

Otitis Externa (Swimmer's Ear)

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THE STORY IN ONE SENTENCE

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“The ear canal's skin gets soaked and breaks down, letting bacteria move in and cause a painful infection—most often after swimming or in humid weather.”

Normal anatomy — the body's job

The outer ear canal is a tube about one inch long that runs from the opening of the ear to the eardrum. Its skin is thin and delicate, and it's lined with tiny glands that make earwax (cerumen). This wax forms a protective coat—it traps dirt and bugs, and it's slightly acidic (around pH 5), which stops bacteria and fungi from growing. The canal also has a natural way of cleaning itself: dead skin and wax slowly move outward toward the opening, carrying germs and debris away.

BODY'S JOB

['The ear canal carries sound waves from the outside world to the eardrum so you can hear.', 'Earwax coats the canal's skin, keeping it waterproof and slightly acidic so germs can't take hold.', 'The skin inside the canal constantly sheds and pushes old wax and dirt outward, cleaning itself without you needing to do anything.']

1. Sound enters the outer ear (the part you can see) and travels down the ear canal.
2. The canal is lined with thin skin and tiny wax glands that release sticky, acidic earwax.
3. The wax coats the skin, traps dust and germs, and slowly migrates outward, carrying debris with it.
4. At the end of the canal sits the eardrum, a thin membrane that vibrates when sound waves hit it, sending signals to the middle ear and then to the brain so you hear.

What breaks

When water stays in the ear canal too long—like after swimming or in humid weather—it soaks the skin, washes away the protective wax, and raises the pH from acidic to neutral. The wet, unprotected skin swells, cracks, and loses its barrier. Now bacteria (most often *Pseudomonas aeruginosa* or *Staphylococcus aureus*) or sometimes fungi can stick to the damaged skin, multiply, and cause an infection. Anything that scratches or irritates the canal (like cotton swabs, hearing aids, or earbuds) makes it even easier for germs to get in.

CLINICAL TERM

Disruption of the ear canal's protective cerumen barrier and acidic pH, combined with maceration (softening and breakdown) of the canal skin from prolonged moisture, allows bacterial (predominantly *Pseudomonas aeruginosa* and *Staphylococcus aureus*) or fungal colonization and invasion, triggering acute inflammation and infection of the external auditory canal epithelium.

How the body compensates

The body tries to fight the infection by sending white blood cells and fluid into the ear canal, which causes redness, swelling, and pus. Pain nerves fire intensely because the canal skin is packed with nerve endings and the swelling presses against the rigid bone around the canal. Unfortunately, this swelling actually traps more moisture and debris, making the infection worse instead of better—so the body's own response can keep the problem going until antibiotics and drying steps break the cycle.

1. {'step': 'Immune cells rush to the infected canal skin', 'why': 'White blood cells arrive to attack the bacteria, releasing chemicals that kill germs but also cause inflammation, redness, heat, and swelling in the canal.'}
2. {'step': 'Fluid and pus accumulate in the canal', 'why': 'The immune response leaks fluid and dead white cells (pus) into the narrow canal, trying to flush out bacteria, but this fluid has nowhere to drain easily, so it pools and can block the canal.'}
3. {'step': 'Pain signals fire intensely', 'why': 'The ear canal has many pain nerves, and the swelling presses the inflamed skin against the hard bone surrounding the canal, causing severe pain—especially when you touch the outer ear, chew, or move your jaw.'}
4. {'step': 'The canal tries to push debris outward', 'why': 'The skin's normal self-cleaning tries to work, but swelling narrows the canal so much that wax, pus, and dead skin get stuck inside, keeping moisture and bacteria trapped and prolonging the infection.'}
5. {'step': 'Itching and irritation increase', 'why': 'Nerve endings in the inflamed skin send itch signals, making you want to scratch—but scratching damages the skin further and lets more bacteria in, creating a vicious cycle.'}

Domino effect

1. Water stays trapped in the ear canal after swimming, showering, or exposure to humid air. — The canal's narrow shape and earwax can trap water inside, keeping the skin wet for hours or even days instead of drying out quickly.
2. Prolonged moisture washes away the protective, acidic earwax and softens (macerates) the canal skin. — Water dilutes and removes the wax barrier, raises the pH from acidic (~5) to neutral (~7), and makes the skin swell and weaken—like how your fingers prune and soften in a long bath.
3. The wet, unprotected skin develops tiny cracks and loses its barrier against germs. — Without the wax coat, the swollen skin is fragile and easily damaged by scratching, cotton swabs, earbuds, or hearing aids, creating entry points for bacteria.
4. Bacteria (usually *Pseudomonas aeruginosa* or *Staphylococcus aureus*) or fungi colonize the damaged skin and multiply rapidly. — The neutral pH and moist, warm canal are perfect conditions for these germs to stick, grow, and invade the broken skin.
5. The body's immune system sends white blood cells and fluid to the canal, causing inflammation, redness, swelling, and pus. — The immune response tries to kill the bacteria, but the resulting swelling presses the inflamed skin against the rigid bone of the canal, triggering intense pain and further narrowing the canal.
6. Swelling narrows or even blocks the canal, trapping moisture, pus, and debris inside and muffling sound. — The canal can't drain properly, so infected material stays put, feeding the infection and blocking sound waves from reaching the eardrum, which reduces hearing.
7. Pain worsens with any touch to the outer ear (the tragus or pinna) or jaw movement (chewing, talking). — The ear canal is packed with pain nerves, and moving the jaw or touching the ear shifts the swollen, inflamed skin against bone, amplifying the pain signal.
8. Without treatment (antibiotic and/or antifungal ear drops, pain relief, and keeping the ear dry), the infection can spread to nearby skin, cartilage, or—in severe cases—bone, especially in people with diabetes or weakened immune systems. — The infection can break through the canal skin into surrounding tissue, causing cellulitis, perichondritis (cartilage infection), or even malignant (necrotizing) otitis externa, a serious bone infection that requires intravenous antibiotics and sometimes surgery.

Symptoms · what the patient feels, and why

- Ear pain that gets worse when you tug on the outer ear or press the little bump in front of the ear canal: The skin lining the ear canal is swollen and infected, so any movement or pressure on that tender tissue hurts
- Itching deep inside the ear: The infection irritates nerve endings in the ear canal skin, triggering an itch signal even though scratching makes things worse

- Clear or yellowish fluid draining from the ear: Infected skin in the canal leaks fluid and pus as the body's immune cells fight the bacteria or fungus growing there
- Ear canal looks red and swollen when the doctor looks inside: Blood rushes to the infected area to deliver immune cells, making the tissue puffy and bright red
- Feeling of fullness or blockage in the ear, sometimes with muffled hearing: Swelling and debris narrow the ear canal so sound waves can't travel through as well, like trying to hear through a partly plugged tube
- Tender or swollen lymph nodes in front of the ear or down the neck on the same side: Lymph nodes are like filter stations that catch germs draining from infected areas, and they swell as they work overtime to trap bacteria
- Fever: The body raises its core temperature to help immune cells work faster and make it harder for bacteria to multiply
- Severe pain that does not get better with over-the-counter pain medicine: Infection may be spreading beyond the ear canal into deeper tissue or bone, which causes much stronger pain signals
- Redness or swelling spreading onto the face or scalp around the ear: Bacteria are breaking through the ear canal and infecting the surrounding skin and soft tissue, a sign the infection is no longer contained

Focused exam

- Pain when you gently tug on the outer ear (the part you can see) or press on the small bump in front of the ear opening: This pain means the ear canal itself is inflamed and sore. Middle-ear infections (the kind behind the eardrum) usually don't hurt when you touch the outside of the ear, so this helps tell swimmer's ear apart from other ear problems.
- The ear canal looks red and swollen when you look inside with a light; sometimes the canal is so swollen it is nearly closed: Redness and swelling show that the skin lining the canal is fighting an infection. When the canal is very swollen, it can trap infection inside and make it hard for ear drops to reach deep enough to work.
- White, yellow, or greenish fluid draining out of the ear, sometimes with a bad smell: This discharge is a mix of dead skin, germs (bacteria or sometimes fungus), and fluid from the inflamed tissue. The color and smell tell you infection is present; a bad smell can mean the bacteria are breaking down tissue.
- The eardrum looks normal (not red, not bulging, moves normally when you puff air at it): A normal eardrum means the infection is only in the outer canal, not behind the drum in the middle ear. This confirms the diagnosis is swimmer's ear, not a middle-ear infection.

- Redness, swelling, or tenderness spreading beyond the ear onto the face or neck, or fever above 101°F (38.3°C): When infection spreads outside the ear canal into the surrounding tissue or bone, it becomes a much more serious problem (called malignant otitis externa) that can damage the skull bone and nerves. This needs immediate treatment in the hospital with IV antibiotics.

Diagnostics · every test answers a question

- Visual inspection of the ear canal with an otoscope (a lighted tool to look inside the ear) → Is the ear canal red, swollen, or filled with discharge? Does the eardrum look normal or is it involved?
- Culture of ear drainage (swabbing the fluid and growing the germs in a lab) → Which specific bacteria or fungus is causing the infection, and which antibiotics will kill it?
- Blood glucose (sugar) level, especially in adults with severe or recurring ear infections → Does the patient have diabetes or high blood sugar that is making infections harder to fight off?
- CT scan of the skull base (detailed X-ray pictures of the bone around the ear) → Has the infection spread from the ear canal into the bone of the skull (osteomyelitis)?
- Inflammatory markers: ESR (erythrocyte sedimentation rate) and CRP (C-reactive protein) blood tests → Is there severe, deep inflammation suggesting the infection is spreading beyond the ear canal?

Treatment logic

- Antibiotic ear drops (usually a fluoroquinolone like ciprofloxacin, or a combination of neomycin, polymyxin, and hydrocortisone) → The antibiotic kills the bacteria growing in the ear canal, stopping the infection. The drops deliver medicine right to the infected skin, so they work faster and with fewer side effects than pills. Most people feel better within 2 to 3 days.
- Pain relief with acetaminophen (Tylenol) or ibuprofen (Advil, Motrin) → These medicines lower pain and reduce swelling in the ear canal, making the person more comfortable while the infection heals. Ibuprofen also fights inflammation directly.
- Keep the ear dry: avoid swimming, use earplugs or a shower cap when bathing, and do not insert anything into the ear canal → Keeping the ear dry stops more moisture from softening the skin and feeding bacteria. It helps the ear canal heal faster and prevents the infection from coming back.

- Ear wick (a small foam or gauze strip inserted into the swollen ear canal) → The wick soaks up antibiotic drops and carries them deep into the canal when it is too swollen for drops to flow in on their own. This lets the medicine reach the infection. The wick usually stays in for 2 to 3 days and falls out as the swelling goes down.
- Oral antibiotics (pills, usually a fluoroquinolone like ciprofloxacin), used when infection spreads outside the canal or the patient has diabetes or weak immunity → Pills deliver antibiotics through the bloodstream to reach infection in tissue and bone that drops cannot touch. They are necessary when the infection is deeper or more serious.
- IV antibiotics (medicine through a vein) for severe cases like malignant otitis externa, usually an antipseudomonal drug (e.g., piperacillin-tazobactam, cefepime, or ciprofloxacin) for 4 to 6 weeks → IV antibiotics deliver high doses directly into the bloodstream to fight infection in bone and deep tissue. They are life-saving when infection has spread into the skull base and can prevent nerve damage, brain infection, or death.
- Surgical debridement (cutting away dead, infected tissue and bone) → Removing dead tissue eliminates the hiding place for bacteria and helps antibiotics work better. This is sometimes needed in malignant otitis externa when bone has died and won't heal with medicine alone.

Medications

Ciprofloxacin + Dexamethasone ear drops (Ciprodex) · Fluoroquinolone antibiotic + corticosteroid combination

Ciprofloxacin kills bacteria by breaking the machinery they use to copy their DNA (so they can't multiply), and dexamethasone calms down inflammation (swelling, redness, pain) by stopping the body's alarm chemicals from being made.

1. You put drops into the ear canal so the medicine touches the infected skin.
2. Ciprofloxacin enters bacteria (common ones like *Pseudomonas* and *Staph*) and blocks an enzyme called DNA gyrase that bacteria need to copy their genes.
3. Without working DNA gyrase, the bacteria can't multiply and they die.
4. Dexamethasone enters the cells lining the ear canal and turns off genes that make prostaglandins and other inflammation signals.
5. Less inflammation means less swelling, so the canal opens up, pain drops, and drainage improves.

SAFETY WATCH

Do NOT use if the eardrum is torn or has a tube in it (the steroid can harm the delicate nerves and bones inside). · Warm the bottle in your hand for a minute before using—cold drops can make you dizzy. · Keep using the drops for the full number of days (usually 7), even if your ear feels better sooner, so all the bacteria are killed. · If itching or rash gets worse, stop and call your doctor—you might be allergic to the medicine.

Ofloxacin ear drops (Floxin Otic) · Fluoroquinolone antibiotic (otic solution)

Ofloxacin kills bacteria by breaking the tools they use to twist and copy their DNA, so the germs can't reproduce and the infection clears.

1. You place the drops into the ear canal so the liquid reaches the infected lining.
2. Ofloxacin soaks into bacteria (*Pseudomonas*, *Staph*, and others) and blocks DNA gyrase and topoisomerase IV—enzymes that unwind and copy bacterial DNA.
3. Without these enzymes, bacteria can't divide, and they die off.
4. As the number of bacteria drops, redness, swelling, and pus production slow down, and the ear heals.

SAFETY WATCH

Safe to use if you have ear tubes or a small eardrum perforation—check with your doctor first. · Finish the full course (usually 7–10 days) even if you feel better, to make sure all bacteria are gone. · If you notice new itching, rash, or the ear gets more painful, call your doctor—you may need a different medicine.

Acetic acid 2% ear drops (VoSol, Domeboro Otic) · Acidifying agent (otic solution)

Acetic acid makes the ear canal more acidic (lowers the pH), and most bacteria and fungi that cause swimmer's ear can't survive in that acidic environment, so the infection clears.

1. You place the drops into the ear canal.
2. The acetic acid lowers the pH of the ear-canal skin to around 3–4 (normal skin is closer to 5–6).
3. Bacteria (especially *Pseudomonas*) and fungi prefer a neutral or slightly alkaline environment, so the acid stops their growth.
4. The drops also dry out moisture in the canal (water trapped in the ear makes infections worse), which helps healing.

SAFETY WATCH

Can sting or burn when you first put it in, especially if the skin is raw—this is normal but tell your doctor if it's very painful. · Do NOT use if your eardrum is torn (the acid can irritate structures inside the ear). · Often used to *prevent* swimmer's ear after swimming rather than treat a full infection.

Neomycin + Polymyxin B + Hydrocortisone ear drops (Cortisporin Otic) · Aminoglycoside + polypeptide antibiotic + corticosteroid combination

Neomycin and polymyxin B kill bacteria by punching holes in their outer walls and jamming their protein-making factories, and hydrocortisone calms inflammation (swelling, redness, pain) by blocking the body's alarm signals.

1. You put the drops into the ear canal so they touch the infected skin.
2. Polymyxin B attaches to the bacterial cell membrane (the outer wrapper) and creates holes, so the bacteria leak and die.
3. Neomycin enters bacteria and sticks to their ribosomes (the machines that build proteins), so the bacteria can't make the proteins they need to survive.
4. Hydrocortisone enters the skin cells and turns off genes that make prostaglandins and cytokines (inflammation chemicals), which lowers swelling and pain.

SAFETY WATCH

Do NOT use if your eardrum is torn, punctured, or has a ventilation tube—neomycin can permanently harm your hearing. · Some people are allergic to neomycin (it can cause itching, rash, or swelling)—stop the drops and call your doctor if this happens. · Use the full course (usually 7–10 days) even if symptoms improve, to clear all bacteria.

Ibuprofen or Acetaminophen (oral pain relief) · Nonsteroidal anti-inflammatory drug (ibuprofen) or analgesic/antipyretic (acetaminophen)

Ibuprofen blocks an enzyme (cyclooxygenase) that makes prostaglandins—chemicals that cause pain, swelling, and fever—so you feel less pain and the swelling goes down.

Acetaminophen works in the brain to raise your pain threshold (you notice pain less) and lower fever, but it does not reduce swelling.

1. You swallow the pill and it dissolves in your stomach.
2. The medicine enters your bloodstream and travels to the ear canal and to pain centers in your brain and spinal cord.
3. Ibuprofen blocks COX enzymes, so fewer prostaglandins are made; less prostaglandin means less pain signal and less swelling.

4. Acetaminophen raises the threshold at which nerves send pain signals, so the same amount of inflammation feels less painful.

SAFETY WATCH

Follow the dose on the bottle (for adults, ibuprofen is usually 200–400 mg every 6 hours; acetaminophen is 500–1000 mg every 6 hours). · Do not take ibuprofen if you have stomach ulcers, kidney disease, or are on blood thinners without asking your doctor first. · Do not take more than 3000 mg of acetaminophen in 24 hours (high doses can harm your liver). · These medicines make you feel better but do not replace antibiotic ear drops—you need both.

Red flags

- Fever above 100.4°F (38°C)
- Swelling or redness spreading to the face, jaw, or neck
- Severe pain that does not improve with ibuprofen or acetaminophen
- New hearing loss or dizziness
- Diabetes or a weakened immune system (higher risk for dangerous spread of infection)

Nursing priorities

1. Give pain medicine right away, before other treatments. — Swimmer's ear causes severe throbbing pain because the ear canal is tightly packed with nerves and has no room to swell. Controlling pain first helps the patient tolerate ear cleaning and drop placement, and shows compassion for real suffering.
2. Clean out debris and drainage from the ear canal gently before putting in drops. — Pus, dead skin, and earwax block the antibiotic drops from reaching the infected skin. Think of it like trying to paint over dirt—the medicine can't work if it never touches the infection. Gentle suctioning or wiping clears the path.
3. Teach the patient how to put ear drops in correctly: lie on side with bad ear up, pull the ear backward and upward, put drops in, and stay lying down for 5 minutes. — Drops only work if they flow all the way down the ear canal and sit against the infected skin long enough to soak in. Sitting up too fast makes the drops run right back out. The pull straightens the curved canal so drops can travel deeper.

4. Tell the patient to keep the ear completely dry until healed—no swimming, use a cotton ball coated with petroleum jelly when showering, and do not stick anything in the ear. — More water will keep the infection going by keeping the skin soggy and washing away the antibiotic drops. Poking with cotton swabs scrapes off the healing skin layer and pushes infection deeper. The ear must stay dry and untouched to heal.
5. Watch closely for spreading redness, increasing swelling around the ear, new fever, or worsening pain despite treatment, and report these immediately. — These signs mean the infection is not staying in the ear canal but is moving into surrounding tissue or bone. This is especially dangerous in people with diabetes or weak immunity and requires urgent medical attention to prevent serious complications.

Sources

- American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS) Clinical Practice Guideline: Acute Otitis Externa 2014
- CDC
- UpToDate
- American Academy of Family Physicians (AAFP)

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