

Dermatophytosis Update Part 2

Karen A. Moriello DVM DACVD
Clinical Professor of Dermatology
University of Wisconsin-Madison
Karen.moriello@wisc.edu

Leon Congress 2019

Dermatophytosis Part 1 and Part 2

#1 *Current Update Core Information*

#2 *Point of Care Diagnostic Tests*

#3 *Cleaning and Decontamination*

#4 Treatment

#5 Monitoring Response to Treatment

#6 Common Problems

Leon Congress 2019

Open Access

Veterinary Dermatology

Ver Dermatol 2017; 28: 266-468

Diagnosis and treatment of dermatophytosis in dogs and cats.

Clinical Consensus Guidelines of the World Association for Veterinary Dermatology

Karen A. Moriello*, Kimberly Coyner†, Susan Paterson‡ and Bernard Mignon§



DOI: 10.1111/vid.12440

Leon Congress 2019

Clinical Signs

Leon Congress 2019

Clinical Signs

- Highly variable
- Follicular and superficial disease
- Any combination of hair loss, papules, scales, crusts, erythema, follicular plugging, hyperpigmentation
- Lesions are asymmetrical
- Pruritus varies from none to marked
- **All clinical signs are related to pathogenesis and interplay of host immune response**

Leon Congress 2019

Rethinking Clinical Signs

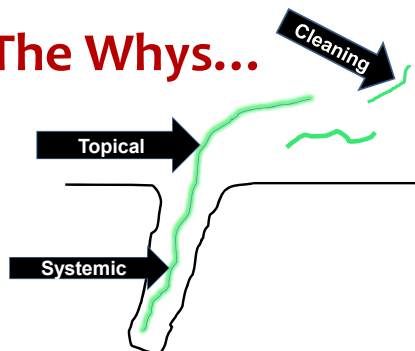
- **Simple infections**-infections in other wise healthy animals
- **Complicated Infections**-infections in animals under physiological stress, with concurrent illnesses or other 'factors' that make treatment a challenge, e.g. fractures
- **Culture positive, lesion free** –are these fomite carriers or too early to detect infections

Leon Congress 2019

#4 Treatment

Leon Congress 2019

The Whys...



Leon Congress 2019

Limiting Contagion and Contamination

- Continued use of topical therapy to disinfect the hair coat is most important
- Routine cleaning
- Minimize excessive shedding of infected hairs
 - Scissor clip infected lesions
 - Comb coat to remove infected hairs
 - Whole body clipping not usually necessary

Leon Congress 2019

Specific Cleaning Recommendations

Laundry-wash it twice to remove hairs, bleach is not necessary

Carpets-vacuum and wash with beater brush rug scrubber or steam cleaner

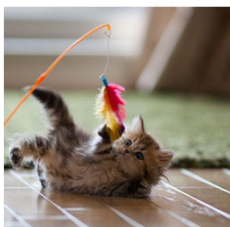
Hard surfaces-remove debris, wash with detergent until visibly clean, rinse, remove excess water

Disinfectants-ready to use products labelled as efficacious against *Trichophyton*

- Bathroom disinfectants
- Look for products with accelerated hydrogen peroxide
- Avoid bleach-irritant, needs to be prepared daily, breaks down if exposed to light, irritant to people and animals

Leon Congress 2019

Confinement-not so much....



- Confining to make cleaning easier
- Environmental contamination can prolong treatment due to false positive monitoring tests
- Must provide contact and socialization

Leon Congress 2019

Aggressive Confinement and Treatment Can Lead to Life Long Behavioral Problems



Leon Congress 2019

Topical Therapy-Not Optional

- Clipping of hair coat-not needed
- OK to comb out 'broken hairs' prior to treatment
- **Disinfection of hair coat**
 - Stops new lesion development
 - Shortens treatment time
 - Shortens confinement
- **Minimizes transmission of disease**

Leon Congress 2019

Mechanical Removal of Infected/Fractured Hairs



- **Daily-part of socialization**
- **Just Prior to Topical Therapy**



Leon Congress 2019

Topical Therapy Whole Body

Whole body treatment –twice a week

- Use leave on rinse or shampoo
- Enilconazole leave on rinse
- Lime sulfur 1:16 leave on rinse
- Chlorhexidine 2%/Miconazole2% shampoo (no residual activity)

Leon Congress 2019

Miconazole/chlorhexidine Shampoo

jms

A study of the efficacy of topical and systemic therapy for the treatment of feline *Microsporum canis* infection

A H Sparkes, A Robinson*, A D MacKay*, S E Shaw

Miconazole/chlorhexidine shampoo as an adjunct to systemic therapy in controlling dermatophytosis in cats

Paterson, JSAP 1999

Short Communication



jms

An open-field study comparing an essential oil-based shampoo with miconazole/chlorhexidine for hair coat disinfection in cats with spontaneous microsporiasis

Nardoni, et al

Leon Congress 2019

Enilconazole Rinse

5.5

Enilconazole emulsion in the treatment of dermatophytosis in Persian cats: tolerance and suitability

Veterinary Dermatology 2001, 13, 21-28

Evaluation of topically applied enilconazole for the treatment of dermatophytosis in a Persian cattery

KESTER A. HOPKINS* and LINDA MEDLEY†

†DVM and Diplomate ACVD, University of Illinois at Urbana-Champaign, Urbana, IL, USA

Veterinary Dermatology

Eradication of feline dermatophytosis in a shelter: a field study

Carlotti, D, et al 2009

Evaluation of the efficacy of oral lufenuron combined with topical enilconazole for the management of dermatophytosis in catteries

Guillot, et al 2002

Leon Congress 2019

Lime Sulphur Rinse

Original Article

Management of endemic *Microsporum canis* dermatophytosis in an open admission shelter: a field study

Newbury et al

Veterinary Dermatology

DOI: 10.1111/vder.12000

Use of itraconazole and either lime sulphur or Malaseb Concentrate Rinse® to treat shelter cats naturally infected with *Microsporum canis*: an open field trial

Newbury et al, 2010

Use of lime sulphur and itraconazole to treat shelter cats naturally infected with *Microsporum canis* in an annex facility: an open field trial

Newbury, et al Vet Derm 2007

Veterinary Dermatology

DOI: 10.1111/vder.12000

Treatment of shelter cats with oral terbinafine and concurrent lime sulphur rinses

Kane-McCabe*, J. Minkley-Casper*, J. Ann Trimmer*, Sandra Newbury and Doris Kunder*

Leon Congress 2019

In Vitro “Kitten on a Stick”

- Pre-treatment impression
- Treatment
- Post-treatment impression



Leon Congress 2019

Residual Activity of Whole Body Treatments (n=3)



Hairs were treated with product 72 h before being plated on *M. canis* inoculated plates

Plates at 30 days

Leon Congress 2019

Shampoos As Topical Treatment

Original Article



In vitro efficacy of shampoos containing miconazole, ketoconazole, climbazole or accelerated hydrogen peroxide against *Microsporum canis* and *Trichophyton* species

Karen A Moriello

Journal of Feline Medicine and Surgery
1-5
© The Author(s) 2016
Reprints and permissions:
sagepub.co.uk/journalsPermissions.nav
DOI: 10.1177/1098612315626337
jfm.sage.com
SAGE

Leon Congress 2019

Problem: Rinse or Shampoo?

Children or any immunocompromised person

- Lime sulfur rinses 2x/week for 6 weeks then shampoo
- Enilconazole

Uninfected exposed pets

- Shampoo therapy

Reasonable adults in home

- Shampoo therapy

Cannot be wetted-Mousse

Leon Congress 2019

Problem: Children and Kittens

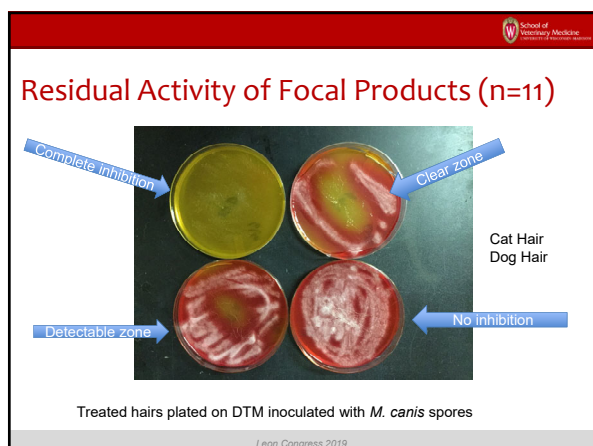
- Highest risk of ‘breaks in confinement’
- High risk of transmission: kitten to child
- Need optimum protection
- Use **lime sulfur** or **enilconazole** twice a week
- Use other residual topical on hard to treat areas every 48 hr

Leon Congress 2019

Topical Therapy Focal Areas

- Used concurrently with whole body treatment for hard to treat areas
- Areas such as
 - Face
 - Ears convex and concave pinnae
 - Digits
 - Severe focal lesions

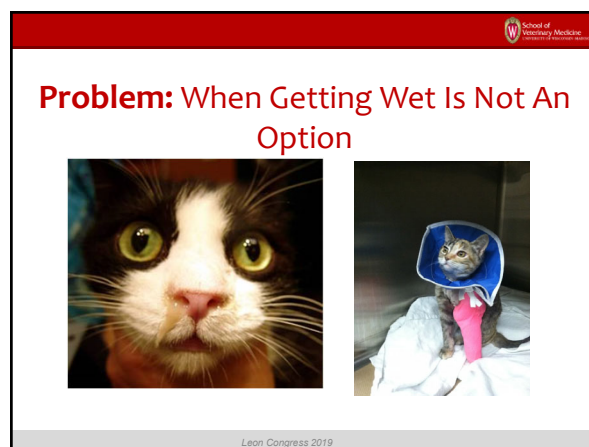
Leon Congress 2019



Focal Therapy Findings

- Complete Inhibition
 - Enilconazole
 - Terbinafine
 - Clotrimazole 1%
 - 2% miconazole/2% chlorhexidine spray
- Clear Zone
 - 1% miconazole nitrate spray
 - 2% miconazole nitrate cream
 - 1% ketoconazole/2% chlorhexidine spray
 - Miconazole/chlorhexidine mousse
 - Miconazole/ketoconazole mousse
 - Climbazole/chlorhexidine mousse

Leon Congress 2019



Systemic Therapy

- Recommended drugs
 - Cats:
 - Itraconazole 5 mg/kg orally week on-week off;
 - DO NOT USE compounded products
 - Dogs:
 - Terbinafine 30-40 mg/kg orally once a day
 - Ketoconazole 5 mg/kg orally once daily
- Do not use fluconazole-poor efficacy against dermatophytes
- Do not use lufenuron-no efficacy

Leon Congress 2019

Systemic Therapy (1900-2017)

Itraconazole n=12 (n=316 cats)
 Ketoconazole n=4 (n=151 cats)
 Terbinafine n=10 (n=208 cats)
 Griseofulvin n=13 (n=278 cats)
 Fluconazole NOT effective against dermatophytes
 NO evidence of increasing resistance in animals

Leon Congress 2019

Adverse Effects and Itraconazole

No deaths reported in any studies
 No itraconazole induced liver failure at doses used for dermatophytosis

Itraconazole for the Treatment of Cryptococcosis in Cats

Linda Medeau, Gilbert J. Jacobs, and M. Amanda Marks

N=1 cat; 27
 mg/kg for 4
 months

Veterinary Pharmacology and Therapeutics
 J. vet. Pharmacol. Therap. doi: 10.1111/jvp.12231

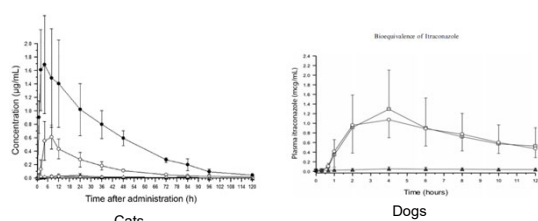
S. M. MEDLETON*

Alternate-day dosing of itraconazole in healthy adult cats

100 mg/kg orally q 48 h for 8
 wks

Leon Congress 2019

Do Not Use Compounded Itraconazole



Compounded products have poor bio-availability

Leon Congress 2019

Systemic Antifungal Therapy and Pharmacokinetics Studies



Leon Congress 2019

Original Article

Efficacy of itraconazole oral solution using an alternating-week pulse therapy regimen for treatment of cats with experimental *Microsporum canis* infection

Christopher Pule¹, Aaron Johnson¹, Karrie Young²,
 Jonathan Hare³, Kelly Rosenkrans¹, Lisa Young¹
 and Karen Moriello⁴

Journal of Feline Medicine and Surgery
 1-6

© The Author(s) 2017

OPEN

Reprints and permissions:
sagepub.com/journalsPermissions.nav

DOI: 10.1177/1098612317729807

journals.sagepub.com/home/jfm

This paper was handled and processed
 by the American Editorial Office (AEO)

for publication in JFMS

SAGE

Moriello Comment: Week on/week off UNTIL mycological cure

Leon Congress 2019

#5 Monitoring Response to Treatment

Leon Congress 2019

Monitoring Tools

- **Clinical signs**
 - Simple infections resolve quickly, rapid clinical cure
- **Wood's lamp examination**
 - Rapid loss of glowing hair shafts
 - May simply see glowing tips
- **Fungal culture**
 - Rapid change from positive to negative
 - Rapid decrease in number of colony forming units per plate
 - Positive vs Negative IS NOT adequate information from laboratory

Leon Congress 2019

Clinical Lesion Resolution



May 21, 2012






June 2, 2012

Leon Congress 2019

USE THE WOOD'S LAMP

SKIN



Not all Wood's Positive Hairs Are Culture Positive

Leon Congress 2019

Mycological Cure

Therapy of Spontaneous Ringworm in Cats with Orally Administered Griseofulvin

WILLIAM KAPLAN, D.V.M., and LIBERO AJELLO, Ph.D., Atlanta 1959

The criterion for a complete mycologic cure was established on the basis of two successive negative cultures taken two weeks apart. Animals were regarded as clinically normal when crust and scale formation could not be detected by visible inspection and manual palpation and areas of alopecia were rapidly being filled in by normal hair.

Treatment group: 20 Persian cats with chronic dermatophytosis and 2 alley cats

Leon Congress 2019

Short Communication


One vs two negative fungal cultures to confirm mycological cure in shelter cats treated for *Microsporum canis* dermatophytosis: a retrospective study

Rebecca L Stuntebeck^{1,2} and Karen A Moriello²

371 cats

- First negative FC predictive in 90.3% of cats (n=335)
- More than one FC (n=36 cats)

19-possible sampling error
17-complicated infections



Journal of Feline Medicine and Surgery
1-4
© The Author(s) 2019
Article reuse guidelines:
sagepub.com/journalsPermissions.nav
DOI: 10.1177/1098612X19868791
journals.sagepub.com/home/fms
This paper was handoff and processed
by the American Editorial Office (AAEP)
for publication in JFMS
SAGE

Leon Congress 2019

Mycological Cure

- **Unthrifty or ill cats**
 - Obtain first FC until there is BOTH clinical cure and resolution of underlying medical illness
- **Lesion-free, culture positive cats**
 - Obtain first FC one week after starting therapy
 - Will determine if cat was originally FC positive due to fomite carriage

Leon Congress 2019

Otherwise Healthy Cats

- **Otherwise healthy cats**
 - Obtain first FC one week after completing therapy unless clinical findings suggest active infection
 - If FC negative, assume mycological cure
 - If FC positive,
 - How many cfu/plate?
 - Review cleaning protocol, could this be fomite carriage?
 - Clean, continue topical therapy, re-culture
 - OR continue treatment for 4-6 weeks and repeat FC

Leon Congress 2019

Evaluation of incubation time for *Microsporum canis* dermatophyte cultures

Rebecca Stuntebeck, Karen A Moriello and Maria Verbrugge



Only need 14 days to finalize no growth cultures

Leon Congress 2019

Post Treatment Fungal Cultures

- Positive vs. Negative
- How much growth?-it matters A LOT
- Microscopic confirmation
- If *M. canis* look at Wood's lamp findings





Leon Congress 2019

Lesion status, Wood's, and Culture


		EXAM	WOOD's Hair Shafts	Wood's Hair Tips	Decision
M. CANIS	P1	Lesional	Pos/Neg	Pos/Neg	High Risk/Not Cured
		Nonlesional	Positive	Pos/Neg	High Risk/Not Cured
		NonLesional	Negative	Pos/Neg	Cured
	P2	Lesional	Pos/Neg	Pos/Neg	High Risk/Not Cured
		Nonlesional	Positive	Positive	High Risk/Not Cured
		NonLesional	Negative	Pos/Neg	Cured
	P3	Lesional/NonLesional	Pos/Neg	Pos/Neg	High Risk/Not Cured

Monitoring response to treatment

Leon Congress 2019

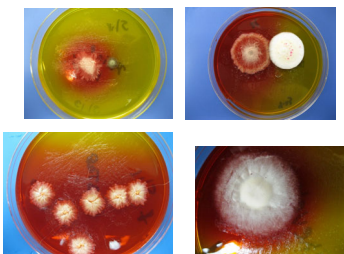
#6 Common Problems

Leon Congress 2019



Leon Congress 2019

Delayed or Odd Growth OR “it won’t sporulate”-TX effects



Leon Congress 2019

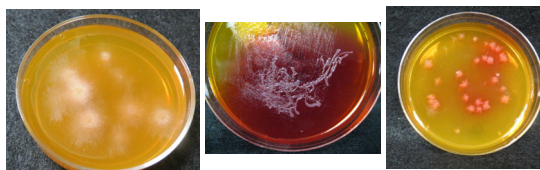
Over-Inoculation-no spores



Lack of development of macroconidia

Leon Congress 2019

Weird Things

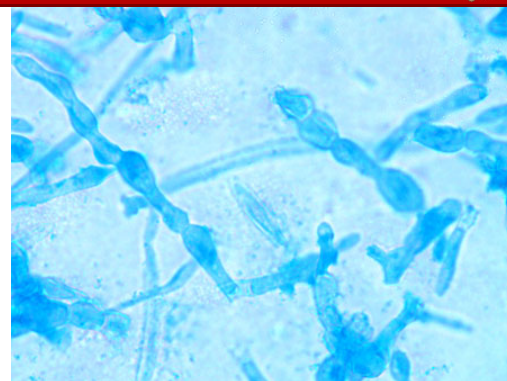


Media Mites

Lack of colour change


Abnormal colony morphology

Leon Congress 2019



Leon Congress 2019

Treatment Effect: Abnormal Morphology



Leon Congress 2019

Post Treatment Odd Growth-good sign



Leon Congress 2019

School of Veterinary Medicine
University of Wisconsin-Madison

Everyday Worries

Leon Congress 2019

School of Veterinary Medicine
University of Wisconsin-Madison

Veterinary Research Communications, 20 (1996) 161-166
Copyright © Kluwer Academic Publishers bv - Printed in the Netherlands

ISOLATION OF KERATINOPHILIC FUNGI FROM THE FLOORS OF PRIVATE VETERINARY CLINICS IN ITALY

F. MANCIANTI¹ AND R. PAPINI²
¹Dipartimento di Patologia Animale, Profilassi e Igiene degli Alimenti; ²Istituto di Patologia Speciale e Clinica Medica Veterinaria, Facoltà di Medicina Veterinaria, Viale delle Piagge 2, 56123 Pisa, Italy

50 clinics n=15 positive clinics but samples taken at end of day BEFORE cleaning (1996) no reports of out breaks

Vet Dermatol 2013; 24: 474-475

Letter to the Editor

One year surveillance of the isolation of pathogenic dermatophyte spores from risk areas in a veterinary medical teaching hospital

23 of 1604 positive samples over 12 months
Continuous cleaning throughout day

TVMA Annual Conference & Expo 2019 Frisco Texas

School of Veterinary Medicine
University of Wisconsin-Madison

If your staff is cleaning for any infectious disease, you are just fine



TVMA Annual Conference & Expo 2019 Frisco Texas

School of Veterinary Medicine
University of Wisconsin-Madison

Opps-when gloves were not worn.....

"She doesn't REALLY think hand sanitizer kills dermatophyte spores, DOES SHE?"-reviewer's comment about my list of items to include in a site visit kit.....




Leon Congress 2019

School of Veterinary Medicine
University of Wisconsin-Madison

What's the risk of taking it home?


- Almost nil if you wear a laboratory coat or smock



School of Veterinary Medicine
University of Wisconsin-Madison


Rechecking of cats under treatment

- Ideally schedule for the end of the day
- Keep the cat in a carrier, have client cover with a towel
- Cover examination surface with a blanket
- Keep cat on the blanket
- Fold blanket from edges in so infective material is on the inside
- Bag it, wash blanket/towels at end of day




The 'unexpected' exposure

- Think "Parvo" or "URI"
- Cleaning is no different
- Be discrete, the client is taking the cat home..
- Send the cat home in a carrier
- Immediately spray area to keep hair in room
- **Change laboratory coats and smocks BEFORE cleaning room, bag it: prevent fomite spread**
- **Wash appropriately**



Cleaning the "exposed room"

- Mechanical removal of debris
- Wash with detergent and water
- Wash until visibly clean
- Spray area generously with a disinfectant
- Remain wetted for 10 minutes
- Concerned? Clean again
- Change laboratory coat or smock again
- Waiting room? Swiffer and flat mop cleaning



Thank you for your attention!

Questions?