Your child has a fungal infection. These simple words often yield a similar reaction in parents: a mixture of disbelief, surprise, and confusion. Many parents assume that cutaneous fungal infections only occur in people who lack proper personal hygiene. However, despite how clean a child may be, he or she can still contract these infections from everyday sources including contaminated surfaces of floors, bed sheets, clothing, combs, brushes, hair accessories, telephones, toys, exercise equipment, and lockers. Even infected classmates and household pets can spread fungus. In fact, superficial cutaneous fungal infections are so common in children that they actually account for up to 15 percent of all outpatient pediatric visits in the US.

Below, we will review the two most common fungal skin infections seen in the pediatric population: tinea capitis and tinea corporis. Both of these conditions are caused by dermatophytes, a group of skin fungi that are able to invade and multiply within the cornified layers of the skin, hair, and nails.

Tinea Capitis
Tinea capitis is an infection of the scalp and hair shaft caused by dermatophytes. It is often seen in pre-adolescent children, especially African American males. The most common organism responsible for tinea capitis is *Trichophyton tonsurans*, though *Trichophyton violaceum* and *Microsporum canis* are also responsible to a lesser extent.

Clinical presentation can vary, but three common presentations have been well described in the literature. The first of these is the non-inflammatory presentation, characterized by dandruff-like scales on the scalp with minimal hair loss and itchiness. This form of tinea capitis can be confused with seborrheic dermatitis of the scalp. Secondly, tinea capitis can also present as a black dot where significant hair loss occurs on the affected area. The third and most severe presentation is the inflammatory form, which is also known as a kerion. This presents as boggy, erythematous, oozing masses with hair loss that can be mistaken for an abscess. Physical findings that can help differentiate tinea capitis from the other entities mentioned above are the presence of cervical lymphadenopathy, hair loss, and scaly scalp.

Diagnosis and Treatment. The diagnosis of tinea capitis is made by fungal culture of the affected area using a moist standard bacterial culturette. Although results can take up to two weeks or more to be reported, we recommend performing a fungal culture prior to initiating therapy.

Whether diagnosed by a high degree of clinical suspicion or confirmed by culture, tinea capitis lesions always require systemic therapy. Topical antifungals are not efficacious because they do not penetrate the hair shaft where the fungus is present. Traditionally, griseofulvin has been the standard of therapy. It is FDA-approved, well tolerated by patients, and comes in a liquid form. Recently, however, higher doses of griseofulvin have been required to control tinea capitis infections. The current standard dose is 20-25mg/kg/day of the

<table>
<thead>
<tr>
<th>Drug</th>
<th>Recommended Dosage*</th>
<th>Cost of Drug</th>
<th>Treatment Period</th>
<th>Overall Cost to Consumer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Griseofulvin microsize suspension</td>
<td>15mg/kg</td>
<td>$46.99 for 120mL</td>
<td>45 days</td>
<td>$264.32</td>
</tr>
<tr>
<td>Griseofulvin ultramicrosize tabs</td>
<td>25mg/kg</td>
<td>$162.41 for 90 tabs</td>
<td>45 days</td>
<td>$406.03</td>
</tr>
<tr>
<td>Terbinafine, generic tabs</td>
<td>187.5mg</td>
<td>$48.99 for 30 tabs</td>
<td>45 days</td>
<td>$73.49</td>
</tr>
<tr>
<td>Terbinafine, generic tabs</td>
<td>187.5mg</td>
<td>$9.00 for 30 tabs via Wal-mart generic prescription plan</td>
<td>45 days</td>
<td>$13.50</td>
</tr>
<tr>
<td>Lamisil granules</td>
<td>187.5mg</td>
<td>$392.99 for 30 granules</td>
<td>45 days</td>
<td>$589.49</td>
</tr>
</tbody>
</table>

*for an average child weighing 25 kg. (Prices verified on www.drugstore.com)
stop Stopping. More psoriasis patients achieve efficacy when they receive continuous treatment with Humira (adalimumab, Abbott) compared to patients who interrupt therapy, according to a new report. The findings were from a sub-analysis of Abbott’s 52-week study, REVEAL and the open-label extension. After 33 weeks, patients who had achieved adequate response to Humira were randomized into two groups. One group continued to receive Humira; the other was given placebo. Beginning at week 52, all patients received Humira. Among those who discontinued and then re-started Humira, 84 percent of patients who had maintained adequate response achieved PASI 75 after 24 weeks of re-treatment, compared to 55 percent of those patients who had lost adequate response after stopping treatment.

**NEW In Your Practice**

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**Table 2. Guidelines for KOH Examination**

1. Proper collection of specimen for examination.
   a. Cleanse affected area with alcohol or soap and water
   b. Allow the area to air dry
   c. Collect specimen by scraping scale from the advancing border with a 15 blade, and place on slide
2. Add one to two drops of potassium hydroxide 10–30% solution to specimen on glass slide, followed by a coverslip
3. Gently heat the slide (avoid boiling) or allow to sit for 10 to 15 minutes to dissolve the skin cells and allow for easier visualization
4. Examine under low power of microscope with condenser lowered for septate branching hyphae.

   **Adapted from Theos A. Diagnosis and Management of Superficial Cutaneous Fungal Infections in Children. Pediatr Ann. 2007; (36):47–54**

**Tinea Corporis**

Commonly known as ringworm, tinea corporis is an inflammatory mycosis of the glabrous (relatively hairless) skin caused by several different species of fungi such as *Trichophyton, Microsporon*, and *Epidermophyton floccosum*.

In children, tinea corporis usually presents on exposed areas of the body such as the face, neck, and extremities; however, any site on the body may be involved. Body ringworm lesions begin as erythematous papules that enlarge to the periphery. An oval or circular plaque with elevated, inflamed edges develops as the fungus consumes the keratin at the center of the lesion and moves outward (Fig. 2). Concentric rings or wavy patterns can also form. The most common symptoms reported by patients include itching and burning.

Patients who are immunosuppressed or in close contact with an infected human or animal, or with someone who has a personal history of tinea capitis, are at greater risk of developing tinea corporis. Another well-known risk factor is participation in contact sports such as wrestling.

**Diagnosis and Treatment.** Because tinea corporis tends to present as the classic annular lesions with central clearing and active red scaly border, the diagnosis is often suspected clinically. A microscopic potassium hydroxide (KOH) examination of skin scrapings and/or fungal culture should also be done and is required to confirm a fungal infection. The presence of septate hyphae indicates a positive KOH examination and confirms a fungal etiology, but it does not delineate which particular species is the culprit. To specifically identify the fungal species responsible for the infection, a fungal culture must be performed. The broad differential diagnosis for tinea corporis includes granuloma annulare, erythema annulare centrifugum, erythema chronicum migrans, annular psoriasis, pityriasis
rosea, pityriasis versicolor, and parapsoriasis. It can also be confused with nummular, atopic, or contact dermatitis. However, these conditions can be easily distinguished from tinea corporis by their negative KOH examination and fungal culture.

Twice-daily application of topical antifungals is usually effective in treating tinea corporis and can clear infections in one to four weeks. Physicians should be aware that local skin irritation is the most common adverse reaction to using topical therapy. For pediatric patients who fail topical treatments, are immunosuppressed, or have extensive skin involvement, systemic antifungal medications are appropriate. The systemic drug of choice in children is griseofulvin, for two to four weeks, at a dose of 5 to 10mg/kg/day of ultramicrosize formulation or 10-20mg/kg/day of microsize formulation. The FDA has approved griseofulvin for the treatment of tinea corporis in children older than two years. Oral terbinafine, fluconazole, and itraconazole have been used for refractory pediatric tinea corporis cases and appear to have a greater efficacy with fewer side effects than oral griseofulvin when used in adults, but they are more expensive and have not yet been approved by the FDA for use in children. Also, wrestlers with active tinea corporis should not be allowed to participate in matches or practices until completing 10 to 15 days of oral therapy due to concern over spread of infection.

The Importance of Being Cleanest

While good hygiene alone may not always be sufficient in preventing fungal skin infections, cleanliness combined with efforts to minimize contact with potential carriers or contaminated objects can help limit the spread of dermatophytes and prevent recurrence of infection. It is also comforting to know that although tinea capitis and tinea corporis are relatively common in children, modern therapies do exist that are not only capable of controlling symptoms, but can often quickly and effectively cure the conditions with minimal side effects.

Ms. Hsu and Dr. Matiz have no relevant disclosures.