Basic Mycology
September 2006

0609-2 Skin scraping toes
Trichophyton tonsurans
– Contaminated sample

CMPT QA: *Trichophyton tonsurans.* Unfortunately this sample became contaminated with *Aspergillus flavus*.

Reference Laboratory: *Trichophyton tonsurans* confirmed.; however, contaminated w/ *Aspergillus* sp. / *A. flavus.*

PARTICIPANT RESULTS One participant reported *Trichophyton mentagrophytes*; 4 reported *Aspergillus* species, and 1 did not submit a report. Four reported using Fungus selection agar incubated at room temperature (RT); 2 noted Potato Dextrose agar, Dermatophyte test agar/25°C; 1 noted SAB RT and 1 used SAB RT, SAB/CCG, 28° C, 37°C, DTM, SAB/CCG, 28°C.

SPECIMEN COLLECTION AND LABORATORY PROCESSING An adequate amount of keratin must be collected (scraped) from the area of the lesion where fungal growth is most likely to be active. Demonstration of hyphae in a KOH wet mount of the skin scrapings can immediately establish the presence of a fungus. Most laboratories use at least 2 different mediums (selective and non-selective) for fungal culture, which are incubated at 25-30°C and examined weekly for up to 4 weeks before issuing a negative report[1]. Collecting samples using a moistened cotton swab is an easy, reproducible method of obtaining a fungal culture sample, especially from small children who may be frightened by other methods [2]. Delay in plating the specimen (if the specimen is sent to an outside laboratory) does not decrease sensitivity or specificity.

IDENTIFICATION [1,3-6] *Trichophyton* differs from *Microsporum* and *Epidermophyton* by having cylindrical, clavate to cigar-shaped, thin-walled or thick-walled, smooth macroconidia. A combination of macroscopic and/or microscopic characteristics from each medium is required for identification and no one single test is infallible.

Microscopic morphology *Trichophyton tonsurans* has numerous microconidia of various shapes and sizes such as pyriform, tear drop, club shaped or balloon shaped; intercalary and terminal chlamydospores are found in older culture; macroconidia are rare, those found are smooth walled and distorted. Spiral hyphae may be present. Invaded hairs show an endothrix infection. Hair infected by *M. canis* fluoresces under **Wood's light**; hair infected by *T. tonsurans* does not fluoresce.

Colony morphology [2,3] Matures in about 12 days with colonies on Sabouraud's dextrose agar showing considerable variation in texture and colour. They may be suede-like to woolly to powdery, flat with a raised centre or folded, often with radial grooves. The colour may vary from pale-buff to yellow, the so called sulfureum form which resembles *Epidermophyton floccosum,* to dark-brown. The reverse colour varies from lemon yellow-brown to reddish-brown to deep mahogany; a dark diffusing pigment may be present.

Hyphae are relatively broad, irregular, much branched with numerous septa. Numerous characteristic microconidia varying in size and shape from long clavate to broad pyriform, are borne at right angles to the hyphae, which often remain unstained by lactophenol cotton blue. Very occasional smooth, thin-walled, irregular, clavate macroconidia may be present on some cultures. Numerous swollen giant forms of microconidia and chlamydoconidia are produced in older cultures.

Tests [1,3,4] Alkalinization of BCP-milk (bromcresol purple agar); urea hydrolysis (urease is positive), hair perforation is usually negative, and thiamine enhances growth. *T. mentagrophytes is also* urease positive.

CLINICAL SIGNIFICANCE [1,7] Members of the genus *Trichophyton* possess several virulence factors including acid proteinases, elastase, keratinases, and other proteinases that allow them to invade the keratinous tissues of humans and animals [1,3]. *Trichophyton tonsurans* is an anthropophilic fungus with a world wide distribution which causes inflammatory or chronic non-inflammatory finely scaling lesions of skin, nails, and scalp. *T. tonsurans* is highly contagious and temporary exclusion from school until appropriate treatment has commenced has long been considered a part of treatment. The etiological organisms of tinea capitis depend on the geographic area. In North America, they are *Trichophyton tonsurans* and *Microsporum canis.*

T. tonsurans is the causative agent of **tinea corporis gladiatorum**, a fungal infection of wrestlers and spread among wrestling teams worldwide [8]. This fungal infection is transmitted through close skin-to-skin contact. In the United States, Kohl et al. found that 84% of wrestling teams had at least one case of tinea corporis gladiatorum during the 1998-1999 season. Cases in judo teams at a university in Japan (2004) and a judo school in France (2005) were recently reported. In the 49 cases reported in the French study, the investigators found that the lesions mimiced mat-burns or skin grazes, were frequent in team members above the protuberances of bones on wrists or elbows, and the number of lesions were often underestimated by the individual.

TREATMENT [1,3-7] Ketoconazole, clotrimazole, itraconazole, terbinafine, naftifine, and amorolfine are in general active in vitro against *Trichophyton*. Terbinafine and itraconazole are now commonly used in treatment of infections due to *Trichophyton* spp. and other dermatophytes. For treatment of tinea capitis and onychomycosis, oral therapy is usually preferred [3]. Terbinafine usually appears to be the most effective agent. Griseofulvin, once the drug of choice for treatment of dermatophytosis, is now less commonly used

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due to the availability of more effective and less toxic drugs.

As the French investigators noted, self-medication with topical treatments failed as many of the skin lesions were considered to be benign problems (e.g., mat burns), therefore not all lesions received the treatment. Oral treatment (Terbinafine) was therefore indicated and worked well in this study [8].

REFERENCES

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CMPT critique 0509-2 (simulated skin scraping): *M. gypseum*
http://www.interchg.ubc.ca/cmpt/pdf_mycology/0509_2_mgyp.pdf

Internet Resource Photographs

http://microbiology.mtsinai.on.ca/mig/dsma/dsmafig037.shtml