

Gangrene

Definition

Gangrene refers to the death of body tissue due to a lack of blood flow or a bacterial infection. Gangrene most commonly affects the extremities, including your toes, fingers and limbs, but it can also occur in your muscles and internal organs.

Your chances of developing gangrene are higher if you have an underlying condition that can damage your blood vessels and affect blood flow, such as diabetes or atherosclerosis.

Treatments for gangrene include surgery to remove dead tissue, antibiotics and other approaches. The prognosis for recovery is better if gangrene is identified early and treated quickly.



Symptoms

When gangrene affects your skin, signs and symptoms may include:

- Skin discoloration — ranging from pale to blue, purple, black, bronze or red, depending on the type of gangrene you have
- A clear line between healthy and damaged skin
- Severe pain followed by a feeling of numbness
- A foul-smelling discharge leaking from a sore

If you have a type of gangrene that affects tissues beneath the surface of your skin, such as gas gangrene or internal gangrene, you may notice that:

- The affected tissue is swollen and very painful
- You're running a fever and feel unwell

A condition called septic shock can occur if a bacterial infection that originated in the gangrenous tissue spreads throughout your body. Signs and symptoms of septic shock include:

- Low blood pressure
- Fever, possibly, though temperature may also run lower than the normal 96.8 F (36 C)
- Rapid heart rate
- Lightheadedness
- Shortness of breath
- Confusion

Causes

Gangrene may occur due to one or both of the following:

- **Lack of blood supply.** Your blood provides oxygen, nutrients to feed your cells, and immune system components, such as antibodies, to ward off infections. Without a proper blood supply, cells can't survive, and your tissue decays.
- **Infection.** If bacteria thrive unchecked for long, infection can take over and cause your tissue to die, causing gangrene.

Types of gangrene

- **Dry gangrene.** Dry gangrene is characterized by dry and shriveled skin ranging in color from brown to purplish-blue to black. Dry gangrene may develop slowly. It

occurs most commonly in people who have a blood vessel disease, such as atherosclerosis.

- **Wet gangrene.** Gangrene is referred to as "wet" if there's a bacterial infection in the affected tissue. Swelling, blistering and a wet appearance are common features of wet gangrene.

It may develop after a severe burn, frostbite or injury. It often occurs in people with diabetes who unknowingly injure a toe or foot. Wet gangrene needs to be treated immediately because it spreads quickly and can be fatal.

- **Gas gangrene.** Gas gangrene typically affects deep muscle tissue. If you have gas gangrene, the surface of your skin may initially appear normal.

As the condition progresses, your skin may become pale and then evolve to a gray or purplish-red color. A bubbly appearance to your skin may become apparent, and the affected skin may make a crackling sound when you press on it because of the gas within the tissue.

Gas gangrene is commonly caused by infection with the bacterium *Clostridium perfringens*, which develops in an injury or surgical wound that's depleted of blood supply. The bacterial infection produces toxins that release gas — hence the name "gas" gangrene — and cause tissue death. Like wet gangrene, gas gangrene can be life-threatening.

- **Internal gangrene.** Gangrene affecting one or more of your organs, such as your intestines, gallbladder or appendix, is called internal gangrene. This type of gangrene occurs when blood flow to an internal organ is blocked — for example, when your intestines bulge through a weakened area of muscle in your abdomen (hernia) and become twisted.

Internal gangrene may cause fever and severe pain. Left untreated, internal gangrene can be fatal.

- **Fournier's gangrene.** Fournier's gangrene involves the genital organs. Men are more often affected, but women can develop this type of gangrene as well. Fournier's gangrene usually arises due to an infection in the genital area or urinary tract and causes genital pain, tenderness, redness and swelling.
- **Progressive bacterial synergistic gangrene (Meleney's gangrene).** This rare type of gangrene typically occurs after an operation, with painful skin lesions developing one to two weeks after surgery.

Treatments and drugs

Tissue that has been damaged by gangrene can't be saved, but steps can be taken to prevent gangrene from progressing. These treatments include:

- **Surgery.** Your doctor removes the dead tissue, which helps stop gangrene from spreading and allows healthy tissue to heal. If possible, your doctor may repair damaged or diseased blood vessels in order to increase blood flow to the affected area.

A skin graft is a type of reconstructive surgery that may be used to repair damage to your skin caused by gangrene. During a skin graft, your doctor removes healthy skin from another part of your body — usually a place hidden by clothing — and carefully spreads it over an affected area.

The healthy skin may be held in place by a dressing or by a couple of small stitches. A skin graft can be done only if an adequate blood supply has been restored to the damaged skin.

In severe cases of gangrene, an affected body part, such as a toe, finger or limb, may need to be surgically removed (amputated). In some cases, you may later be fitted with an artificial limb (prosthesis).

- **Antibiotics.** Antibiotics given through a vein (intravenous) may be used to treat gangrene that's become infected.
- **Hyperbaric oxygen therapy.** In addition to antibiotics and surgery, hyperbaric oxygen therapy also may be used to treat gangrene. Under increased pressure and increased oxygen content, your blood is able to carry greater amounts of oxygen. Blood rich in oxygen slows the growth of bacteria that thrive in the absence of oxygen and helps infected wounds heal more easily.

In this type of therapy, you'll be situated in a special chamber, which usually consists of a padded table that slides into a clear plastic tube. The chamber is pressurized with pure oxygen, and the pressure inside the chamber will slowly rise to about two and a half times normal atmospheric pressure.

Hyperbaric oxygen therapy for gas gangrene generally lasts about 90 minutes. You may need two to three treatments daily.

Other treatments for gangrene may include supportive care, including fluids, nutrients and pain medication to relieve your discomfort.

Outlook

Generally, people who have dry gangrene have the best chance of a full recovery because dry gangrene doesn't involve a bacterial infection and spreads more slowly than do the other types of gangrene. However, when gangrene caused by an infection is recognized and treated quickly, the odds of recovery are good.

Prevention

By Mayo Clinic Staff

Here are a few suggestions to help you reduce your risk of developing gangrene:

- **Care for your diabetes.** If you have diabetes, make sure you examine your hands and feet daily for cuts, sores and signs of infection, such as redness, swelling or drainage. Ask your doctor to examine your hands and feet at least once a year.
- **Lose weight.** Excess pounds not only put you at risk of diabetes but also place pressure on your arteries, constricting blood flow and putting you at risk of infection and slow wound healing.
- **Don't use tobacco.** The chronic use of tobacco products can damage your blood vessels.
- **Help prevent infections.** Wash any open wounds with a mild soap and water and try to keep them clean and dry until they heal.
- **Watch out when the temperature drops.** Frostbitten skin can lead to gangrene because frostbite reduces blood circulation in an affected area. If you notice that any area of your skin has become pale, hard, cold and numb after prolonged exposure to cold temperatures, call your doctor.