

Methamphetamine and HCV: Part 2



Alan Franciscus, Editor-in-Chief

Unfortunately, there is very little research about methamphetamine and hepatitis C. In this article I will discuss two of the larger studies – the first study is “Hepatitis C augments cognitive deficits associated with HIV infection and methamphetamine,” by M. Cherner and colleagues,¹ and the second study is one of the largest studies to date on methamphetamine and HCV, “Hepatitis C virus infection among methamphetamine-dependent individuals in outpatient treatment,” by Rachel Gonzales and colleagues.²

In the first study, Cherner and colleagues recruited 430 men and women who were participating in the program project on NeuroAIDS Effects of methamphetamine at the University of San Diego. The participants were recruited from substance abuse recovery programs and from the San Diego community. Potential candidates for participation in the study were excluded if they met criteria for dependence on any other drug except cannabis or alcohol (due to very high prevalence or use among the methamphetamine population). However, people with alcohol dependence or chronic long-term alcoholism within the *prior 12 months* were excluded from the study. The

primary objective of this study was to examine the role of HIV and methamphetamine dependence use on neurocognitive function (impairment of thought and behavior of the brain). The trial did not actively recruit HCV positive participants, but after recruitment was completed the participants were screened for hepatitis C and the prevalence was reported as follows:

- 37% among methamphetamine users who were HIV positive
- 28% among methamphetamine users who were HIV negative
- 7% among participants who were HIV positive but did not use methamphetamine
- 2% among participants who did not use methamphetamine and who were HIV negative

It was also found that the HCV positive study participants “were slightly older, had somewhat lower level of education, were more likely to have been diagnosed with episodic alcohol dependence in the past, and had elevated indicators of liver function.”

In the second study, by Gonzales and colleagues, the objective of the trial was to look at the relationship between methamphetamine use and the prevalence of hepatitis



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C. Seven hundred and twenty-three methamphetamine dependent individuals who sought treatment from outpatient drug treatment centers between 1999 through 2005 were recruited into the study. The treatment locations included 10 out-patient programs throughout the United States, including Northern and Southern California, Iowa, Hawaii, Missouri, Montana, and Texas. Information about methamphetamine use and HCV status were taken from the records collected at each treatment program.

The characteristics of the study group were: 56% of the group was male, average age was 34.5 years, 71% were White, 12% were Hispanics, 11% were Asians/Pacific Islanders, 2% were African Americans, 2% were American Indians/Native Americans, and 3% were of other ethnic background.

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METH: PART 2

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The reported route of administration of methamphetamine was smoking (66%), injecting (20%) and intranasal or snorting (14%). The average lifetime use of methamphetamine was an average of 9.69 years (\pm 6.8).

The researchers found that about 15% of all the participants were HCV positive – breaking it down by mode of transmission it was found that 44% of the injectors were HCV positive, compared to 12% of the intranasal users (snorted) and 7% of the smokers.

The higher prevalence of HCV among the injectors is consistent with the current literature. The prevalence of HCV among the non-injectors is also in line with previous studies that have found a risk of acquiring HCV through non-injection practices. In addition the authors point out that there could be other factors that influence the rate of HCV prevalence in their study among injectors and non-injectors, such as tattooing, piercing, sharing drug equipment, and high risk sex. Still this study does shed some light on the connection between HCV and methamphetamine use that will hopefully lead to more studies on methamphetamine use and hepatitis C which can help define the messages needed to help prevent the transmission of HCV among methamphetamine users.

References

1. Cherner M, Letendre S, Heathon RK, et al. Hepatitis C augments cognitive deficits associated with HIV infection and methamphetamine. *Neurology*. Apr 26 2005; 64(8):1343-1347
2. Gonzales R, Marinelli-Casey P, Shoptaw S, Ang A, Rawson RA. Hepatitis C virus infection among methamphetamine-dependent individuals in outpatient treatment. *J Subst Abuse Treat*. Sep 2006;31(2):195-202.

NEUROCOGNITIVE IMPAIRMENT

In their study, Cherner and colleagues¹ found that HCV was a significant predictor of neuropsychological (NP) impairment above and beyond the contribution of HIV infection and methamphetamine (METH) dependence.

Here is what was reported:

HCV infection: impairment was found in the global or overall NP functioning and in specific NP areas such as learning, abstraction, and motor skills, with trends in speeded information processing, and delayed recall. Hepatitis C infection *did not* predict scores in attention/working memory or verbal fluency.

HIV infection: impairment was found in the global or overall NP functioning and specific areas such as learning, delayed recall, abstraction, speeded information processing with trends in attention/working memory and motor ability.

Methamphetamine dependence: impairment was found in the global or overall NP functioning and specific areas such as learning, delayed recall, attention/working memory, motor performance with a trend in abstraction.

The authors noted that, “Observations from the current study are consistent with the hypothesis that HCV infection has an independent adverse effect on NP performance and the effects of HCV, HIV, and METH use are additive.”

Gastro-Related Trivia

Alan Franciscus, Editor-in-Chief

- People produce between 1 and three pints of saliva a day – that’s about 25,000 quarts in a lifetime.
- The average male will eat approximately 50 tons of food during his lifetime to sustain a weight of 150 lbs
- It takes about 12 hours for food to entirely digest.
- The average small intestine is about 22 feet long
- The average large intestine is about 5 feet long
- A normal cow’s stomach has 4 compartments – the rumen, reticulum (storage area), omasum (where water is absorbed), and abomasum (the only compartment with digestive juices).
- The stomach can produce and secrete about 2 to 3 litres of gastric acid per day

The Seven Benefits of Regular Physical Activity

1. Strengthen your cardiovascular and respiratory systems
2. Keep bones and muscles strong
3. Manage your weight
4. Prevent and manage diabetes
5. Ease depression and manage pain and stress
6. Reduce your risk of certain types of cancer
7. Sleep better

Source: www.mayoclinic.com.

HealthWise:

A Laugh a Day May Keep the Doctor Away



Lucinda K. Porter, RN

Since 1998, the subject of all but four of the April *Healthwise* columns have been about humor. One of those four was about memory, which in me is a laughing matter. Humor is so important to me that I include the concept when I write health promotion articles for the Hepatitis C Support Project.

I have studied the affect of laughter on the immune system. I have taken continuing education workshops on the subject. One memorable workshop was led by an Intensive Care Unit nurse who was a certified clown. She worked with Patch Adams, the physician, clown, and humanitarian portrayed by Robin Williams in the movie *Patch Adams*. This workshop leader also worked with Norman Cousins. Edward Asner portrayed Cousins in the made for TV version of the book *Anatomy of an Illness*.

Cousins referred to laughter as “inner jogging.” Before his death in 1990, he used humor to cope with two severe medical conditions. Cousins translated his personal experience into a medical art. He worked in a hospital and charged the staff with a daily task – learn a new joke and tell it to the patients and staff. He replaced apples with a joke a day to keep the doctor away.

Perhaps a laugh a day does not keep the doctor away, but it sure makes life more bearable. Humor can help us talk about the unspeakable. Peter Ustinov mused, “Comedy is simply a funny way of being serious.”

Having chronic hepatitis C viral infection (HCV) is *not* funny. The initial diagnosis is especially serious. However, living with it can provide endless amusement. I laugh the most about HCV when I attend support groups with others who are learning to live and laugh with this disease. Although the vast majority of us will die of something other than HCV, approximately ten to twelve thousand of us will die from this virus. While on their deathbeds, I have seen people laugh even in the last stages of

liver failure. People who die with a smile on their face seem to do so with dignity and grace. This was eloquently stated when Anne Lamott declared, “Laughter is carbonated holiness.”

Reba McEntire quipped, “To succeed in life, you need three things: a wishbone, a backbone and a funny bone.” To help us find our funny bones, I end with a few insights I describe as *things you don’t want to hear your liver doctor say*:

- “You have had hepatitis C for HOW LONG????!!”
- “You donated how many quarts of blood?”
- “Could you stop that thing from beating – I can’t concentrate with all this noise.”
- “Wow, I have never seen anything like this.”
- “You injected your interferon where?”
- “You were supposed to take those pills twice a day, not just twice.”
- “The injection instructions were once a week, not once a day.”
- “The manufacturer recalled the drug you took.”

Things you don’t want to hear during a liver biopsy:

- “Oops, missed again.”
- “Don’t worry, I always shake a little in the morning before my first couple of drinks.”
- “Wait a minute, if this is the liver, then what is that?”
- “Rats, I hate it when the needles aren’t very sharp.”
- “Sorry, I am late. I was up late last night; my wife and I had a fight this morning and

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LAUGHTER

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the coffee maker broke so I didn't have my usual morning coffee."

- "Darn, I hate it when a page is missing from the manual."
- "Nurse, hand me that what-cha-ma-call-it."
- "Hmmm, I wonder how long the power will be out this time."
- "I thought the liver was on the left side. I hate it when I mix up the heart and the liver."

And finally, the one that actually happened to me before my first liver biopsy, "Damn, I left my glasses back at the office."

For further reading or laughs:

1. Patch Adams *www.patchadams.org*
2. Comedy Central A Joke a Day *jokes.comedycentral.com/joke_of_day.aspx*
3. Cousins, Norman *Anatomy of an Illness* Bantam Books
4. Lamott, Anne *Plan B: Further Thoughts on Faith* Riverhead Books
5. Laughter Heals Foundation *laughterheals.org*



Impaired Quality of Life



Alan Franciscus, Editor-in-Chief

It is well-known that people with hepatitis C have a diminished quality of life compared to those without hepatitis C. However, does hepatitis C impair health-related quality of life (HRQOL) for those people with hepatitis C who have persistently normal liver enzyme levels? A study titled "Impaired health-related quality of life in patients with chronic hepatitis C and persistently normal aminotransferase levels" was recently released that looked at this very issue.

In the study, Von Wagner and colleagues enrolled 165 patients with hepatitis C – 45 HCV patients with persistently normal aminotransferases (PNAL), 70 HCV patients with elevated aminotransferase, and 50 healthy subjects (control group). Emotional and psychological states were evaluated by the Profile of Mood States (POMS) scale, and health-related quality of life was evaluated by the 'Everyday Life' questionnaire (EDLQ), a validated questionnaire related to the SF-36 Health Survey. Age and sex were similar between the study groups. However, compared to the HCV group with elevated aminotransferase, people with PNAL were more likely to be women, to have been infected for longer periods, and to have less inflammatory activity and progression of fibrosis.

The study found that compared to the healthy controls, PNAL patients had significantly higher scores for depression and anger, and significantly lower scores for self-confidence, zest for life, relationship to partner, and body image. There were no differences between the 2 groups of HCV patients except that the PNAL group had worse scores for anger than the patients with elevated aminotransferases. The authors stated that "[n]o association of quality of life with severity of liver disease was found," and concluded that "[i]mpairment of HRQOL by chronic infection with HCV is similar in patients with PNAL and those with elevated aminotransferase levels."

"the PNAL group had worse scores for anger than the patients with elevated aminotransferases"

Reference

von Wagner M et al. Impaired health-related quality of life in patients with chronic hepatitis C and persistently normal aminotransferase levels. *J Viral Hepat* 2006 Dec; 13:828-34.



Retrovirus Conference Report

■■■
Liz Highleyman

The 14th Conference on Retroviruses and Opportunistic Infections, held February 25-28 in Los Angeles, featured numerous reports on HIV/HCV and HIV/HBV coinfection.

ACUTE HCV INFECTION

Over the past few years, several outbreaks of apparently sexually transmitted acute HCV infection have been reported among gay and bisexual men in the UK and European cities, most of whom were HIV-positive. At the recent conference, Martin Fisher and colleagues from Brighton (*abstract 130*) reported that such infections also occur in HIV-negative men who have sex with men. The researchers tested nearly 4,000 patients for HCV at their HIV/sexually transmitted disease (STD) clinic since 2000. They identified 25 new cases of HCV infection (3.6 per 1000 person-years in 2006), including 16 in HIV-positive men, five in HIV-negative men, and four in men of unknown HIV serostatus. The acute infection rate increased from no cases during 2000-2002 to 13 in 2006. New HCV diagnoses were associated with fisting, unprotected anal intercourse, multiple sex partners, other STDs, and non-injection drug use. While HIV-positive men were about 13 times more likely to be diagnosed with acute hepatitis C, the report illustrates that HIV-negative people are also at risk, and underlines the need for improved prevention efforts.

Another presentation showed

that HIV-positive people with acute HCV infection may experience rapid liver disease progression. Daniel Fierer and colleagues from Mount Sinai School of Medicine (*abstract 889*) performed liver biopsies on five HIV-positive men who have sex with men in New York City who presented with recent HCV infection. Four of these patients had moderate (stage 2) portal fibrosis, despite a very short period of HCV infection. All were negative for hepatitis A and B, denied heavy alcohol use, and had no other apparent causes of liver fibrosis. While past research has shown that liver fibrosis progresses more rapidly in HIV/HCV-coinfected individuals — most of whom are infected with HCV first — this study suggests that progression may be further accelerated in people who are already HIV-positive at the time they acquire HCV.

INTERACTION OF HCV AND HIV

The reasons for faster liver disease progression in HIV/HCV-coinfected patients are not well understood, but a presentation by F. Yue and colleagues from the University of Toronto (*abstract 133*) suggested a possible explanation. Performing biopsies on six HCV-monoinfected and 14 HIV/HCV-coinfected individuals,

they found that while both groups had similar numbers of HCV-specific CD4 and CD8 T-cells in their livers, coinfecting patients also had HIV-specific T-cells, leading to greater overall production of interferon-gamma and TNF-alpha, cytokines that are linked to more intense inflammation and fibrogenesis.

“smaller CD4 cell increases after starting HAART predicted the emergence of hepatic clinical events.”

Past research has produced conflicting data about whether

HCV influences HIV disease progression. N. Gwamzi and colleagues (*abstract 921*) reported that after six months of antiretroviral therapy, non-injection drug-using HIV-monoinfected and HIV/HCV-coinfected patients in Kenya had similar CD4 cell counts and were equally likely to have undetectable HIV viral load, contradicting several previous studies showing that coinfection was associated with slower immunological recovery after starting HAART.

S. Resino and colleagues (*abstract 935*) reported that antiretroviral therapy reduced the rate of fibrosis progression and the development of bridging fibrosis and cirrhosis in HIV/HCV-coinfected patients. In a related study, Jose Garcia-Garcia and colleagues (*abstract 934*) found that the overall rate of clinical

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progression of liver disease was relatively low among coinfecting patients, but that smaller CD4 cell increases after starting HAART predicted the emergence of hepatic clinical events. Andri Rauch and colleagues (*abstract 925*) reported that HCV viral load was significantly higher in coinfecting individuals with low CD4 cell counts in the Swiss HIV Cohort, but the clinical relevance of this finding is unknown.

HEPATITIS C TREATMENT IN COINFECTION PATIENTS

Raymond Chung of Massachusetts General Hospital (*abstract 162*) presented an overview of hepatitis C treatment in HIV/HCV-coinfecting patients. Given the disappointing response rates and adverse events associated with existing therapy, and the prospect of new targeted anti-HCV agents in the pipeline, he concluded that the decision about whether to initiate treatment now or wait rests on a variety of individual factors, including history of prior interferon-based therapy, HCV RNA level, and stage of liver disease.

Several presentations focused on individually tailored anti-HCV therapy and factors that predict response in coinfecting patients. Jose Mira and colleagues (*abstract 891*) confirmed that rapid virological response, or undetectable HCV RNA four weeks after starting interferon-based therapy, is a reliable predictor of sustained virological response (SVR) in coinfecting patients; D. O'Shea and colleagues (*abstract 894*) reported similar findings. However, Mamta Jain and colleagues (*abstract 895*) found that larger decreases in HCV

RNA during the first two weeks of therapy also predicted SVR, potentially pushing the decision point for continuing treatment even earlier.

Looking at dose levels and duration of therapy, Pablo Barreiro and colleagues (*abstract 901*) found that a high plasma concentration of ribavirin (at least 2.1 mcg/mL) was the main determinant of virological response, suggesting that weight-based dosing is superior to a fixed dose. Marina Nunez and colleagues (*abstract 899*) reported that in the Spanish PRESCO trial, extending the duration of pegylated interferon plus ribavirin to 12 months for genotype 2/3 patients or 18 months for genotype 1/4 patients did not reduce the risk of relapse after completion of therapy.

In another PRESCO presentation, Vincent Soriano and colleagues (*abstract 905*) concluded that the higher SVR rates observed in this study compared with past coinfection trials – 35% for genotype 1/4 and 72% for genotype 2/3 – may be attributable to participants having higher CD4 cell counts (above 300 cells/mm³), higher doses of ribavirin (1000-1200 mg/day), avoidance of ddI, and limited use of AZT (which, like ribavirin, can cause anemia).

With regards to antiretroviral therapy, Jose Mira and colleagues (*abstract 898*) reported that coinfecting patients who received HAART regimens containing tenofovir or d4T plus 3TC were more likely to achieve SVR compared with those taking other nucleoside reverse transcriptase inhibitors. Firouze Bani-Sadr and colleagues (*abstract 897*) found that use of abacavir was associated with a lower likelihood of early virological response, possibly due to a negative interaction between

abacavir and ribavirin.

Paola Nasta and colleagues (*abstract 896*) reported that higher HOMA-IR insulin resistance scores were associated with reduced virological response rates. In a related presentation, Dominique Salmon and colleagues (*abstract 917*) reported that insulin resistance was also associated with more severe liver fibrosis.

NONINVASIVE FIBROSIS TESTS

In the area of noninvasive monitoring of liver fibrosis, David Thomas of Johns Hopkins (*abstract 161*) gave an overview of existing tests in comparison with liver biopsy. Though current biomarker tests leave much to be desired, he noted that biopsy itself is prone to error, and suggested that, “clinicians may want to consider using noninvasive methods to assess HCV treatment urgency.”

Several studies on various noninvasive tests produced conflicting results. While D. Nunes and colleagues (*abstract 916*) concluded that, “Serum markers of liver fibrosis are highly predictive of adverse liver events in HCV-infected individuals with and without HIV coinfection,” Norah Shire and colleagues (*abstract 914*) found that, “Current models for fibrosis assessment have poor discriminatory capacity in HCV/HIV-coinfecting patients.” Patrice Cacoub and colleagues (*abstract 909*) confirmed the general consensus that noninvasive biomarkers do a reasonably good job at distinguishing advanced fibrosis or cirrhosis from absent or minimal fibrosis, but perform less well at distinguishing between intermediate stages. Salvador Vergara and colleagues (*abstract 910*) reached a similar conclusion regarding the FibroScan

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Extrahepatic Manifestations: *Systemic Lupus Erythematosus*



Alan Franciscus, Editor-in-Chief

Systemic lupus erythematosus (SLE) is a disease that can cause inflammation and damage to various parts of the body. Lupus can affect any area of the body, but it most often affects the joints, skin, kidneys, heart, lungs, blood, or brain. Lupus is an autoimmune disease – this is when a person’s immune system produces antibodies against normal cells and organs. It is estimated that between 1.5 and 2 million Americans have been diagnosed with lupus and there are about 16,000 Americans who develop lupus each year. Lupus more commonly strikes woman than men – about 90% of all lupus cases are among women. The majority of women are diagnosed between the ages of 15 and 45. Lupus is more than two to three times as common in people of color – African Americans, Hispanics, Asians, and Native Americans – than in Caucasians.

For most people with lupus it is a mild condition that usually only affects a few organs, but in others it can be a serious, debilitating and even life-threatening condition.

CAUSE

The exact cause of lupus is not known, but environmental, genetic, other conditions and diseases (such as HCV) may act as a trigger. There is a limited amount of information about the HCV connection to lupus. One of the largest studies on lupus and HCV was performed by Manuel Ramos-Casals and colleagues¹ which

evaluated the relationship between lupus and HCV among 134 patients with lupus (121 women and 13 men). In this study it was reported that HCV antibodies were present and confirmed in 11% of the study participants. The authors also commented that some of the HCV-related lupus appeared to produce or mimic the symptoms of lupus which would result in a lower number of people in the trial who had ‘true’ lupus. It is important to know that this study looked at the prevalence of HCV in a group of people with lupus, but it **was not** a study that looked at the prevalence of lupus in the hepatitis C population. We do not know the percentage or how many people with hepatitis C also have lupus but it is believed to be very low.

SYMPTOMS AND DIAGNOSIS

The diagnosis of lupus is often difficult because the symptoms are similar to other diseases or conditions. The most common symptoms of lupus include joint pain, frequent unexplained fever, swollen joints, fatigue (moderate to severe), skin rashes, chest pain (especially on deep breathing), rash across the cheek and nose (resembles the shape of a butterfly), sensitivity to light or the sun, hair loss, abnormal blood clotting, Raynaud’s syndrome, seizures and/or mouth or nose ulcers, and anemia. At this time there is not a single laboratory test to diagnose lupus.

The American College of Rheumatology (ACR) issued a list of 11 symptoms that are used to diag-

nose lupus such as rashes, photosensitivity, oral ulcers, arthritis, serositis (inflammation of the linings of the heart or lung), kidney dysfunction (excessive protein in urine), seizures, psychosis, hemolytic anemia, leucopenia (low white blood cells), and positive to antinuclear antibody (ANA – a sign of autoimmune disease). A diagnosis is usually made when a person has 4 or more of these symptoms and/or blood test abnormalities.

DISEASE PROGRESSION

There is no cure (at this time) for lupus, but the prognosis for most people with lupus is good. Some people will develop serious or life-threatening illness, but the vast majority of people with lupus can expect to live a normal lifespan. As with any condition or disease, it is always important to become as educated as possible and advocate for your medical care. There are some organizations that help people with lupus and it is a good idea to find a support group in your area so that you can connect to and get support from others who have the same condition.

TREATMENT

There are many strategies to treat or manage lupus. The most important strategy is to work closely with a knowledgeable medical team. The medical specialist who manages and treats lupus is rheumatologist – a doctor that

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ORGAN DONATION

The President and Congress have proclaimed April to be *National Donate Life Month*. This time is set aside to raise awareness about the need for organ donation. There is a critical need for organs. Most states in the U.S. have donor registries. States without official registries and not previously featured in *The Advocate* are Arkansas, Hawaii, Maine, Maryland, Massachusetts, Mississippi, New Hampshire, New Jersey, North Dakota, Oregon, Rhode Island, Tennessee, Vermont, and West Virginia. Puerto Rico does not maintain a donor registry.

Organs can be donated in the states and territories without official registries. Residents may indicate their preferences on their driver's license or state ID at time of application or renewal. Residents are encouraged to tell their loved ones about their preferences. A family notification card may be downloaded at: www.donatelife.net/CommitToDonation/notify_form.pdf

People living with HCV may donate their organs. Organs are used on a case-by-case basis. Honor *National Donate Life Month* by asking your family to donate your organs upon death. Also, ask your family and friends to join you by offering this lifesaving gift.

Donate Life America www.donatelife.net/index.php

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transient elastometry method.

ENTECAVIR ACTIVE AGAINST HIV

Finally, turning to HIV/HBV coinfection, Chloe Thio and colleagues (*abstract 136LB*) reported that the anti-HBV drug entecavir (Baraclude) appears to also have activity against HIV and may select for mutations that compromise the effectiveness of antiretroviral therapy. Several approved and investigational anti-HBV agents are active against both HIV and HBV. Since it was thought to be active only against HBV, entecavir was often recommended for HIV/HBV-coinfected patients who did not yet need HAART. Thio's team identified three such patients who experienced decreased HIV viral load after starting entecavir, indicating that the drug was active against HIV. They then confirmed the activity of entecavir against HIV in laboratory tests, and found that the drug led to the emergence of the M184V mutation, which confers resistance to 3TC (approved for treatment of both HBV and HIV) and emtricitabine (approved for HIV). In light of these findings, the U.S. Food and Drug Administration and manufacturer Bristol-Myers Squibb notified healthcare providers in February that the entecavir product label is being revised to reflect the new data.

For Retrovirus conference abstracts and posters, see <http://www.retroconference.org/2007>.



LUPUS

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specializes in treating diseases that affect the joints and muscles. It is also important that a person with lupus learn to recognize when an increase in symptoms is starting ('flare-up') and what triggers a 'flare-up.' In general it is recommended that people with lupus avoid excessive alcohol consumption, smoking, and overexposure to the sun.

There are many medications that can help to alleviate the symptoms of lupus including non-steroidal anti-inflammatory drugs (NSAIDs), acetaminophen, corticosteroids, immunomodulating drugs, and anticoagulants.

Research

There is much research that is looking at what causes lupus and what drugs can be used to treat it. For more information on clinical trials for lupus go to www.clinicaltrials.gov

References

¹Ramos-Casals M, Font J, Garcia-Carrasco M, Cervera, R, Jimenez, S, Trejo, O, De La Red, G, Sanchez-Tapias, J, and Ingelmo M. Hepatitis C Virus infection mimicking systemic lupus erythematosus. *Arthritis Rheum.* 2000; 43(12):2801-2806

Resources:

Lupus Foundation of America INC
– www.lupus.org



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