Objectives

- Describe the etiologies of fungal infection on the skin.
- Recognize and identify fungal infections.
- Conduct diagnostic tests to ascertain whether fungus is the cause of the skin problem.
- Appropriately treat fungal lesions.

Fungal Infections

- Tinea pedis and manus
- Tinea capitis
- Tinea corporis
- Tinea cruris
- Tinea incognito
- Tinea versicolor
- Sporotrichosis

Types of Fungal Organisms causing Skin Infections

- Dermatophytes
  - Trichophyton
  - Microsporum
- Yeasts
  - Candida
  - Malassezia furfur = Pityrosporum

Trichophyton rubrum
**Tinea pedis**
- interdigital
- moccasin distribution
- vesicular

**Tinea Pedis** Differential Diagnosis
- Dyshidrotic Eczema
- Contact dermatitis
- Pitted keratolysis
- Plantar psoriasis

**Contact Dermatitis**

**Dyshidrotic eczema**

**Pitted Keratolysis**

Bacterial and malodorous
Pitted keratolysis

- mimics tinea pedis
- a number of bacteria have been implicated
  - including Micrococcus sedentarius
  - treat with topical erythromycin
- pits on the bottom of the foot
- malodorous and sweaty feet (hyperhidrosis – treat with aluminum chloride)
EBM for topical treatment of Tinea Pedis*

- In placebo-controlled trials, allylamines and azoles were both efficacious.
- Allylamines (terbinafine and naftifine) cure slightly more infections than azoles (clotrimazole and miconazole) but are more expensive. (LOE 1a)
- Cost-effective strategy start with azoles use allylamines if the azole fails.


Costs of Topical Antifungals

- Over the counter:
  - Clotrimazole (Lotrimin) $8
  - Miconazole (Micatin) $9
  - Terbinafine (Lamisil AT)* $16
  - Ketoconazole (Nizoral) $20
- By prescription:
  - Econazole (Spectazole) $30
  - Naftifine (Naftin)* $38
  - *slightly more effective allylamine

Per ounce from www.drugstore.com

Oral Antifungal medications – tinea pedis

- Based on data from twelve trials, involving 700 participants
- Oral terbinafine for 2 weeks cures 52% more patients than oral griseofulvin
- Terbinafine is equal to itraconazole in patient outcomes


EBM – tinea pedis

- Evidence supports the use of oral terbinafine or itraconazole over oral griseofulvin in the treatment of tinea pedis.
- Cochrane Database of Systematic Reviews
- http://www.cochrane.org//reviews/en/ab 003584.html

Tinea pedis leading to cellulitis
Tinea manus

- **Diagnosis:**
  - Often unilateral, but with bilateral feet
  - May have only scant scaling, vesicles
- **Differential Diagnosis:**
  - Eczema, contact dermatitis
- **Treatment:** Topical antifungal agents

Two feet one hand syndrome

Atopic dermatitis
Kerion

- severe inflammatory reaction to the dermatophyte
- boggy raised nodule with hair loss
- may need oral steroid to treat

Kerion healing
T. Capitis Diagnosis

1. Pull out a few loose hairs
   - Place on microscopic slide with KOH/DMSO (can get at delasco.com)
   - Looking for hyphae/spores
2. Woods lamp: bright green fluorescence with Microsporum infection occurs less than 20% of the time
3. Culture: If KOH is negative but strong clinical suspicion

Tinea capitis – differential dx

- Alopecia areata
- Seborrhea
- Traction alopecia
- Scarring alopecia
  - Discoid lupus

Alopecia Areata

Traction Alopecia
**T. capitis**

**Treatment**
- Systemic therapy needed
- Griseofulvin for 6 - 8 wks
  (Or 2 wks beyond cure)
- Itraconazole pulse therapy

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**Griseofulvin and terbinafine for tinea capitis – EBM**
- Griseofulvin and terbinafine are both effective and well tolerated in the treatment of tinea capitis
  - Griseofulvin is cheaper.
- LOE = 1b


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**Tinea corporis**
- Papules or plaques with erythema and scale
- Look for annular lesions with central clearing
- Concentric rings – high specificity for t. corporis
- Well-demarcated edges
Tinea corporis - Differential diagnosis
- Nummular eczema
- Granuloma annulare
- Pityriasis rosea
- Psoriasis
- Erythrasma
- Candida
- Cutaneous larva migrans

Nummular eczema

Pityriasis rosea

Granuloma annulare
Cutaneous Larva Migrans

Tinea corporis - Treatment

- topical agents for mild to moderate disease
- oral agents for more extensive or resistant cases
- continue for 1-2 weeks beyond cure

Tinea cruris

Tinea Cruris

Tinea Cruris

Tinea Cruris
Tinea cruris

- spares scrotum
- look at feet for source of infection
- treat with topical antifungal - not nystatin

T.cruris Differential Dx

- Erythrasma
- Psoriasis (inverse)
- Seborrheic dermatitis
- Candida
- Intertrigo (irritant dermatitis)

- Do a scraping with fungal stain when you are not sure
Coral red fluorescence with Wood's lamp (ultraviolet light)
May not be present when patient has bathed that day

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T. Cruris treatment
- Topical antifungal agent for 2-3 weeks or until clear
- Mild topical steroid such as hydrocortisone for itching and inflammation is acceptable
- Treat feet with topical antifungal if also infected
- May need oral antifungal if severe
Tinea incognito

Tinea versicolor

Tinea versicolor

Tinea versicolor

Tinea versicolor

Courtesy of Chris Wenner, MD
**KOH - CPT code 87220**

**Diagnosis**
- scrape from leading edge
- Use KOH with DMSO or
- Swartz Lamkins Stain 0.5oz $12.50
  - [www.Delasco.com](http://www.Delasco.com)
  - 3 year shelf life

**Tinea versicolor treatment**

- **Topical Antifungals** -
  - Large areas - Selenium sulfide, Zinc pyrithione
  - Small areas - Ketoconazole or clotrimazole cream
- **Oral is easy** -
  - one 400 mg dose of Ketoconazole or Fluconazole

**Sporotrichosis**

Deep Fungal

Photos by Eric Kraus, MD
Some take home messages:

- Use fungal stains and Wood's lamp for diagnostic challenges
- Inverse psoriasis and erythrasma are common conditions that appear fungal
- T. Pedis- highly variable presentation with many looks alike
- T. capitis- oral therapy needed, look for kerions
- T. versicolor- oral therapy effective but not always needed

Photographs from collection of Richard Usatine, MD

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