

# Dermatophytosis Update Part 1

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## 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

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## Open Access

### Veterinary Dermatology

Vet 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

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## #1 Core Update

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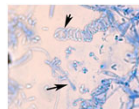
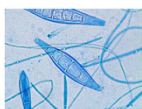
## Primary Pathogens

*Microsporum canis*

- *Trichophyton* spp (10% in shelters)

Reclassification to genus *Arthroderma*

**No evidence of change in pathogenicity or resistance to antifungal drugs**



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## The “Myth” of Every Skin Lesion is Ringworm

Scott et al Can Vet J 1990

Hill P et al Vet Rec 2006

Hobi S et al Vet Dermatol

Scott et al J Feline Med Surg 2013

O'Neill et al Vet Journal 2014 (100,000)

**0% to 2.4%**

**Fact: “It is NOT ringworm until proven otherwise”**

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## What about immunosuppressed cats?

### Facts.....

Seropositive FIV and/FelLV status in cats alone does not increase risk

Not reported as a complication of treatment of pemphigus foliaceus large case series studies

Publications of concurrent dermatophytosis and concurrent disease are uncommon

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## Zoonosis Facts

Respect zoonotic diseases

Causes skin lesions

Treatable and curable in both cats and people

Low level pathogen (biohazard scale)

Everyone knows or lives with someone with 'ringworm'



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## What about immunocompromised owners?



### Severe Dermatophytosis and Acquired or Innate Immunodeficiency: A Review

Claire Renaud <sup>1,\*</sup>, Rodolphe Hux <sup>2</sup>, Olivier Chénou <sup>3</sup>, Nicolas Dupin <sup>4</sup>, Anne Paul <sup>5</sup>, Olivier Leffler <sup>6,7</sup> and Emory Lammiman <sup>8,9,10</sup>

Received: 22 October 2019; Accepted: 14 December 2019; Published: 18 December 2019

Academic Editor: David S. Poth



The Veterinary Journal 2019, 191, 460–468

Contents lists available at ScienceDirect

The Veterinary Journal

Journal homepage: www.elsevier.com/locate/jvet

Immunocompromised patients and their pets: Still best friends?

David Elad <sup>1</sup>

doi:10.1016/j.jvet.2019.10.004

Rare, no deaths, most common finding was prolonged treatment

Problem pathogen-*Trichophyton rubrum*  
*Microsporum canis*, uncommon

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## Transmitted via Direct Contact or Traumatic Fomite Contact

Requires direct contact with infective spores

Requires moisture for germination

Requires concurrent micro-trauma to skin



Journal of Medical Microbiology (2007) 56, 671–675

DOI: 10.1098/jmm.2007.0119

### Reconstructed interfollicular feline epidermis as a model for *Microsporum canis* dermatophytosis

Jeremy Tabart<sup>1</sup>, Aline Baldo<sup>1</sup>, Sandy Vermout<sup>1</sup>, Betty Nuyens<sup>2</sup>,

Charles Lapiere<sup>2</sup>, Bertrand Loozeau<sup>1</sup> and Bernard Mignon<sup>1</sup>

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<sup>2</sup>University of Corneille Disease Biology, University of Liège, Tour de Pathologie 820/3, 4000 Liège, Belgium

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## Children As Infection Models For Cats!

### THE PATHOGENESIS OF TINEA CAPITIS DUE TO *MICROSPORUM AUDOUINI* AND *MICROSPORUM CANIS*\*

I. GROSS OBSERVATIONS FOLLOWING THE INOCULATION OF HUMANS

ALBERT M. KLIGMAN, M.D., Ph.D.



Journal of Investigative Dermatology, 1951

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## #2 Point of Care Diagnostics

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## Veterinary Dermatology

WAVD  
DOI: 10.1111/MSD.12440

Var Dermatol 2017; 28: 269-469

### Diagnosis and treatment of dermatophytosis in dogs and cats.

Clinical Consensus Guidelines of the World Association for Veterinary Dermatology

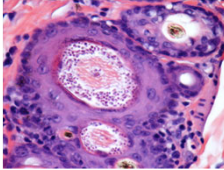

- No one test was identified as the “gold standard”
- Dermatophytosis is diagnosed by utilizing a number of complementary tests to confirm active hair infection.....

\* Moriello, et al

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## Confirmation of Infection

**Skin biopsy and direct examination/cytology are the only tests that confirm active infection**

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Images courtesy of F. Albanese, C. Reeder, S. Koch

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## Point of Care Testing

- **In clinic**
  - Cytology
  - Direct examination of hairs/scale
  - Fungal culture
- **Tools to find hairs for direct exams/culture**
  - Wood's Lamp
  - Dermoscope

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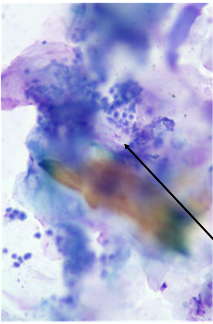
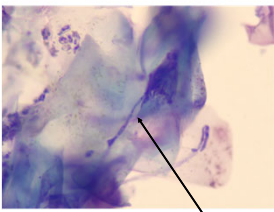
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## Cytology of Exudative Lesions




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Hyphae and fungal spores

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## Direct Examination Diagnostics



Positive Direct Examination Confirms Infection

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Dermatologia

## Comparazione di due metodiche di prelievo per l'esame microscopico diretto nella diagnosi della dermatofitosi del cane e nel gatto

Veterinaria Anno 24 n. 3 Giugno 2010

Skin scraping and hair plucking  
Identified >87% of cases  
Use mineral oil for mounting



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## Veterinary Dermatology

Dermoscopic features in 12 cats with dermatophytosis and in 12 cats with self-induced alopecia due to other causes: an observational descriptive study

Fabia Scarampella\*, Giordana Zanna\*, Andrea Pesar\*, Elisabetta Fabbri† and Antonella Testi‡



Hairs for direct exam and/or culture

Images Courtesy of Charli Dong, DVM

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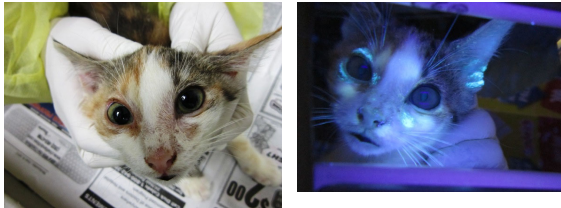
## Finding Hairs-Wood's Lamp Tool

- Point of care diagnostic tool for finding hairs for direct examination
- UV light 320 to 400 nm, peak 365 nm
- Looks for inherent fluorescence (apple green) of *M. canis*
- **Contrary to 'old' literature, fluorescence is a common property of *M. canis***
- >90% *M. canis* infections in untreated animals fluorescence

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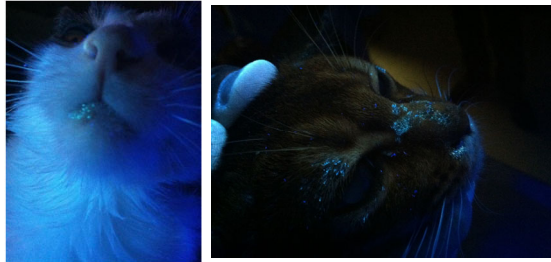
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## Find Lesions Otherwise Missed

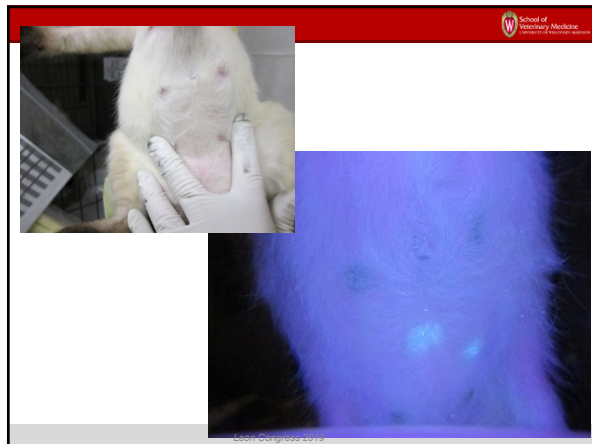


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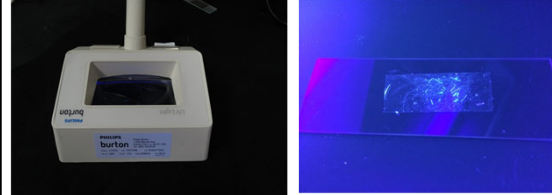
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For *M. canis* suspects... Use Wood's lamp to find target hairs



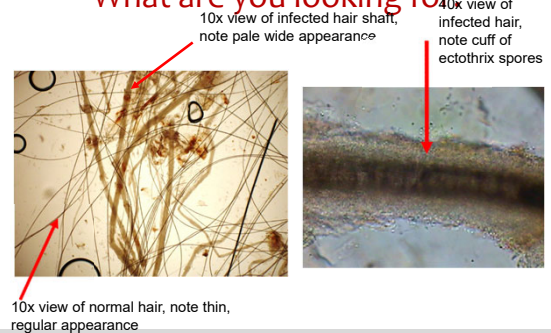
Make a control slide

UV light 320 to 400 nm, peak 365 nm

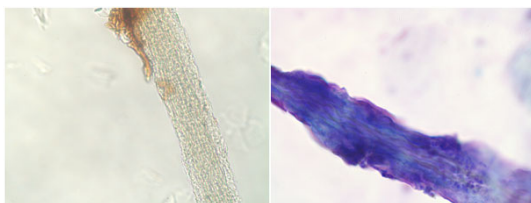
### Key Use Tips

- Medical grade lamp, plug in, NOT BLACK LIGHT
- **Built in magnification, increases find 50%**
- **Hold CLOSE to skin (2-4 cm)**
- Start on head, move slowly
- **LIFT** crusts, **only hair shafts glow**
- Newly infected hairs are very short
- Worried about false fluorescence? Look at hair root

### What are you looking for?



### Practice Tips For Finding Hairs



Stained with Diff-Quick

POC Confirmation Allows Immediate Start of Treatment

### Any Blue Stain



Mix a few drops with mineral oil, cover slip, and let set for 10 min before examining



**Veterinary Dermatology**

Turn out lights  
Hold Wood's  
Lamp near slide  
Look through  
ocular

View of glowing hair  
through ocular using  
Wood's lamp illumination

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**Veterinary Dermatology**

Ver Dermatol 2016; 27: 284-e68 DOI: 10.1111/vid.12322

**Comparison between point-of-care dermatophyte test medium and mycology laboratory culture for diagnosis of dermatophytosis in dogs and cats**

Ronnie Kaufmann\*, Shlomo E. Blum†, Daniel Elad† and Gila Zur\*

Follow Instructions 3% chance of error  
Don't follow instructions > 20% chance of error

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**Veterinary Dermatology**

Ver Dermatol 2019; 30: 60-e17 DOI: 10.1111/vid.12795

**Comparison of two inoculation methods for *Microsporum canis* culture using the toothbrush sampling technique**

Diana Di Mattia\*, Alessandra Fondati†, Moira Monaco†, Mario Pasquetti† and Andrea Pisanò†

support, training

• Referral

• Be sure laboratory knows how to inoculate toothbrush specimens

Superior method

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**In House Fungal Cultures**

- Use Dermatophyte Test Medium-large surface area plate
- Put plate in plastic bag-minimizes dehydration of plate
- Hold cultures in plastic container
- Incubate at 28 to 30C°
- Does not need to be "in the dark"-folklore
- Biohazard-staff handles like fecal specimens

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**What Fungal Culture Medium is BEST?**

Take Home:  
All good except low volume  
Use medium with most volume for money  
Use easy to inoculate/sample packaging

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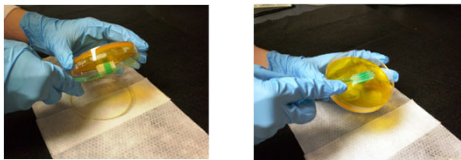
**Culturing Lesions**

Soft bristled toothbrush

Toothbrush culture-focus on lesions only


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### Inoculation Techniques



Inoculate over a disinfectant cloth

Inoculate 'upside down' because it decreases risk of contaminating work surface and cross contamination



Bristles should have medium on them

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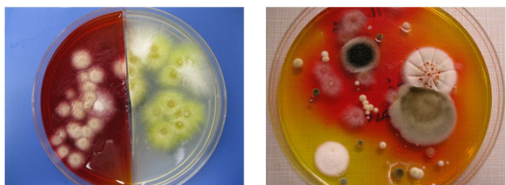
### Do Not Over Inoculate Plate



Over inoculation results in hyphae and minimal macroconidia

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### DTM Colour Principal



Red Colour change around pale colony-sample that colony for microscopic exam

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### Evaluation of incubation time for *Microsporum canis* dermatophyte cultures

Short Communication

Journal of Feline Medicine and Surgery  
1-4  
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sagepub.com/journalsPermissions.nav  
DOI: 10.1177/1098185X17703086  
journals.sagepub.com/home/jfms  
This paper was handled and processed  
by the American Editorial Office (AAEP)  
for publication in jfms.

Rebecca Stuntebeck, Karen A Moriello and Maria Verbrugge



Only need 14 days to finalize no growth cultures

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### "Reading Cultures"

- Positive vs. Negative-not good enough
- How much growth?-it matters A LOT
- Microscopic confirmation



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### Microscopic Exam



Lactophenol cotton blue stain

Use clear sticky tape

Press to surface

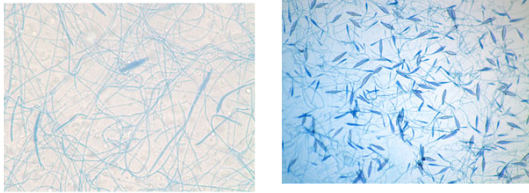
Can see colony material

Blot off extra stain

Ready for exam

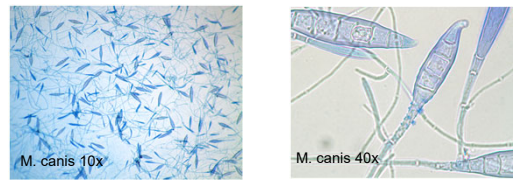
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Practice tip: let stained slide set for 10-15 minutes before examination



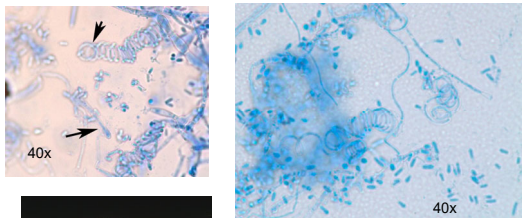
Allowing the sample to sit for 10 to 15 minutes will allow the stain to be absorbed intracellularly making it easier to see macroconidia

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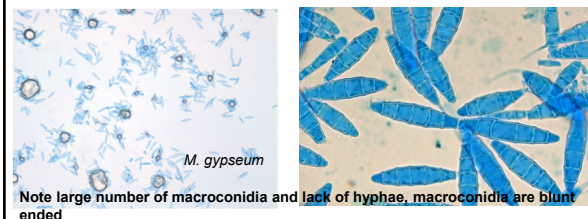
*M canis* on DTM

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*Trichophyton*

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Note large number of macroconidia and lack of hyphae, macroconidia are blunt ended



*M. gypseum* on DTM

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## #3 Cleaning and Decontamination

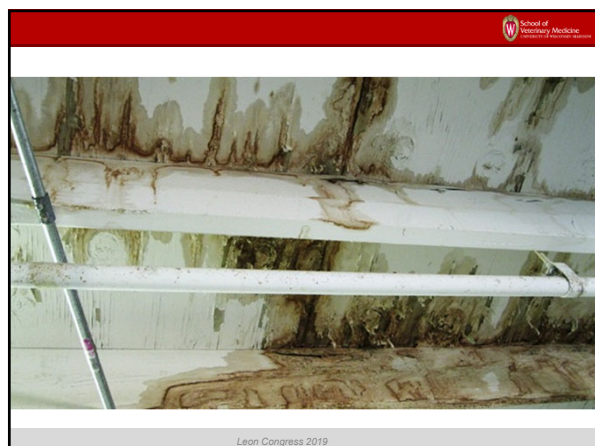
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## Environmental Contact Alone Inefficient Mode



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### The Evidence Shows

- Spores do not live forever
- Spores do not invade 'homes'-live keratin
- Spores do not multiply in environment, source is the pet
- **If you can wash it, you can decontaminate it...**

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### RECOMMENDATION

#### Clean Like Company Is Coming

#### Hard surfaces

- Mechanical removal of debris
- Visible cleanliness, remove animal hair
- Soap and water
- RINSE and remove excess water
- Then a disinfectant-maybe
- Consider 'bleach' alternatives-Ready to Use Products

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### Veterinary Dermatology

Vol Dermatol 2013; 34: 401-4107 DOI: 10.1111/ved.12076

**Efficacy of eight commercial disinfectants against *Microsporum canis* and *Trichophyton* spp. infective spores on an experimentally contaminated textile surface**

Karen A. Moriello\*, Darcie Kunder\*\* and Hanna Hondzo

School of Veterinary Medicine, University of Wisconsin-Madison, 2015 Linden Drive West, Madison, WI, 53706, USA  
Correspondence: Karen A. Moriello, School of Veterinary Medicine, University of Wisconsin-Madison, 2015 Linden Drive West, Madison, WI 53706, USA. E-mail: moriello@vetmed.wisc.edu

Over the counter ready to use products with label claim as efficacious against *Trichophyton mentagrophytes*

Bathroom Cleaners

### Veterinary Dermatology

Vol Dermatol 2014 DOI: 10.1111/ved.12102

**Efficacy of disinfectants containing accelerated hydrogen peroxide against conidial arthrospores and isolated infective spores of *Microsporum canis* and *Trichophyton* sp.**

Karen A. Moriello\* and Hanna Hondzo†

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### Problems with Bleach

- Human and pet animal health hazards
- HAS "USE BY DATE", important if opened!
- Rapid loss of efficacy once diluted-keep out of light
- Lacks detergency
- False sense of security
- Still need to remove organic debris
- Potential to interact with other chemicals to create toxic gases
- Damage to hard surfaces, floors, kennels, etc.


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**Veterinary Dermatology**

1st December 2019 DOI: 10.1111/vid.12779

**Mechanical washing of pet food bowls is effective for *Microsporum canis* decontamination**

Karen A. Moriello



Soak in hot water for 2 min


Wash until visibly clean

Washing alone disinfected bowls

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**How To Wash Laundry**

Original Article



**Decontamination of laundry exposed to *Microsporum canis* hairs and spores**

Karen A Moriello

Journal of Feline Medicine and Surgery  
1-5  
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DOI: 10.1177/1098612X15687575  
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**How To Clean Carpets**

Original Article



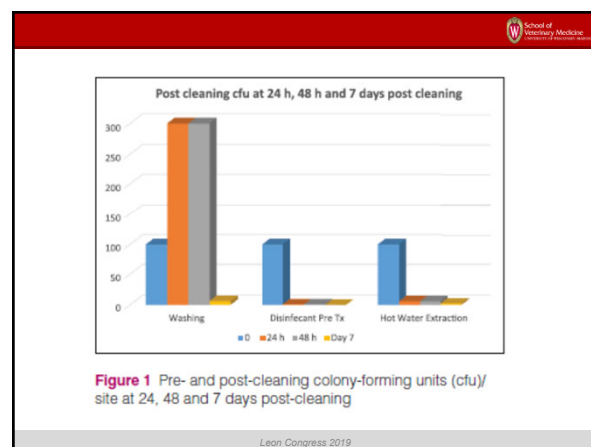
**Decontamination of carpet exposed to *Microsporum canis* hairs and spores**

Karen A Moriello

Journal of Feline Medicine and Surgery  
1-5  
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DOI: 10.1177/1098612X16034390  
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**And What About the “Real World”?**

**Veterinary Dermatology**

1st December 2019; 30(12):e45 DOI: 10.1111/vid.12732

**Decontamination of 70 foster family homes exposed to *Microsporum canis* infected cats: a retrospective study**

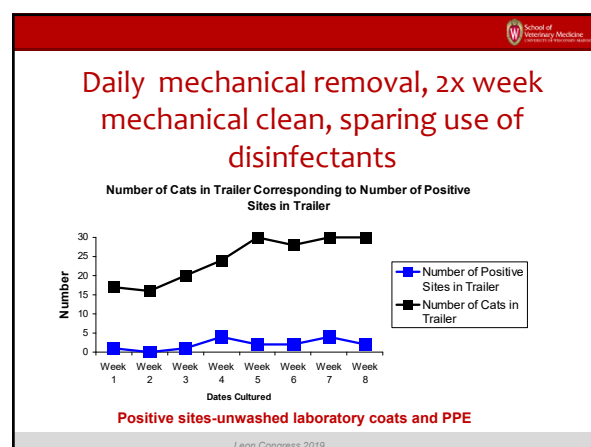
Karen A. Moriello

Routine recommended cleaning while kitten/cat was in the home  
Routine cleaning after kitten/cat left, then environmental cultures

**66 homes decontaminated with 1 to 2 cleanings**

- 3 homes needed 3 total cleanings
- 1 not decontaminated due to admitted non-compliance

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**How To Disinfect Clippers**

**Remove all hair and debris**

**Spray and wet for 10 min with alcohol clipper glide**

**Clean again and repeat 10 min wetting time**


Laboratory Trials n=20x




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**Thank you for your attention!**





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