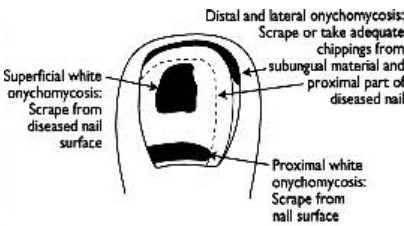


# Fungal skin and nail infections: Diagnosis and laboratory investigation

## Quick reference guide for primary care: Summary table

<ul style="list-style-type: none"> <li>☑</li> <li>☑</li> <li>☑</li> </ul>	<ul style="list-style-type: none"> <li>❑ Many nail problems can look like fungal infections, eg psoriasis or injury. Always send samples before starting long-term treatment, as only 45% of dermatology samples received are positive for fungal infections.<sup>1B-</sup></li> <li>❑ Microscopy detects 91% of positives, and provides the most rapid diagnosis.<sup>1B-</sup></li> <li>❑ Culture distinguishes dermatophyte from non-dermatophyte moulds, which is important as this may alter treatment.</li> </ul>
<b>WHEN SHOULD I TAKE DERMATOLOGICAL SAMPLES FOR FUNGI?</b>	
<ul style="list-style-type: none"> <li>☑</li> </ul>	<ul style="list-style-type: none"> <li>❑ Samples are not needed for: <ul style="list-style-type: none"> <li>• uncomplicated Athlete's foot (tinea pedis)</li> <li>• mild infections of the groin; if samples are not taken, treat as suspected Candida or Erythrasma with topical imidazole<sup>5A-</sup></li> <li>• mild skin ringworm</li> </ul> </li> <li>❑ Take samples for fungi: <ul style="list-style-type: none"> <li>• when oral treatment is being considered (scalp ringworm or nail disease)</li> <li>• in severe or extensive skin fungal infections, eg moccasin-type Athlete's foot</li> <li>• skin infections refractory to initial treatment, as occasionally gram negative bacterial infections cause interdigital cracking that looks like tinea pedis<sup>6B+</sup></li> <li>• when the diagnosis is uncertain</li> </ul> </li> </ul>
<b>HOW SHOULD I TAKE SAMPLES FOR FUNGAL INVESTIGATION?</b>	
<ul style="list-style-type: none"> <li>☑</li> </ul>	<ul style="list-style-type: none"> <li>❑ Swabs are of little value for dermatophytes, unless there is insufficient material obtained by scraping.</li> <li>❑ Wipe off any treatment creams before sampling.</li> <li>❑ Keep any samples at room temperature. Do not refrigerate as dermatophytes are inhibited at low temperatures, and humidity facilitates the growth of contaminants.<sup>8C</sup></li> <li>❑ Samples should be collected into folded dark paper squares. Secure dark paper squares with a paper clip and place in a plastic bag, or use commercially available fungal packets, eg Mycotrans; Dermapak.<sup>9D</sup></li> <li>❑ Skin scrapings: <ul style="list-style-type: none"> <li>• scrape skin from the advancing edge of lesion; use a blunt scalpel blade or similar</li> <li>• 5mm<sup>2</sup> of skin flakes are needed for microscopy and culture</li> </ul> </li> <li>❑ Nail samples (better taken by clinicians):<sup>3D</sup> <ul style="list-style-type: none"> <li>• most viable fungi are usually found in the most proximal part of diseased nail; sample with chiropody scissors</li> <li>• include full thickness clippings of the diseased nail</li> <li>• sample as far back from nail tip as possible, as this is where fungi are usually found; also sample debris from under the diseased part of the nail</li> <li>• in superficial infections, scrape surface of diseased nail plate with scalpel blade</li> </ul> </li> <li>❑ Hair samples:<sup>2A+,21A-</sup> <ul style="list-style-type: none"> <li>• take scalp scrapings, as this often pulls out infected hair stumps, which are critical for successful culture and microscopy; hair plucking does not produce the best samples.</li> <li>• a soft toothbrush can be used if scrapings are not possible.<sup>21A-</sup></li> </ul> </li> </ul>
	
<b>INTERPRETING THE LABORATORY REPORT</b>	
<ul style="list-style-type: none"> <li>☑</li> </ul>	<ul style="list-style-type: none"> <li>❑ When to treat: <ul style="list-style-type: none"> <li>• a positive microscopy (fungal elements seen) is sufficient to start antifungals</li> <li>• a positive dermatophyte culture with negative microscopy is still significant</li> <li>• a negative microscopy or culture does not rule out fungal infection, particularly with kerion and nail infections; if clinical appearance very suggestive of fungal infection, repeat sample and start treatment.</li> </ul> </li> <li>❑ Significant fungi isolated and reported:<sup>1B-</sup> <ul style="list-style-type: none"> <li>• the most common dermatophytes from foot or trunk infections are <i>T. rubrum</i> (80%) and <i>T. interdigitale</i> (15%)<sup>1B-</sup></li> <li>• <i>Epidermophyton floccosum</i> and <i>Microsporum</i> species are also encountered</li> <li>• <i>T. tonsurans</i> and <i>T. violaceum</i> cause 80% of scalp infections in the UK<sup>1B-</sup></li> <li>• <i>Scytalidium</i> spp. are the most common non-dermatophyte moulds that can cause both skin and nail infections<sup>10B+</sup></li> <li>• true nail infections with the yeasts <i>C. albicans</i> and <i>C. parapsilosis</i> are rare and are more likely to affect the finger nail or finger nail folds; other <i>Candida</i> spp. may very rarely cause paronychia<sup>3D,4D,11B+</sup></li> </ul> </li> <li>❑ Fungi of uncertain clinical significance:<sup>12B-</sup> <ul style="list-style-type: none"> <li>• non-dermatophyte moulds (eg <i>Aspergillus</i> spp., <i>Scopulariopsis</i> spp., <i>Acremonium</i> spp.) are very rare</li> </ul> </li> </ul>

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	<p>causes of nail infection, usually following nail trauma, immunosuppression, or underlying dermatophyte infection; discuss management with a local microbiologist or dermatologist</p> <ul style="list-style-type: none"> <li>• such a diagnosis requires positive direct microscopy, isolation of the organism in pure culture, and ideally, on repeated occasions</li> <li>• repeat sample usually requested to confirm significance of non-dermatophyte moulds</li> </ul> <p>❑ Antifungal susceptibilities:<sup>4D,13D,14B+,15B+,16A+</sup></p> <ul style="list-style-type: none"> <li>• susceptibility testing of dermatophytes is not required, as antifungal resistance is rare, and there is no known correlation between antifungal susceptibilities and outcome</li> </ul>
<b>TREATING FUNGAL SKIN AND NAIL INFECTIONS</b>	
<p>☑</p> <p>☑</p> <p>☑</p>	<p>❑ <b>For non-dermatophyte moulds other than <i>Candida</i> spp. seek the advice of a microbiologist or dermatologist.</b></p> <p>❑ Dermatophyte and candida infection of the fingernail or toenail:<sup>17A+,18A+,19A-</sup></p> <ul style="list-style-type: none"> <li>• treat only if infection confirmed by laboratory; only use topical treatment if superficial infection of the top surface of nail plate; 5% amorolfine nail lacquer; 1-2 times weekly; 6 months on fingers; 12 months on toes</li> <li>• for infections with dermatophytes use oral terbinafine; 250mg OD; 6-12 weeks on fingers; 3-6 months on toes; or itraconazole; 200mg BD; 2 courses of 7 days a month for fingers; 3 courses of 7 days a month for toes</li> <li>• for infections with candida or non-dermatophyte moulds use oral itraconazole</li> <li>• idiosyncratic liver and other severe reactions occur very rarely with terbinafine and itraconazole</li> <li>• for children, seek specialist advice</li> </ul> <p>❑ Dermatophyte infection of the skin:<sup>17A+,19A-,20A-</sup></p> <ul style="list-style-type: none"> <li>• take skin scrapings for culture</li> <li>• as terbinafine is fungicidal, one week is as effective as 4 weeks azole which is fungistatic; topical 1% terbinafine; 1-2 times daily; 1 week</li> <li>• if intractable, consider oral terbinafine</li> <li>• discuss scalp infections with specialist</li> <li>• use a 1% azole cream for groin infections; 1-2 times daily; 4-6 weeks</li> <li>• topical undecenoic acid or 1% azole; 1-2 times daily; 4-6 weeks</li> </ul> <p>❑ Candida infection of skin:<sup>20A-</sup></p> <ul style="list-style-type: none"> <li>• confirm by laboratory</li> <li>• treat with 1% azole cream; use lotion if treating paronychia; 1-2 times daily; 1 week, or in case of paronychia, until swelling goes</li> <li>• seek advice for nail infection</li> </ul> <p>❑ <i>Pityriasis versicolor</i>:<sup>20A-</sup></p> <ul style="list-style-type: none"> <li>• scratching the surface of the lesion should demonstrate mild scaling</li> <li>• 1% azole cream; 1% terbinafine or shampoo containing ketoconazole; 1-2 times daily; usually 1 week</li> </ul> <p>☑ ❑ <b>Follow-up: unless there is underlying disease, eg psoriasis, eradication of the fungus generally restores the nail to its pre-infection state.</b><sup>4D</sup> <b>Siblings of children with scalp ringworm should be screened by scalp brushing.</b><sup>21A-</sup></p>
<p><b>KEY: ☑ = good practice point</b></p>	

### GRADING OF GUIDANCE RECOMMENDATIONS

The strength of each recommendation is qualified by a letter in parenthesis. This is an altered version of the grading recommendation system used by **SIGN**.

STUDY DESIGN	RECOMMENDATION GRADE
Good recent systematic review and meta-analysis of studies	A+
One or more rigorous studies; randomised controlled trials	A-
One or more prospective studies	B+
One or more retrospective studies	B-
Non-analytic studies, eg case reports or case series	C
Formal combination of expert opinion	D

This guidance was originally produced in 2009 by the South West GP Microbiology Laboratory Use Group, in collaboration with the Association of Medical Microbiologists, general practitioners, nurses and specialists in the field. This guidance was reformatted in 2017 in line with PHE recommendations. For detailed information regarding the comments provided and action taken, please email [sarah.alton@phe.gov.uk](mailto:sarah.alton@phe.gov.uk). Public Health England works closely with the authors of the **Clinical Knowledge Summaries**.

If you would like to receive a copy of this guidance with the most recent changes highlighted, please email [sarah.alton@phe.gov.uk](mailto:sarah.alton@phe.gov.uk).

For detailed information regarding the search strategies implemented and full literature search results, please email [sarah.alton@phe.gov.uk](mailto:sarah.alton@phe.gov.uk).