Fungal Dermatosis: Tinea or Ringworm Infections

What is tinea (or a ringworm infection)?

Tinea, also referred to as ringworm, is a common fungal infection of the skin. Fungi are widespread in the environment. There are thousands of fungal species, but only approximately 200 species regularly infect humans, causing either superficial or deeper infections, and, occasionally, both.

The body area affected by the infection classifies tinea. "Tinea capitis" is a superficial fungal infection involving the scalp, while "tinea corporis" is a superficial fungal infection involving the trunk, limbs, and face. "Tinea manuum," or ringworm, is an infection of the hands, whereas "tinea pedis" is a fungal infection the feet. "Tinea unguium," or "onychomycosis," affects the nails.

What causes tinea?

Dermatophytes, a group of fungi, cause superficial fungal infections, also known as fungal dermatosis, dermatophytosis, ringworm, or tinea.

Who gets tinea?

A dermatophyte infection of the scalp (tinea capitis) and of the general skin surface (tinea corporis) is very common during childhood. Because tinea capitis is no longer reportable to the Health Department, the true incidence is unknown. Probably, the highest incidence of tinea capitis occurs among children who are 1 to 10 years of age.

A dermatophyte infection of the hands (tinea manuum) and of the feet (tinea pedis) is more common in adulthood than in childhood. Tinea pedis is probably the most common dermatophytosis worldwide; up to 70% of the population has had this infection. Tinea pedis occurs in
males and in females, and the incidence of the infection increases with age. Most cases of tinea pedis occur after puberty. Nail infection (tinea unguium) is unusual during the first two decades of life.

Tinea most commonly occurs in warm, humid, tropical climates. Certain risk factors may increase the likelihood of a person developing an infection. These predisposing risk factors include some systemic disorders and certain environmental and occupational sources. Systemic diseases that may predispose individuals to tinea infections include diabetes mellitus and those with compromised immune systems. Environmental and occupational risk factors include animal contact, especially with kittens, puppies, and horses; contact sports; use of gymnasiums and swimming pools; and outdoor occupations.

**How do dermatophytes cause disease?**

Dermatophytes cause infection by invading keratin, which is a protein in the outermost layer of the skin, in the hair, and in the nails. Direct contact with infected animals, soil, or humans causes tinea.

**What are the common findings?**

Many patients with a mild tinea infection may have no symptoms. Symptoms include itching and burning, especially when the body, hands, or feet are involved. Patients also may complain of tenderness, swelling, and pain in the affected area. The more severe the infection, the worse the symptoms may become.

Tinea capitis appears as a combination of hair breakage and loss, redness, and scaling of the scalp. The extent of scalp redness and scaling varies from person to person. There can be minimal scaling and redness that resembles a mild form of dandruff, or there can be marked redness, swelling, puss formation, and hair loss. Some patients have a strong reaction in their scalp to the dermatophyte, and may develop tenderness, pain, and swelling of the lymph nodes in their
neck. Rarely, patients have an elevated white blood cell count. A long-term, severe case of tinea capitis that is not treated adequately may lead to permanent hair loss and scarring.

Tinea corporis is a dermatophyte infection of the general body surface. Physical examination reveals individual and grouped round patches of red, scaly skin. These round patches, or "rings," (hence the term, "ringworm") progressively enlarge and migrate outwards from the center of the ring to form expanding rings. As the ring expands, the center of the ring often becomes clear. Tinea corporis is similar in its appearance virtually anywhere on the body.

Tinea faciei appears on the face, and tinea cruris is an infection that involves the upper thigh and groin area.

A tinea infection of the hands primarily involves the palms, with a dry scale often looking like small circular areas of scale. Occasionally, a tinea infection of the hands can have small blisters on the palms. For unknown reasons, a tinea infection of just one hand, in conjunction with an infection of both feet, is the most common pattern. Usually, tinea pedis is red and scaly between the toes and on the soles. The skin of the web spaces between the toes can become red, softened, and swollen. The redness and scaling can spread to the side of the foot. Blister formation is more common on the feet than with the other tinea infections.

A tinea infection of the nails (tinea unguium or onychomycosis) invades the nail plate, and causes the nail to lift, thicken, discolor, and become fragile.

**How is tinea diagnosed?**

An appointment should be made with a primary care provider or a dermatologist for diagnosis and treatment, if an individual experiences the following: hair loss, accompanied by redness and scaling of the
scalp; patches of red, circular, scaly skin on the body, hands, or feet; blisters on the palms and soles; or nail changes.

The health care provider will sample a small piece of scale or blister, hair, or nail, and analyze it under the microscope for a fungal organism to establish the diagnosis. This test is called a potassium hydroxide preparation (KOH). Occasionally, the fungal branches and spores characteristic of the infection cannot be seen under the microscope, and a fungal culture will be sent to the laboratory to establish the correct diagnosis. It may take two to four weeks to obtain the fungal culture results.

**How is tinea treated?**

Tinea infections are treated with topical or systemic oral antifungal medications, and, occasionally, both. Anytime the infection involves the hair or the nails, an oral antifungal medication must be used. When only the skin is involved, a topical antifungal medication is usually sufficient, if the infection does not cover a large body area. If a large percentage of the body surface is involved, an oral and topical antifungal medication may be prescribed. Antifungal drugs have become increasingly effective in the treatment of tinea infections, especially the newer antifungal drugs on the market. Experience with most of the newer antifungal drugs is limited to patients over 12 years of age.

Griseofulvin was the first significant oral antifungal on the market used to treat tinea infections. It continues to be the preferred drug in the pediatric population because of its long history of effectiveness, its low cost, and its proven safety profile. Griseofulvin is used frequently to treat tinea capitis and tinea corporis in children. It also is used to treat tinea manuum and tinea pedis. Common side effects of griseofulvin include headaches and gastrointestinal upset. Rarely, allergic rashes from griseofulvin occur. Griseofulvin may make a
patient more sensitive to the sun, and the patient is at risk of developing a photosensitive rash or a sunburn.

Many very effective topical antifungal medications are available over the counter, and they can be used one to two times daily to clear infections (except tinea capitis and onychomycosis). Blistering skin eruptions on the palms and soles should be treated with cool compresses, such as Burrow's solution. Large blisters should be opened and drained for comfort. The newer antifungal medications on the market, namely Itraconazole and Terbinafine, are very effective for nail infections. Your primary care provider will help you to decide which topical and/or oral antifungal medication is most appropriate for your child.

**What are the complications?**

Tinea infections may lead to secondary bacterial infections, hair loss, and scarring. Occasionally, patients will have swollen lymph nodes that may persist.

**How is tinea prevented?**

A cool, dry environment, as well as avoiding exposure to infected animals, soil, and humans, may help reduce infections. Good personal hygiene, thorough drying of the hands and feet, absorbent socks, and wearing breathable natural materials may help prevent infection. For patients that experience recurrent tinea pedis infections, light, ventilated footwear or sandals and a medicated foot powder may be helpful. Sprays or powders with antifungal activity applied into footwear also may help prevent reinfection. Treatment is usually permanent, although the infection may recur.

**References**


**Leslie Capin, M.D.**

Dr. Capin received her medical education and completed her dermatology residency at the University of Colorado. A Fellow of the American Academy of Dermatology, she is board certified in Dermatology. She has been in practice at the Aurora/Parker Skin Care Center for twelve years, and recently opened CARA MIA Medical Day Spa in Parker, Colorado. She enjoys teaching, and often has students with her during office hours. She is experienced in medical and surgical dermatology, as well as cosmetic dermatology. She is often asked to participate in conferences, and speaks internationally.