

What is chronic recurrent multifocal osteomyelitis?

Chronic Recurrent Multifocal Osteomyelitis (CRMO) is a potentially serious disease. It involves inflammation of one or multiple bones that can be long lasting, or chronic. Symptoms can come and go. Inflammation may start in one bone, but later develop in other bones. CRMO is sometimes called Chronic Non-bacterial Osteomyelitis (CNO) by physicians and in publications. “Non-bacterial” means there is no bacterial infection. Some physicians prefer this term because the disease is not always recurrent or multifocal in nature.

CRMO is under-recognized, which means many doctors may not be familiar with this disease. Currently there are about 400 cases reported in the literature of patients with CRMO.

Inflammation is a normal process. It is the way our immune system protects our bodies from infections and germs. It causes pain, redness, and swelling. However, in CRMO, there is no infection. Instead, the immune system wrongly attacks normal bone. This causes inflammation.

How is CRMO diagnosed?

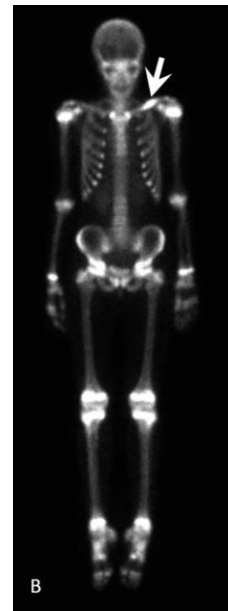
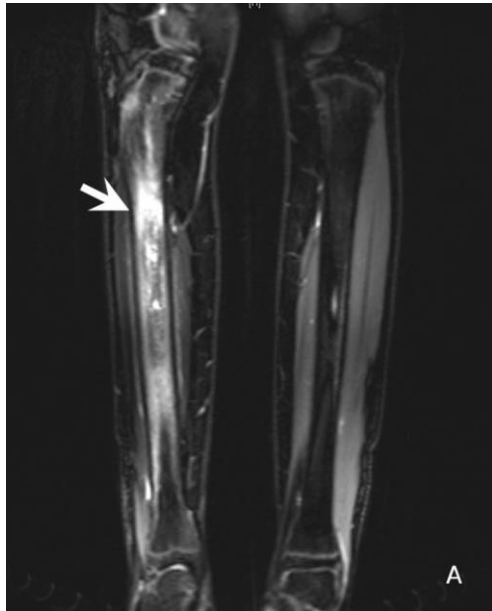
CRMO is a “diagnosis of exclusion.” This means that other diseases must be ruled out before the diagnosis can be made because the bone changes can look like infection or cancer. Generally, many tests are required, such as blood tests, X-rays, bone scans, MRI, and sometimes a bone biopsy. There is no unique test to confirm the diagnosis of CRMO. Your doctor will decide which tests are needed to diagnose your child.

Magnetic resonance imaging (MRI) is a technique that uses a magnetic field and radio waves to create detailed images of the organs and tissues within the body. Whole body MRI is the preferred imaging tool used to monitor CRMO. If whole body MRI is not available, an MRI of specific sites (such as an ankle or collarbone) and/or a bone scan may be done. A bone scan is a nuclear imaging test that uses radioactive materials to highlight areas of abnormal bone. A bone scan is not as sensitive as an MRI but can give a whole body picture as a baseline. A bone biopsy is a procedure where a sample of bone is removed and tested for cancer, infection, or other bone diseases.



A. Irregular area of bone destruction (indication by arrow) in the right fibula (thinner bone of the ankle) shown on an X-ray.

B. Normal left fibula from same child on an X-ray A. Irregular area of bone destruction (indication by arrow) in the right fibula (thinner bone of the ankle) shown on an X-ray.



MRI (A) and bone scan (B) images showing inflammation within bones.

A. Tibia (shin bone)

B. Clavicle (collar bone)

What Causes CRMO?

The cause of CRMO is unknown. The immune system damages the bone. Genetic and environmental factors may play a role.

What is happening in the bone?

Your immune system cells produce proteins that send signals to make inflammation. There are two main type of cells needed for bone development in children. One type of cell, osteoblasts, makes the bone. The other, osteoclasts, breaks down the bone. In normal bone development, these two cells work together to maintain healthy strong bones.

In CRMO, the immune system proteins make the osteoclasts work too much and the result is that they damage or eat the bone. This causes bone pain with or without swelling. Subsequently, fractures may occur. Even if pain is better with treatment inflammation may still be occurring. Children with CRMO/CNO need long term follow up with a pediatric rheumatologist. The drawing below illustrates normal and abnormal bone.

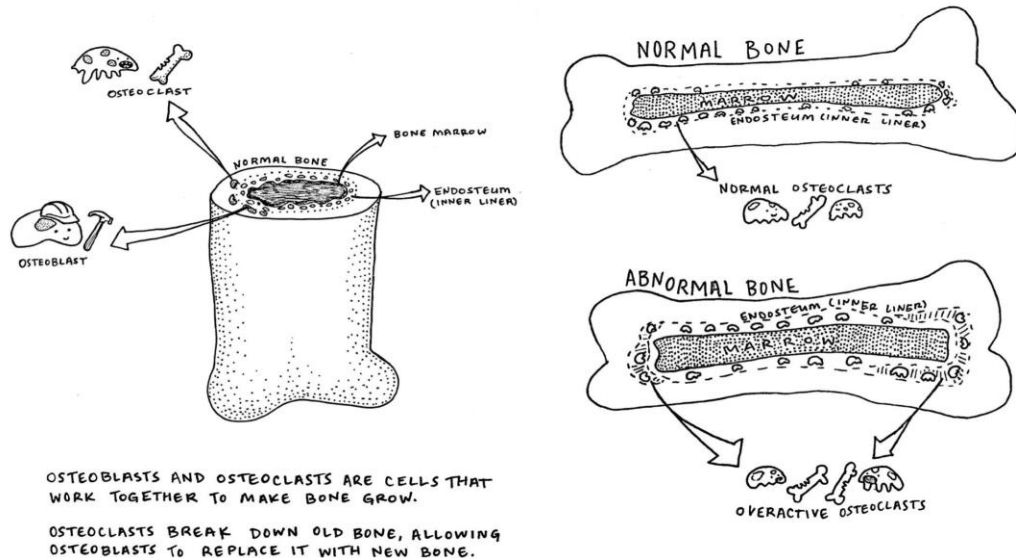


Illustration by Lauren Potts

What happens after your child is diagnosed with CRMO/CNO?

Find a doctor who has experience with patients with CRMO/CNO. CRMO/CNO in children is generally treated by a pediatric rheumatologist. Ask your doctor for a referral.

Why do we treat CRMO/CNO?

- Reduce inflammation
- Prevent bone damage and bone deformities (for example: fractures, leg length discrepancies, changes in spine curvature)
- Help avoid growth problems
- Decrease pain

How is CRMO/CNO treated?

CRMO is different for each patient. Different children respond to different treatments. Your doctor may need to try several medications before finding the one that works for your child. In severe cases, doctors may combine medications to treat the disease. Your doctor will work with you and your child to help find the best treatment.

For some CRMO patients, the disease can be managed with nonsteroidal anti-inflammatory drugs (NSAIDs) alone. NSAIDs are the first-line treatment. NSAIDs work by blocking one of the signals that causes increased bone damage. This may decrease the pain and inflammation in the bone to allow normal growth.

NSAIDs	Additional Medications
Naproxen (Aleve®)	Methotrexate (Otrexup®, Rasuvo®, Trexall®)
Celecoxib (Celebrex®)	Sulfasalazine (Azulfidine®)
Meloxicam (Mobic®)	Leflunomide (Arava®)
Piroxicam (Feldene®)	Pamidronate (Aredia®)
Indomethacin (Indocin®)	Zolendronic Acid (Zometa®)
Diclofenac (Voltaren®)	Adalimumab (Humira®)
	Etanercept (Enbrel®)
	Infliximab (Remicade®)

Your physician may start additional medicines for the following reasons:

- If NSAIDs alone are not effective
- If your child does not tolerate NSAIDs
- If there are high-risk bone lesions, such as lesions in the spine

In some case your doctor may use a short course of corticosteroids, for example, Prednisone=Deltasone® or Prednisolone=Orapred®.

These medicines are also used in children with other inflammatory and/or bone conditions. Side effects may occur while taking these medications. Your physician will have a discussion with you prior to starting any new treatment, which may include a combination of several medications.

What happens after your child begins treatment?

Your child's pediatric rheumatologist will make sure your child gets the right care. CRMO/CNO is a chronic condition where symptoms can come and go for years. Children might have inflammation in other bones of the body without symptoms. For this reason, your doctor will want to see your child even if he/she is feeling well. Once your child is on effective treatment, he/she should begin to feel better.

The pediatric rheumatologist will carefully monitor your child. It is important to keep all appointments because your doctor will want to continue monitoring for bone inflammation and any problems with the medications.

Whole body MRI is an imaging tool used to monitor CRMO/CNO. If whole body MRI is not available, your pediatric rheumatologist may order an MRI of specific sites (such as an ankle or collar bone) or a bone scan. A bone scan is not as sensitive as an MRI but can give a whole body picture as a baseline.

Having a new diagnosis of a chronic disease can be stressful. Your pediatric rheumatologist is available to suggest other resources for you and your child such as:

- Physical and occupational therapy for exercises to regain muscles strength and/or joint mobility.
- School accommodations, such as a 504 plan.

How will you and your doctor tell whether a treatment is working?

- Decrease in pain
- Return to normal activities
- Improvement in inflammation tests and/or imaging studies

What is the prognosis for patients with CRMO?

Prognosis will depend on your child's individual disease and response to treatment. The course can be different depending on the child. Many children will not have active disease on appropriate treatment, but in others the disease may persist. Some children will need to stay on medications for many years. Others could come off medications. This is why it is important to continue seeing your pediatric rheumatologist.