ARTHRITIS
PET-POD

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Arthritis is the most common orthopedic problem of pets. The term arthritis literally means “joint inflammation,” which is a good clinical description of this condition. It is a chronic problem that can vary from mild aches and pains of old age to an incapacitating and life-shortening disability.

Common signs of arthritis include morning stiffness, decreased activity, swollen joints, and limping. In severe cases, you might hear the joints make a “grinding” sound, or feel them vibrate during movement. Arthritis is much more common in dogs than in cats, because dogs are larger and heavier, which places a greater strain on joints.

The most common type of arthritis is the osteoarthritis that comes from old age, after years of wear and tear on the joints. This arthritic process can be accelerated by hip dysplasia, previous fractures, or joint infection because these conditions create friction and increased wear in the joint. Overweight animals and those with certain musculoskeletal problems (e.g., knock-kneed) are also at greater risk of developing early arthritis.

Arthritis can also be caused by autoimmune conditions in which the body’s own immune defenses mistakenly attack the joints. Such immune-mediated arthritis can lead to rapid deterioration of the joint and progressive lameness.

To determine the type of problem, your veterinarian will perform a physical examination and X-rays, focusing on the joints. In some cases, it may be necessary to obtain a small sample of joint fluid for analysis. Blood tests can be helpful in diagnosing infectious or immune-mediated disorders, but they are not 100 percent accurate.

Once the problem is diagnosed, your vet will consider your pet’s overall condition and provide you with treatment options. Many dogs respond well to occasional anti-inflammatory medications (such as aspirin or carprofen), while more severe or autoimmune conditions can require corticosteroids and other specialized medications. In some cases, surgery is required to correct joint instability or to replace a severely damaged joint with an artificial one. In all cases, keeping your pet fit and trim will help it move better, lessen the development and severity of arthritis, and minimize the need for medication.

It is important to NEVER give your pet any medication without your vet’s advice because many over-the-counter human drugs can be harmful to pets.
JOINTS

A joint is found in every place bones meet and move against each other. The shoulder and hip are called “ball and socket” joints because the top part of the long bone resembles a ball that fits into a cup or socket of bone on the shoulder blade or pelvis. In the shoulder, the ball part of the joint is the top part of the humerus; in the hip, the ball is at the top of the femur (thighbone).

Ball and socket joints have a fairly wide range of motion, able to move in a circular direction. The elbow and stifle (knee) are hinged joints that allow movement primarily in one direction or plane, backward and forward. The carpus (wrist) and hock (ankle) are gliding joints that allow a certain degree of flexing and twisting motions.

The continual movement of bone on bone would quickly wear down the joints if it wasn’t for the many protective mechanisms designed to cushion and shield them.

- **Cartilage** is a glossy, protein-based substance that coats the ends of bones. Articular cartilage functions to cushion impact, decrease friction, and protect the bone ends from wear.

- The **joint capsule** is a tough, fibrous envelope that surrounds the joint. It functions to strengthen the joint and limit movement in the wrong direction. It also serves as a receptacle for joint fluid.

- **Joint (synovial) fluid** fills the joint capsule, lubricating the joint and nourishing the cartilage.

- **Ligaments** strengthen the joint by connecting bone to bone, and **tendons** do so by connecting bone to muscle.

- Internal structures called **menisci** (singular meniscus) act as gel-filled cushions that soften impacts to some joints.
Shoulder (A) and elbow (B) joints of a dog showing the joint capsules (6, 15), and various tendons (3, 4, 7, 8, 9, 17), ligaments (11, 12, 21), and muscles (9, 19, 20).

Diagram showing the cruciate (crossed) ligaments, menisci, and cartilage inside the stifle (knee) joint. The joint cavity is filled with synovial fluid

CAUSES

Joint inflammation can develop for a number of reasons.

Osteoarthritis

Osteoarthritis is the term used for the most common form of joint inflammation. This condition, also known as degenerative joint disease, is typically seen in older dogs in which the protective cartilage in the joint has worn away over time. Overweight dogs are especially at risk because excess weight increases wear on the joint and makes movement more difficult and painful. Osteoarthritis can also develop in younger dogs when problems within the joint increase friction and hasten cartilage wear.

Any event that injures, damages, strains, or causes inflammation in a joint and its surrounding structures may eventually lead to osteoarthritis.

- Fractures involving the joint produce irregular surfaces that hasten wear.
- Problems like hip dysplasia or rupture of a cruciate ligament cause joint instability and subsequent osteoarthritis, unless surgically corrected.
- Misalignment of the limbs, such as being knock-kneed or walking toed in, also puts unusual strain on joints and increases the chance of osteoarthritis.

X-ray of a fracture involving the tarsal (hock) joint of a dog

Hip Dysplasia
The most common cause of canine osteoarthritis is hip dysplasia. The hip joint is formed by the ball-shaped top of the thigh bone (femur) and the socket (acetabulum) of the pelvic bone. Normally, these two structures fit together snugly, held firmly in place by muscles and tendons.

In hip dysplasia, the joint doesn't develop properly, so that there is looseness (laxity) that allows the ball of the femur to slip back and forth in the socket of the pelvis. In severe cases, the ball can periodically pop out of the socket, making an audible thud. Over time, this laxity and resulting trauma leads to damage and inflammation in and around the joint, resulting in chronic osteoarthritis.

Hip dysplasia can be seen in any dog, including mixed breeds, but it is most common in large and giant breeds, as well as in some smaller ones (e.g., Pugs). Dysplasia may be caused by many factors, including genetics, nutrition (especially high energy intake and excess calcium), and activity level.

Signs are often present as early as 4–6 months of age, although puppies with hip dysplasia may not initially show any signs at all. As dogs get older, laxity stretches the joint capsule, causing pain, inflammation, and eventually scar tissue and osteoarthritis. Your dog may actually improve for a period of time, but the lameness typically gets worse as the osteoarthritis worsens and the joint is slowly destroyed.
X-ray of a young dog with mild hip dysplasia and little signs of joint damage (A) versus an older dog with severe hip dysplasia and arthritis (B). Notice how the ball of the femur in B (arrows) is misshapen from arthritic changes.

### CAUSES

**Immune-Mediated (Autoimmune) Arthritis**

Immune-mediated arthritis develops when the immune system attacks joint tissues, causing inflammation. This sometimes represents a direct attack by antibodies targeting joint tissue, but is most often an indirect attack resulting from tiny immune complexes that attract inflammatory cells, such as neutrophils and macrophages, into the joint. These cells release irritating substances that lead to inflammation and subsequent joint damage.

Diagram showing (A) direct antibody-mediated and (B) indirect, immune-complex mediated damage from autoimmune disease. In figure B, the immune complexes are damaging blood vessels, but the same process occurs in joints.

Autoimmune arthritis commonly comes in two forms:

- In the milder form, there is no early evidence of bone destruction. Common examples include idiopathic polyarthritis, drug-induced polyarthritis, systemic lupus erythematosus (SLE or lupus), and polyarthritis of chronic disease.

- In the more severe (erosive) form, destruction of joint surfaces and bone occurs throughout the disease. Examples include rheumatoid arthritis, erosive polyarthritis of Greyhounds, and feline progressive polyarthritis.

Except for feline progressive polyarthritis, all forms of immune-mediated arthritis occur most commonly in dogs, especially Shelties, Old English Sheepdogs, Afghan Hounds, Collies, Beagles, Poodles, and German Shepherds.

Typically, multiple joints are affected (polyarthritis), so that pets may be lame in more than one leg. Lameness may also shift from leg to leg.

Joints are often warm or swollen to the touch, and muscle can atrophy on affected limbs. More generalized signs include fever, lethargy, loss of appetite, and skin or kidney problems.

The specific cause of immune-mediated arthritis is often a mystery. In some cases, the immune system is activated by bacterial or viral infections, such as in Lyme disease. In other cases, drugs such as sulfonamide antibiotics may cause drug-induced polyarthritis. Polyarthritis of chronic disease represents a secondary problem from chronic illnesses, such as cancer or certain heart or intestinal problems.
Infectious or septic arthritis is caused by microorganisms (most commonly bacteria) entering the joint. Infection can reach the joint directly through puncture wounds, such as those associated with cat bites or foreign objects (e.g., nails or wire), or via the circulating blood. Young pets that do not have well-developed immune systems, pets with depressed immune function, and those with osteoarthritic joints are more likely to develop bacterial arthritis.

Lyme disease is a common cause of infectious arthritis, although some of the damage from this organism is immune-mediated. Two other tick-borne bacteria that can localize in the joints include the organisms associated with Rocky Mountain spotted fever and ehrlichiosis.

Joint swelling, lameness, and severe pain in the joint are the most common signs. Lethargy and loss of appetite are also common. The skin over the affected joints may feel warm and may be reddened.

If the infection has spread through the bloodstream, several joints may be involved, and there are usually other signs of infection, such as fever. Puncture wounds typically affect only one joint without necessarily producing widespread signs of illness.
Common signs associated with arthritis include pain and stiffness in the morning (or after lying down for a long time), which decreases as the pet moves around throughout the day. Affected pets tend to limp and/or move slowly, and often have trouble climbing stairs or walking on smooth surfaces. Lameness may be constant or intermittent, and may worsen after exercise (especially if the exercise is followed by a rest period).

Pets with severe pain or those with autoimmune or septic arthritis may have a fever and show signs of lethargy and poor appetite.

### Common Signs of Polyarthritis

- Reluctance to rise or walk, or crying out when rising or walking
- Walking gently on the toes as if walking on hot coals or eggshells
- Walking hunched over or with a stiff gait
- Swollen joints or joints that are painful when squeezed or moved
- Back or neck pain if the joints between vertebrae are involved
- Lethargy or poor appetite due to pain or fever
Your vet can often easily diagnose arthritis by history, physical examination, and X-rays. For example, painful hips in an old dog or one with a history of dysplasia are easily recognized as osteoarthritis.

Signs of arthritis such as bone spurs (osteophytes) can usually be readily seen on X-ray. However, determining the cause of the arthritis often requires additional testing, especially when multiple joints are involved in a younger animal.

Blood tests can help rule out infectious or immune-mediated causes, because white blood cell counts are often increased in these conditions. Your veterinarian may also want to run specific blood tests to measure the level of antibody against the Lyme spirochete, or the presence of antinuclear antibodies or rheumatoid factor, which are sometimes (but not always) associated with autoimmune conditions.
In some cases, it may be helpful to look inside the joint with an endoscope to assess the level of joint damage and to guide surgical repair. Endoscopy requires special equipment and skill, so your vet may refer you to a specialist.

Endoscopic view inside an arthritic joint. Note the osteophyte formation (arrows).

Another useful diagnostic test is examination of a fluid sample from an inflamed joint. The pet is sedated or anesthetized, and (after thoroughly cleaning the area) a small amount of joint fluid is withdrawn using a needle and syringe.

Photomicrographs showing (A) quiescent immune cells found sparingly in normal joint fluid, (B) inflammatory neutrophils and a macrophage (first black arrow) found in noninfectious arthritis, and (C) red blood cells (red arrow) and neutrophils (including one loaded with bacteria (second black arrow) in a joint-fluid sample in septic arthritis.

TREATMENT AND PREVENTION

Nonsteroidal, anti-inflammatory drugs (NSAIDs) are used to treat most types of arthritis. Commonly used drugs include the following:

- Aspirin that has been buffered or enterically coated to protect against stomach upset
- Carprofen (Rimadyl®)
- Deracoxib (Deramaxx®)
- Firocoxib (Previcox®)
- Meloxicam (Metacam®)
- Tepoxalin (Zubrin®)

To reduce stomach irritation, all of these medications are typically given with food. Your vet may want to run some liver tests before prescribing an NSAID, because these drugs are metabolized by the liver.

NSAIDs are not used in cats because of potential toxicity. Other human pain relievers, such as ibuprofen (Advil®), acetaminophen (Tylenol®), and naproxen (Aleve®) should NEVER be given to pets. These drugs can cause serious toxic reactions.

When possible, treatment should be tailored to address the underlying cause.

Osteoarthritis

For most cases of osteoarthritis, occasional use of NSAIDs can ease pain and improve mobility. Dogs may also benefit from a variety of supplements containing glucosamine, chondroitin, and/or omega-3 fatty acids. These supplements can decrease joint damage and some pain, are safe, and can be used for years if needed. There is also an injectable form of glucosamine/chondroitin (polysulfatedglycosaminoglycans) that your vet can administer as a shot.

Other conservative therapies may include acupuncture, which has provided relief to some animals, and steroid medications, which are usually given only as a last resort because of their serious side effects.

Weight reduction is an important part of treatment for overweight dogs because slimming down allows dogs to move easier and reduces the amount of medication needed to control pain (see the Obesity POD for weightloss details).

Consistent, frequent, low-impact exercise (such as walking or swimming) can help your pet lose weight and improve mobility and muscle mass. But high-impact forms of exercise, such as running and jumping, should be avoided.

When available, rehabilitation therapy (e.g., hydrotherapy) can also significantly improve your pet’s quality of life. But even simple things like rugs and mats can improve traction and help your arthritic dog navigate slick surfaces.
Surgical Correction for Joint Instability
Weight reduction and conservative treatment with supplements and NSAIDs may be all that is needed to control mild dysplasia. But surgery may be needed to correct the instability associated with moderate to severe dysplasia or conditions such as cruciate ligament rupture and joint dislocation. Depending on the type and severity of the problem, surgery may be as simple as using wire to tighten the joint, or as complex as joint removal or replacement with an artificial joint.

Infectious Arthritis
Septic arthritis can quickly damage joints, so it is important to begin treatment promptly. This problem usually requires long-term antibiotic therapy that specifically targets the pathogen(s) involved. Antibiotics are typically begun as soon as laboratory samples have been submitted, and then changed as needed once the results of culture and sensitivity testing are available.

Pets may initially require hospitalization so that injectable antibiotics can be given. But animals with infectious arthritis are usually placed on long-term oral antibiotics (or antifungal drugs in the case of fungal infection within the joint). Drugs are commonly given for at least 4 weeks, or for 2 weeks after the clinical signs disappear.

Other treatments and supportive care (e.g., IV fluids) may be needed for widespread infections. Your vet may also prescribe NSAIDs or other pain relievers. Once the pain and swelling subside, physical rehabilitation therapy can help get your pet back in shape.

If there is severe infection confined to one joint, your vet may want to surgically drain the joint. This is often the case following bite wounds or stubborn infections that don’t respond to antibiotics within a few days. Once surgically opened, the joint can be irrigated with sterile fluid and either closed again or left open to drain.

Open wounds require specialized care and daily bandage changes until the infection resolves. Pets are usually hospitalized during this process and may be referred to a specialty practice experienced with joint infections.

Immune-Mediated Arthritis
Immune-mediated arthritis is typically a chronic disease that requires long-term (up to 3–6 months) treatment and follow-up.

Relief from immune-mediated arthritis requires relatively high levels of NSAIDs or drugs to depress the immune system. Corticosteroids (e.g., prednisone) can be very effective at reducing both inflammation and autoimmunity, but carry considerable long-term risks, such as cartilage damage, Cushing’s disease, and secondary infection. Steroids and NSAIDs are not used together, because this combination can cause severe gastrointestinal irritation and even ulceration.

Five Principles of Medical Management of Osteoarthritis
- Body-weight management
- Nutritional supplementation
- Exercise moderation
- Physical therapy
- Anti-inflammatory medication

TREATMENT AND PREVENTION
In some dogs, autoimmune conditions do not respond well to steroids alone, so more potent immunosuppressive drugs (e.g., cyclophosphamide) must be added to the therapy. Injectable gold salts have been used with success in dogs with rheumatoid arthritis.

If all else fails, surgical fusion of the joint may be appropriate to eliminate joint movement and therefore the pain associated with a destroyed and collapsed joint.

Common surgical approach used to fuse the hock joint

Your vet may recommend other treatments based on your pet’s concurrent condition(s) or level of illness. If drug-induced autoimmune disease is suspected, the offending drugs should be discontinued.

Veterinarians commonly recommend periodic physical exams and joint fluid analyses to monitor both disease progression and response to therapy. Periodic laboratory tests are also needed to detect bone-marrow suppression and inflammation of organs such as the bladder, liver, or pancreas (which are problems occasionally associated with high-level steroids or other immunosuppressive drugs).

Testing for feline leukemia virus should be performed annually in cats on immunosuppressive therapy because these pets are more likely to contract the disease.
Osteoarthritis is a chronic, progressive disease with a course that is difficult to predict. Your vet can help you set up an acceptable treatment plan, but therapy often needs to be adjusted over time as the disease progresses. When you get to the point in which medical therapy is unsuccessful and cannot be further adjusted, surgical alternatives such as joint fusion, arthroplasty, or joint replacement should be considered.

Prognosis with septic arthritis is variable. If it is discovered early and treated aggressively, bacterial arthritis may respond well to therapy. But fungal infections or any widespread, severe infections are more difficult to treat and carry a poorer prognosis. Septic arthritis that requires surgery also has a guarded to poor prognosis, because the resulting degenerative joint disease commonly leads to joint deformity, restricted range of motion, and lameness.

The long-term prognosis for pets with immune-mediated arthritis is uncertain. Prognosis is good for cases of mild arthritis with no evidence of joint destruction, especially if the pet responds well to initial treatment. Prognosis is poor for cases of severe, erosive polyarthritis with joint destruction, and for Greyhound polyarthritis.

In all cases, frequent rechecks may be needed initially to monitor response to treatment and to make adjustments in therapy. Other methods of monitoring treatment progress, such as laboratory tests and repeated X-rays, depend on the underlying cause and presence of other illness.

Prevention
The best way to help prevent arthritis is to keep your dog fit and trim. Moderate daily exercise helps strengthen muscles and tendons, tightens joints, and keeps weight down.

In the event of traumatic injury involving the joint, such as cruciate ligament rupture, proper surgical correction can greatly reduce the risk of subsequent arthritis.

Dogs at increased risk of arthritis, such as those with hip dysplasia, may benefit from joint supplements containing glucosamine and chondroitin.
## Glossary for Arthritis

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>Antibody</td>
<td>Specialized serum proteins (also known as immunoglobulins) produced by immune cells in response to exposure to invading organisms or other foreign material</td>
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<tr>
<td>Antinuclear Antibody</td>
<td>An antibody against the cell nucleus; these antibodies are commonly (but not always) found in autoimmune conditions.</td>
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<tr>
<td>Articular</td>
<td>Pertaining to a joint</td>
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<tr>
<td>Arthroplasty</td>
<td>An operation in which the arthritic or dysfunctional joint surface is replaced with something better, or in which the joint is remodeled or realigned. This term literally means “surgical joint repair.”</td>
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<tr>
<td>Autoimmune</td>
<td>Having the body’s immune defenses attack the body itself</td>
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<tr>
<td>Corticosteroid</td>
<td>A drug that mimics the hormones involved with controlling inflammation and swelling; these are sometimes referred to as steroids, but they should not be confused with the anabolic steroids used in body or muscle building.</td>
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<tr>
<td>Crepitus</td>
<td>A crunchy or grating sound associated with bone rubbing on bone; may be felt or heard during palpation of arthritic joints</td>
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<tr>
<td>Cushing’s Disease</td>
<td>A disease in which the adrenal glands produce too much of the natural corticosteroid known as cortisol. This disease (formally known as hyperadrenocorticism) was originally described in people by Dr. Harvey Cushing.</td>
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<tr>
<td>Cyclophosphamide</td>
<td>An anticancer drug used in the treatment of lymphomas and leukemias</td>
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<tr>
<td>Ehrlichiosis</td>
<td>A disease caused by blood parasites of the genus <em>Ehrlichia</em> (and related genera)</td>
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<tr>
<td>Endoscope</td>
<td>A tube (usually flexible) used by health professionals to see into hollow spaces inside joints or organs; the endoscope is often connected to a video camera so that moving images can be recorded.</td>
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<tr>
<td>Feline Leukemia Virus (FeLV)</td>
<td>A virus of cats that can cause cancer of the blood cells</td>
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<tr>
<td>Feline Progressive Polyarthritis</td>
<td>A chronic autoimmune disease of cats associated with arthritis of many joints, which worsens (progresses) over time</td>
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<td>Term</td>
<td>Description</td>
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<tr>
<td>Hip Dysplasia</td>
<td>Laxity in the hip joint that leads to secondary arthritis and joint damage. Hip dysplasia has a genetic predisposition, making it especially common in certain breeds.</td>
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<tr>
<td>Humerus</td>
<td>The long bone that connects the shoulder to the elbow</td>
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<tr>
<td>Hydrotherapy</td>
<td>Having pets walk (or swim) while immersed in warm water. The buoyant properties of water ease strain on heart, muscles, and joints, making exercise easier for obese or arthritic pets.</td>
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<tr>
<td>Idiopathic</td>
<td>Of unknown cause</td>
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<tr>
<td>Immune Complexes</td>
<td>Clumps of antigen-antibody complexes that can plug blood vessels and damage glomeruli, joints, lung tissue, and other organs. These complexes are often associated with chronic inflammation, such as occurs during autoimmunity.</td>
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<tr>
<td>Lyme Disease</td>
<td>A disease of people and pets caused by the bacteria <em>Borrelia burgdorferi</em>. Lyme disease is transmitted primarily by the bite of the black-legged tick or Western black-legged tick. Deer are an important host for these ticks, which is why they are informally called “deer ticks.”</td>
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<tr>
<td>Macrophages</td>
<td>Large immune cells within tissues that engulf foreign organisms. Macrophages destroy invaders and process their antigens for use by other cells of the immune system.</td>
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<tr>
<td>Neutrophil</td>
<td>A relatively small but numerous white blood cell that consists of a multilobed nucleus within a cytoplasm that contains granular material (aka granulocyte). Neutrophils engulf and destroy invading organisms.</td>
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<tr>
<td>Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)</td>
<td>Any of a class of drugs that control pain and inflammation without the use of corticosteroids. NSAIDs usually target the various COX enzymes involved with pain and inflammation. Aspirin is the oldest NSAID in common use today.</td>
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<tr>
<td>Osteoarthritis</td>
<td>A type of joint inflammation generally associated with aging; also known as degenerative arthritis or degenerative joint disease</td>
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<tr>
<td>Osteophytes</td>
<td>Osteophytes (aka bone spurs) are areas of new bone growth in response to the inflammation associated with arthritis.</td>
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<td>Polyarthritis</td>
<td>Arthritis involving more than one joint</td>
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<td><strong>Glossary for Arthritis</strong></td>
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<td><strong>Rheumatoid Factor</strong></td>
<td>An antibody against IgG, which is a common immunoglobulin found in the body. This is the most common autoantibody present in rheumatoid arthritis.</td>
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<tr>
<td><strong>Rheumatoid Arthritis</strong></td>
<td>An “autoimmune” disease in which the defenses of the immune system directly attack joint tissues.</td>
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<tr>
<td><strong>Rocky Mountain Spotted Fever (RMSF)</strong></td>
<td>A disease of dogs and people caused by the organism <em>Rickettsia rickettsii</em>, which is transmitted by the bite of an infected tick; the disease is characterized by fever, skin rash, and damage to various organs (such as the heart and kidneys). Despite its name, RMSF is most common in the southeastern United States.</td>
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<tr>
<td><strong>Systemic Lupus Erythematosus</strong></td>
<td>A widespread (systemic) autoimmune condition involving multiple organs, including the joints. The Latin word <em>lupus</em> means wolf, and erythematosus refers to redness. The name lupus erythematosus has been used since the 13th century because physicians thought the shape and color of the characteristic butterfly rash gave patients a wolf-like appearance.</td>
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