

OA · Osteoarthritis And Chronic Pain

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THE STORY IN ONE SENTENCE

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“OA (osteoarthritis) is wear-and-tear joint damage. Treatment centers on exercise, weight loss, topical NSAIDs or oral anti-inflammatory pills, physical therapy, and joint replacement when the others no longer work.”

Normal anatomy — the body's job

Picture a healthy joint: two bones meet, each capped with smooth, slippery cartilage that cushions impact and glides without friction. Around the joint sits the synovium, a thin lining that makes slick synovial fluid to keep everything moving smoothly. This setup lets you bend, walk, and lift without pain.

BODY'S JOB

Cartilage absorbs shock (like a car's shock absorber) and spreads the load evenly across the bone. Synovial fluid lubricates the joint (like oil in a hinge) so cartilage surfaces slide past each other with almost no friction. Together they protect the bone underneath and let you move freely.

1. Two bones come together at a joint.
2. Each bone end is capped with articular cartilage, a smooth, rubbery layer about 2–4 mm thick.
3. The synovium (joint lining) secretes synovial fluid into the narrow space between the cartilage surfaces.
4. A tough capsule and ligaments wrap the joint, holding it stable.
5. When you move, the cartilage compresses slightly, then springs back, absorbing shock.

What breaks

The slippery cartilage cushion on the bone ends breaks down, thins, and wears away. Without that cushion, bone rubs directly on bone. The bone underneath reacts by getting thicker, harder, and forming bony lumps at the edges.

CLINICAL TERM

Progressive loss of articular cartilage, subchondral bone sclerosis (thickening and hardening of the bone just under the cartilage), osteophyte formation (bony spurs at joint margins), and joint-space narrowing. This is a mechanical and metabolic failure of the cartilage matrix, driven by aging, repetitive loading, prior injury, obesity, and genetic factors.

How the body compensates

Early on, the body tries to stabilize the damaged joint by tightening muscles around it, growing bone spurs to widen the load-bearing surface, and you adapt by limping or favoring the other side. These strategies reduce pain temporarily but do not restore cartilage — and over months to years, pain worsens, range of motion shrinks, and function declines. The danger is missing the slow downward slope: a patient may look 'stable' on one visit but is actually losing independence, developing chronic opioid use, depression, and deconditioning. Watch the trajectory, not just the snapshot.

1. {'step': 'Muscle guarding and spasm around the joint', 'why': 'Muscles contract to splint the joint and limit painful motion — this buys short-term relief but leads to stiffness and atrophy if it persists.'}
2. {'step': 'Osteophyte (bone spur) formation at joint margins', 'why': 'The body grows extra bone to spread weight over a larger area and stabilize the joint — but these spurs can restrict movement and pinch soft tissue.'}
3. {'step': 'Limping or altered gait (antalgic gait)', 'why': 'You shift weight off the painful joint to reduce load — this protects the bad joint but overloads the opposite leg and spine, causing new pain elsewhere.'}
4. {'step': 'Reduced activity and deconditioning', 'why': 'Because moving hurts, you walk less, avoid stairs, and stop exercising — muscles weaken, weight climbs, and the joint gets even stiffer, creating a vicious cycle.'}
5. {'step': 'Chronic pain and central sensitization', 'why': 'Months of constant pain signals rewire the nervous system so that even light touch or small movements feel painful (the volume knob in the spinal cord and brain gets turned up).')}

6. {'step': 'Depression and social withdrawal', 'why': 'Chronic pain, loss of hobbies, and dependence on others drain mood and motivation — depression is common and makes pain feel even worse.'}
7. {'step': 'The crash point: Escalating opioid use, severe disability, and loss of independence', 'why': 'When non-opioid treatments no longer control pain, patients may receive long-term opioids (which carry addiction, overdose, and worsening pain risks). Severe OA can leave someone unable to work, shop, or care for themselves — at that stage, joint replacement is often the only path back to function.'}

Domino effect

1. Cartilage wears away and bone rubs on bone. — Years of use, prior injury, or excess weight break down the cartilage's protein scaffold faster than cells can repair it, leaving rough, thinned cartilage or bare bone.
2. Pain with movement (use-dependent pain). — Nerve endings in the bone, joint capsule, and synovium fire when bone impacts bone without a cushion, and inflammatory chemicals from damaged cartilage irritate those nerves.
3. Morning stiffness (gel phenomenon) lasting less than 30 minutes. — After rest, synovial fluid thickens and the joint 'gels'; a few minutes of movement pumps fresh fluid in and loosens things up — this is much shorter than the hour-plus stiffness in rheumatoid arthritis.
4. A crackling feel or sound (Crepitus) (crunching or grinding sounds and sensation). — Rough cartilage and bone surfaces scrape against each other instead of gliding smoothly, producing a grinding noise and vibration you can feel under your hand.
5. Reduced range of motion. — Pain makes you avoid full bending or straightening; over time, the joint capsule shrinks, muscles tighten, and bone spurs block movement — so the joint literally cannot move as far.
6. Joint swelling (effusion) — mild, bony-hard enlargement. — A small amount of extra synovial fluid accumulates from low-grade inflammation, and the bone spurs themselves make the joint look and feel larger and knobbier.
7. No fever, no whole-body illness. — Osteoarthritis is a local mechanical and metabolic problem in one or a few joints — it is not an infection or a systemic autoimmune disease, so you do not get fever, weight loss, or feeling sick all over.
8. Deformity in advanced disease (e.g. varus knee, Heberden's nodes in fingers). — Uneven cartilage loss and bone remodeling shift the joint alignment; in the knee, the inner cartilage often wears faster, bowing the leg inward (varus deformity). In finger joints, bone spurs at the tips form visible bumps (Heberden's nodes).

Symptoms · what the patient feels, and why

- Joint pain that gets worse with use and feels better with rest: The cushioning cartilage (the smooth padding at the ends of bones) wears away over time, so bones rub closer together when you move the joint, causing pain. Resting gives inflamed tissue a break.
- Morning stiffness that lasts less than 30 minutes: Fluid and mild swelling build up in the joint overnight when you're still. Once you start moving, the joint warms up and the fluid circulates, so stiffness fades quickly.
- Joint swelling that feels bony and hard, not warm or squishy: As cartilage breaks down, the bone underneath tries to repair itself by growing extra bone at the edges (osteophytes, or bone spurs), making the joint look and feel larger and knobby.
- Bony bumps on the fingers—Heberden nodes at the tips, Bouchard nodes in the middle: Extra bone grows at the joint edges where cartilage has worn thin, forming hard lumps you can see and feel under the skin.
- A crackling feel or sound (Crepitus)—a grinding, crackling, or popping feeling when you move the joint: Without enough smooth cartilage to glide on, rough bone surfaces rub and catch against each other, making noise and vibration you can feel.
- Pain and stiffness in the knees, hips, hands (especially the base of the thumb and finger joints), lower back, and neck: These joints carry the most weight or do the most repetitive work over a lifetime, so their cartilage wears out faster than in other joints.
- Reduced range of motion—the joint doesn't bend or straighten as far as it used to: Bone spurs, loose cartilage fragments, and thickening of the joint capsule (the tough bag around the joint) all take up space and block full movement.
- Joint instability or buckling, especially in the knee: Worn cartilage and stretched ligaments mean the joint doesn't hold together as tightly, so it can give way or feel wobbly under load.

Focused exam

- Bony bumps on the finger joints (Heberden nodes on the fingertips, Bouchard nodes on the middle joints): These bumps are bone trying to rebuild itself after the smooth cartilage cushion wears away. They prove that osteoarthritis is really there and has been going on for a while. They do not appear in other joint diseases like rheumatoid arthritis.
- Pain when you press on the joint or move it through its full range: This pain means the smooth cartilage cushion is gone and rough bone is rubbing on rough bone. Pain with movement and pressure is the main clue for osteoarthritis.
- Crunchy, grinding sounds when you move the joint (called a crackling feel or sound (crepitus)): When smooth cartilage wears away, rough bone surfaces scrape together and make noise. Hearing or feeling this grinding proves the cartilage cushion is damaged.

- Stiffness first thing in the morning that gets better after 30 minutes of moving around: Overnight, fluid settles in the narrowed joint space. Moving the joint warms it up and pumps the fluid out. This short morning stiffness is classic for osteoarthritis — other joint diseases stay stiff much longer.
- The joint looks a little puffy and feels warm to touch, but the person has no fever: Osteoarthritis causes low-grade swelling from irritation and wear, not from infection. No fever rules out infection and confirms this is wear-and-tear arthritis.
- Less motion range in the affected joint compared to the other side: Bone bumps, swelling, and pain from osteoarthritis block the joint from bending and straightening as far as it should. Measuring this helps track how bad the damage is.

Diagnostics · every test answers a question

- X-ray of the painful joint (knee, hip, hand, or spine) → Is the joint space narrowed, and are there bone spurs or hard, dense bone under the cartilage?
- Red blood cell (Erythrocyte) sedimentation rate (ESR) and C-reactive protein (CRP) → Is there high inflammation in the whole body, or is this just local wear and tear?
- Joint fluid analysis (arthrocentesis) if the joint is swollen and warm → Is the swelling from osteoarthritis irritation, infection, or crystal disease like gout?
- Rheumatoid factor (RF) and anti-CCP antibody if multiple small joints are involved → Is this rheumatoid arthritis instead of osteoarthritis?
- MRI of the joint (not routine, only when surgery is being considered or diagnosis is unclear) → How much cartilage is left, and is there damage to ligaments, meniscus, or bone marrow?

Treatment logic

- Weight loss through diet and low-impact aerobic exercise (walking, swimming, cycling) plus muscle strengthening around the joint → Less weight pressing down on worn knee and hip joints means less pain when you move and use them. Stronger muscles around the joint support it and take pressure off the damaged bone. ACR guidelines say this is the most effective first treatment.
- Topical NSAIDs (like diclofenac gel) rubbed on the skin over hands and knees → The medicine soaks through the skin and lowers swelling right inside the joint, which reduces pain when you move that spot. It works best on joints close to the skin.
- Oral NSAIDs (like ibuprofen or naproxen) for short periods during flare-ups, at the lowest effective dose → The medicine lowers inflammation inside the whole joint space, which reduces the pain signals your nerves send when you use that joint. It works faster than topical gels.

- Acetaminophen (Tylenol) up to 3,000 mg per day in divided doses → It blocks pain signals in the brain and spinal cord, which makes mild to moderate osteoarthritis pain less intense. It is safer for the stomach and kidneys than NSAIDs.
- Intra-articular corticosteroid injection (like triamcinolone) into the painful joint → The steroid reduces inflammation and swelling directly inside the joint space, which quiets pain for weeks to months when the joint is flaring badly.
- Duloxetine (Cymbalta) 30–60 mg daily, an SNRI antidepressant → It blocks reuptake of serotonin (a brain messenger that steadies mood and sleep) and norepinephrine (a messenger that controls alertness and pain pathways) in the spinal cord and brain. This changes how your nervous system processes chronic pain signals from the worn joint, making pain feel less intense over time. FDA-approved for chronic musculoskeletal pain including osteoarthritis.
- Joint replacement surgery (total knee arthroplasty, total hip arthroplasty) when the joint is too damaged to move or function and other treatments have failed → A new artificial joint made of metal and plastic replaces the completely worn cartilage and damaged bone, restoring movement and eliminating pain from that worn-out joint. This is the only treatment that truly fixes severe osteoarthritis.

Medications

Acetaminophen (Tylenol) · Non-opioid pain reliever

Acetaminophen quiets pain signals in the brain and spinal cord. It does NOT reduce swelling in the joint — it only dials down how much pain you feel. Think of it like turning down the volume on a painful alarm, but it doesn't fix the worn cartilage or calm the inflammation that's causing the alarm to ring in the first place.

1. Acetaminophen reaches the brain and spinal cord through the bloodstream.
2. It blocks enzymes (cyclooxygenase, or COX) in the central nervous system that help create pain signals.
3. With fewer pain signals being made, the brain registers less pain from the worn joint.
4. It does NOT block COX in the joint itself, so swelling and inflammation continue unchanged.

SAFETY WATCH

Do NOT take more than 3,000 mg in 24 hours (some guidelines say 4,000 mg max, but 3,000 is safer for most people). · Taking too much can damage the liver, especially if you drink alcohol regularly or already have liver disease. · Check labels — many cold medicines, sleep aids, and prescription pain pills already contain acetaminophen, so you can accidentally overdose if you take multiple products at once. · If you have liver disease, ask your doctor before using acetaminophen.

Topical NSAIDs (diclofenac gel, ibuprofen gel) · Nonsteroidal anti-inflammatory drug (topical)

Topical NSAIDs are rubbed directly onto the skin over the painful joint (usually hands or knees). The medicine soaks through the skin and into the joint, where it blocks the chemicals that cause swelling and pain. Because you rub it on instead of swallowing it, very little gets into the bloodstream, so the stomach and kidneys stay safer than with pills.

1. You rub the gel onto the skin over the painful joint.
2. The medicine penetrates the skin and moves into the joint tissues below.
3. Inside the joint, it blocks an enzyme called cyclooxygenase (COX), which makes prostaglandins — chemicals that trigger swelling, heat, and pain.
4. With fewer prostaglandins, the joint swells less and hurts less.
5. Because only a tiny amount enters the bloodstream, the stomach lining and kidneys are mostly spared.

SAFETY WATCH

Wash your hands after applying unless you are treating your hands. · Do NOT use on broken or infected skin. · Avoid heating pads or tight bandages over the gel — this can push too much medicine through the skin. · Rarely, people get skin irritation, rash, or itching where they apply it. · Even though it's safer than pills, people with severe kidney disease or a history of stomach ulcers should still ask their doctor first.

Oral NSAIDs (ibuprofen, naproxen, diclofenac) · Nonsteroidal anti-inflammatory drug (oral)

Oral NSAIDs are pills that travel through the stomach into the bloodstream and reach the painful joint from the inside. They block the chemicals that cause swelling and pain throughout the body. They work faster and stronger than topical gels, but because they go everywhere in the body, they also carry more risk to the stomach, kidneys, and heart.

1. You swallow the pill and it dissolves in the stomach.

2. The medicine enters the bloodstream and travels to all tissues, including the painful joint.
3. It blocks cyclooxygenase (COX) enzymes throughout the body, which stops the production of prostaglandins (the chemicals that cause swelling, heat, and pain).
4. With fewer prostaglandins, the joint swells less and hurts less.
5. Because COX is also needed to protect the stomach lining, make mucus, and help the kidneys filter blood, blocking it everywhere can cause side effects.

SAFETY WATCH

Use the lowest dose that controls pain and only for short periods (a few weeks at a time) if possible. · Can irritate or ulcerate the stomach lining — take with food to lower this risk. · Can raise blood pressure and increase the risk of heart attack or stroke, especially in people with existing heart disease or after long-term use. · Can harm the kidneys, especially in older adults, people with diabetes, or those already on blood-pressure pills. · Avoid if you have a history of stomach ulcers, heart failure, severe kidney disease, or recent heart surgery. · Do NOT combine with blood thinners (like warfarin or aspirin) without asking your doctor — bleeding risk goes up.

Intra-articular corticosteroid injections (triamcinolone, methylprednisolone) · Corticosteroid (injected into the joint)

A doctor injects a powerful anti-swelling medicine directly into the painful joint. The steroid calms down the inflamed lining of the joint (the synovium) and reduces fluid buildup. This gives fast relief — often within a few days — but it only lasts weeks to months, not forever. It's meant for flare-ups, not daily control.

1. The doctor numbs the skin, then inserts a needle into the joint space.
2. The steroid medicine is injected directly into the joint.
3. The steroid enters the synovial cells and tells them to stop making inflammatory chemicals (like cytokines and prostaglandins).
4. Swelling and pain drop quickly, and the joint moves more easily.
5. The effect wears off after weeks to months as the steroid breaks down and inflammation returns.

SAFETY WATCH

Do NOT get injections more than 3–4 times per year in the same joint — repeated steroids can soften and damage cartilage and bone. · Small risk of infection in the joint after injection (very rare, but serious). · Can raise blood sugar temporarily, especially in people with diabetes. · Pain may flare for 1–2 days after injection (called a 'steroid flare') before relief kicks in. · Not safe if the joint is infected or the skin over it is broken.

Duloxetine (Cymbalta) · Serotonin-norepinephrine reuptake inhibitor (SNRI), used for chronic pain

Duloxetine raises the levels of two brain messengers — serotonin and norepinephrine — in the spinal cord and brain. These messengers help the brain's natural pain-blocking system work better, so pain signals from the worn joint get dampened before they reach your awareness. This is especially helpful for chronic osteoarthritis pain that has become constant and hard to control with joint-focused treatments alone.

1. You swallow the pill and it enters the bloodstream, then crosses into the brain and spinal cord.
2. Duloxetine blocks the pumps (reuptake transporters) that normally suck serotonin and norepinephrine back into nerve cells.
3. With more serotonin and norepinephrine floating in the gaps between nerve cells, the brain's descending pain-control pathways (which run from the brainstem down to the spinal cord) become more active.
4. These pathways release signals that tell the spinal cord to quiet incoming pain messages from the joint.
5. The brain registers less pain, even though the joint damage itself hasn't changed.

SAFETY WATCH

Takes 2–4 weeks to feel the full benefit — it is NOT a fast pain reliever. · Common side effects include nausea (usually goes away after the first week), dry mouth, constipation, dizziness, and drowsiness. · Can raise blood pressure slightly — check your blood pressure regularly if you have high blood pressure (hypertension). · Do NOT stop suddenly — taper the dose slowly over weeks to avoid withdrawal symptoms (dizziness, tingling, irritability). · Rarely can increase thoughts of self-harm, especially in younger adults — tell your doctor immediately if your mood worsens. · Avoid if you have severe liver disease or uncontrolled narrow-angle glaucoma. · Do NOT combine with MAO inhibitors (a type of older antidepressant) — dangerous interaction.

Tramadol · Weak opioid and serotonin-norepinephrine reuptake inhibitor

Tramadol works in two ways: it binds weakly to opioid receptors in the brain and spinal cord (like stronger opioids do, but with less power), and it also raises serotonin and norepinephrine levels, which help block pain signals. It's used cautiously in osteoarthritis when other pain medicines haven't worked well enough and you need something stronger than acetaminophen or NSAIDs but want to avoid full-strength opioids.

1. You swallow the pill and it enters the bloodstream, then crosses into the brain and spinal cord.

2. Tramadol binds weakly to mu-opioid receptors, which normally respond to the body's natural pain-relief chemicals (endorphins). This binding closes some of the 'gates' that let pain signals through.
3. At the same time, tramadol blocks the reuptake of serotonin and norepinephrine, boosting the brain's descending pain-control pathways.
4. Together, these actions turn down the volume on pain signals, so the joint pain feels less intense.

SAFETY WATCH

Can cause dizziness, nausea, constipation, and drowsiness — do not drive or operate machinery until you know how it affects you. · Risk of dependence and withdrawal, even though it's weaker than traditional opioids — use the lowest dose for the shortest time. · Can lower the seizure threshold (make seizures more likely), especially in people with epilepsy or those taking other seizure-risk medicines. · Dangerous if combined with other serotonin-raising drugs (SSRIs, SNRIs, MAO inhibitors) — can cause serotonin syndrome (confusion, fast heart rate, high fever, muscle rigidity). · Avoid alcohol — increases drowsiness and breathing problems. · Do NOT use in people with severe breathing problems or active alcohol/drug addiction. · Current guidelines discourage long-term opioid use (including tramadol) for chronic osteoarthritis because harms often outweigh benefits.

Red flags

- Sudden, severe joint pain with fever or a red, hot, swollen joint—may be infection (septic arthritis) and needs emergency care
- Pain at rest or at night that wakes you up—may be a fracture, bone tumor, or severe inflammatory arthritis
- Rapid loss of function or inability to bear weight—may be a fracture, severe cartilage tear, or joint dislocation
- New numbness, tingling, or weakness below the joint—may mean nerve compression and needs prompt evaluation

Nursing priorities

1. Assess pain level using a 0-to-10 scale and ask which joints hurt during movement and rest — Pain assessment guides treatment intensity; pain only with movement suggests early disease treated with exercise and topical creams while constant rest pain signals severe cartilage loss needing stronger interventions like injections or surgery

2. Check the painful joint for warmth, redness, and swelling to rule out infection or inflammatory arthritis — A hot red swollen joint may have septic arthritis (bacteria inside the joint) which destroys cartilage within hours and needs emergency drainage; osteoarthritis causes cool mild swelling without redness
3. Teach weight loss strategies including calorie reduction and daily aerobic exercise like walking or swimming for 30 minutes — Every pound of body weight creates four pounds of pressure on the knee joint; losing 10 pounds removes 40 pounds of force per step which slows cartilage breakdown and reduces pain without medication
4. Demonstrate proper application of topical diclofenac gel (an anti-inflammatory cream) to hands and knees four times daily — Topical NSAIDs (non-steroidal anti-inflammatory drugs) block COX enzymes (proteins that make pain chemicals) directly in the joint with minimal absorption into the bloodstream so they cause less stomach bleeding and kidney damage than oral pills
5. Teach quadriceps strengthening exercises (straight leg raises while lying down) and hip muscle exercises to support the joint — Strong muscles around the joint absorb shock and stabilize the bones so less force transmits through the worn cartilage; quadriceps weakness allows the knee to wobble and accelerates cartilage damage
6. Educate about using oral NSAIDs like ibuprofen 400 to 600 mg only during pain flare-ups for the shortest time possible with food — Oral NSAIDs reduce prostaglandins (inflammation chemicals) throughout the body which relieves pain but also removes protective prostaglandins in the stomach lining causing ulcers and removes protective prostaglandins in kidney blood vessels causing kidney damage with long-term use
7. Monitor for side effects of chronic NSAID use including black tarry stools, decreased urine output, and swelling in the legs — Black stools signal gastrointestinal bleeding from stomach ulcers; decreased urine and leg swelling indicate acute kidney injury from reduced blood flow; both complications require stopping NSAIDs immediately
8. Prepare patient for intra-articular corticosteroid injection by explaining the procedure reduces inflammation inside the joint capsule for 6 to 12 weeks — Steroids block multiple inflammation pathways in the synovial fluid (joint lubricant) providing longer relief than NSAIDs; the injection delivers high drug concentration directly to damaged cartilage with minimal whole-body steroid exposure

Sources

- American College of Rheumatology (ACR) 2019 Osteoarthritis Guidelines
- Osteoarthritis Research Society International (OARSI) 2019 Guidelines
- American Academy of Orthopaedic Surgeons (AAOS) 2021 OA Management
- Cochrane Musculoskeletal Group

Last reviewed: 2026-07-07