LUPUS: NONDIETARY AND DIETARY FACTORS

ã **2004 Amy C. Brown, PhD, RD**
Department of Human Nutrition, Food, & Animal Sciences
College of Tropical Agriculture & Human Resources
University of Hawaii at Manoa
1955 East-West Road, Rm 216
Honolulu, HI 96822
808/956-3846 * 808/956-4024 fax
amybrown@hawaii.edu

DEFINITION

"Lupus" is Latin for wolf, and "erythematosus" refers to the red rash on a person's face that makes them look wolf-like. Lupus erythematosus is a chronic, inflammatory auto-immune disease that is more common than muscular dystrophy, cystic fibrosis, leukemia, or multiple sclerosis. It is difficult to say what causes lupus, because autoimmune diseases are multifactorial with genetic, environmental, hormonal, viral, and psychoneurological influences all playing a role. Normally, the immune system protects a person from infection and disease by producing antibodies that attack foreign substances such as bacteria and viruses. In lupus, the body's antibodies attack itself (collagen tissue) resulting in inflammation.

Two Types of Lupus:

1) Discoid lupus erythematosus (DLE) - a milder form of the disease, is identified by an inflammation that primarily affects the skin in the form of a rash.
2) Systemic lupus erythematosus (SLE) – the more serious form of the disease can involve any organ in the body particularly the joints, skin, blood, kidney, heart, lungs, and nervous system. Symptoms often oscillate between exacerbation and remission, however, some people with lupus are unaware that they even have the disease, while others have major complications.

NONDIETARY FACTORS

AVOID EXCESS STRESS

Stress is one of the biggest causes of flare-ups and should be avoided.

AVOID ULTRAVIOLET LIGHT

Almost half (40%) of the people with lupus are sensitive to the sun. Only about 50 percent of the normal cells ability to repair DNA is present in people with lupus and this is a problem because sunlight or tanning booths may damage the cells, DNA leaks into the tissues/blood, and antibodies are formed against the DNA. As a result, excessive sun exposure may cause skin lesions, burning, itching, fatigue, weakness, nausea, vomiting, and joint pain. A sun protective factor (SPF) of at least 15 should be applied before exposure to the sun, and some people extremely sensitive to the sun benefit by relocating to a cooler climate.

SUFFICIENT REST AND SLEEP

AVOID INFECTIONS/CONTAGIOUS DISEASES

Activating the immune system should be avoided so it's important to avoid colds, unnecessary immunizations, and any type of infection.

PREGNANCY

Pregnancy can induce flare-ups in women with previously inactive or active lupus. Two apparently healthy women were reported to experience postpartum kidney failure which actually led to the diagnosis of systemic lupus erythematosus. Many women with lupus have normal pregnancies, however, a few experience exacerbation of symptoms after delivery. One researcher reported that this occurred less than one fourth of the time.

If a woman decides to get pregnant, her kidney function needs to be stable for at least 6 months prior to pregnancy. There is also an increased risk of a miscarriage early in pregnancy and a higher occurrence of late complications such as pregnancy induced hypertension. On very rare occasions, the infant may have congenital heart block and ten percent of these cases die within the first year.

AVOID "TRIGGER" DRUGS

Less than 10 percent of all lupus cases are drug related, and the lupus-like symptoms are usually alleviated once the medication is stopped. The two types of drugs most often implicated are hydralazine or procainamide, and baseline ANA values should be determined before beginning therapy with these drugs. The list of drugs implicated in inducing lupus continues to grow and a few are listed below:

alpha-methyldopa
aminosalicyclic acid
antibiotics (penicillin, tetracyclines)
anti-convulsant drugs (Dilantin, Mysoline)
antithyroid drugs (propylthiouracil)
barbiturates (Phenobarbitol)
carbamazepine
diphenylhydantoin
estrogen
**** heart medications: Procainamide (Pronestyl) - the most common drug inducing lupus. It is used to treat heart irregularities.
** high blood pressure medications (Apresoline, Hydralazine)
hydantoin
ibuprofin (headache remedy)
isoniazid
mezantoin
methphenylethylhydanloin
oral contraceptives - estrogen-containing contraceptive pills can result in exacerbations of SLE and are generally not recommended
procainmide
propyl thiouracil
sulfa drugs (sulfonamides)
trimethadione

DIETARY FACTORS

No specific diet for the treatment of lupus exists, however, certain substances in the diet may aggravate or alleviate lupus symptoms and these are listed in Table 1 & 2 below. This tentative list is based on the relatively few studies (animal & human) in the scientific literature showing a relationship between nutrition and lupus, and no large scale studies have been done with lupus patients to substantiate the benefit, if any, of these dietary interventions. Any changes in diet need to be pre-approved by a physician and implemented with the assistance of a registered dietitian.

Overall, aggravating substances appear to include excess calories, excess protein, high fat (especially saturated and omega-6 polyunsaturated fatty acids), zinc, iron, and L-canavine found in alfalfa tablets. Possible beneficial dietary compounds include vitamin E, vitamin A (beta-carotene), selenium, fish oils (omega-3 polyunsaturated fatty acids), evening primrose oil, flaxseed, a plant herb (Triptergium wilfordii), DHEA (dehydroepiandrosterone), and calcium plus vitamin D (if taking corticosteroids). Some people with systemic LE placed on food allergy elimination diets reported improvement in their LE symptoms, however, this may be related to a decrease of other substances in the diet. Also, although no direct evidence was reported on the beneficial effects of either bromelain or a vegetarian diet (possibly allowing fish), it is suggested that they might be beneficial. Limitations to this research are that the findings are based on relatively few studies, many of which were without control groups or extrapolated from animal models. No large scale studies have been done with LE patients to substantiate the benefit, if any, of these individual dietary interventions, and if they were conducted, the remission and exacerbation pattern of LE may interfere with elucidating their effectiveness. Also, dietary changes should not be attempted without a physician's approval/monitoring and a dietitian's guidance.

Table 1

POSSIBLE HARMFUL DIETARY SUBSTANCES RELATED TO LUPUS ERYTHEMATOSUS

Possible Harmful Substances	**Suggested Maximum Daily Intakes**[a]
Excess Energy	2400-2600 calories (men) 1600 calories (women)[b]
Excess Protein	63 g (men)/50 g (women)
High Fat (especially saturated	30% of calories/65 g (total fat)
& polyunsaturated omega-6 fatty acids)	10% of kcalories/20 g (sat fat)
Zinc	15 mg (men)/12 mg (women)
Iron	10 mg (men)/15 mg (women)
L-canavine (alfalfa tablets)	NA

[a] Based on the 1989 Recommended Dietary Allowances (RDA) for adults 25-50 yrs; 1997 Dietary Reference Intakes (DRI); Reference Daily Intakes (RDI) and Daily Reference Values (DRV).

[b] Note: These values represent the average daily caloric intake of Americans (the majority of which are overweight) and are below the RDA values for men (2900 kcalories) and women (2200 kcalories).

Table 2

POSSIBLE BENEFICIAL DIETARY SUBSTANCES RELATED TO LUPUS ERYTHEMATOSUS

Beneficial Substances	Possible Daily Intakes[a]
Vitamin E[b]	30 IU/9 mg alpha-TE (400-1500 IU/130-500mg)
Vitamin A (beta-carotene)	5000 IU/1000 ug RE
Selenium	70 ug
Fish Oils[c] (omega-3 fatty acids)	(1.5 - 3 g of EPA/DHA)
Evening Primrose Oil	(5 g)
Flaxseed	(30 g)
Plant Herb (Triptergium wilfordii)	(10 mg)
DHEA[d] (dehydroepiandrosterone)	?/(200 mg - side-effects?)
Food Allergy Elimination Diets	NA
Calcium (if taking corticosteroids)	1000 mg
Plus Vitamin D	400 IU/10 ug

[a] Based on the Reference Daily Intakes (RDI). Amounts in ( ) represent tentative research data.

[b] High dosages of vitamin E act as an anticoagulant.

[c] Most fish oil capsules contain about 300 mg of omega-3 fatty acids, so about 2-3 tablets/meal will yield 1.8 - 2.7 g.

[d] Caution: People should not take DHEA unless under the care of their physician who approves such a regimen. The benefits of DHEA reported in people with lupus occurred at high, and questionable, intakes of 200 mg/day. DHEA is an androgenic with male hormonal influences, and dosages as low as 50 mg/day have been reported to cause minor side-effects such as acne, facial hair growth, menstrual changes, and improved mood. There are also animal studies in which DHEA appears to cause liver cancer in rats.

POSSIBLE HARMFUL SUBSTANCES

Excess Calories

Cutting back on calories does improve the symptoms of lupus in mice and increases their longevity. Laboratory tests reveal lower levels of circulating immuno complexes in mice on a calorie-restricted diet.

Excess Protein

Low-protein diets are known to improve survival rates in mice with lupus. When researchers fed mice a diet free of milk protein (casein), 12 of 15 mice were still alive at 10 months compared to only 1 in 10 mice on the control diet. The casein-free mice also had less anti-DNA antibody and immunoreactants in the kidneys. Limiting foods such as beef and dairy products that are high in certain amino acids such as phenylalanine and tyrosine, has also reportedly been beneficial in laboratory animals. A special precaution should be taken to avoid tryptophan supplementation, an amino acid that used to be purchased in health food stores as a sleep aid because elevated levels of tryptophan metabolites have been reported in lupus patients, and researchers have suggested that tryptophan breakdown products may lead to autoantibody production. Animals with lupus were reported to survive longer if fed a tryptophan-deficient diet.

The bottom line given these results, is that it may be a good idea to avoid any and all

amino acid supplementation unless specifically recommended by a physician. Also, the average American ingests double the protein needed for one day, so an easy way to reduce protein and any resulting affect on lupus, if any, is to become a vegetarian. To determine the recommended amount of protein needed each day, simply multiply desired body weight by .36. Someone weighing 120 pounds would only need 44 grams of protein a day (120 x .36 = 44). There are about seven grams of protein in each ounce of meat, egg, one ounce of cheese, one cup of milk, one cup of dried beans (kidney, soybean, lentil, etc), one cup of green peas, one and a half tablespoons of peanut butter (142 calories/12 grams fat), and one fourth cup of peanuts (210 calories/18 grams fat). The remaining foods contain negligible amounts of protein.

High Fat (Especially saturated & polyunsaturated omega-6 fatty acids)

It's a paradox, but indirectly suppressing the immune response through diet may be beneficial to autoimmune disease patients. A deficiency is not recommended at all, but it may help not to provide abundant amounts of immune-system stimulating nutrients such as protein, essential fatty acids, and zinc. Vitamin C is also important for the immune system, but there were no reported studies of its affect on lupus symptoms.

Lupus patients who reduced their dietary polyunsaturated fats for one year reported beneficial effects. In animals, less fatty acids resulted in an increased survival time for mice in part because there was a delay in antibody production and less severe renal disease. Reducing fatty acids may be beneficial because it makes less available for the production of certain prostaglandins responsible for inflammation. It was also reported that adjuvant arthritis was suppressed in rats fed less essential fatty acids. An essential fatty acid deficiency should be avoided in humans because it can result in dermatitis (skin inflammation) and failure-to-thrive in infants.

Acid Food Source	**Omega-6 Fatty Acid (g/100g)**
Safflower Oil	74.3
Sunflower Oil	66.5
Poppyseed Oil	66.5
Corn Oil	57.8
Wheat Germ Oil	54.8
Walnut Oil	52.8
Cottonseed Oil	50.9
Sesame Oil	41.3
Mayonnaise	36.3
Rice Bran Oil	33.4
Liquid Margarine	33.4
Peanut Oil	26.1
Brazil Nuts	20.8
Tahini	23.1
Pine Nuts	20.7
Pumpkin Kernels	20.7

Zinc

Animals fed less zinc had increased survival times in the presence of a delayed expression of autoantibodies. The only foods really high in zinc are meats, oysters, and Brazil nuts. It would be prudent not to take essential fatty acid or zinc supplements and to avoid excessive intakes of foods high in these nutrients. A vegetarian diet would automatically reduce overall zinc intake.

Iron

One animal study suggests that very high iron intakes may affect the kidneys. Dietary sources of iron would never reach the level given to laboratory animals. A source of excess iron for humans is ingestion of pre-natal vitamin/mineral supplements that often contain 30-60 mg which is much higher than a woman's RDA of 15 mg/day.

Alfalfa Tablets

Alfalfa tablets are not recommended because giving alfalfa seeds or sprouts induces lupus in monkeys. Two women with lupus experienced symptoms of weakness, apathy, sluggishness, drowsiness, joint pain, and depression after ingesting 8-15 alfalfa tablets daily. The compound in alfalfa causing these affects may be L-canavine which gets more concentrated in alfalfa tablet form.

POSSIBLE BENEFICIAL SUBSTANCES

Vitamin E

Controversy continues regarding vitamin E, but benefits have been reported in some, but not all people supplementing their diet with vitamin E. It appears that large vitamin E doses over 300 IU may sometimes help reduce skin lesions. Investigators warn that while vitamin E may help some people, the fact remains that recurrences are not uncommon. It is also important not to ingest too much vitamin E because excesses can result in negative side-effects such as thinning of the blood which is why it is not recommended for people on anticoagulant therapy. Staying within the Reference Daily Intake (RDI) of 10 mg/400 IU is recommended for most people.

Vitamin E Food Source	Vitamin E (mg/100 g)
Wheat Germ Oil	183
Sunflower Oil	60
Sunflower Seed	57
Rice Bran Oil	37
Almonds	27
Filberts/Hazelnuts	25
Canola Oil	23
Cod Liver Oil (Fish Oil)	22
Wheat Germ	18

Vitamin A

Another vitamin on the "possibly beneficial" list is beta-carotene which is really vitamin A from plant sources. Three patients whose skin lesions flared with sun exposure were given beta-carotene three times daily and experienced a clearing of all lesions starting within one week of treatment. It is known that vitamin-A deficient animals experience more severe lupus-like symptoms.

Like vitamin E, excess vitamin A from animal sources can be toxic and an excess may result in one or more of the following symptoms: anemia, headache, dry skin, hair loss, nausea, loss of appetite, bone pain, stunted growth in infants/children, increased pressure within the skull mimicking a brain tumor, headaches, and death. Beta-carotene from plants does not elicit the same symptoms, but it can result in hypercarotenemia which is a condition resulting in orange skin. The RDI for vitamin A is 800-1000 ug/4000-5000 IU per day.

	Beta-Carotene
Food Source	**Beta-Carotene (RE/100 g cooked, unless noted)**
Carrot Juice (canned)	2575
Carrots (raw)	2454
Sweet Potato	2182
Shallots (raw)	1250
Mixed Vegetables (canned)	1164
Pumpkin	1082
Spinach	819
Kale	740
Apricot Halves (dried)	723
Collard Greens	598
Red Bell Pepper (raw)	570

Selenium

Anti-inflammatory properties have been attributed to selenium. Mice with lupus lived longer when given selenium supplements and although the mechanism in these mice was unclear, there were higher levels of natural killer cell activity. Too much selenium may cause side-effects of baldness, loss of nails and teeth, fatigue, vomiting, and possibly death. The RDI for selenium is 70 ug.

Selenium Food Source	**Selenium (ug/100 g)**
Pike	190
Carp	159
Herring	141
Rainbow Trout	124
Wheat Germ	101
Crayfish/Crawdads	100
Anchovies	90
Scallops	82
Tuna (in water)	80
Sunflower Seeds	78
Lobster	77
Octopus	75
Oysters	72
Chicken Livers	71
Whole Wheat Flour	71
Rainbow Trout	71

Salmon	60
Liverwurst - Pork	58
Sardines	57
Pork Sirloin	52

Fish Oils

Fish oils retard, but do not entirely prevent, lupus in some mice resulting in the mice living longer. These mice eventually develop the illness, but at a slower rate than mice not receiving fish oils. Delays in the onset of renal disease may contribute to increased life span. Mice introduced to a fish oil diet as weanlings had an almost total protection against renal disease.

The mechanism? Fish oils are rich in omega-3 fatty acids which reduce the body's production of certain inflammatory compounds. Foods that are high in omega-3 fatty acids include fish oils, canola oil, and green vegetables. Avoid foods such as corn, safflower, soybean, and sunflower oils which contain omega-6 fatty acids which may precipitate inflammatory responses. One researcher even suggested that omega-3, instead of the usual omega-6, oils be used in hospital tube feedings (enteral and parenteral formulas, intravenous emulsions) for patients with inflammatory reactions such as lupus, rheumatoid arthritis, and multiple sclerosis.

Acid Food Source	Omega-3 Fatty Acid (g/100 g)
OILS/NUTS	
Sardine Oil	22.2
Cod Liver Oil	18.8
Walnut Oil	10.4
Canola Oil	8.0
Wheat Germ Oil	6.9
Walnuts	6.8
Soybean Oil	6.8
Mayonnaise	4.7
FISH/SHELLFISH/SOYBEANS	
Mackerel	1.9
Sablefish	1.9
Salmon (Chinook)	1.9
Whitefish	1.9
Herring	1.7
Bluefin Tuna	1.5
Soy Nuts/Soybeans	1.5
Atlantic Sardines in Oil	1.5
Oysters	1.4
Rainbow Trout	1.2
Swordfish	1.1
Sea Bass	1.0
Scallops	1.0

Bromelain

Although no animal or human studies have been conducted on bromelain related to LE, this complex of proteases from the pineapple plant has been known to act as an antiinflammatory agent. Suggested research dosages might approximate 500-1000 mg taken as 500 mg 1-2 times per day.

Evening Primrose Oil (EPO)

There is some evidence to support the use of evening primrose oil. It contains gamma-linolenic acid which is converted to prostaglandin one which has been reported to delay the onset and severity of lupus and increase survival time.

Flaxseed

Two studies, one with mice and the other with human subjects, suggest that flaxseed may be beneficial. Eight humans with lupus were given 30 grams of flaxseed mixed in with their cereal or juice (tomato or orange), and were reported to have improved renal function.

Flaxseed is one of the richest food sources for lignans which are natural antagonists to PAF receptors. This plant food is also high in an omega-3 fatty acid, alpha-linoleic acid. It has been reported that the beneficial affect of these and possible other compounds in flaxseed is best achieved by ingesting it in its whole form, rather than in its oil (linseed oil) or defatted form. Regardless of the form ingested, patients should be cautioned of possible allergic reactions.

Plant Herb

Triptergium wilfordii hook F (TWH), also known as Thunder God Vine, is a plant that has been used by the Chinese for more than 2000 years for various ailments. There are reports of it being used to treat SLE, rheumatoid arthritis, and ankylosing spondylitis. Several studies do show positive results with TWH in people with lupus, however they were not blinded. The plant has been reported to have immunosuppressive qualities when tested in the laboratory. Despite the promising benefit of TWH, it is difficult to evaluate the use of herbal therapies since their apparent successes and sometimes serious side-effects are often not documented.

DHEA (dehydroepiandrosterone)

Although not a nutrient or a dietary supplement, this steroid hormone can be purchased over-the-counter. Animal studies with autoimmune-prone mice have shown that DHEA results are similar to those obtained with caloric restriction - decreased antibody synthesis and prolonged survival rates. In humans, a double-blind, placebo-controlled study of 28 SLE patients taking DHEA (200 mg/day) for 3 months resulted in decreased lupus flares, SLE Disease Activity Index scores, disease activity (assessed by physicians and patients), and prednisone dosages.

Researchers theorize that the ingestion of weak androgens, like DHEA, may improve the clinical manifestations of the disease because immune responses are often influenced by sex hormones. Androgens naturally suppress the immune system and concomitant inflammation, while estrogens can do either, although they usually accelerate autoimmunity. DHEA is an androgen and involved in testosterone synthesis. Women with autoimmune diseases like lupus and rheumatoid arthritis often experience lower androgens in their blood. The androgenic nature of DHEA in women taking over 50 mg a day dictates that a physician should be monitoring the DHEA supplementation. Minor side-effects at this dosage in women include acne, facial hair growth, menstrual changes, and improved mood, however, these symptoms disappeared after DHEA intake was stopped. Short-term studies usually report no serious side-effects in humans ingesting DHEA, but long-term trials have not been performed and androgen replacement remains in the realm of clinical investigation. There is the possibility that DHEA can convert into certain sex hormones, and there is speculation about its relationship to cancer since it has been linked to liver cancer in rats.

Food Allergies

Lupus patients seem to be more prone to food allergies, and there are studies showing that remissions occurred in some lupus patients following food elimination diets, a common procedure used to detect food allergies. Wheat, milk, and corn are three of the most common food allergies.

Calcium Plus Vitamin D (if taking corticosteroids)

Calcium and vitamin D are not reported to alleviate lupus symptoms, however, they are recommended as part of the treatment against osteoporosis, the most serious side-effect of long-term corticosteroid therapy. Corticosteroids are the most commonly prescribed immunosuppressants, and their long-term use is responsible for an estimated 20 percent of the 20 million osteoporosis cases in the United States. One in four of these patients experiences a fracture, however, unlike other forms of osteoporosis, the majority of fractures in corticosteroid-induced osteoporosis are at the spine.

To combat the effects of corticosteroids, the American College of Rheumatology (ARC) has formulated optimal medical management guidelines to reduce the risk of bone loss in patients. Preventative treatment should begin as soon as long-term corticosteroid therapy is started and includes a baseline bone mineral test, using the lowest effective dosage, hormone replacement therapy, medication, reducing risks for falls, lifestyle (weight-bearing exercise, and avoiding smoking, immobilization, and amenorrhea), and plenty of dietary calcium (supplements for calcium may be up to 1000 mg and vitamin D not in excess of 10 ug (400 IU). Other nutrient factors to reduce include eliminating excess protein, salt, alcohol, or caffeine. Side-effects of excess calcium supplements include constipation, headaches, calcification of the soft tissues, and certain kidney stones. Vitamin D supplements should also not be taken in excess, because they have been reported to cause headache, nausea, calcification of the soft tissues and bone, a tendency toward kidney stones, and in children - possible stunted growth, mental retardation, and death by renal failure.

SUMMARY

No dietary recommendations currently exist for LE patients, however, physician researchers postulated over fifteen years ago that diet might be one of the possible future therapies for people with LE. Tables 1 & 2 provide tentative dietary suggestions based on a literature review. Patients with LE may benefit from a balanced diet limited in calories and fat (especially saturated and omega-6 polyunsaturated fatty acids), containing rich sources of vitamin E, vitamin A (beta-carotene), selenium, and calcium. Supplements of fish oil, evening primrose oil, flaxseed, a plant herb (Triptergium wilfordii), DHEA (under a physician's care), and calcium plus vitamin D (if taking corticosteroids) may also be beneficial. Foods high in omega-3 polyunsaturated fatty acids are recommended and include fish oils, fatty fish, certain vegetable oils such as walnut and canola, and soybeans. Conversely, foods to be avoided that contain omega-6 polyunsaturated fatty acids are vegetable oils made from corn, cottonseed, poppyseed, safflower, sesame, soybean, sunflower, and walnut. People with LE may also benefit by avoiding supplements containing protein, omega-6 polyunsaturated fatty acids, zinc, and iron. Avoiding an excess of foods rich in these compounds might possibly be beneficial which would consist of limiting meats (protein), dairy (protein), oysters (zinc), Brazil nuts (zinc), and enriched grains and cereals, including breakfast cereals (zinc and iron). It may also be judicious to avoid alfalfa tablets or alfalfa in any form including sprouts. Remissions have been reported in people with LE going on food elimination diets, and perhaps these could be tried by LE patients in an attempt to alleviate flare-ups or eliminate the possibility of any existing food allergies. Further investigation should be conducted on the possible beneficial use of bromelain and vegetarian diets in people with LE.

Again, these tentative dietary suggestions are based on a literature review and the nature of remissions occurring in people with LE along with any medications make it difficult to evaluate their effectiveness. Extrapolations from the research are tenuous at best, and the lack of control groups in many studies (many of them from animal studies) sheds questionable query on the results. However, an ample array of studies have been conducted and their results are available to practitioners and researchers in the form of Tables 1 & 2. This compilation is based on a limited number of studies and no large scale studies have been done with LE patients to substantiate the benefit, if any, of these dietary interventions. However, the possibility that patients with LE may benefit by incorporating one or more of these dietary modifications with the

guidance of a dietitian, needs to be considered, especially since the side-effects from such dietary modifications under a physician's care could be minimal to nonexistent.

142 references available upon request

RESOURCES

Organizations

The Lupus Foundation of America [www.lupus.org]
Rockville, MD 20850-4303
800-558-0121

The SLE Foundation of America
95 Madison Avenue, New York, NY 10016
212/685-4118

The American Lupus Society [www.healthy.net/pan/cso/cioi/TALS.HTM]
260 Maple Court, Suite 123, Ventura, CA 93003-3512
805/339-0443 * 800/331-1802 * 805/339-0467 (fax)

Books

DiGeronimo, TF. New Hope for People with Lupus. Prima Publishing.
Phillips RH. Coping with Lupus. Avery Publications Group.
Wallace DJ. The Lupus Book. A Guide for Patients and their Families. Oxford University Press, 1995.

World Wide Web

www.hamline.edu/lupus/index.html (Hamline University, St. Paul, MN)
Cutting edge information/correspondence