancer.

### KEEPING THE LIVER HEALTHY

There are many steps people with chronic hepatitis can take to maintain liver health.

#### Healthy Liver Tips:

- Eat a healthy, well-balanced diet that follows the general guidelines for good nutrition based on the Food Guide Pyramid; such a diet is low in fat and sodium, high in complex carbohydrates, and has adequate protein.
- Avoid or reduce the consumption of alcohol.
- Avoid or limit the use of recreational drugs.
- Take no more than the recommended doses of medications.
- Use caution when mixing over the counter medications, prescription drugs, herbs, street drugs, and/or alcohol.
- Avoid exposure to toxic liquids and fumes including solvents, paint thinners, and pesticides. If it is necessary to use such chemicals, work in a well-ventilated area, cover the skin, and wear gloves and a protective facial mask.
- Avoid raw or undercooked shellfish, which may contain bacteria or viruses.
- Get vaccinated against hepatitis A and hepatitis B if appropriate.



For Living Positively. Being Well.



[www.hcvadvocate.org](http://www.hcvadvocate.org)

**HCSP**

P.O. Box 427037  
San Francisco, CA  
94142-7037