



Emerging Ringworm

AT A GLANCE

Healthcare providers should be aware of emerging strains of the fungi that cause severe ringworm. Some strains are antimicrobial-resistant. Diagnosis often requires specialized testing only available at select reference laboratories. Treatment may require itraconazole or other antifungal medications usually reserved for invasive fungal infections.

Overview

Ringworm (also known as "tinea" and "dermatophytosis") is typically mild among immunocompetent people and treatable with antifungal medication. Over the past decade, healthcare providers have reported increasing cases of severe and antimicrobial-resistant ringworm.

Topical antifungals and oral terbinafine are frequently ineffective against antimicrobial-resistant ringworm. Instead, patients with these infections might require treatment with the antifungal itraconazole, or other antifungals usually reserved for severe fungal infections.

The true number of antimicrobial-resistant ringworm cases is difficult to estimate. Antifungal susceptibility testing for dermatophytes is not widely available and the US does not require reporting.

Clinical considerations

Healthcare providers should consider patients' recent travel history if severe or antimicrobial-resistant ringworm is suspected.

Antimicrobial resistance

Not all emerging types of ringworm are antimicrobial-resistant. However, it is important to monitor patient response to treatment. Consider antimicrobial susceptibility testing when symptoms do not improve with treatment.

Several factors may be contributing to the emergence and spread of antimicrobial-resistant ringworm:

- Overuse of over-the-counter topical antifungal creams.
- Inappropriate use of topical steroid creams.
- Inappropriate prescription of antifungal drugs.
- Inadequate adherence to prescribed courses of antifungal medication.

Emerging strains

Terbinafine-resistant *Trichophyton rubrum* (*T. rubrum*)

Trichophyton rubrum (*T. rubrum*) is the most common cause of fungal nail infections (onychomycosis) and ringworm worldwide. Cases of *T. rubrum* that are resistant to the terbinafine, the first-line treatment, are increasingly being reported.

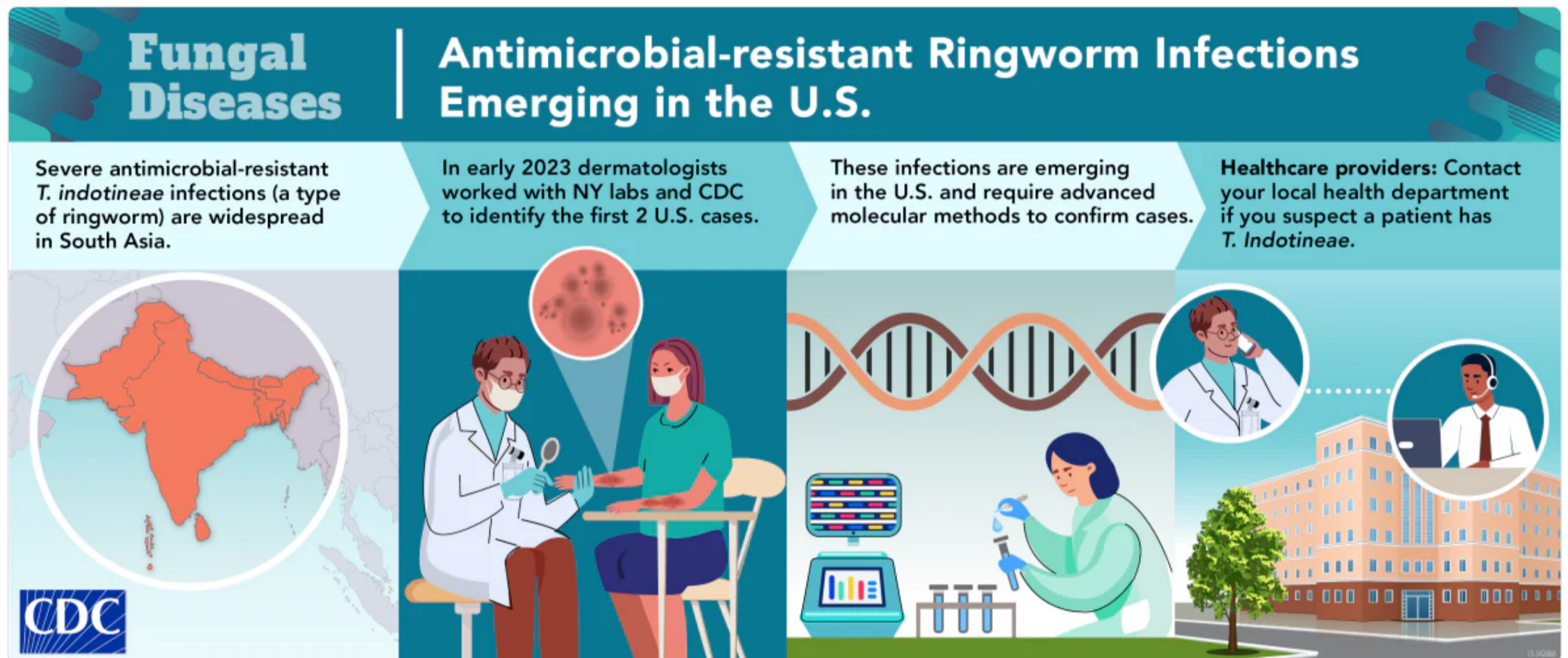
Trichophyton indotineae (*T. indotineae*)

Previously considered a subtype of *Trichophyton mentagrophytes* (*T. mentagrophytes* genotype VIII), *T. indotineae* is now considered its own species. *T. indotineae* often has genetic mutations that make it resistant to antifungal drugs, including terbinafine, a first-line treatment. Ringworm caused by *T. indotineae* are often severe (covering large regions of the body) and difficult to treat.

In the Indian subcontinent, cases of antimicrobial-resistant *T. indotineae* infections became widespread. Although less common, cases have been reported outside of the Indian subcontinent, including in Europe, North America, South America, and Africa.

Diagnosing *T. indotineae* infection requires advanced molecular techniques such as genomic sequencing; most clinical laboratories cannot distinguish *T. indotineae* from *T. mentagrophytes* or *T. interdigitale*, two other types of dermatophyte that commonly cause ringworm.

Keep Reading: Read about how the first two reported U.S. cases were confirmed from the clinician's perspective.



Cases of antimicrobial-resistant *T. indotineae* have been reported in the U.S..

Trichophyton mentagrophytes genotype VII (TMVII)

TMVII is an emerging dermatophyte fungus that may be spread during sex. It can cause inflamed, painful, itchy, and persistent skin lesions, located on the genitals, buttocks, or face.

TMVII has been circulating among men who have sex with men in Europe for several years. Some cases have also occurred among people who traveled to Southeast Asia for sex tourism.

TMVII infection was documented in a man in New York City following travel to several countries in Europe and to California. TMVII cases do not appear to be widespread in the United States. Public health officials are investigating whether additional people have been affected.

Current evidence suggests that oral terbinafine is effective for TMVII infections, but some patients may require itraconazole. Patients may require weeks to months of antifungal therapy.

Public health efforts and research

CDC works closely with partners from state and local health departments, academia, international organizations, and other federal agencies to address issues surrounding antimicrobial resistance.

CDC leads and supports several projects related to ringworm through its [Antimicrobial Resistance Solutions Initiative](#), including:

- Performing outreach to healthcare providers and professional societies to raise awareness of antimicrobial-resistant ringworm and improve adherence to guidelines for ringworm diagnosis and treatment.
- Supporting studies to better understand the burden of antimicrobial-resistant ringworm in the United States, with an emphasis on preventing further spread.
- Increasing laboratory capacity for antifungal susceptibility testing.



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