

Recognizing
The National
Bone and Joint Decade
2002–2011

*Questions
& Answers
about . . .*

Arthritis and Rheumatic Diseases

*National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)
National Institutes of Health
Public Health Service • U.S. Department of Health and Human Services*

For Your Information

This publication contains information about medications used to treat the health condition discussed in this booklet. When this booklet was printed, we included the most up-to-date (accurate) information available. Occasionally, new information on medication is released.

For updates and for any questions about any medications you are taking, please contact the U.S. Food and Drug Administration at 1-888-INFO-FDA (1-888-463-6332, a toll-free call) or visit its Web site at www.fda.gov.

For updates and questions about statistics, please contact the Centers for Disease Control and Prevention's National Center for Health Statistics toll free at 1-800-232-4636 or visit its Web site at www.cdc.gov/nchs.

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Additional copies of this booklet are available from:

National Institute of Arthritis and Musculoskeletal
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NIAMS/National Institutes of Health
1 AMS Circle
Bethesda, MD 20892-3675

You can also find this booklet on the NIAMS Web site at www.niams.nih.gov.

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Information Box

Common Signs and Symptoms of Arthritis 9

This booklet answers basic questions about arthritis and rheumatic diseases. The National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) has other fact sheets and booklets that provide more information about specific forms of arthritis and rheumatic diseases.

If you have further questions after reading this information, you may wish to discuss them with your doctor.

What Is Arthritis and What Are Rheumatic Diseases?

Arthritis literally means joint inflammation. Although joint inflammation describes a symptom or sign rather than a specific diagnosis, the term “arthritis” is often used to refer to any disorder that affects the joints. These disorders fall within the broader category of rheumatic diseases. These are diseases characterized by inflammation (signs include redness or heat, swelling, and symptoms such as pain) and loss of function of one or more connecting or supporting structures of the body. These diseases especially affect joints, tendons, ligaments, bones, and muscles. Common signs and symptoms are pain, swelling, and stiffness. Some rheumatic diseases also can involve internal organs.

There are more than 100 rheumatic diseases. Some are described as connective tissue diseases because they affect the supporting framework of the body and its internal organs. Others are known as autoimmune diseases because they occur when the immune system, which normally protects the body from infection and disease, harms the body's own healthy tissues. Throughout this booklet, the terms "arthritis" and "rheumatic diseases" are used interchangeably.

The burden of arthritis in the United States is enormous. More than 46 million people in the United States have arthritis or other rheumatic conditions. Adults with arthritis and other rheumatic conditions incurred mean medical care expenditures of \$6,978 in 2003, of which \$1,635 was for prescriptions. Expenditures for adults with arthritis and other rheumatic conditions totaled \$321.8 billion in 2003. Persons age 18 to 64 with arthritis and other rheumatic conditions earned \$3,613 less than other persons. Of this amount, \$1,590 in lost wages was attributable to arthritis and other rheumatic conditions.

What Are Some Examples of Rheumatic Diseases?

Osteoarthritis – This is the most common type of arthritis, affecting an estimated 27 million adults in the United States. Osteoarthritis affects both the cartilage, which is the tissue that cushions the ends of bones within the joint, as well as the underlying bone. In osteoarthritis, there is damage to the cartilage, which begins to fray and may wear away

entirely. There is also damage to the bond stock of the joint. Osteoarthritis can cause joint pain and stiffness. Disability results most often when the disease affects the spine and the weight-bearing joints (the knees and hips).

Rheumatoid arthritis – This inflammatory disease of the immune system targets first the synovium, or lining of the joint, resulting in pain, stiffness, swelling, joint damage, and loss of function of the joints. Inflammation most often affects joints of the hands and feet and tends to be symmetrical (occurring equally on both sides of the body). This symmetry helps distinguish rheumatoid arthritis from other forms of the disease. About 0.6 percent of the U.S. population (about 1.3 million people) has rheumatoid arthritis.

Juvenile idiopathic arthritis – This disease is the most common form of arthritis in childhood, causing pain, stiffness, swelling, and loss of function of the joints. This condition may be associated with rashes or fevers and may affect various parts of the body.

Fibromyalgia – Fibromyalgia is a chronic disorder that causes pain throughout the tissues that support and move the bones and joints. Pain, stiffness, and localized tender points occur in the muscles and tendons, particularly those of the neck, spine, shoulders, and hips. Patients also may experience fatigue and sleep disturbances. Fibromyalgia affects millions of adults in the United States.

Systemic lupus erythematosus – Systemic lupus erythematosus (also known as lupus or SLE) is an autoimmune disease in which the immune system harms the body’s own healthy cells and tissues. This can result in inflammation of and damage to the joints, skin, kidneys, heart, lungs, blood vessels, and brain. By conservative estimates, lupus affects about 150,000 people.

Scleroderma – Also known as systemic sclerosis, scleroderma means literally “hard skin.” The disease affects the skin, blood vessels, and joints. It may also affect internal organs, such as the lungs and kidneys. In scleroderma, there is an abnormal and excessive production of collagen (a fiber-like protein) in the skin and internal organs.

Spondyloarthropathies – This group of rheumatic diseases principally affects the spine. One common form – ankylosing spondylitis – also may affect the hips, shoulders, and knees. The tendons and ligaments around the bones and joints become inflamed, resulting in pain and stiffness. Ankylosing spondylitis tends to affect people in late adolescence or early adulthood. Reactive arthritis, sometimes called Reiter’s syndrome, is another spondyloarthropathy. It develops after an infection involving the lower urinary tract, bowel, or other organ. It is commonly associated with eye problems, skin rashes, and mouth sores.

Infectious arthritis – This is a general term used to describe forms of arthritis that are caused by infectious agents, such as bacteria or viruses. Parvovirus arthritis and gonococcal

arthritis are examples of infectious arthritis. Arthritis symptoms also may occur in Lyme disease, which is caused by a bacterial infection following the bite of certain ticks. In those cases of arthritis caused by bacteria, early diagnosis and treatment with antibiotics are crucial to removing the infection and minimizing damage to the joints.

Gout – This type of arthritis results from deposits of needle-like crystals of uric acid in the joints. The crystals cause episodic inflammation, swelling, and pain in the affected joint, which is often the big toe. An estimated 2.1 million Americans have gout.

Polymyalgia rheumatica – Because this disease involves tendons, muscles, ligaments, and tissues around the joint, symptoms often include pain, aching, and morning stiffness in the shoulders, hips, neck, and lower back. It is sometimes the first sign of giant cell arteritis, a disease of the arteries characterized by headaches, inflammation, weakness, weight loss, and fever.

Polymyositis – This rheumatic disease causes inflammation and weakness in the muscles. The disease may affect the whole body and cause disability.

Psoriatic arthritis – This form of arthritis occurs in some patients with psoriasis, a scaling skin disorder. Psoriatic arthritis often affects the joints at the ends of the fingers and toes and is accompanied by changes in the fingernails and toenails. Back pain may occur if the spine is involved.

Bursitis – This condition involves inflammation of the bursae, small, fluid-filled sacs that help reduce friction between bones and other moving structures in the joints. The inflammation may result from arthritis in the joint or injury or infection of the bursae. Bursitis produces pain and tenderness and may limit the movement of nearby joints.

Tendinitis (tendonitis) – This condition refers to inflammation of tendons (tough cords of tissue that connect muscle to bone) caused by overuse, injury, or a rheumatic condition. Tendinitis produces pain and tenderness and may restrict movement of nearby joints.

What Causes Rheumatic Diseases?

Rheumatic diseases are generally believed to be caused by a combination of genetic and environmental factors. In other words, you may be born with a susceptibility to a disease, but it may take something in your environment to get the disease started.

Some of these factors have been identified. For example, in osteoarthritis, inherited cartilage weakness or excessive stress on the joint from repeated injury may play a role. In rheumatoid arthritis, juvenile idiopathic arthritis, and lupus, patients may have a variation in a gene that codes for an enzyme called protein tyrosine phosphatase nonreceptor 22 (PTPN22).

Certain viruses may trigger disease in genetically susceptible people. For example, scientists have found a connection between Epstein-Barr virus and lupus. There are likely many genes and combinations of genes that predispose people to rheumatic diseases, and many different environmental factors that trigger them.

Gender is another factor in some rheumatic diseases. Lupus, rheumatoid arthritis, scleroderma, and fibromyalgia are more common among women. (See next section for details.) This indicates that hormones or other male-female differences may play a role in the development of these conditions.

Who Is Affected by Rheumatic Diseases?

An estimated 43 million people in the United States have arthritis or other rheumatic conditions. By the year 2020, this number is expected to reach 60 million. Rheumatic diseases are a more frequent cause of activity limitation than heart disease, cancer, or diabetes.

Rheumatic diseases affect people of all races and ages. Some rheumatic conditions are more common among certain populations. For example:

- Rheumatoid arthritis occurs two to three times more often in women than in men.

- Scleroderma is more common in women than in men.
- Nine out of 10 people who have lupus are women.
- Nine out of 10 people who have fibromyalgia are women.
- Gout is more common in men than in women. After menopause, the incidence of gout for women begins to rise.
- Systemic lupus erythematosus is more common in women than in men, and it occurs more often in African Americans and Hispanics than in Caucasians.

What Are the Signs and Symptoms of Arthritis and Rheumatic Diseases?

Different types of arthritis and rheumatic diseases have different signs and symptoms. In general, people who have arthritis feel pain and stiffness in the joints. Some of the more common symptoms are listed in the box on page 9. Early diagnosis and treatment help decrease further joint damage and help control symptoms of arthritis and many other rheumatic diseases.

How Are Rheumatic Diseases Diagnosed?

Diagnosing rheumatic diseases can be difficult because some symptoms and signs are common to many different diseases. A general practitioner or family doctor may be able to evaluate a patient or refer him or her to a rheumatologist (a doctor who specializes in treating arthritis and other rheumatic diseases).

Common Signs and Symptoms of Arthritis

- swelling in one or more joints
- stiffness around the joints that lasts for at least 1 hour in the early morning
- constant or recurring pain or tenderness in a joint
- difficulty using or moving a joint normally
- warmth and redness in a joint

The doctor will review the patient's medical history, conduct a physical examination, and obtain laboratory tests and x rays or other imaging tests. The doctor may need to see the patient more than once and possibly a number of times to make an accurate diagnosis.

Medical History

It is vital for people with joint pain to give the doctor a complete medical history. Answers to the following questions will help the doctor make an accurate diagnosis:

- Is the pain in one or more joints?
- When does the pain occur?
- How long does the pain last?
- When did you first notice the pain?
- What were you doing when you first noticed the pain?
- Does activity make the pain better or worse?
- Have you had any illnesses or accidents that may account for the pain?
- Are you experiencing any other symptoms besides pain?
- Is there a family history of arthritis or other rheumatic disease?
- What medicine(s) are you taking?
- Have you had any recent infections?

Because rheumatic diseases are so diverse and sometimes involve several parts of the body, the doctor may ask many other questions.

It may be helpful for people to keep a daily journal that describes the pain. Patients should write down what the affected joint looks like, how it feels, how long the pain lasts, and what they were doing when the pain started.

Physical Examination and Laboratory Tests

The doctor will examine the patient's joints for redness, warmth, damage, ease of movement, and tenderness. Because some forms of arthritis, such as lupus, may affect internal organs, a complete physical examination that includes the heart, lungs, abdomen, nervous system, eyes, ears, mouth, and throat may be necessary. The doctor may order some laboratory tests to help confirm a diagnosis. Samples of blood, urine, or synovial fluid (lubricating fluid found in the joint) may be needed for the tests. Many of these same tests may be useful later for monitoring the disease or the effectiveness of treatments.

Common laboratory tests and procedures include the following:

Antinuclear antibody (ANA) – This test checks blood levels of antibodies that are often present in people who have connective tissue diseases or other autoimmune disorders,

such as lupus. Because the antibodies react with material in the cell's nucleus (control center), they are referred to as antinuclear antibodies. There are also tests for individual types of ANAs that may be more specific to people with certain autoimmune disorders. ANAs are also sometimes found in people who do not have an autoimmune disorder. (In such cases, the result is referred to as a "false positive.") Therefore, having ANAs in the blood does not necessarily mean that a person has a disease.

CCP (or anti-CCP) – This test checks blood levels of antibodies to citrulline, a protein that can be detected in up to 70 percent of people in the early stages of rheumatoid arthritis. Because the presence of anti-CCPs is associated with more aggressive disease, the test can also be useful in helping doctors plan treatment.

C-reactive protein test – This nonspecific test is used to detect generalized inflammation. Levels of the protein are often increased in patients with active disease such as rheumatoid arthritis or any other disease that causes inflammation.

Complement – This test measures the level of complement, a group of proteins in the blood. Complement helps destroy germs and other foreign substances that enter the body. A low blood level of complement is common in people who have active lupus.

Complete blood count (CBC) – This test determines the number of white blood cells, red blood cells, and platelets

present in a sample of blood. Some rheumatic conditions or drugs used to treat arthritis are associated with a low white blood count (leukopenia), low red blood count (anemia), or low platelet count (thrombocytopenia).

Creatinine – This blood test measures the level of creatinine, a breakdown product of creatine, which is an important component of muscle. Creatinine is excreted from the body entirely by the kidneys, and the level remains constant and normal when kidney function is normal. This test is commonly used to diagnose and monitor kidney disease in patients who have a rheumatic condition such as lupus.

Erythrocyte sedimentation rate (sed rate or ESR) – This blood test is used to detect inflammation in the body. Higher sed rates, indicating the presence of inflammation, are typical of many forms of arthritis, such as rheumatoid arthritis and ankylosing spondylitis. Higher sed rates are also typical of many of the immunologic connective tissue diseases, such as lupus and scleroderma.

Hematocrit (PCV, packed cell volume) – This test and the test for hemoglobin (a substance in the red blood cells that carries oxygen throughout the body) measure the number of red blood cells present in a sample of blood. A decrease in the number of red blood cells (anemia) is common in people who have inflammatory arthritis or another rheumatic disease.

Rheumatoid factor – This test detects the presence of rheumatoid factor, an antibody found in the blood of most (but not all) people who have rheumatoid arthritis. In rheumatoid arthritis, it is associated with more aggressive disease. Rheumatoid factor may be found in many diseases besides rheumatoid arthritis and sometimes in people without health problems. (In the latter case, the result is referred to as a “false positive.”)

Synovial fluid examination – Synovial fluid may be examined for white blood cells (found in patients with rheumatoid arthritis and infections), bacteria or viruses (found in patients with infectious arthritis), or crystals in the joint (found in patients with gout or other types of crystal-induced arthritis). To obtain a specimen, the doctor injects a local anesthetic, then inserts a needle into the joint to withdraw the synovial fluid into a syringe. The procedure is called arthrocentesis or joint aspiration.

Urinalysis – In this test, a urine sample is studied for protein, red blood cells, white blood cells, and bacteria. These abnormalities may indicate kidney disease, which may be seen in lupus as well as several rheumatic conditions. Some medications used to treat arthritis also can cause abnormal findings on urinalysis.

X Rays and Other Imaging Procedures

To see what the joint looks like inside, the doctor may order x rays or other imaging procedures. X rays provide an

image of the bones, but they do not show cartilage, muscles, and ligaments. Other noninvasive imaging methods such as computed tomography (CT or CAT scan), magnetic resonance imaging (MRI), and arthrography show the whole joint. The doctor also may look for damage to a joint by using an arthroscope: a small, flexible tube which is inserted through a small incision at the joint. The arthroscope transmits the image from inside the joint to a video screen.

What Are the Treatments?

Treatments for rheumatic diseases include rest and relaxation, exercise, proper diet, medication, and instruction about the proper use of joints and ways to conserve energy. Other treatments include the use of pain relief methods and assistive devices, such as splints or braces. In severe cases, surgery may be necessary. The doctor and the patient develop a treatment plan that helps the patient maintain or improve his or her lifestyle. Treatment plans usually combine several types of treatment and vary depending on the rheumatic condition and the patient.

Rest, Exercise, and Diet

People who have a rheumatic disease should develop a comfortable balance between rest and activity. One sign of many rheumatic conditions is fatigue. Patients must pay attention to signals from their bodies. For example, when

experiencing pain or fatigue, it is important to take a break and rest. Too much rest, however, may cause muscles to become weak and joints to become stiff.

People with a rheumatic disease such as arthritis can participate in a variety of sports and exercise programs. Physical exercise can reduce joint pain and stiffness and increase flexibility, muscle strength, and endurance. Exercise also can result in weight loss, which in turn reduces stress on painful joints and contributes to an improved sense of well-being. Before starting any exercise program, people with arthritis should talk with their doctor.

Doctors often recommend getting exercise in each of these three categories. The benefits listed below often reinforce each other.

- Range-of-motion exercises (e.g., stretching, dance) help maintain normal joint movement, maintain or increase flexibility, and relieve stiffness.
- Strengthening exercises (e.g., weight lifting) maintain or increase muscle strength. Strong muscles help support and protect joints affected by arthritis.
- Aerobic or endurance exercises (e.g., walking, bicycle riding, swimming) improve cardiovascular fitness, help control weight, improve strength, and improve overall well-being. Studies show that aerobic exercise can also reduce inflammation in some joints.

Another important part of a treatment program is a well-balanced diet. Along with exercise, a well-balanced diet helps people manage their body weight and stay healthy. Diet is especially important for people who have gout. People with gout should avoid alcohol and foods that are high in purines, such as organ meats (liver, kidney), sardines, anchovies, and gravy.

Medications

A variety of medications are used to treat rheumatic diseases. The type of medication depends on the rheumatic disease and on the individual patient. The medications used to treat most rheumatic diseases do not provide a cure, but rather limit the symptoms of the disease. One exception is infectious arthritis, which can be cured if medications are used properly. Another exception is Lyme disease, which is spread by the bite of certain ticks: If the infection is caught early and treated with antibiotics, symptoms of arthritis may be prevented or may disappear.

Medications commonly used to treat rheumatic diseases provide relief from pain and inflammation. In some cases, especially when a person has rheumatoid arthritis or another type of inflammatory arthritis, the medication may slow the course of the disease and prevent further damage to joints or other parts of the body.

The doctor may delay using medications until a definite diagnosis is made because medications can hide important

symptoms or signs (such as fever and swelling) and thereby interfere with diagnosis. Patients taking any medication, either prescription or over the counter, should always follow the doctor's instructions. The doctor should be notified immediately if the medicine is making the symptoms worse or causing other problems, such as upset stomach, nausea, or headache. The doctor may be able to change the dosage or medicine to reduce these side effects.

Following are some of the types of medications commonly used in the treatment of rheumatic diseases.

Analgesics – Analgesics (pain relievers) such as acetaminophen (Tylenol)¹ are often used to reduce the pain caused by many rheumatic conditions. For severe pain or pain following surgery or a fracture, doctors may prescribe stronger prescription or narcotic analgesics.

Topical analgesics – People who cannot take oral pain relievers or who continue to have some pain after taking them may find topical analgesics helpful. These creams or ointments are rubbed into the skin over sore muscles or joints and relieve pain through one or more active ingredients. These are the most common:

- **Counterirritants** – These ingredients, such as menthol, oil of wintergreen, eucalyptus oil, or

¹ Brand names included in this booklet are provided as examples only, and their inclusion does not mean that these products are endorsed by the National Institutes of Health or any other Government agency. Also, if a particular brand name is not mentioned, this does not mean or imply that the product is unsatisfactory.

camphor, work by irritating the nerve endings in the skin. This distracts the brain from the deeper source of pain. They are found in many products such as Eucalyptamint and Icy Hot.

- **Salicylates** – This ingredient works like aspirin, by blocking chemicals in the body that contribute to pain. Salicylates are found in Aspercreme, BenGay, Flexall, and several other over-the-counter preparations.
- **Capsaicin** – This natural ingredient found in cayenne peppers is an effective pain reliever for many. It is available in a number of products, including Zostrix and Capzasin-P.

Nonsteroidal anti-inflammatory drugs (NSAIDs) –

A large class of medications useful against both pain and inflammation, NSAIDs are staples in arthritis treatment. A number of NSAIDs – such as ibuprofen (Advil, Motrin), naproxen sodium (Aleve), and ketoprofen (Orudis, Oruvail) are available over the counter. More than two dozen others, including a subclass of NSAIDs called COX-2 inhibitors, are available only with a prescription.

All NSAIDs work similarly: by blocking substances called prostaglandins that contribute to inflammation and pain.

However, each NSAID is a different chemical, and each has a slightly different effect on the body.²

The Food and Drug Administration has warned that long-term use of NSAIDs, or use by people who have heart disease, may increase the chance of a heart attack or stroke. So it's important to work with your doctor to choose the one that's safest and most effective for you. Side effects also may include stomach upset and stomach ulcers, heartburn, diarrhea, fluid retention, hypertension, and kidney damage. For unknown reasons, some people seem to respond better to one NSAID than another.

Disease-modifying antirheumatic drugs (DMARDs) –

A family of medicines that are used to treat inflammatory arthritis like rheumatoid arthritis and ankylosing spondylitis, DMARDs may be able to slow or stop the immune system from attacking the joints. This in turn decreases pain and swelling. DMARDs typically require regular blood tests to monitor side effects, which may include increased risk of infection. In addition to relieving signs and symptoms, DMARDs may help to retard or even stop joint damage from progressing. However, DMARDs cannot fix joint damage that has already occurred. Some of the most commonly

² Warning: NSAIDs can cause stomach irritation or, less often, they can affect kidney function. The longer a person uses NSAIDs, the more likely he or she is to have side effects, ranging from mild to serious. Many other drugs cannot be taken when a patient is being treated with NSAIDs because NSAIDs alter the way the body uses or eliminates these other drugs. Check with your health care provider or pharmacist before you take NSAIDs. Also, NSAIDs sometimes are associated with serious gastrointestinal problems, including ulcers, bleeding, and perforation of the stomach or intestine. People age 65 and older, as well as those with any history of ulcers or gastrointestinal bleeding, should use NSAIDs with caution.

prescribed DMARDs are methotrexate, hydroxychloroquine, sulfasalazine, and leflunomide.

Biologic response modifiers – Biologic response modifiers, or biologics, are a new family of genetically engineered drugs that block specific molecular pathways of the immune system that are involved in the inflammatory process. They are often prescribed in combination with DMARDs such as methotrexate. Because biologics work by suppressing the immune system, they could be problematic for patients who are prone to frequent infection. They are typically administered by injection at home or by intravenous infusion at a clinic. Some commonly prescribed biologics include etanercept, adalimumab, infliximab, abatacept, and rituximab.

Corticosteroids – Corticosteroids, such as prednisone, cortisone, solumedrol, and hydrocortisone, are used to treat many rheumatic conditions because they decrease inflammation and suppress the immune system. The dosage of these medications as well as their method of administration will vary depending on the diagnosis and the patient. Again, the patient and doctor must work together to determine the right amount of medication.

Corticosteroids can be given by mouth, in creams applied to the skin, intravenously, or by injection directly into the affected joint(s). Short-term side effects of corticosteroids include swelling, increased appetite, weight gain, and emotional ups and downs. These side effects generally stop when the drug is stopped. It can be dangerous to stop

taking corticosteroids suddenly, so it is very important that the doctor and patient work together when changing the corticosteroid dose. Side effects that may occur after long-term use of corticosteroids include stretch marks, excessive hair growth, osteoporosis, high blood pressure, damage to the arteries, high blood glucose, infections, and cataracts.

Hyaluronic acid substitutes – Hyaluronic acid products, such as Hyalgan and Synvisc, mimic a naturally occurring body substance that serves to lubricate joints and is believed to be deficient in joints with osteoarthritis. Depending on the particular product, patients receive a series of three to five injections, which are administered directly into the affected knee(s) or hip(s) to help provide temporary relief of pain and flexible joint movement.

Medical Devices

A number of devices may be used to treat some rheumatic diseases. For example, transcutaneous electrical nerve stimulation (TENS) has been found effective in modifying pain perception. TENS blocks pain messages to the brain with a small device that directs mild electric pulses to nerve endings that lie beneath the painful area of the skin.

Some health care facilities use a blood-filtering device called the Prosorba Column to filter out harmful antibodies in people with severe rheumatoid arthritis.

Heat and Cold Therapies

Heat and cold can both be used to reduce the pain and inflammation of arthritis. The patient and doctor can determine which one works best.

Heat therapy increases blood flow, tolerance for pain, and flexibility. Heat therapy can involve treatment with paraffin wax, microwaves, ultrasound, or moist heat. Physical therapists are needed for some of these therapies, such as microwave or ultrasound therapy, but patients can apply moist heat themselves. Some ways to apply moist heat include placing warm towels or hot packs on the inflamed joint or taking a warm bath or shower.

Cold therapy numbs the nerves around the joint (which reduces pain) and may relieve inflammation and muscle spasms. Cold therapy can involve cold packs, ice massage, soaking in cold water, or over-the-counter sprays and ointments that cool the skin and joints.

Hydrotherapy, Mobilization Therapy, and Relaxation Therapy

Hydrotherapy involves exercising or relaxing in warm water. The water takes some weight off painful joints, making it easier to exercise. It helps relax tense muscles and relieve pain.

Mobilization therapies include traction (gentle, steady pulling), massage, and manipulation. (Someone other than the patient moves stiff joints through their normal range

of motion.) When done by a trained professional, these methods can help control pain, increase joint motion, and improve muscle and tendon flexibility.

Relaxation therapy helps reduce pain by teaching people various ways to release muscle tension throughout the body. In one method of relaxation therapy, known as progressive relaxation, the patient tightens a muscle group and then slowly releases the tension. Doctors and physical therapists can teach patients a variety of relaxation techniques.

Splints and Braces

Splints and braces are used to support weakened joints or allow them to rest. Some prevent the joint from moving; others allow some movement. A splint or brace should be used only when recommended by a doctor or therapist, who will explain to the patient when and for how long the device should be worn. The doctor or therapist also will demonstrate the correct way to put it on and will ensure that it fits properly. The incorrect use of a splint or brace can cause joint damage, stiffness, and pain.

Assistive Devices

A person with arthritis can use many kinds of devices to ease the pain. For example, using a cane when walking can reduce some of the weight placed on a knee or hip affected by arthritis. A shoe insert (orthotic) can ease the pain of walking caused by arthritis of the foot or knee. Other devices

can help with activities such as opening jars, closing zippers, and holding pencils.

Surgery

Surgery may be required to repair damage to a joint after injury or to restore function or relieve pain in a joint damaged by arthritis. Many types of surgery are performed for arthritis. These include:

- **Arthroscopic surgery** – surgery to view the joint using a thin lighted scope inserted through a small incision over the joint. If repair is needed, tools may be inserted through additional small incisions.
- **Bone fusion** – surgery in which joint surfaces are removed from the ends of two bones that form a joint. The bones are then held together with screws until they grow together forming one rigid unit.
- **Osteotomy** – a surgery in which a section of bone is removed to improve the positioning of a joint.
- **Arthroplasty** – also known as total joint replacement. This procedure removes and replaces the damaged joint with an artificial one.

Nutritional Supplements

Nutritional supplements are sometimes helpful in treating rheumatic diseases. These include products such

as S-adenosylmethionine (SAM-e) for osteoarthritis and fibromyalgia, dehydroepiandrosterone (DHEA) for lupus, and glucosamine and chondroitin sulfate for osteoarthritis.

The Glucosamine/Chondroitin Arthritis Intervention Trial (the results of which were published in 2006) assessed the effectiveness and safety of glucosamine and chondroitin sulfate when taken together or separately. The trial was cosponsored by the National Center for Complementary and Alternative Medicine and NIAMS. The trial found that the combination of glucosamine and chondroitin sulfate did not provide significant relief from osteoarthritis pain among all participants. However, a smaller subgroup of study participants with moderate to severe pain received significant relief from the combined supplements.

Generally speaking, reports on the safety and effectiveness of any nutritional supplement should be viewed with caution because the Food and Drug Administration does not regulate supplements the way it monitors medications, and many have not been proven helpful in formal studies.

Myths About Treating Arthritis

At this time, the only type of arthritis that can be cured is that caused by infections. Although symptoms of other types of arthritis can be effectively managed with rest, exercise, and medication, there are no cures. Some people claim to have been cured by treatment with herbs, oils, chemicals, special diets, radiation, or other products. However, there

is no scientific evidence that such treatments cure arthritis. Moreover, some may lead to serious side effects. Patients should talk to their doctor before using any therapy that has not been prescribed or recommended by their health care team.

Work With Your Doctor to Limit Your Pain

The role you play in planning your treatment is very important. It is vital for you to have a good relationship with your doctor in order to work together. You should not be afraid to ask questions about your condition or treatment. You must understand the treatment plan and tell the doctor whether or not it is helping you. Research has shown that well-informed patients who participate actively in their own care experience less pain and make fewer visits to the doctor.

What Can Be Done to Help?

Many people find that having arthritis or another rheumatic disease limits their activities. When people can no longer participate in some of their favorite activities, their overall well-being can be affected. Even when arthritis impairs only one joint, a person may have to change many daily activities to reduce pain and protect that joint from further damage. When a condition affects the entire body, as it often does with rheumatoid arthritis, lupus, or

fibromyalgia, many daily activities have to be changed to deal with pain, fatigue, and other symptoms.

Changes in the home may help a person with chronic arthritis continue to live safely, productively, and with less pain. People with arthritis may become weak, lose their balance, or fall. In the bathroom, installing grab bars in the tub or shower and by the toilet, placing a secure seat in the tub, and raising the height of the toilet seat can help. Special kitchen utensils can accommodate hands affected by arthritis to make meal preparation easier. An occupational therapist can help people who have rheumatic conditions to identify and make adjustments in their homes to create a safer, more comfortable, and more efficient environment.

Friends and family members can help a patient with a rheumatic condition by learning about that condition and understanding how it affects the patient's life. Friends and family can provide emotional and physical assistance. Their support, as well as support from other people who have the same disease, can make it easier to cope. The Arthritis Foundation has a wealth of information to help people with arthritis. (See "Where Can People Find More Information About Arthritis and Rheumatic Diseases?" on page 38.)

What Research Is Being Done on Arthritis and Rheumatic Diseases?

The National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), part of the National Institutes of

Health (NIH), leads the Federal medical research effort in arthritis and rheumatic diseases. NIAMS sponsors research and research training on the NIH campus in Bethesda, Maryland, and at universities and medical centers throughout the United States. Both clinical studies (involving patients) and basic (laboratory) research result in a better understanding of what causes these conditions and how best to treat and prevent them.

NIAMS currently supports three types of research centers that study arthritis, rheumatic diseases, and other musculoskeletal conditions: Centers of Research Translation (CORTs), Multidisciplinary Clinical Research Centers (MCRCs), and Research Core Centers (RCCs). A list of these centers and their locations can be obtained from the Institute (See “Where Can People Find More Information About Arthritis and Rheumatic Diseases?” on page 38.)

CORTs are designed to bring together basic and clinical research in a way that helps translate basic discoveries into new drugs, treatments, and diagnostics. Currently there are four CORTs, including one focusing on lupus and another focusing on scleroderma.

MCRCs focus on clinical research designed to assess and improve outcomes for patients affected by arthritis and other rheumatic diseases, musculoskeletal disorders (including bone and muscle diseases), and skin diseases. Each center studies one or more of the diseases within the

NIAMS mission and provides resources for developing clinical projects using more than one approach.

RCCs promote interdisciplinary, collaborative efforts among scientists doing high-quality research related to a common theme. By providing funding for facilities, pilot and feasibility studies, and program enrichment activities at RCCs, the Institute reinforces investigations already under way in NIAMS program areas. Current centers include Rheumatic Diseases Research Core Centers, Skin Disease Research Core Centers, and Core Centers for Musculoskeletal Disorders.

Research registries provide a means for collecting clinical, demographic, and laboratory information from patients, and sometimes from their relatives. These registries facilitate studies that could ultimately lead to improved diagnosis, treatment, and prevention. NIAMS currently supports research registries for rheumatic diseases such as rheumatoid arthritis, fibromyalgia, antiphospholipid syndrome (an autoimmune disorder), ankylosing spondylitis, lupus and neonatal lupus, scleroderma, juvenile idiopathic arthritis, and juvenile dermatomyositis.

Some current NIAMS research efforts that pertain to rheumatic diseases are outlined below.

Biomarkers

Recent scientific breakthroughs in basic research have provided new information about what happens to the body's

cells and other structures as rheumatic diseases progress. Biomarkers (laboratory and imaging signposts that detect disease) help researchers determine both the likelihood that a person will develop a specific disease as well as its possible severity and outcome. Biomarkers have the potential to lead to novel and more effective ways of predicting and monitoring both disease activity and responses to treatment. NIAMS supports research on biomarkers for rheumatic and skin diseases, including initiatives to identify and validate biomarkers for osteoarthritis and lupus.

PROMIS

NIAMS has responsibility for managing an NIH-wide initiative known as PROMIS (Patient-Reported Outcomes Measurement Information System). The goal of this initiative is to develop ways to measure patient-reported symptoms such as pain and fatigue as well as other aspects of health-related quality-of-life across a wide variety of chronic diseases and conditions. Arthritis and many other diseases that compromise daily life involve pain, fatigue, and other quality-of-life outcomes that are hard to measure. A means of measuring changes in these symptoms could enhance clinical research and practice, providing a significant benefit to patients and their health care providers.

Studies on specific rheumatic diseases are described on the following pages.

Fibromyalgia

In recent years, NIAMS has supported an increasing amount of research into this condition, which is not well understood. Scientists are using imaging studies of the central nervous system to better understand the overresponsiveness to painful stimuli in people with this disorder. They are studying the role of sex hormones, stress, and other factors on fibromyalgia. They are also examining the effectiveness of behavior therapy, exercise, medications, micronutrients, acupuncture, and other alternative approaches for dealing with pain, fatigue, and loss of sleep.

Osteoarthritis

NIAMS has embarked on several innovative efforts to understand the causes and identify effective treatment and prevention methods for osteoarthritis. Through a public/private partnership, researchers are identifying biomarkers for osteoarthritis that will help develop and test new drugs. Imaging studies designed to better identify joint disorders and assess their progression are taking place as well.

NIH's National Center for Complementary and Alternative Medicine and NIAMS funded a major, 16-center study on the usefulness of the dietary supplements glucosamine and chondroitin sulfate, which previous studies have suggested may be useful for osteoarthritis. (See "Nutritional Supplements" on page 25 for more details about this trial.)

Some genetic and behavioral studies are focusing on factors that may cause osteoarthritis to develop. Among behavioral risk factors, excessive weight and lack of exercise have been identified as contributing to knee and hip disability.

Researchers are working to understand the role certain enzymes play in the breakdown of joint cartilage in osteoarthritis. They also are testing drugs that block the action of these enzymes and looking at new ways to administer drugs.

Studies show that young adults who have had a previous joint injury are more likely to develop osteoarthritis. These studies underscore the need for increased education about joint injury prevention and use of proper sports equipment. They are also prompting scientists to look for ways to prevent joint cartilage breakdown after injury.

Rheumatoid Arthritis

Researchers are trying to identify the cause of rheumatoid arthritis so they can develop better and more specific treatments. They are examining the roles that the endocrine (hormonal), nervous, and immune systems play, and the ways in which these systems interact with environmental and genetic factors in the development of rheumatoid arthritis. Some scientists are trying to determine whether an infectious agent triggers rheumatoid arthritis. Others are studying the role of certain enzymes (specialized proteins in the body that spark biochemical reactions) in breaking down

cartilage. Researchers are also trying to identify the genetic factors that place some people at higher risk than others for developing rheumatoid arthritis.

Moreover, scientists are looking at new ways to treat rheumatoid arthritis. They are experimenting with new drugs, genetic therapies, and biologic agents that selectively block certain immune system activities associated with inflammation. In recent years, several biologic agents have been approved. These include etanercept (Enbrel) and infliximab (Remicade), which block a cytokine, or chemical messenger, called tumor necrosis factor (TNF); anakinra (Kineret), which blocks the cytokine interleukin-1 (IL-1); and abatacept (Orencia), which interferes with function of some cells such as T-lymphocytes. These cells are important in rheumatoid arthritis. Followup studies of biologics have shown that they not only relieve signs and symptoms of rheumatoid arthritis, but also block the joint destruction it causes. Studies for additional new drugs targeting other cytokines and inflammation pathways continue.

Recently, scientists discovered that the presence of proteins called anti-citrulline antibodies can help identify people with early rheumatoid arthritis who are likely to have aggressive disease. This enables doctors to begin aggressive treatment early and help prevent damage. Researchers continue to search for biomarkers that identify people at risk of aggressive disease as well as those most likely to respond to a particular treatment.

Researchers are also studying non-medication treatments for rheumatoid arthritis, such as green tea, fish oil, borage seed oil, and relaxation techniques.

Scleroderma

Current studies on scleroderma are focusing on overproduction of collagen, blood vessel injury, and abnormal immune system activity. Researchers hope to discover how these three elements interact to cause and promote scleroderma. In a number of studies, researchers have found evidence of fetal cells within the blood and skin lesions of women who had been pregnant years before developing scleroderma. These studies suggest that fetal cells may somehow play a role in scleroderma. Scientists are continuing to study the implications of this finding.

Scientists are also trying to better understand the organ complications that can occur in people with scleroderma and to find factors that predict who is at greatest risk for these complications.

Treatment studies are under way as well. One study in particular has looked at the effectiveness of ultraviolet light in softening the thickened skin of people with scleroderma, and others have shown that drugs affecting the circulation can improve symptoms of scleroderma.

Spondyloarthropathies

Researchers are working to understand the genetic and environmental causes of spondyloarthropathies, which include ankylosing spondylitis, psoriatic arthritis, reactive arthritis, and arthritis associated with inflammatory bowel disease. They are also looking at genetic determinants of disease severity, the development of associated eye problems, and potential new treatments for the diseases and their complications.

Systemic Lupus Erythematosus

Researchers are looking at how genetic, environmental, and hormonal factors influence the development of systemic lupus erythematosus. They are trying to find out why lupus is more common or more severe in certain populations, and they have made progress in identifying the genes that may be responsible for lupus. Researchers also continue to study the cellular and molecular basis of autoimmune disorders such as lupus. Promising areas of research on treatment include biologic agents; newer, more selective drugs that suppress the immune system; and bone marrow transplants to correct immune abnormalities. Contrary to the widely held belief that estrogens can make the disease worse, a major NIAMS-supported study has shown that it may be safe to use estrogens for hormone replacement therapy and birth control in women with lupus.

The Health Partnership Program: A Local Diversity Outreach Initiative for Treating Rheumatic Diseases

In the winter of 2000, NIAMS launched the Health Partnership Program (HPP), a local model of research and service that addresses disparities in preventing and treating rheumatic diseases in multicultural communities. The initiative focuses on four key areas: (1) public health education, (2) patient care, (3) access to clinical investigations, and (4) recruitment for research careers. The partnership includes community leaders and organizations representing the populations being served. They promote awareness of the program and its services and advise the Institute on community outreach activities.

One component of the HPP is the NIAMS Community Health Center, located in Washington, DC. The health center provides a platform for conducting health disparities research by implementing the four key areas of the HPP. The center offers patients quality health care and health information in a community clinic setting. Patients also have the opportunity to participate in clinical studies. More information about the HPP is available at www.niams.nih.gov/hi/outreach/index.htm.

Where Can People Find More Information About Arthritis and Rheumatic Diseases?

- **National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)**

National Institutes of Health

1 AMS Circle

Bethesda, MD 20892–3675

Phone: 301–495–4484 or

877–22–NIAMS (226–4267) (free of charge)

TTY: 301–565–2966

Fax: 301–718–6366

E-mail: NIAMSinfo@mail.nih.gov

www.niams.nih.gov

NIAMS provides information about various forms of arthritis and rheumatic diseases and bone, muscle, joint, and skin diseases. It distributes patient and professional education materials and refers people to other sources of information. Additional information and updates can be found on the NIAMS Web site.

Listings of clinical trials recruiting patients who have or are at risk of developing a rheumatic disease can be found at www.ClinicalTrials.gov.

- **American Academy of Orthopaedic Surgeons (AAOS)**

6300 North River Road

Rosemont, IL 60018-4262

Phone: 847-823-7186 or

800-824-BONE (2663) (free of charge)

www.aaos.org

AAOS provides education and practice management services for orthopaedic surgeons and allied health professionals. It also serves as an advocate for improved patient care and informs the public about the science of orthopaedics. The orthopaedist's scope of practice includes disorders of the body's bones, joints, ligaments, muscles, and tendons. For a single copy of an AAOS brochure, send a self-addressed stamped envelope to the address above or visit the AAOS Web site.

- **American College of Rheumatology (ACR)/
Association of Rheumatology Health Professionals**

1800 Century Place, Suite 250

Atlanta, GA 30345-4300

Phone: 404-633-3777

Fax: 404-633-1870

www.rheumatology.org

ACR is an organization of doctors and associated health professionals who specialize in arthritis and related diseases of the bones, joints, and muscles. The Association of Rheumatology Health Professionals, a division of ACR, aims to enhance the knowledge

and skills of rheumatology health professionals and to promote their involvement in rheumatology research, education, and quality patient care. The association also works to advance and promote basic and continuing education in rheumatology for health professionals who provide care to people with rheumatic diseases.

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The mission of the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), a part of the U.S. Department of Health and Human Services' National Institutes of Health (NIH), is to support research into the causes, treatment, and prevention of arthritis and musculoskeletal and skin diseases, the training of basic and clinical scientists to carry out this research, and the dissemination of information on research progress in these diseases. The NIAMS Information Clearinghouse is a public service sponsored by the Institute that provides health information and information sources. Additional information can be found on the NIAMS Web site at www.niams.nih.gov.



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