

**MEMORANDUM**

DEPARTMENT OF HEALTH AND HUMAN SERVICES  
PUBLIC HEALTH SERVICE  
FOOD AND DRUG ADMINISTRATION  
CENTER FOR DRUG EVALUATION AND RESEARCH

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**SUBJECT:** NATURAL HISTORY OF TINEA PEDIS

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**Introduction**

Tinea pedis is a common superficial fungal (dermatophyte) skin infection of the feet. It may present in several clinical varieties: intertriginous, moccasin, vesicobullous, or a combination of these. It is often referred to as "Athlete's Foot". Tinea pedis may be accompanied by dermatophyte infection of other parts of the body including groin, hands or nails. It is estimated to affect about 15% of the population at large, being more common in closed communities such as army barracks and boarding schools, in warm weather, among those frequenting swimming pools, and when the feet are occluded with nonporous shoes. Tinea pedis is estimated to be present in about 40% of all patients who attend clinics for any medical concern<sup>1</sup>. Those patients with more severe symptoms seek medical help and often have concomitant fungal infection of the toenails<sup>2,3</sup>. There are many undiagnosed cases, many of which may be asymptomatic and unsuspecting of having tinea pedis<sup>2</sup> and be a possible source of infection for others. Chronic infection is common in patients with concomitant diabetes, atopy, and immunosuppression. In an increasingly aging population and with the increasing numbers of immunocompromised patients, tinea is emerging as an important and a significantly prevalent infection.

**Causative Organism**

Tinea pedis is most commonly caused by *Trichophyton rubrum* (60%), by *Trichophyton mentagrophytes* (20%), and by *Epidermophyton floccosum* (10%); more rarely by *Microsporum canis*, *Trichophyton tonsurans* and by other dermatophyte species, with differences by geographic area and by age of the patient.

**Diagnosis**

Tineas are first seen by non-dermatologists about 60% of the time, and 40% by dermatologists. In clinical practice, diagnosis is often based on clinical presentation and sometimes also on laboratory studies: direct microscopic examination of skin scrapings and mycology culture.

The clinical presentation of tinea pedis may include fissuring, maceration, and scaling in the interdigital or subdigital area of the feet. Also, the area over the soles and on the side of the foot could be involved with minimal inflammation but with a diffuse scaling, or there may be small vesicles or vesicopustules present on the plantar area around the instep of the foot.

The clinical differential diagnosis of cutaneous eruptions of the foot includes many look-alike conditions, such as contact dermatitis, dyshidrosis, eczema, atopic dermatitis, keratoderma, and psoriasis. Among the patients who seek help for skin problems on the foot, only 32% have produced a positive mycology culture, and many of the patients with scaling of the foot and tinea pedis may remain undiagnosed or be misdiagnosed unless a fungus culture is performed<sup>4</sup>.

### **Mycology**

Direct microscopic examination for fungal elements is considered to be a rather insensitive method, with approximately 15% false negative<sup>5</sup>, depending on the particular technique and the experience of the physician. It has been reported that as many as 41% of specimens with a positive KOH did not show fungal growth and only 77% of specimens with a positive fungus culture had been read as a positive KOH<sup>6</sup>. New and more sensitive techniques are being investigated, such as confocal\* microscopy, but may not be ready for widespread use for some time<sup>7</sup>.

Mycology cultures are helpful when positive but it may take up to 4 weeks for a report to be available. False negative results are very common, depending on the degree of inflammation on the skin, how the skin is prepared prior to collection, where the scraping is taken from, the amount of scraping, and the possible persistence of a previously used antifungal on the skin.

### **Treatment**

Dermatology textbooks often recommend treatment with both oral and topical medications. However, recommendations for treatment are often given without sufficient detail to properly guide the prescribing physician. Some references recommend that tinea pedis “moccasin type” be treated with systemic antifungals. Others recommend concomitant use of oral and topical agents. A similar recommendation has been made for intertriginous tinea pedis. Some reported treatment success rates for topical antifungal treatment are: terbinafine cream (95% for 1-week, 76% for 1-week, 86% for 4-weeks), clotrimazole cream (35% for 1-week, 70% for 4-weeks), miconazole cream (95%, no duration specified). Unfortunately some of these references are not accompanied by sufficient details to effectively guide the prescriber.

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\* Confocal microscopy is a non-invasive technique that provides high resolution images of intact skin comparable to routine histology, without requiring specimen preparation.

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