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Learn about the treatment options to keep this viral infection from reproducing and causing further complications for your patient.

By Elizabeth P. Crusse, MA, MS, RN, CNE, and Vicky P. Kent, PhD, RN, CNE

titis C

Ms. L, a 45-year-old part-time teacher, has been experiencing increasing feelings of fatigue, nausea, and loss of appetite over a period of several months. She has been under a great deal of stress following a recent separation from her husband of 20 years. She's concerned about finances and how she'll support her two teenage children on a part-time salary. She realizes she needs to obtain full-time employment and healthcare insurance for herself; however, she can't find the energy to pursue new employment options at this time. She considers herself relatively "healthy" except for having four blood transfusions and an emergency hysterectomy in 1988 after giving birth to her daughter. Given her persistent symptoms, Ms. L's coworkers encourage her to see her primary care provider (PCP) to determine the cause of her fatigue, nausea, and general malaise.

Ms. L makes an appointment and when questioned about her symptoms, reports that her urine is dark in color and she sometimes has strange looking bowel movements. She relates all of her symptoms to the "stress" she has been under since separating from her husband. Upon examination, the PCP palpates Ms. L's abdomen. She complains of discomfort in her right upper abdominal quadrant. When questioned further about other symptoms, Ms. L reports that even though her urine is dark and her bowel movements are different from normal, she isn't worried. She just feels tired and knows everything will return to normal after her nausea is gone and she's able to drink more fluids and eat better.

Remember that HCV and its treatment can affect your patient's physical, social, psychological, and emotional well-being.

The PCP orders a battery of tests to determine the possible cause(s) of Ms. L's symptoms, including the enzyme immunoassay (EIA-3) screening test for hepatitis C antibodies. Ms. L's results indicate the presence of hepatitis C antibodies. The PCP explains the lab results and suggests more tests to confirm the diagnosis. Ms. L is devastated. She doesn't understand how she can have a contagious illness when she hasn't used I.V. drugs or had more than one sexual partner.

Defining the infection

Hepatitis C is a contagious blood-borne viral infection that affects the liver. Hepatitis C virus (HCV) is only one of several types of viruses that affect the liver. Hepatitis A and B viruses also attack the liver. The difference in the types of viruses is in the way they're transmitted and their impact on the liver (see *Picturing hepatitis*).

Like other viruses, HCV's structure is stored in a person's ribonucleic acid (RNA), which converts the virus into a form suitable for transmission. There are six strains or types of HCV, known as genotypes. A person can be infected with one or more genotypes. Genotypes 1, 2, and 3 are the most common types found worldwide; genotype 1 is the most common in the United States. There's a high prevalence of genotypes 4 and 5 among people in Africa, and genotype 6 is more prevalent among those living in Asia.

HCV can be an acute or chronic condition. The acute phase usually occurs within 6 months of a person being infected. An individual with acute HCV may experience fever, fatigue, dark urine, and jaundice (yellowing of the skin and sclera) or may be asymptomatic. The chronic condition may take years to manifest; it's usually a slow, progressive disease that can cause liver damage, cirrhosis, liver cancer, or even death. It's important to note that people can be infected with HCV without knowing it until they have a blood test done, which confirms the presence of the virus. Also, individuals may not know they have HCV until their blood has been screened for something else, such as after donating blood. There's evidence that some people may actually get rid of the virus without ever needing treatment.

Data from the CDC indicate that over 3 million people in the United States are chronically infected with HCV. The World Health Organization data indicate between 130 and 150 million individuals worldwide are chronically infected with hepatitis C. Other data suggest that 350,000 to 500,000 people die each year from liver diseases related to this virus. Additionally, although hepatitis C can be acute, approximately 75% to 85% of people who are infected develop a chronic infection, according to the CDC. Not everyone diagnosed with acute HCV converts to chronic HCV.

Who's at risk?

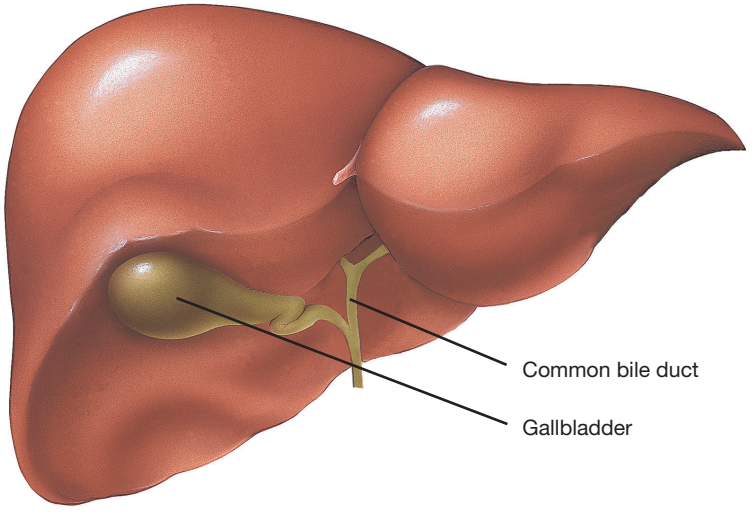
As a blood-borne pathogen, HCV can be spread when blood from an infected person is transferred or transmitted to a noninfected person in a variety of ways:

- sharing needles, syringes, or other drug-related paraphernalia
- needle sticks or mucosal exposures within a healthcare/first responder setting
- being born to a mother who's infected with the virus
- receiving transfusions or organ transplants (less likely after July 1992 due to blood donor testing)
- hemodialysis
- sharing personal items that may have come in contact with an infected person's blood (for example, a razor)
- sexual contact (in some populations).

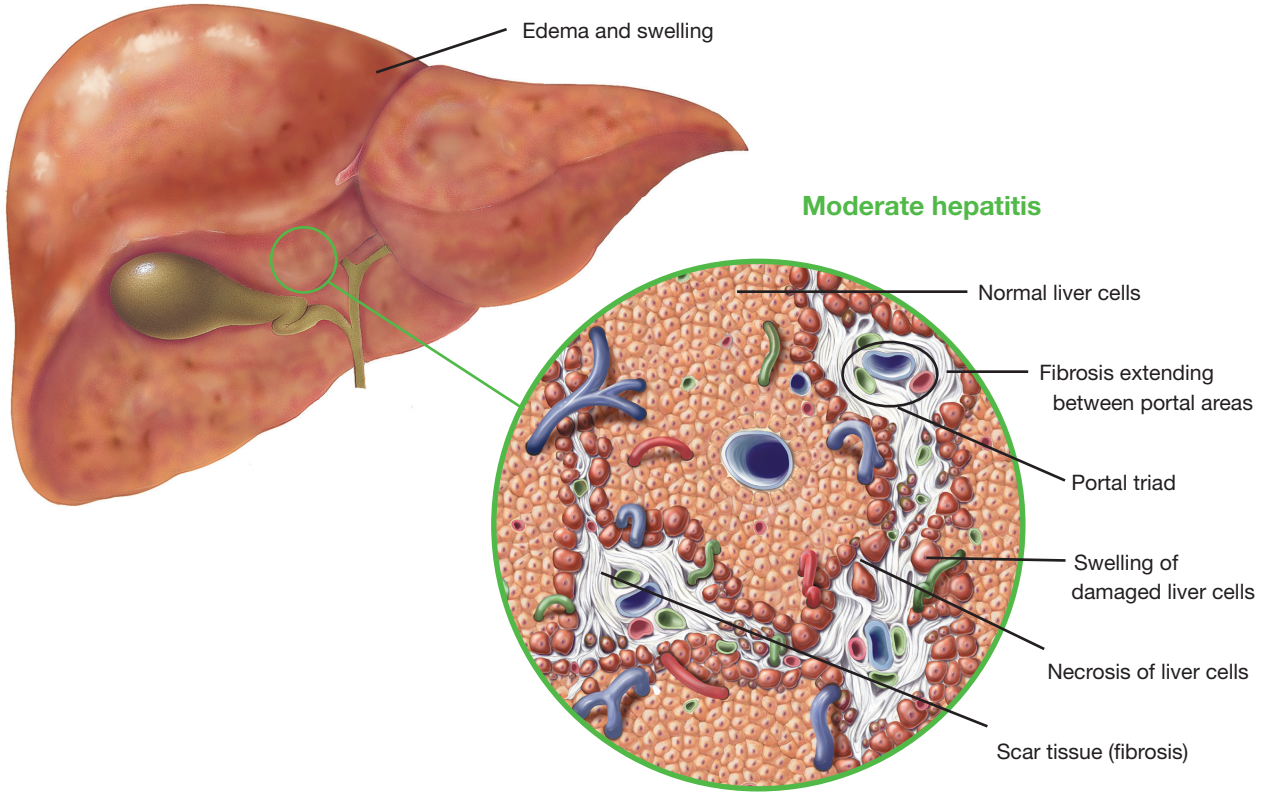
It isn't spread through breast milk, food, water, or casual contact with someone infected with the virus. This includes activities

Picturing hepatitis

Normal liver



Liver with the effects of hepatitis



such as holding hands, sharing utensils, hugging, or kissing.

Although everyone is at risk for contracting HCV, some are more susceptible than others. More men than women are diagnosed with HCV, as are more non-Hispanic Blacks than non-Hispanic Whites or Mexican Americans. Data from the CDC reveal that between 3% and 4% of people born between 1945 and 1965 are infected with HCV, thus older adults are being diagnosed with HCV at a higher rate than younger adults. The infection rate among this cohort accounts for up to 75% of all hepatitis C infections in the United States.

It has been reported that there's a high prevalence of HCV in jailed populations, especially men. It's speculated that those engaging in high-risk behaviors, such as I.V. drug use and unprotected sexual contact with known HCV or HIV-infected persons, are at increased risk for contracting HCV.

Now that you know who's susceptible to contracting HCV, what are the recommendations for who should be tested? Currently, it's suggested that all healthcare providers and first responders who've experienced a needle stick or have had any exposure to patients' blood and body fluids should be screened. I.V. drug users, individuals diagnosed with HIV, and anyone known to have a sexual relationship with an infected person or who has multiple sexual partners should be tested for HCV. People with known blood clotting disorders and anyone who received blood transfusions before 1992 also need to be tested.

The CDC recommends that baby boomers (those born between 1945 and 1965) should be screened for HCV. Both the CDC and the National Institutes of Health recommend screening for infants born to mothers infected with HCV. The American Academy of Pediatrics recommends that the screening should be conducted at age 18 months. HCV antibodies cross the placenta, thus screening infants born to HCV-positive mothers at birth may lead to false positive results.

memory jogger

Remember the **LIVER** when caring for a patient with liver disease related to HCV.

L **Listen to your patient.** One of the first steps of assessment involves taking an oral history. What potential symptoms are being experienced (fatigue, nausea, general malaise)? Has your patient engaged in any high-risk behaviors that may lead you to suspect HCV (sex with multiple partners or I.V. drug use?) What's your patient's occupation?

I **Investigate your findings further.** Review the lab values carefully to determine if there's hepatitis C infection. Remember, liver function tests may remain normal even with the presence of chronic HCV. Perform additional assessments to uncover the questions surrounding your patient's history: physical, medication history, nutritional, mental/social health, just to name a few. What support is available to the patient during possible treatment (financial, family/friends)?

V **Verify your findings.** Consult with members of the interdisciplinary team to determine the best approach for your patient. What options are available and how committed is your patient to completing the suggested treatment?

E **Educate your patient and his or her caregivers regarding the disease, treatment, and possible adverse reactions.** Remember to discuss potential signs of depression. Look into support groups for your patient and those assisting with care. Stress the importance of continuing the treatment as prescribed. Notify the PCP or specialist of any new symptoms or complaints.

R **Recovery begins as treatment progresses.** Because treatment can be prolonged (based on response to the medication), patients need to feel supported throughout the entire process. Following treatment, it's imperative to maintain appointments with healthcare providers. Additional blood work will be needed to determine the sustained viral response and identify any complications following treatment. Help your patient resume an active and productive life.

Symptoms focus

Hepatitis C has been called a silent epidemic because many people infected exhibit no signs or symptoms. According to the CDC, it can take from 4 to 12 weeks for someone to show any signs of HCV. If symptoms manifest, they're usually mild, such as fever, nausea, and vomiting similar to a flu-like illness. Although the symptoms may be absent or mild, liver damage can already occur.

As HCV continues to multiply, other symptoms become apparent: loss of appetite, dark urine, abdominal and/or joint pain,

fatigue, light- or clay-colored stools, and jaundice. Chronic HCV can lead to liver fibrosis (scarring), cirrhosis, cancer, and the need for liver transplant. In addition to the liver, other organs such as the kidneys and thyroid gland can be negatively affected by HCV.

Confirming the diagnosis

There are multiple tests needed to establish a definitive diagnosis of hepatitis C. These blood tests can be ordered by a PCP or a specialist, such as a gastroenterologist or hepatologist. Blood tests, such as EIA, enhanced chemiluminescence immunoassay, and liver enzymes (such as alanine aminotransferase), are used to confirm the diagnosis. Following a positive screening test, which detects the presence of HCV antibodies, additional testing is performed to determine the amount of virus present in the person's body. Test results that reveal both a positive HCV antibody and a reactive HCV RNA indicate infection. These individuals need to be referred for treatment.

In addition to immune assays and the HCV-RNA screening studies, liver functions studies are used to determine the presence of and/or extent of liver damage, which may already exist. A liver biopsy is also warranted to confirm the diagnosis of HCV and ascertain the amount of liver inflammation, progress of the disease, possible fibrosis, degree of necrosis, and possible other diseases. The biopsy is usually done before beginning treatment. The liver biopsy is often performed on an outpatient basis. There's a risk of bleeding following the procedure, thus patients must be closely monitored.

Educate patients about the procedure, monitor them closely following the procedure, and ensure proper after care to prevent postbiopsy complications. Patients should lie flat on their right side for 1 to 2 hours and then on their back for 3 to 5 hours. BP and pulse are checked frequently, as well as any signs of bleeding during this postprocedural time. Upon discharge, patients are instructed not to lift anything heavy or perform strenuous exercise for at least 1 to 2 weeks following the procedure and to avoid taking all anticoagulant medications, including aspirin and nonsteroidal anti-inflammatory drugs, for 1 week after the procedure.

The goals of HCV treatment are to improve the patient's health, decrease the risk of spreading the infection, and lower morbidity and mortality associated with the disease.

Treatment options

The goals of HCV treatment are to improve the patient's health, decrease the risk of spreading the infection, and lower morbidity and mortality associated with the disease. Improving the health of the individual with HCV requires achieving a sustained viral response—the absence of detectable RNA of the virus in the blood. The ultimate goal for treating hepatitis C is to eradicate the virus, have the patient test negative at the end of treatment, and remain HCV-RNA negative 24 weeks following completion of the medication regime. Elimination of the virus greatly improves the patient's quality of life.

There are numerous medications used to achieve the goal of reducing and eliminating HCV. The medications chosen depend on several factors: genotype, viral load, whether treatment has been previously given, degree of liver failure, and projected ability to tolerate the treatment. The treatment regimen typically involves using a combination of pegylated (long-lasting) interferon (PEG-INF) and ribavirin. Before the patient begins treatment, the PCP will order additional lab tests, such as lactic acid levels and thyroid function studies. PEG-INF increases lactic acid levels and may exacerbate autoimmune disorders.

PEG-INF decreases liver inflammation while suppressing replication of HCV. This medication is administered subcutaneously once a week, up to 48 weeks. Adverse reactions include flu-like symptoms, fever,

musculoskeletal pain, fatigue, rigors (related to the fever), headache, depression and suicidal ideation, hair loss (alopecia), itching (pruritus), and insomnia. Thorough physical, psychological, emotional, and social assessments and lab tests, such as complete blood cell (CBC) count with differential and platelets, thyroid stimulating hormone (TSH), liver function studies, and HCV viral loads, need to be performed on a regular basis (see *Pertinent adult lab values for HCV*).

Ribavirin, the second antiviral agent, is used concurrently with PEG-INF to reduce the spread of the virus by interrupting replication. This oral medication is taken twice daily for 24 to 48 weeks. Adverse reactions can include fatigue, flu-like symptoms, fever, headache, muscle aches, skin rash, nausea, and diarrhea. Frequent blood tests are needed to identify early signs of possible hemolytic anemia, which is one of the most life-threatening adverse reactions of ribavirin.

Over the years, other oral antiviral medications have been used in conjunction with PEG-INF and ribavirin to treat patients with significant liver disease as a result of HCV. These include telaprevir, boceprevir, and simeprevir. Using a third medication concomitantly with PEG-INF and ribavirin helps stop further progression of liver disease. Common adverse reactions of these antiviral drugs include rash, pruritus, nausea, muscle pain (myalgia), and acute sensitivity to the sun. Educate patients to limit the amount of time in the sun and use sunscreen when outside. Simeprevir may also cause

Pertinent adult lab values for HCV

Test	Normal findings	Indication
Aspartate aminotransferase (AST)	0 to 40 units/L of serum	Elevation may or may not indicate liver damage because AST can also be found in the heart, muscles, and brain. Lab results may be normal, increase, or decrease over time. AST can't be used to determine the degree of liver disease.
Alanine aminotransferase (ALT)	4 to 56 units/L of serum	More specific to liver disease, lab results may be normal, increase, or decrease over time. ALT can't be used to determine the degree of liver disease.
Prothrombin time	9.5 to 13.8 seconds	This test identifies the blood's ability to clot; may be longer if liver disease is present.
Albumin	3.5 to 5 g/dL	Albumin is a protein formed in the liver, and blood results can indicate liver function. A lower level (hypoalbuminemia) may indicate chronic liver disease.
Platelet count	150,000 to 400,000/ microliter	With liver disease, the platelet count may be low (thrombocytopenia).
Glucose	70 to 100 mg/dL (fasting nondiabetic) 70 to 130 mg/dL (fasting diabetic)	Hypoglycemia may occur in advanced liver disease or absence of sufficient nutrition. The nausea, vomiting, and anorexia of hepatitis C and its treatment may cause a decrease in glucose levels.
HCV antibody	Nonreactive	A reactive response indicates current hepatitis C infection or past infection that has resolved. A false positive result may occur; in this situation, the patient won't have HCV RNA detected in the blood.
HCV RNA	Not detected	RNA detection indicates current hepatitis C infection; treatment is recommended.

Note: It's possible for patients with chronic HCV to have normal liver function.

hormonal contraceptive medication to be less effective, thus alternative types of birth control measures should be discussed.

It's important to review with your patient the purpose of the medications, how and when to take them, and potential adverse reactions. Patients may become frustrated and even discouraged by the adverse reactions of the various medications and length of treatment. Strong interdisciplinary team support may enhance patient compliance with the medication regime. Just like with other diseases, scientists are researching and developing new drugs that have fewer adverse reactions.

Know your role

Now that you know who's at risk and how HCV is diagnosed and treated, how can you intervene to empower your patient? Before beginning treatment, thorough head-to-toe physical, psychological, and emotional assessments are needed to provide baseline data. Lab tests include a CBC count, urinalysis, electrolyte screening, screening for hepatitis A and B, TSH, blood glucose, and liver and kidney function studies.

Remember that HCV and its treatment can affect your patient's physical, social, psychological, and emotional well-being. Subjective and objective findings should be reported. How's the patient tolerating the treatment? What concerns does he or she have related to the diagnosis? If treatment is an option, can the patient financially afford to complete the treatment? What support systems are in place to assist the patient with the diagnosis and treatment? These are just a few important questions to guide your assessment of your patient's situation.

Ongoing assessments should be completed and documented each time the patient sees the healthcare provider because there are numerous and potentially life-threatening adverse reactions to each medication. Potential risk factors should be identified. Respiratory and cardiac assessments are necessary to determine if the patient is experiencing any complaints of chest pain or shortness of breath; these symptoms may be related to signs of anemia.

did you know?

New treatments are being researched to shorten the time of treatment and the combination of medications used. For example, the new oral combination medication ledipasvir/sofosbuvir doesn't require interferon or ribavirin and causes fewer adverse reactions. This medication is indicated for treatment of patients with genotype 1 HCV. Although there are vaccines for hepatitis A and B, there's no vaccine yet for hepatitis C. Research is currently being done to develop a vaccine to address HCV.

Complete a nutritional assessment to determine if there are signs of dehydration or malnutrition due to potential adverse reactions. Ask your patient about his or her alcohol intake. Alcohol is detoxified through the liver. Using alcohol or other drugs during treatment can cause increased adverse reactions and potential liver complications.

Make sure to ask your patient about all medications being taken, including prescriptions, over-the-counter medications, vitamins, supplements, and alternative medicines. Because many medications are detoxified through the liver, it's important to identify all medications both during and after treatment. Someone with liver disease may process and remove medications at a slower rate than those without liver disease, putting the patient at greater risk for drug reactions or toxicity. Furthermore, it's suggested that people with any known liver disease refrain from taking medications such as acetaminophen that are detoxified through the liver.

Monitor the patient's intake and output to watch for possible signs of dehydration. Weigh the patient at each visit and have patients weigh themselves weekly to determine if there has been any weight loss.

Skin should be assessed for signs of rashes or bruising; this can be irritation at the PEG-INF injection site, a drug reaction, or bleeding due to a decreased platelet count.

For women of child-bearing age, determine if the patient or partner is pregnant, planning to become pregnant, or currently breastfeeding.

Given the risk of fetal abnormalities from the various medications, education regarding contraception is essential.

Depression and suicidal ideation have been observed in patients receiving interferon, thus it's important to complete psychological and emotional assessments before treatment and at each visit.

Education is another important nursing intervention. Teach patients and their family members how the virus is and isn't spread. Patients with hepatitis C may feel afraid that they can give the virus to others. Healthcare providers should use appropriate bloodborne precautions when performing activities such as drawing blood or demonstrating injection techniques. Patients should be taught the proper way to dispose of used needles following medication administration. Medications should never be shared with anyone else and should be kept out of the reach of children.

Ongoing evaluation is necessary to ensure adherence with the medication regimen and overall care plan. If the patient experiences significant adverse reactions, then medication adjustment may be necessary. Lab work to assess the efficacy of the medication is required after 4 weeks of treatment and again after 12 weeks to determine if the virus is still detectable in the blood. This is considered the viral load. If the viral load hasn't decreased significantly, then treatment may be discontinued.

Another viral load blood level is drawn around 24 weeks posttreatment. If there's an undetectable viral load, the patient is considered "cured." However, that doesn't mean that the patient will never develop signs of HCV again. As with other chronic illnesses, ongoing visits with a PCP or specialist are important.

on the web

- **American Liver Foundation:** http://hepc.liverfoundation.org
- **CDC:** http://www.cdc.gov/hepatitis/hcv
- **MedlinePlus:** http://www.nlm.nih.gov/medlineplus/hepatitisc.html
- **U.S Department of Veterans Affairs:** http://www.hepatitis.va.gov
- **World Health Organization:** http://www.who.int/mediacentre/factsheets/fs164/en

Back to our patient

After receiving the news that she had HCV, Ms. L. is referred to a gastroenterologist by her PCP. She undergoes other diagnostic tests. Her liver biopsy indicates that she has mild liver inflammation. Her genotype is 1. Additional blood work shows that Ms. L is a good candidate for treatment using PEG-INF and ribavirin.

After taking her first dose on a Friday evening, Ms. L becomes extremely ill. Her temperature spikes to 105° F and she developed chills and uncontrollable shaking. The symptoms begin to subside by Sunday and she feels more like herself by Tuesday. This becomes the pattern for the next 12 weeks. Ms. L finds that she's unable to work and is glad she can take family medical leave until the school year ends.

Early in the course of the treatment, Ms. L begins to feel overwhelmed and withdraws from all other activities. Her gastroenterologist identifies her symptoms as possible depression and adds an antidepressant to her medication regime. Her mother moves in to help care for her and her daughters. After 12 weeks, Ms. L has a blood test to determine her viral load and is pleased to learn that it has significantly decreased. Treatment continues for the next 36 weeks.

Each week Ms. L experiences myriad adverse reactions, such as nausea, fatigue, and shortness of breath. At one point, her hemoglobin is so low that her gastroenterologist orders epoetin alfa to increase the production of red blood cells as a result of drug-induced hemolytic anemia. Forty-eight weeks from the beginning of treatment, Ms. L is able to stop taking her medications. She continues to follow up with her PCP and gastroenterologist for lab tests and physical exams. She develops signs of hypothyroidism as a result of the HCV medications and begins taking levothyroxine.

Ms. L is able to return to teaching and secures a full-time position. Six months following her final treatment, her viral load is tested. She begins crying when her gastroenterologist tells her that she's "cured." Although she still needs to see her healthcare providers every 6 months for follow up, she feels that she's back in control of her life.

Support for a full life

HCV can affect people of all ages and ethnic groups. It's a global health problem that requires us to understand the implications for screening, treatment, and recovery. Screening is imperative for individuals who are considered high risk for contracting the disease. The current treatment requires using combination drug therapy that has many adverse reactions, which often makes patients want to discontinue the regimen. With proper treatment, support, and education, patients diagnosed with HCV can lead full lives. ■

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