

## Of mites and fungi

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PROGRAM

Training Course in  
Pediatric Dermatology  
(SGDV/SSDV)

Update in Pediatric Dermatology  
for Dermatologist, Pediatrician and General practitioners  
www.kinderhaut-zuerich.ch

Thursday, 20<sup>th</sup> January 2022, Careum Zürich  
Hybrid-Event

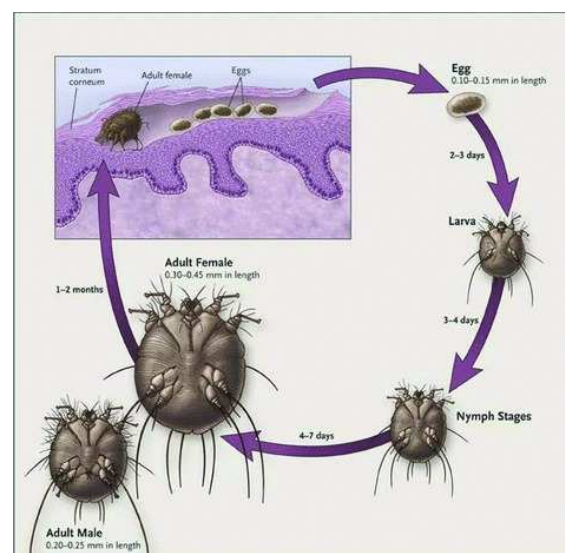
UNIVERSITÄTS-  
KINDERSPITAL  
ZÜRICH

SGPD

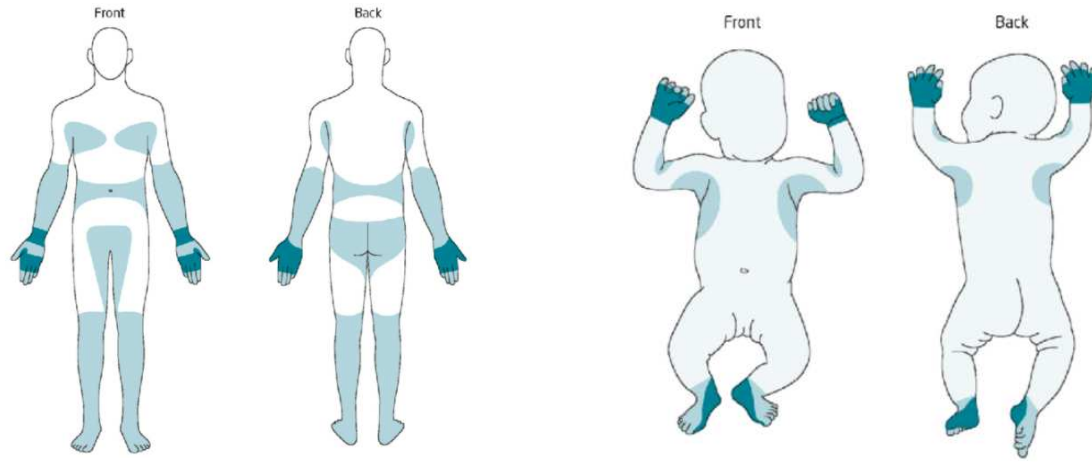
sgdv  
ssdv

## Scabies

- Infection with the host specific mit *Sarcoptes scabiei* var. *hominis*
- lives whole life-cycle within the epidermis of humans
- size of adult mite 0.3x0.35mm
- **time from infection to development of symptoms = 2 – 6 weeks**
- **asymptomatic infestation possible**



### predilection sites for scabies







infantile acropustulosis

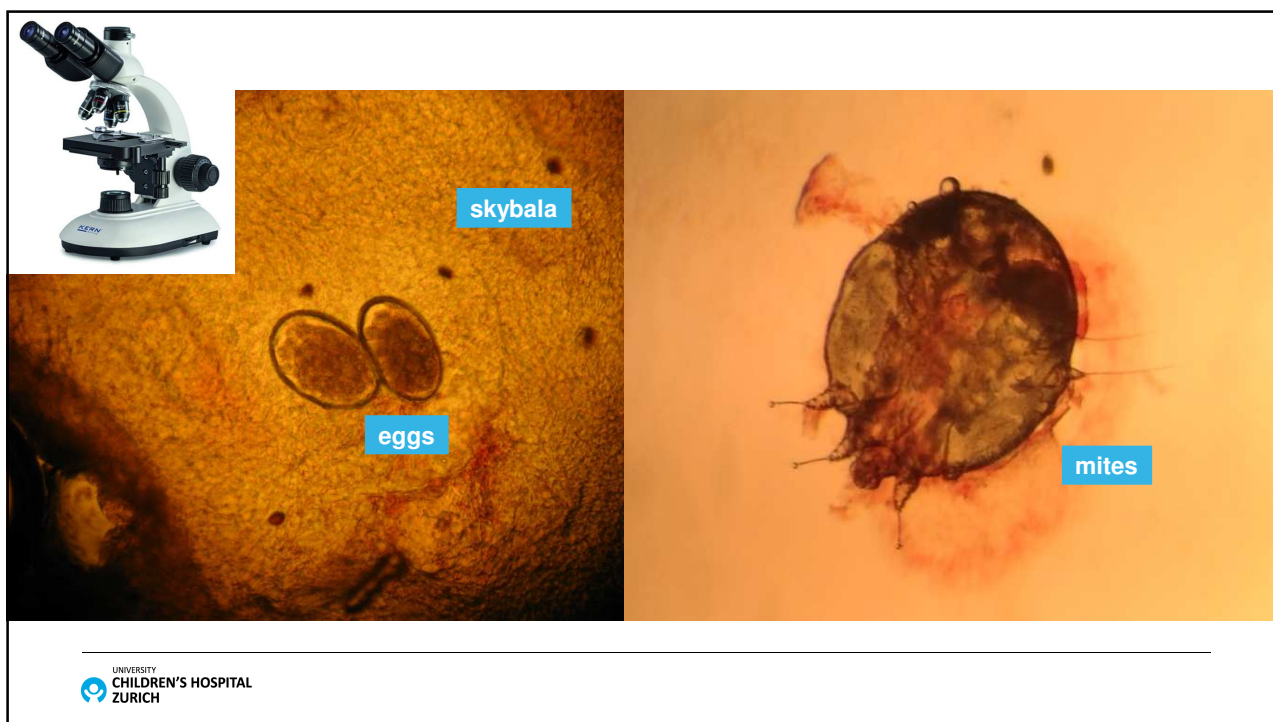
may occur concomitantly and post-scabies  
(and also without scabies)



Delta-wing jet sign



glabrous skin in younger children involved  
more mites than in adults!!



## Treatments for scabies

### Local treatments

- Permethrin 5% (Scabi-med®), **only licensed tx** in Switzerland (30g = 28.45 CHF)
- Benzylbenzoate (Antiscabiosum 10% (children) or 25% (adults), 200g = 36.35 CHF)
- Crothamiton 10% (Crotamitex®, 100g = 41.90 CHF)
- ...

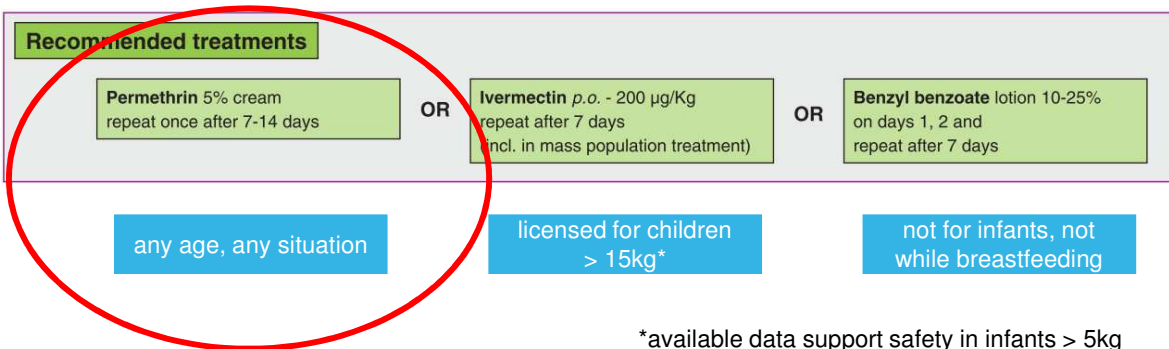
### Systemic treatments

- Ivermectin (Stromectol®, Driponin®)  
(4 tbl à 3mg = 87.30 CHF)



## GUIDELINE

## European guideline for the management of scabies

C.M. Salavastru,<sup>1,\*</sup> O. Chosidow,<sup>2</sup> M.J. Boffa,<sup>3</sup> M. Janier,<sup>4</sup> G.S. Tiplica<sup>5</sup>

## Kispi experience with scabies treatment 2021

Only 4/12 = 33% did not require other topical than permethrin (despite combination with ivermectin)

	Age (years)	Permethrin 5% applications	Ivermectin applications (0.2 – 0.3mg/kg)	Benzylbenzoate treatments (3 day cycles)	Crotamiton treatments (5 day cycles)
1	2		15	8	1
2	2		6	4	2
3	0.5		6	4	2
4	0.75		7	6	2
5	1		3	2	2
6	3		3	2	2
7	0.5		8	2	2
8	2		11	2	2
9	5		11	2	2
10	0.5		11	4	2
11	3		6	2	2
12	0.5		6	2	2
<b>Mean (range)</b>	<b>1.73 (0.5 – 5)</b>	<b>7.75 (3 – 15)</b>	<b>3.33 (2 – 8)</b>	<b>1.83 (1 – 2)</b>	<b>2</b>

Family	Sex (M-F)	Age (years)	Number of permethrin treatments (days)	Number of applications for week	Alternative therapy performed	Number of new treatments
1	M	13	14	2	Benzyl benzoate 20% cream	6
1	M	9	14	2	Benzyl benzoate 20% cream	6
1	M	53	14	2	Benzyl benzoate 20% cream	6
1	F	45	14	2	Benzyl benzoate 20% cream	6
2	F	2	9	3	Benzyl benzoate 20% cream	6
2	F	34	9	3	Benzyl benzoate 20% cream	6
2	F	68	9	3	Benzyl benzoate 20% cream	6
2	M	42	9	3	Benzyl benzoate 20% cream	6
3	M	62	18	3	Ivermectin per OS 200 µg/kg	2
3	F	59	18	3	Ivermectin per OS 200 µg/kg	2
3	M	21	18	3	No other therapies	
3	F	23	18	3	No other therapies	
4	F	55	15	3	No other therapies	
4	M	82	16	3	No other therapies	
5	F	4	15	3	No other therapies	
5	F	28	15	3	No other therapies	

21/31 patients (68%) did not clear with Permethrin 5% alone (median n of tx = 13)

10/31 patients (32%) cleared with Permethrin 5% alone (median n of tx = 15)

All patients that received other treatment (Ivermectin, Benzylbenzoate, other) cleared within 4 weeks

## Permethrin resistant mites??



Journal of the German Society of Dermatology

### Review

Eingereicht: 2.7.2018  
Angenommen: 24.9.2018  
Interessenkonflikt:  
Keiner.

DOI: 10.1111/ddg.13706  
English online version on Wiley Online Library

JDDG 2019

Zunahme von Skabies in Deutschland und Entwicklung resistenter Krätzmilben? Evidenz und Konsequenz  
Increase of scabies in Germany and development of resistant mites? Evidence and consequences

ORIGINAL ARTICLE

DERMATOLOGIC THERAPY WILEY

Is there a really resistance to scabies treatment with permethrin? In vitro killing activity of permethrin on *Sarcoptes scabiei* from patients with resistant scabies

Aslan Yürekli

Dermatol Ther 2021

- No clear evidence to support scabies resistance to permethrin 5%
- One report showed longer survival after contact with permethrin

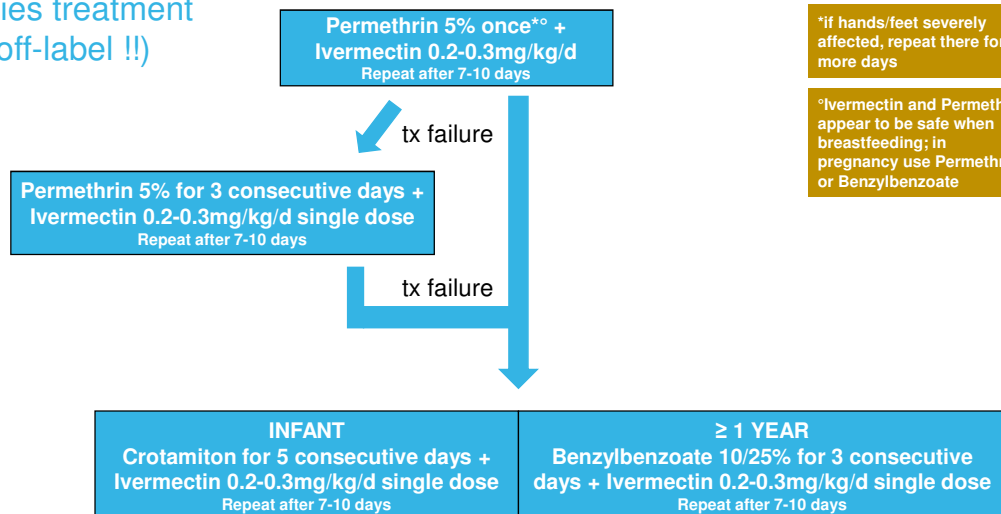
→ Main reasons for treatment failures:

- **Incorrect treatment**
- **Insufficient treatment of close contacts**

→ Children more difficult to treat:

- Infestation detected late
- Greater number of mites (especially young children)
- More likely to infect other persons due to close contact

## Kispi scabies treatment (all tx are off-label !!)



\*If hands/feet severely affected, repeat there for 2 more days

oIvermectin and Permethrin appear to be safe when breastfeeding; in pregnancy use Permethrin or Benzylbenzoate

## Additional considerations for successful scabies treatment

- **Do NOT undertreat children (especially infants!!)**
- Treat from head to toe in young children
- Re-apply medication after washing hands
- **Do NOT forget close contacts and treat simultaneously**
- Careful instruction, use written treatment plan and information leaflets\*
  - \*[http://www.setzer-verlag.com/epages/79584208.sf/de\\_DE/?ObjectPath=/Shops/79584208/Products/12](http://www.setzer-verlag.com/epages/79584208.sf/de_DE/?ObjectPath=/Shops/79584208/Products/12) free and available in many languages
- Offer support with treatment (Kispex)
- Consider in-patient treatment in recalcitrant, severe cases
- **Follow-up regularly until cleared**



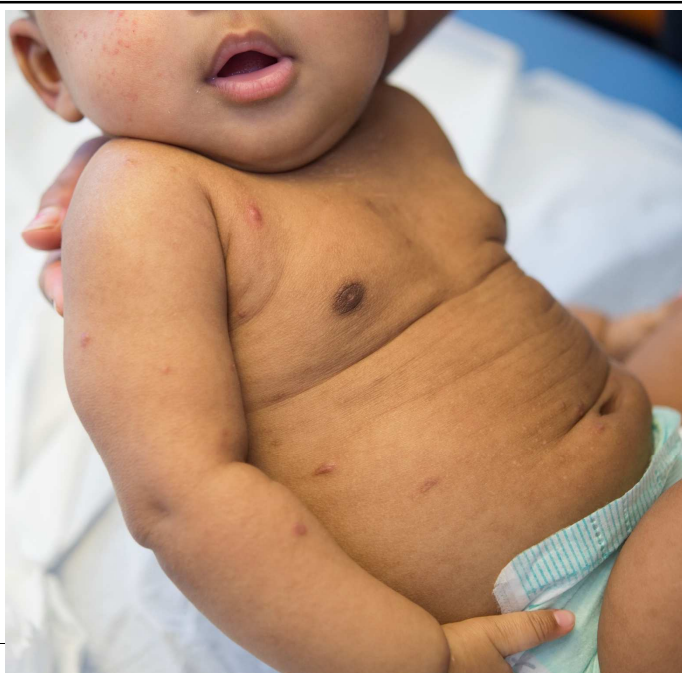
## Decontamination measures for scabies

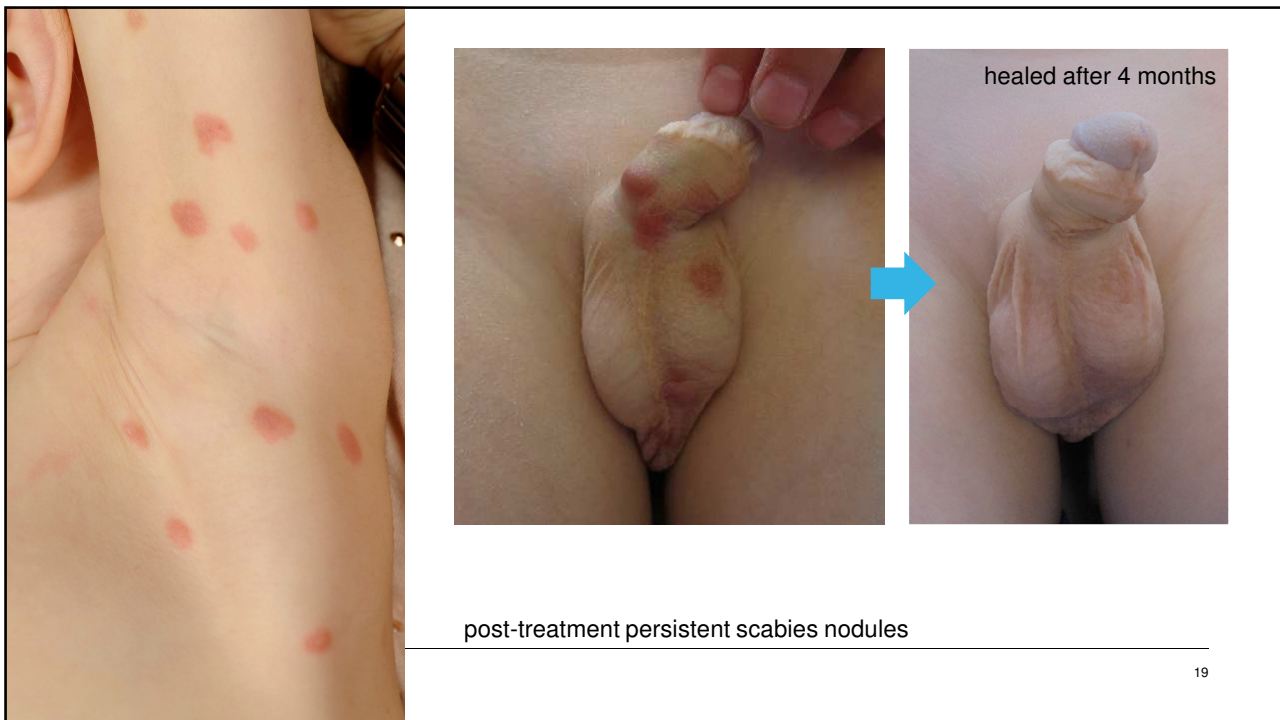
- Wear clean clothes and change bed linen after treatment
- Machine wash all recently used textiles ( $\geq 50^{\circ}\text{C}$  and 35min)
- Store non-washable items (shoes, stuffed toy animals) with recent bodily contact for 3 days in closed plastic bag at  $\geq 21^{\circ}\text{C}$  (or freeze for a few hours)
- Clean all contact surfaces
- Vacuum-clean furniture, cushions, beds, mattresses, carpets and automobile seats



## post-scabies dermatitis

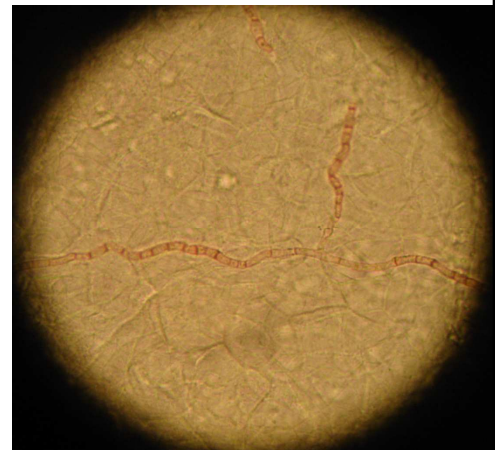
- itchy dermatitis persists for 6-8 weeks despite successful treatment
- may wax and wane
- scabies-nodules often persist for many months
- responds to anti-inflammatory therapy





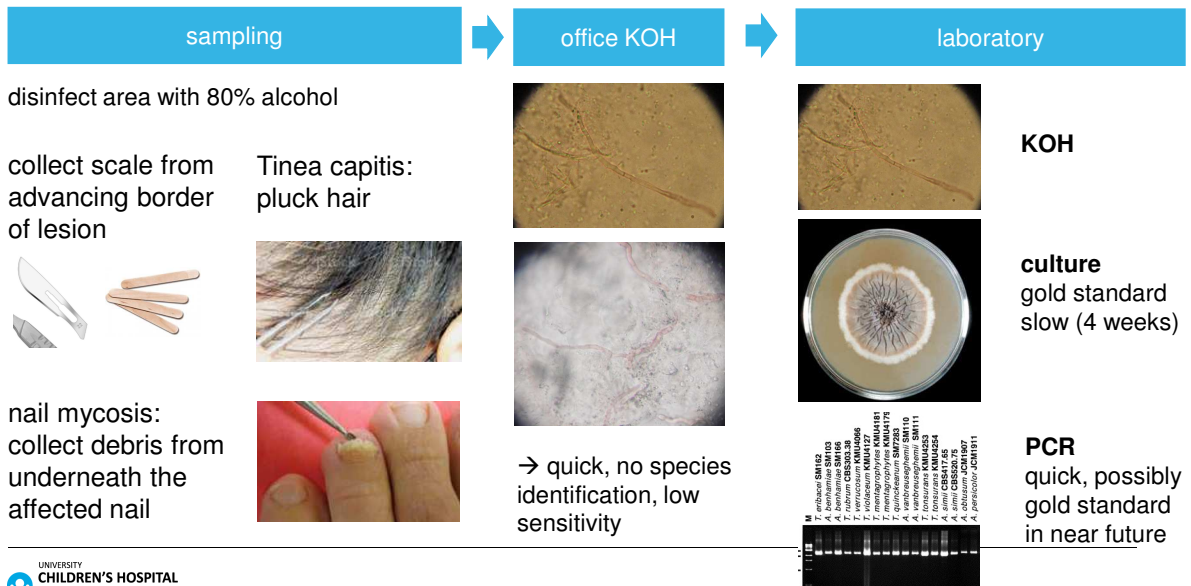
## Dermatophytes (ringworm)

- group of closely related filamentous fungi
- ability to invade and infect keratinized tissues
- worldwide distribution in humans and animals
- most important genera for infections in humans:  
*Trichophyton*, *Microsporum*, *Epidermophyton*
- anthropophilic, zoophilic and geophilic species

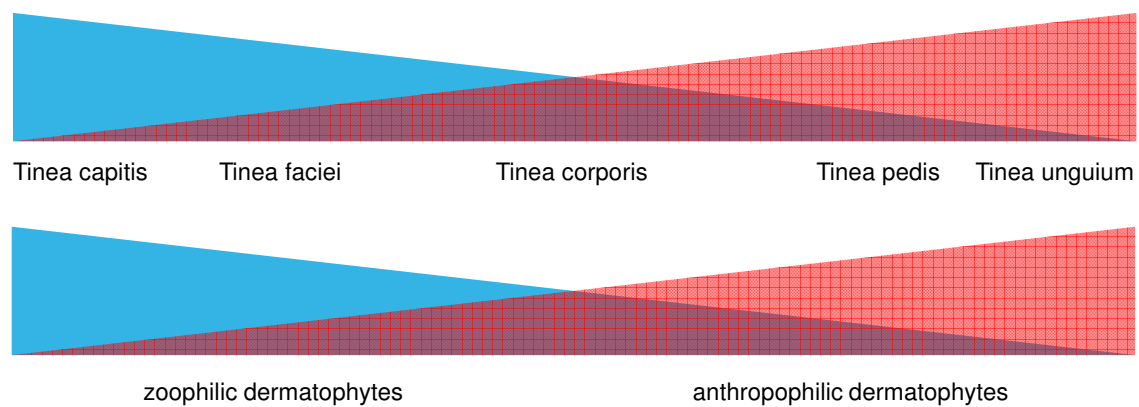


## Diagnosing dermatophyte infections

aim for microbiological diagnosis!



## Tinea – children vs. adults



## Tinea capitis

- most frequent manifestation of tinea in children
- pre-school/school-age
- typical species in Switzerland



anthropophilic	zoophilic
<b>T. violaceum</b>	<b>M. canis</b>
M. audouinii	T. mentagrophytes
...	T. benhamiae
	...

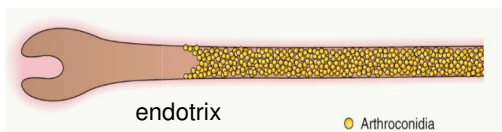


children with african descent



caucasian children

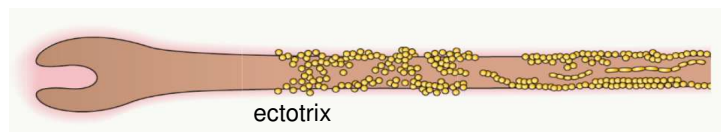
## Tinea capitis



T. violaceum, T. tonsurans



Black-dot Tinea



M. canis, M. audouinii, T. mentagrophytes, T. benhamiae



Microsporum



Inflammatory Tinea





T. violaceum



T. verrucosum



T. benhamiae



T. benhamiae

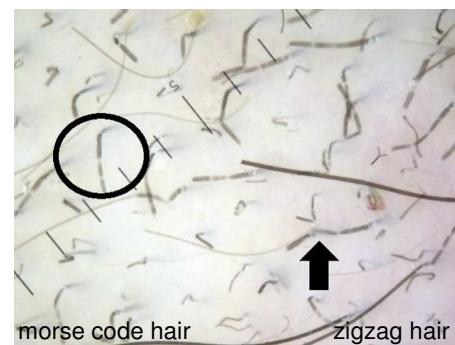
Kerion celsi

## Trichoscopy

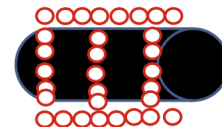
- first described for tinea capitis in 2008
- allows for a diagnosis of tinea capitis
  - sensitivity of 94%
  - specificity 83%
- differentiation of other common hair disorders
  - Alopecia areata, Trichotillomanie
- differentiation between anthropophilic *Trichophyton* species and *Microsporum*



## Trichoscopic features of tinea capitis



Trichophyton



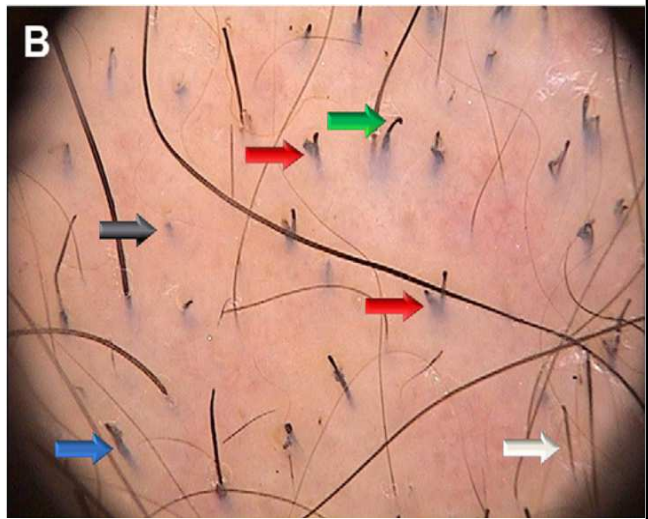
Microsporum

Group I: Endothrix type

Group II: Ectothrix type with transverse invasion of hair shaft.



**Alopecia areata**  
exclamation hairs, dystrophic hairs

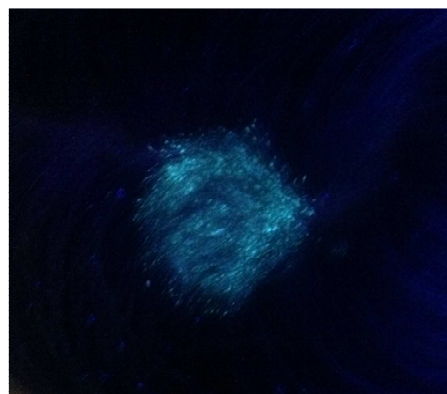


**Trichotillomania**  
broken hairs, hook hairs, V-sign, flame hairs

Rudnika L et al, Dermatol Clin 2013

### Wood lamp examination

M. canis und M. audouinii show yellow-green fluorescence



M. canis



## Tinea capitis – systemic treatment mandatory

**Table 1** Choice of antifungal agents based on the organism identified.

<i>Trichophyton mentagrophytes, benhamiae, tonsurans, violaceum, soudanense, and other Trichophyton spp.</i>	Terbinafine	Lamisil®, Terbinafin Mepha®, Terbinax®, ...
<i>Microsporum canis, M. audouinii, M. ferrugineum</i>	Itraconazole or griseofulvin (no longer available)*	Sporanox® Kps/Lösung, Itraconazol Mepha Kps®, ...
<i>Nannizzia gypsea</i>	Itraconazole or griseofulvin (no longer available)*	

**Do not wait for culture results if clinical suspicion for tinea capitis is high!**



Wood lamp negative  
comma hairs  
corkscrew hairs  
african descent

Terbinafin

**wood lamp positive**  
morse code hairs  
zigzag hairs

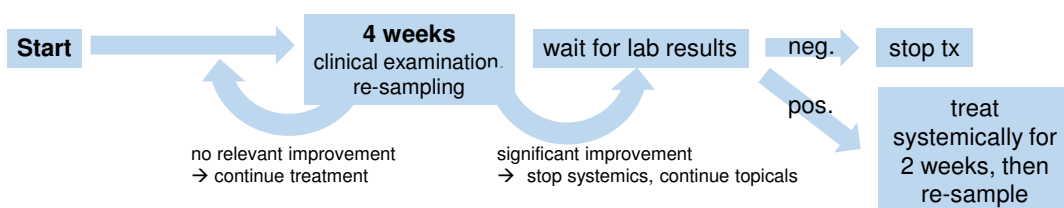
Itraconazol



## treatment of tinea capitis

- all symptomatic household members require systemic treatment
- always combine with topicals (Ketoconazole shampoo)
- treat asymptomatic household members topically

Terbinafin	Itraconazol
< 20kg 62.5mg/d 20-40kg 125mg/d > 40kg 250mg/d	5mg/kg/d single daily dose (max. 200mg/d)
Tablets may be crushed	Solution available, take on empty stomach!
Licensed > 2 years (and 10 kg)	Licensed > 18 years (safe from infancy)



## differential diagnoses to tinea capitis



### Atopic scalp dermatitis

scratch marks, serous crusts

### Scalp psoriasis:

abundant/thick (white) scale, extends onto front and ears

### Seborrheic scalp dermatitis

infants / after puberty, mild pruritus

## Tinea faciei

- usually zoophilic dermatophytes
- mostly children and adolescents

## treatment tinea faciei/corporis

- topical treatment for small lesions (terbinafine cream, econazole cream, ...)
- treat systemically if
  - multifocal lesions, 2-4 weeks
  - in hair-bearing regions (eyelashes, eyebrows!), 6-8 weeks

## Tinea pedis

- rare in childhood
- most frequent dermatophytosis after adolescence
- topical treatment usually sufficient
- in severe/recalcitrant cases, add systemic treatment for 2-4 weeks



T. interdigitale

## Onychomycosis

- rather rare before puberty, around 15% of all nail problems in childhood
- more frequent in Down syndrome or immunodeficiency
- often household exposure
- usually *T. rubrum*
- clinical presentation as in adults



## onychomycosis therapy in children

- **topically** only if nail distally involved (< 50%), amorolfine lacquer
- all other situations **topically and systemically** (cure rates better than in adults)

Terbinafin	Itraconazol
< 20kg 62.5mg/d 20-40kg 125mg/d > 40kg 250mg/d	5mg/kg/d single daily dose (max. 400mg/d)
Tablets may be crushed	Solution available, take on empty stomach!
Licensed > 2 years (and 10 kg)	Licensed > 18 years (safe from infancy)
Continuous treatment - fingernails: 6 weeks - toenails: 12 weeks	Pulsed treatment (1 week per month) - fingernails: 2 pulses - toenails: 3 pulses

## Take home points

- think of scabies!
- dermoscopy is a helpful tool for children with skin disorders
- do not forget household / close contacts in families with scabies or tinea capitis
- the infant with scabies is the problem → do not undertreat
- tinea capitis ALWAYS requires systemic treatment