



## Heterotopic Ossification

*Heterotopic Ossification (HO) is the abnormal growth of bone in the non-skeletal tissues including muscle, tendons, or other soft tissue. When HO develops, new bone grows at 3 times the normal rate resulting in jagged, painful joints.*

### What causes Heterotopic Ossification (HO)?

HO only occurs below the level of injury. The specific cause of HO after spinal cord injury is unknown. There are many theories about why it develops after spinal cord injury including:

- Trauma or injury
- Immobilization or paralysis
- Muscle spasms
- Loss of oxygen
- Severe bleeding
- Inflammation - the body's natural response to injury
- Genetics
- Prolonged pressure on the hips

HO may develop within days following the spinal cord injury or several months later. HO usually occurs 3-12 weeks after spinal cord injury yet has been known to also develop years later.

HO occurs after other injuries, too. HO has been known to occur in cases of traumatic brain injury, stroke, poliomyelitis, myelodysplasia, carbon monoxide poisoning, spinal cord tumors, syringomyelia, tetanus, multiple sclerosis, post total hip replacements, post joint arthroplasty, and after severe burns.

In patients with spinal cord injury, 90% of cases occur in hips but it can also occur at the knees, elbows, and shoulders. HO occurs more in men than in women. People in their 20's and 30's are affected more than other age groups.

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## What are the symptoms?

### *Decreased range of motion*

A person with HO may have difficulty or limitation in the ability to perform activities of daily living or in moving their arms or legs as they once did. This is related to the development of bone at the joint which interferes with movement. This is most often seen as a decrease in ability to bend at the hips, bend the knees, bend the elbow, or move the shoulder.

### *Swelling or warmth of joint area*

Redness, swelling, or warm areas over a joint may develop due to the rapid onset of HO. Areas that this may develop include:

- Hip
- Knee
- Elbow
- Shoulder
- Thigh
- Entire leg

### *Fever*

Sometimes a fever will develop and can be as high as 103 degrees Fahrenheit. Sometimes the fever or temperature will be higher at night.

### *Increased spasticity*

Increased muscle spasms may occur related to pain and discomfort in the joints.

### *Joint Pain, Muscle Pain, and Autonomic Dysreflexia*

The bone that grows is often jagged making joint movement rough and bumpy – this can be very painful. If you have sensation after your spinal cord injury, this pain will be picked up by the brain and you will know that you are uncomfortable. If you have lost sensation after your SCI, your brain may not know your body is in pain.

Autonomic Dysreflexia (AD), also known as autonomic hyperreflexia, is an emergency situation. It is an abnormal response which occurs when your body is experiencing pain or discomfort below the level of your spinal cord injury (SCI). Because the pain or discomfort message does not get to the brain because of the spinal cord injury, the body's blood pressure increases to dangerous levels. If the cause of pain or discomfort is not found and treated immediately, serious complications such as stroke, seizure, organ damage, permanent brain injury, or even death may occur. Autonomic dysreflexia can occur with HO and the abnormal bone growth causes pain that the brain doesn't recognize because of the spinal cord injury.

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## What are some of the effects on your body from HO?

Having abnormal bone growth in one or more of your joints can affect many parts of your life. For example, when you can't move your joints freely, this can affect your ability to do transfers, bowel care, bladder care, and other activities of daily living. Also, because HO can increase the amount of pressure applied to tissue under certain boney areas, skin breakdown can occur. Pain in the joint can lead to increased spasticity and/or autonomic dysreflexia. Blood clots or deep vein thrombosis (DVT) can also develop due to decreased movement and problems with circulation around the joints. You will want to work closely with a doctor to treat HO and prevent potential complications.

## How is it diagnosed?

HO is often diagnosed after you have some or all of the symptoms listed above. Your doctor will order some tests to confirm the symptoms are related to HO. Some of the tests that may be ordered include:

- Blood tests
- CT-scan
- Ultrasound
- Three-Phase Bone Scan
- X-rays

## How is it treated?

Your doctor and therapy team will work with you to develop a treatment plan that works for you. Usually, treatment will include gentle range of motion of the joints and some physical therapy. Your doctor may also prescribe medications to slow down or stop the abnormal growth of bone.

When HO severely affects your movement or causes excruciating pain, surgery may be needed. Also, radiation has been used in some cases to stop the growth of bone. All other treatment options are explored first before considering surgery and/or radiation.

## Preventative Measures

Because the cause of HO is currently unknown, preventive measures are limited. Some doctors will prescribe medications to prevent bone growth. The blood thinner Coumadin (Warfarin) is sometimes prescribed because it decreases the activity of Vitamin K, an important component in the development of bone. Another type of medication often prescribed is non-steroidal anti-inflammatory (NSAIDS) drugs. These medications prevent formation of bone growth by blocking prostaglandin cells from forming bone. Depending on your individual health and needs, your doctor and team will develop a plan that is right for you. All medications come with side effects - never start or stop a medication without consulting with your doctor first.

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## The Take Home Message...

People with SCI need to be aware of changes in sensation, function, pain, and strength. With any change, speak with your doctor and report changes early. Losing function, movement, or having pain can indicate problems like HO - Be proactive in your health and talk with your doctor about any changes you experience.