

Update on Infections in Pediatric Dermatology

Streptococcal Intertrigo



- Three case reports, all mistaken for candida intertrigo
- All with bright red, moist, glistening, foul smelling plaques in intertriginous areas
 - Creases of the neck and inguinal region
 - Nuchal region
 - Neck, antecubital, popliteal, axillary and inguinal regions

Honig PJ, Frieden IJ, Kim HJ, Yan AC. Streptococcal intertrigo: An underrecognized condition in children. *Pediatrics*. 2003;112:1427-9

Streptococcal Intertrigo

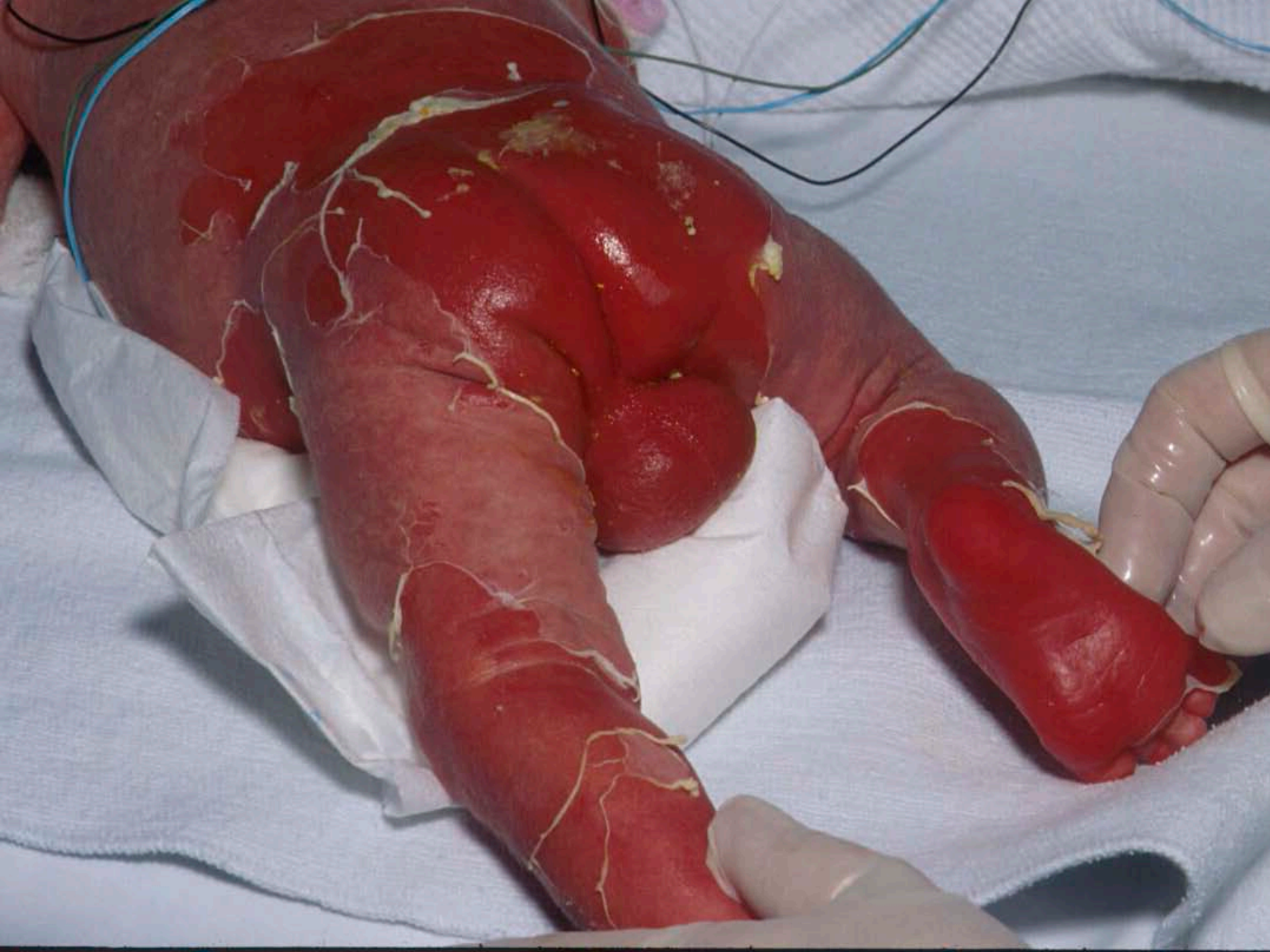


- All grew group A β -hemolytic streptococci
- One case with *Staph aureus* as well
- Treated successfully with oral antibiotics and topical mupirocin and 1% hydrocortisone









Positive *Staph Aureus* Culture May Not Help in the Diagnosis of SSSS

- Fifty-four *S. aureus* isolates from children suspected of having SSSS
- Seventeen (31%) produced exfoliative toxins A or B by PCR or Western blot
- Sixty-nine percent were not toxin-producing strains of *S. aureus*
- Not a specific test for SSSS

Ladhani S, et al. Isolating *Staphylococcus aureus* from children with suspected staphylococcal scalded skin syndrome is not clinically useful. *Pediatr Inf Dis J*. 2003;22:284-5



Methicillin-Resistant *Staphylococcus Aureus* Disease in Three Communities

- Centers for Disease Control and Prevention surveillance project 2001-2
 - Atlanta, Georgia (18 months)
 - Baltimore, Maryland (12 months)
 - Minnesota (24 months)
- MRSA surveillance from hospital and community based laboratories
- Community-acquired based on medical record and phone interview

Fridkin SK, et al. Methicillin-resistant *Staphylococcus aureus* disease in three communities. *New Engl J Med*. 2005;352:1436-44

Methicillin-Resistant *Staphylococcus Aureus* Disease in Three Communities

- 12,553 patients with MRSA
- 2107 (17%) with confirmed or probable community-acquired MRSA
- 1647 cases associated with clinical illness
 - 25.7 cases per 100,000 in Atlanta
 - 18.0 cases per 100,000 in Baltimore
- More common in those less than 2 years of age
- More common in blacks than whites in Atlanta

Methicillin-Resistant *Staphylococcus Aureus* Disease in Three Communities

- 77% skin and soft tissue infections
 - 59% abscesses
 - 42% cellulitis
 - 7% folliculitis
 - 3% impetigo
- 6% invasive- bacteremia, septic arthritis, osteomyelitis
- 10% wound infections
- 2% pneumonia

Methicillin-Resistant *Staphylococcus Aureus* Disease in Three Communities

Antibiotic	Atlanta	Baltimore	Minnesota
Cipro	63%	19%	80%
Clinda	87%	85%	88%
Erythro	11%	12%	47%
Rifampin	98%	67%	97%
TCN	89%	61%	91%
Linezolid	100%	92%	
Bactrim	97%	83%	99%

Methicillin-Resistant *Staphylococcus Aureus* Disease in Three Communities

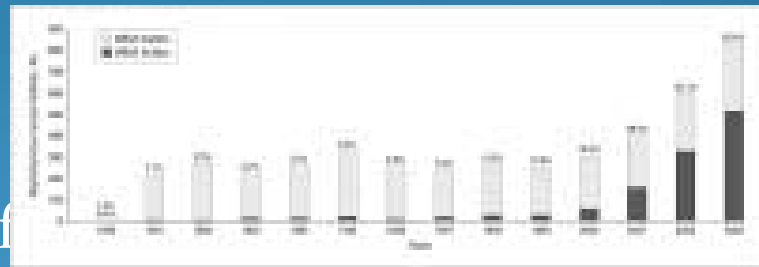
- 58% received β -lactam antibiotics alone
- 15% received β -lactam antibiotics and non- β -lactam antibiotics
- 26% received only non- β -lactam antibiotics
- There were no significant differences in outcomes based on antibiotic coverage
- 23% hospitalized for CA-MRSA infection
- One death

Methicillin-Resistant *Staphylococcus Aureus* Disease in Three Communities

- MRSA is common around the country
- Sensitivities vary by region
- The outcome may not be dependant on antibiotic coverage
- The infections may be serious and death may result

Methicillin-Resistant *Staphylococcus Aureus* Epidemic in Southern Texas

- January 2001 to December 2002 compared with the previous decade
- Percentage of *S. aureus* that was MRSA
 - 2.9% in 1990
 - 10.6% in 1999
 - 19% in 2000
 - 62.4% in 2003, 92.6 % of acquired



Purcell K, Fergie J. Epidemic of community-acquired methicillin-resistant *Staphylococcus aureus* infections: a 14-year study at Driscoll Children's Hospital. *Arch Pediatr Adolesc Med*. 2005;159:98-985

Methicillin-Resistant *Staphylococcus Aureus* Epidemic in Southern Texas

- CA-MRSA requiring hospitalization
 - 1990-1999 = 3.8 cases per 100,000 admissions
 - 2000-2001 = 57.8 cases per 100,000 admissions
 - 2002-2003 = 277.1 cases per 100,000 admissions
- “Categorizing children with CA-MRSA infections into those without risk factors is losing any clinical relevance...The antibiotic susceptibility patterns and the spectrums of disease are becoming increasingly similar.”

Staph Sepsis and Community-Acquired MRSA

- More than 70% of CA-*Staph aureus* at Texas Children's caused by MRSA
- Prior to Sept. 2002, severe, life-threatening infections with CA-MRSA were rare
- Sept. 2002 to Jan. 2004
- Report of 14 adolescents at TCH with CA-*Staph aureus* sepsis, 12 of which were CA-MRSA
- 13/14 with bone/joint and pulmonary infections
- 3/14 died, 2 of which where MRSA infections

Gonzalez BE, et al. Severe staphylococcal sepsis in adolescents in the era of community-acquired methicillin-resistant *Staphylococcus aureus*. *Pediatrics*. 2005;115:642-8

Methicillin-Resistant *Staphylococcus Aureus* Experience in Southern New England

- 1063 children with *Staph aureus* cultures
 - Five year span of 1997-2001
 - 57 (5.4%) MRSA
 - 23 (2.2%) community-acquired MRSA
- Percentage of MRSA increased each year
 - From 2.7% (1997) to 9.3% (2001)
- Many of the children never received an antibiotic effective against MRSA and still recovered

Dietrich DW, Auld DB, Mermel LA. Community-acquired methicillin-resistant *Staphylococcus aureus* in southern New England children. *Pediatrics*. 2004;113:e347-52

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Management of Abscesses Caused by MRSA

- Dallas, Texas
- Sixty-nine children with culture-proven, community-acquired methicillin-resistant *Staphylococcus aureus* skin and soft tissue abscesses
- Most all children had their abscesses drained
- No difference in outcome based on whether or not they received an antibiotic effective against MRSA

Lee MC, et. al. Management and outcome of children with skin and soft tissue abscesses caused by community-acquired methicillin-resistant *Staphylococcus aureus*. *Pediatr Inf Dis. J* 2004;23:123-7

Nasal Carriage of MRSA

- Routine nasal culture of 500 healthy children in Nashville, TN
- MRSA colonization in 9.2%
- Increase from 0.8% in 2001
- About 20% of the isolates had the PVL gene, which is associated with necrotizing pneumonia, furunculosis and abscesses

Creech CB, Kernodle DS, Alsentzer A, Wilson C, Edwards M. Increasing rates of nasal carriage of methicillin-resistant *Staphylococcus aureus* in healthy children. *Pediatr Infect Dis J*. 2005;24:617-621

MRSA in Pro Football



- 2003 season, CDC investigation of 8 MRSA infections in 5 players on the St. Louis Rams
- All linemen or linebackers
- All associated with turf burns (elbows, forearms, knees)
- All large abscesses, 5-7 cm
- Total of 17 missed days due to infection
- Players have 2-3 turf burns per week, most common on artificial turf

Kazakova SV, et al. A clone of methicillin-resistant *Staphylococcus aureus* among professional football players. *N Engl J Med.* 2005;352:469-75

MRSA in Pro Football

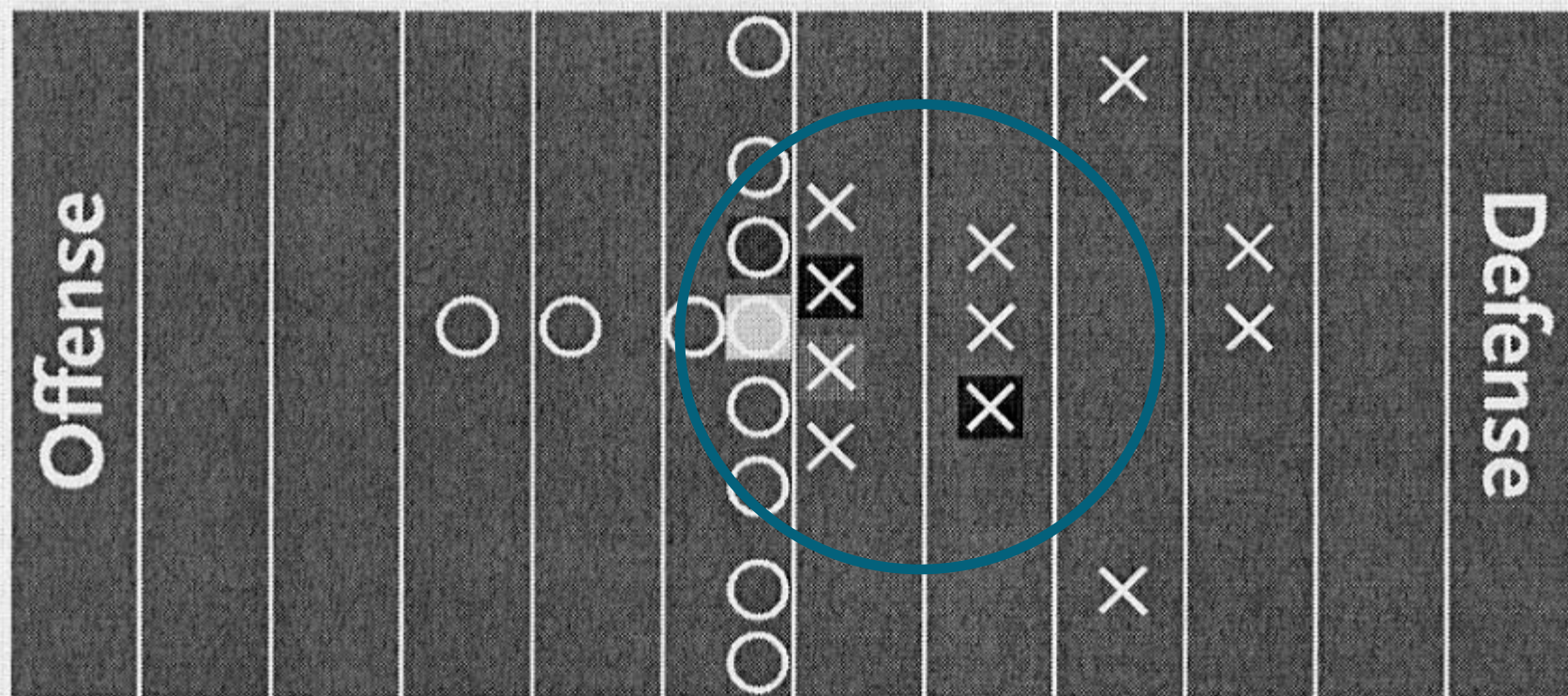
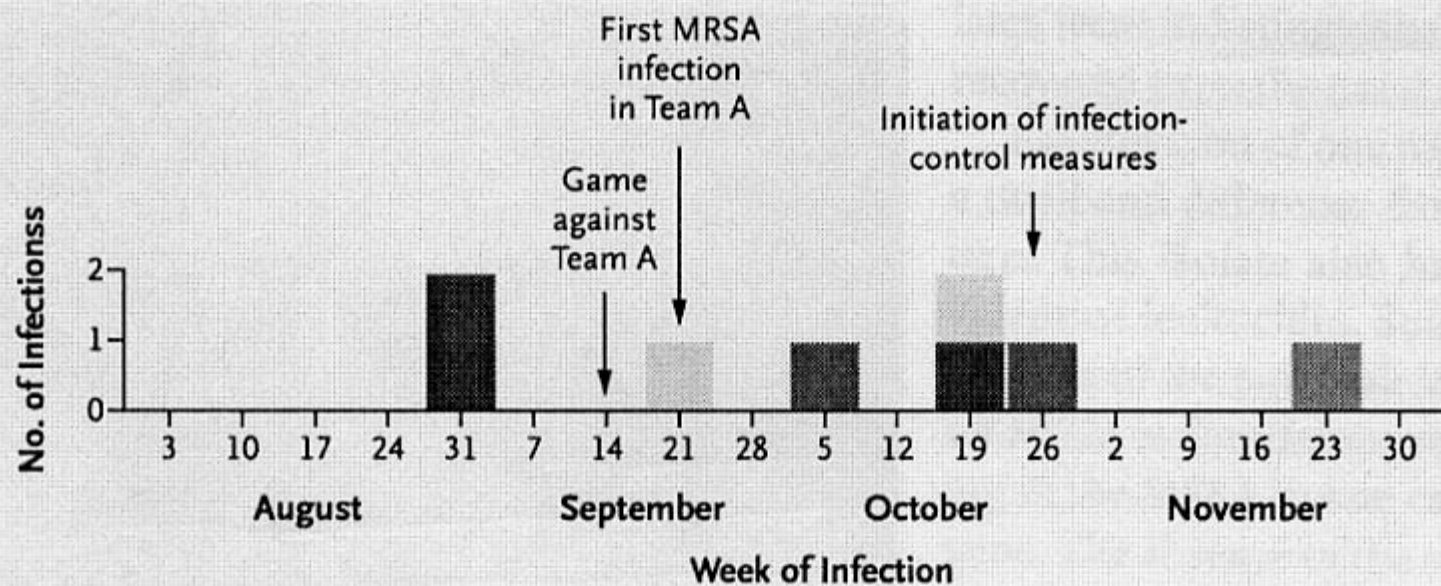


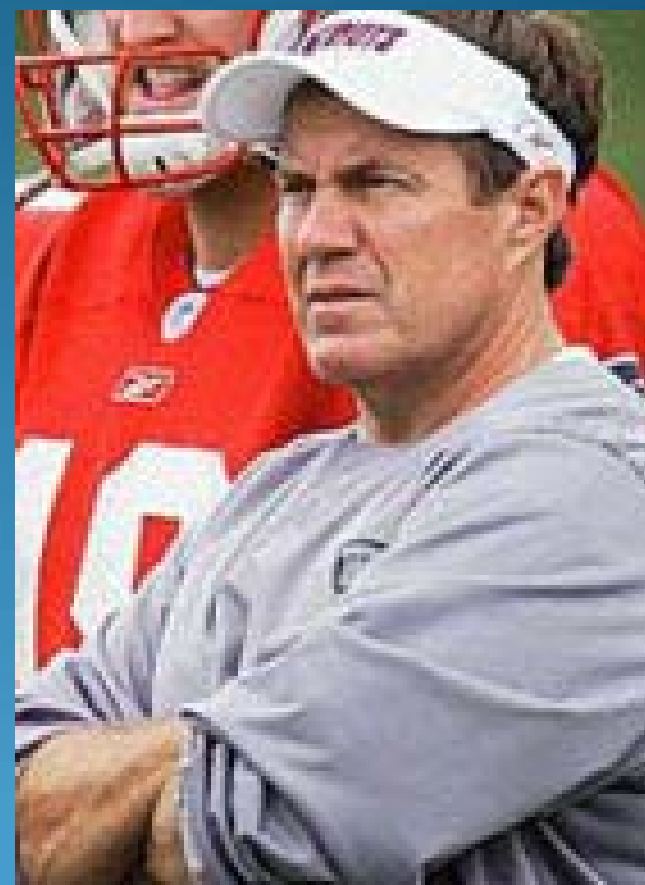
- Those with infection “had a significantly higher body-mass index” than those without infection
- Similar infections developed in players on “Team A” (San Francisco 49ers)
- Identical strain (US300) in all players on both teams
- All positive for Panton-Valentine leukocidin (PVL), a cytotoxin associated with abscesses and necrotizing pneumonia
- 40% *Staph aureus* nasal colonization but no MRSA

MRSA in Pro Football



- Main risk factors
 - Turf burn
 - Frequent skin-to-skin contact
 - Lack of regular access to hand hygiene
- Infection control measures for health care providers
 - Recognize MRSA emergence as pathogen in skin abscesses
 - Get cultures
 - Drain abscesses
 - Provided guidance regarding hand and personal hygiene





MRSA in High School Football

- MRSA in 11 high school football players from western PA with 20 infections
- Most were linemen
- Abscesses were very common and drainage was needed for most
- 33 times more likely to develop a recurrent infection if antibiotic coverage did not include an antibiotic guided by bacterial sensitivities
- Compliance with Bactroban to nares only 38.9%

Rihn JA, Posfay-Barbe K, Harner CD, et al. Community-acquired methicillin-resistant *Staphylococcus aureus* outbreak in a local high school football team. Unsuccessful interventions. *Pediatr Infect Dis J*. 2005;24:841-842

Emergence of Predominant Clone of CA-MRSA

- Isolates obtained from Texas Children's Hospital
- 62% increase in MRSA 2000 to 2003
- One clone has emerged over the past 3 years
 - TCH A
 - Same clone has been described around the United States and is referred to as US300 (remember the Rams and 49ers)
 - Accounts for about 94% of all MRSA

Avalos Mishaan AM, et al. Emergence of a predominant clone of community-acquired *Staphylococcus aureus* among children in Houston, Texas. *Pediatr Inf Dis J*. 2005;25:201-6

Increasing Clindamycin Resistance in MRSA

- *S. aureus* cultures from pediatric patients at 57 military hospitals and clinics from 2001-2 and 2003-4 were compared
- Clindamycin resistance increased from 0.48% to 4.0%
- Sensitivity to TMP-SMX was unchanged at >96% both years
- D-test positivity was low

Braun L, Craft D, Williams R, Tuamokumo F, Ottolini M. Increasing clindamycin resistance among methicillin-resistant *Staphylococcus aureus* in 57 northeast United States military treatment facilities. *Pediatr Infect Dis J.* 2005;24:622-626

Third Reported Case of Vancomycin-Resistant *Staph Aureus*

- Nursing home patient in NY
- Recovered in the urine
- Sensitive to chloramphenicol, linezolid, minocycline, quinupristin, rifampin, trimethoprim-sulfamethoxazole
- Two previous cases in PA and MI with no epidemiologic connection to this case

MMWR 2004;53:322-3

Linezolid (Zyvox) Versus Vancomycin

- Children 12-years-old and younger with nosocomial gram positive infections
- Randomized to receive either linezolid or vancomycin
- Cure rates were virtually identical for methicillin susceptible *Staph aureus*, methicillin resistant *Staph aureus*, and coagulase negative staphylococci
- Linezolid treated patients required significantly fewer days of intravenous therapy and had fewer drug related adverse events

Kaplan SL, et al. Linezolid versus vancomycin for the treatment of resistant gram positive infections in children. *Pediatr Infect Dis J*. 2003; 22:677-85.

Transient Psychosis in a Teen-age Girl Treated with Bactrim

- 19-year-old girl with spina bifida given Bactrim for UTI
- After third dose she became confused and agitated
- Visual, then auditory hallucinations
- Resolved completely within 6 days of stopping the Bactrim and no recurrence since that time
- No other suspect medications at the time

Saidinejad M, Ewald MB, Shannon MW. Transient psychosis in an immune-competent patient after oral trimethoprim-sulfamethoxazole administration. *Pediatrics*. 2005;115:e739-41

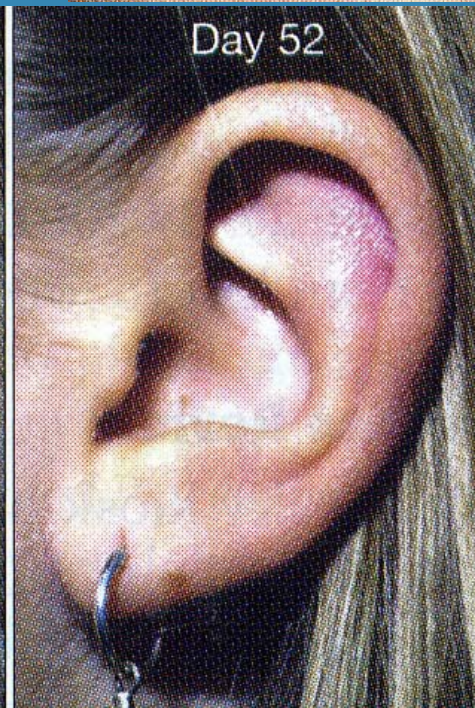
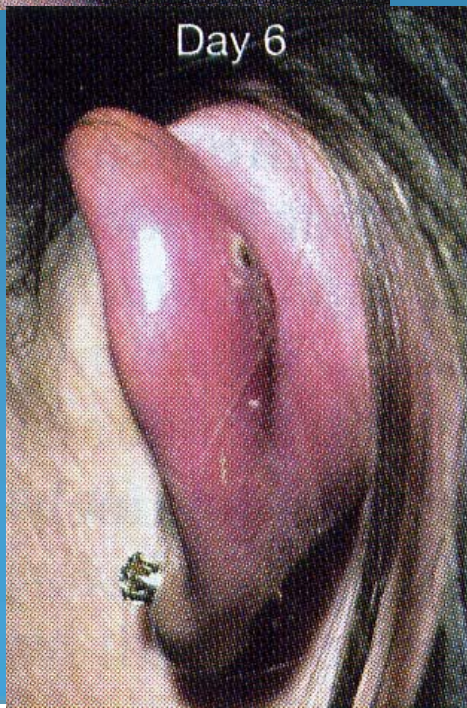
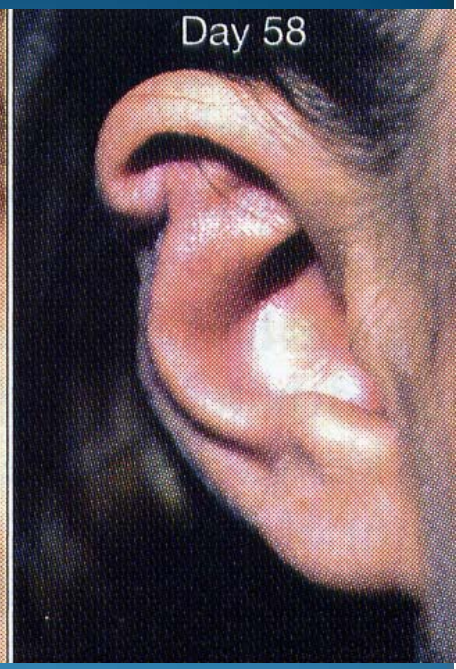
Summary of CA-MRSA

- Infection and carriage are getting more common with each passing year and a single clone may be emerging
- Not just in “hot spots” around the United States
- Treatment with “ineffective” antibiotics may not give a worse outcome (?more recurrences)
- MRSA can be associated with serious disease and sepsis
- Drain abscesses
- Clindamycin resistance is increasing and Vancomycin resistance has become a reality
- Linezolid may match Vancomycin’s efficacy

Pseudomonas aeruginosa in Cartilage Ear Piercing

- Seven confirmed cases of *Pseudomonas aeruginosa* infection from a single kiosk
- All performed on upper ear cartilage
- Another 18 cases suspected but unproven
- Two workers, “disinfectant” spray bottle and sink also culture positive for genetically identical strain
- Many with resultant deformity

Keene WE, Markum AC, Samadpour M. Outbreak of *Pseudomonas aeruginosa* infections caused by commercial piercing of upper ear cartilage. *JAMA*. 2004;291:981-5

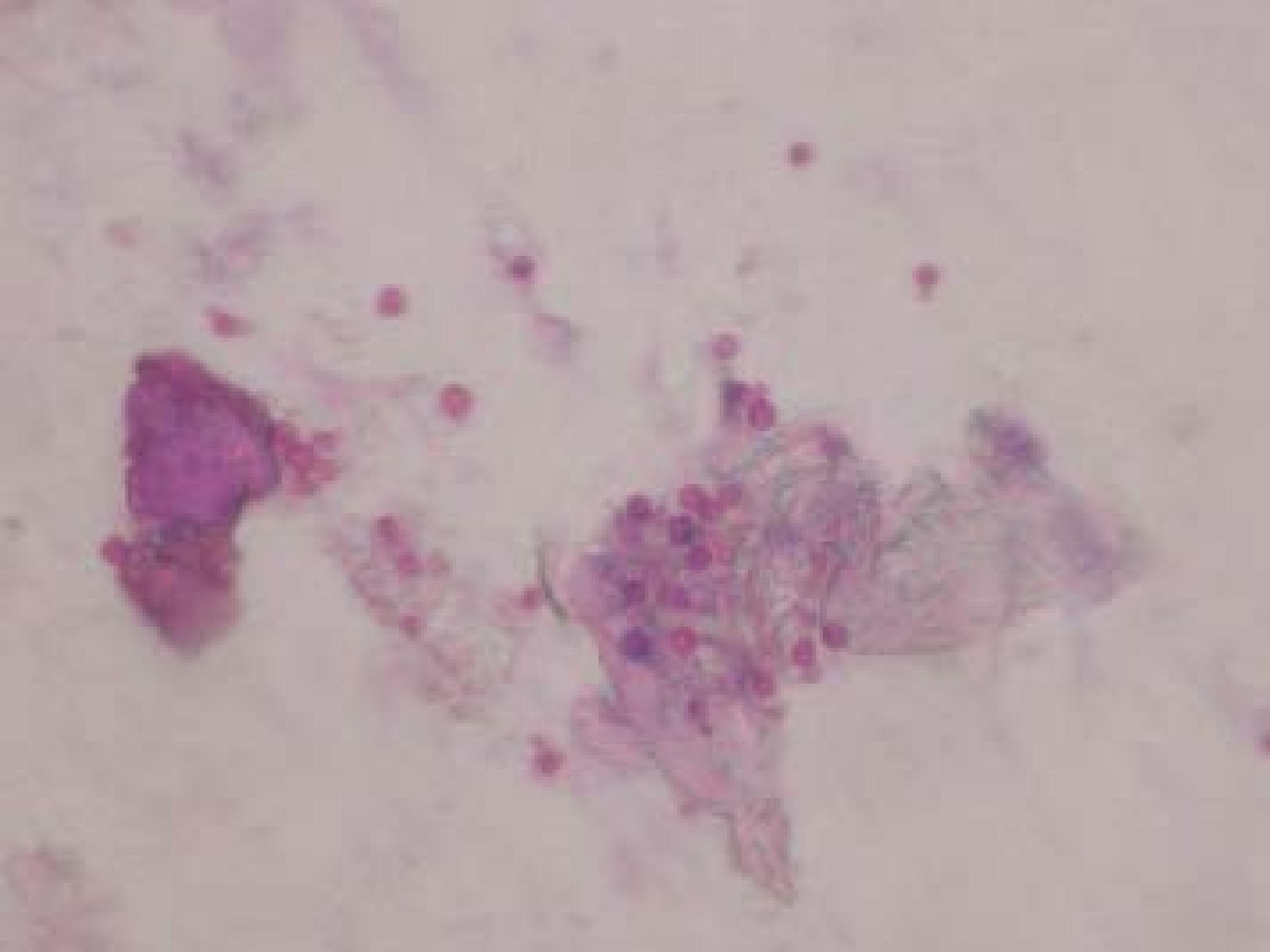




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Pityrosporum Folliculitis

- Case reports of six adolescent females on acne therapy with recent worsening
- Uniform 1-to-2 mm monomorphic, erythematous papules and pustules
- Pruritic during hot weather or increased activity
- KOH with spores and budding yeast
- Treated with various regimens of oral ketoconazole or fluconazole plus topical cream or shampoo

Ayers K, Sweeney, SM, Wiss K. *Pityrospum* folliculitis: diagnosis and management in 6 female adolescents with acne vulgaris. *Pediatrics*. 2005;159:64-7

Pityrosporum Folliculitis

- Suspect when:
 - Pimples look all the same
 - Acne itches
 - Gets worse with exercise or heat
 - Associated with seborrheic dermatitis
 - Extends into the scalp
- Treatment
 - Ketoconazole 200 mg for 14 days, follow-up phone call with results
 - Topical ketoconazole shampoo or ZNP soap bar
 - Prophylaxis with fluconazole



Griseofulvin Takes on the Challengers

- Multicenter, prospective, randomized, non-industry sponsored study
- Compared the efficacy & safety of griseofulvin, terbinafine, itraconazole, & fluconazole in the treatment of *Trichophyton* tinea capitis
- 200 patients, 4 treatment groups

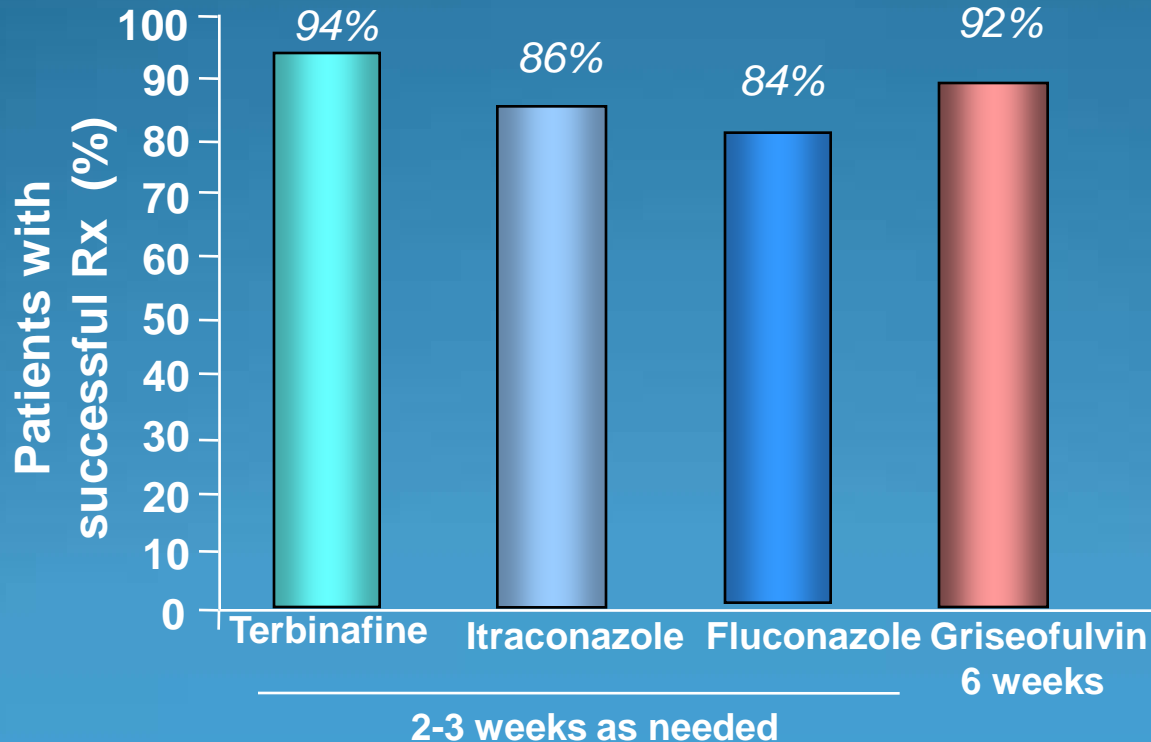
Gupta et. al. Therapeutic options for the treatment of tinea capitis caused by *Trichophyton* species: Griseofulvin versus the new oral antifungal agents, terbinafine, itraconazole, and fluconazole. *Pediatr Dermatol.* 2001;18:433-8

Griseofulvin Takes on the Challengers

- Griseofulvin 20 mg/kg micro x 6 wks
- Terbinafine >40 kg = 250mg, 20-40 kg = 125 mg, <20 = 62.5 mg x 2-3 weeks
- Itraconazole 5 mg/kg/d x 2-3 weeks
- Fluconazole 6 mg/kg/d x 2-3 weeks
- Patients evaluated at weeks 4, 8, 12
- Effective rx = mycological cure +/- a few residual symptoms

Griseofulvin Takes on the Challengers

- ITT population = 50 for each agent
- Conclusion: Newer oral agents, used for 2-3 weeks, are as effective as 6 weeks of griseofulvin



Adverse Effects

- 6 patients in Griseo group – GI
- 1 patient in Griseo group –d/c – nausea
- No adverse effects in other treatment groups
- No laboratory studies checked

Terbinafine vs. Griseofulvin in Tinea Capitis: A Comparative Trial

- Double-blind, randomized prospective evaluation in 50 Peruvian children
- 74% *T. tonsurans*, 26% *M. canis*
- Griseofulvin 15 mg/kg/day for 8 weeks ($n = 25$)
- Terbinafine dosed by weight for 4 weeks, then placebo ($n = 25$)
- Clinical evaluation at weeks 2, 4, 6, 8, 12
- Culture at weeks 8 and 12

Caceres-Rios H, Rueda M, Ballona R, Bustamante B. Comparison of terbinafine and griseofulvin in the treatment of tinea capitis. *J Am Acad Dermatol.* 2000;42:80-4

Terbinafine vs. Griseofulvin in Tinea Capitis: A Comparative Trial

- Cure at 8 weeks
 - Griseofulvin = 76%
 - Terbinafine = 72%
- Cure at 12 weeks
 - Griseofulvin = 44%
 - Terbinafine = 76%
 - If *M. canis* eliminated, 15/16 in terbinafine group cured at week 12 (94% cure rate)
- Dosage of griseofulvin was too low

Terbinafine for Tinea Capitis

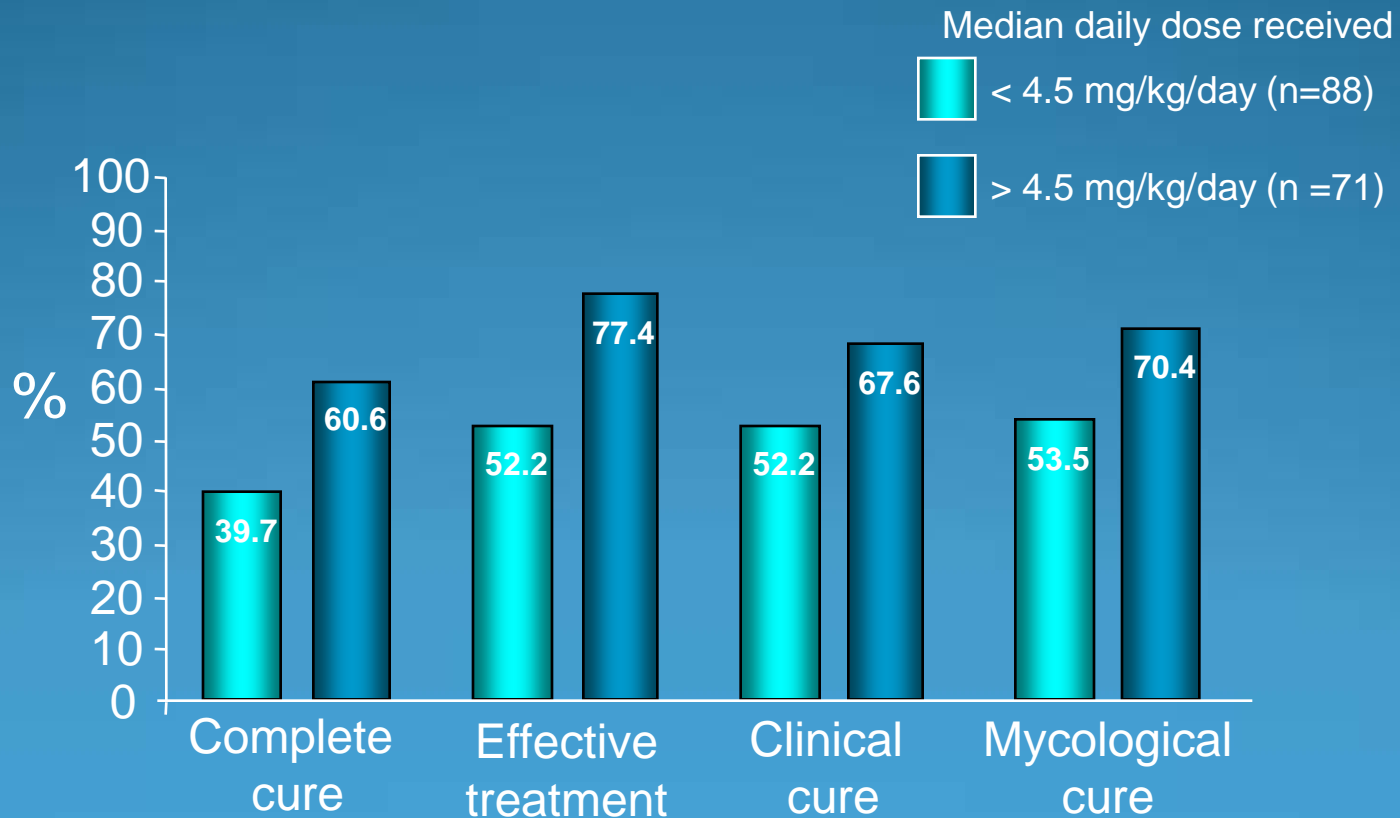
- 159 patients with culture proven *Trichophyton* tinea capitis randomized to 1, 2 or 4 weeks of treatment with terbinafine, 3-6 mg/kg/d
 - Less than 20 kg- 62.5 mg
 - 20-40 kg- 125 mg
 - > 40 kg- 250 mg
- A 20 kg patient received 6.25 mg/kg
- A 40 kg patient received 3.13 mg/kg
- 41 patients discontinued randomized treatment

Friedlander SF, et al. Terbinafine in the treatment of *Trichophyton* tinea capitis: A randomized, double-blinded, parallel-group, duration-finding study. *Pediatrics*. 2002;109:602-7

Terbinafine for Tinea Capitis

- Mycological cure = 60%, 76%, & 72%
- Effective treatment = 56%, 69%, 65%
- No significant difference between 2 & 4 week therapy
- Mean treatment dose = 4.5 mg/kg/day
- Those with dose > 4.5mg/kg/day had higher cure rates

Relationship Between Dose of Terbinafine Received and Efficacy Parameters in *Trichophyton* Study



Is Terbinafine economical?

- Probably yes!
- Assume a 21 kg child who will be treated for:
 - 3 weeks with terbinafine at 125 mg (half a 250 mg pill) daily = \$150
- 6 weeks with liquid suspension 20 mg/kg = \$265
- 6 weeks with ultra microsize 250 mg pill, one and a half pills daily = \$130

Itraconazole for Tinea Capitis Caused by *Microsporum Canis*

- Prospective study of 163 Austrian children
- Open-label, nonrandomized
- 5 mg/kg/day until clear or max of 12 weeks
- Clinical and mycologic cure in all children
- Mean treatment period 39 ± 12 days

Ginter-Hanselmayer G, Smolle J, Gupta A. Itraconazole in the treatment of tinea capitis caused by *Microsporum canis*: experience in a large cohort. *Pediatr Dermatol.* 2004;499-502



Chickenpox After Vaccination

- Outbreak of chickenpox in an Oregon elementary school, total of 21 cases
 - 18/152 (12%) vaccinated students
 - 3/7 (43%) unvaccinated students
 - Vaccine efficacy of 72%, similar to other reports
- Students vaccinated > 5 years prior to the outbreak were 6.2 times more likely to develop disease
- Fever less common in vaccinated group
- Lesion counts about the same
- Will revaccination be needed in the future?

Tugwell BD, et al. Chickenpox outbreak in a highly vaccinated school population. *Pediatrics*. 2004;113:455-9

Chickenpox After Vaccination

- Outbreak of chickenpox in two Utah elementary schools, total of 83 cases, October 2002-Feb. 2003
 - 26 vaccinated students
 - 57 unvaccinated students
 - Vaccine efficacy of 87%
 - Risk factors for breakthrough varicella included vaccinated > 5 years prior to the outbreak or vaccinated at < 18 months of age
- Milder disease in vaccinated group

Haddad, MB. Vaccine effectiveness during a Varicella outbreak among school children: Utah 2002-2003. *Pediatrics*. 2005;115:1488-93

Chickenpox After Vaccination

- Retrospective, population-based study
- Four million covered lives per year from over 100 health insurance plans
- Primary diagnosis of varicella (not zoster)
 - Decline from 2.3 to 0.3 hospitalizations per 100,000
 - 88% decrease ($P < 0.001$)
 - Decline from 215 to 89 ambulatory visits per 100,000
 - 59% decrease ($P < 0.001$)
- Similar results for any diagnosis of varicella

Zhou F, et al. Impact of varicella vaccination on health care utilization. *JAMA*. 2005;294:797-802

Chickenpox Mortality After Vaccination

- Death records 1988-2000 reviewed in the state of California
- Varicella as either an underlying or contributing cause of death
- Vaccine licensure in 1995
- Mortality high of 0.97 per million 1990
- Mortality low of 0.22 per million 1999

McCoy L, Sorvillo F, Simon P. Varicella-related mortality in California, 1988-2000. *Pediatr Inf Dis J*. 2004;23:498-502

Chickenpox Mortality After Vaccination

- Information from National Center for Health Statistics Multiple Cause-of-Death Mortality Data, 1990-2001
- Total deaths decreased from 145 per year to 66 per year
- 1990-1994 = 0.41 deaths per million
- 1999-2001 = 0.14 deaths per million

Nguyen HQ, Jumaan AO, Seward JF. Decline in mortality due to varicella after implementation of varicella vaccination in the United States. *N Engl J Med.* 2005;352:450-8

First Reports of Stroke After Varicella Vaccination

- Lacunar infarction recognized as complication of varicella infection since 1983
- 14 and 18-month-old girls with confirmed strokes 7 and 5 days after immunization
- No coagulopathy or vasculitis
- No rash in either
- Pathogenesis unknown- ? direct viral infection of the vessel or post-viral immune-mediated reaction

Willell E, et al. Stroke after varicella vaccination. *J Pediatr.* 2004;145:845-7

Acyclovir Is Minimally Helpful In Treating Varicella

- Meta analysis of three placebo-controlled studies
 - 988 patients, 2-18 years of age
- Conclusion
 - Shortens time to fever reduction and time to new lesions by one day
 - No effect on complication rates
 - Only works if treatment initiated within 24 hours of rash
 - “Use of acyclovir should not currently be recommended in immunocompetent children with chickenpox”

Harris D, Redhead J. Should acyclovir be prescribed for immunocompetent children presenting with chickenpox?
Arch Dis Child. 2005;90:648-650

Bullous Herpes Zoster

- Four-year-old in consolidation phase of treatment for leukemia
- Known previous chicken pox infection
- Vesicles in C6, C7, T1 distribution
- Vesicles enlarged forming large bulla
- PCR confirmation of varicella DNA
- Improved with opening the bulla and IV acyclovir



Haimi M, et al. Bullous herpes zoster in a child with leukemia; case report and review of the literature. *J Pediatr Hematol Oncol*. 2004;26:587-90

Facial Paralysis From Varicella-Zoster

- Study from Sapporo, Japan
- 30 children with “idiopathic” facial nerve palsy (Bell’s palsy)
- 2 children with cutaneous lesions of zoster (Ramsey-Hunt syndrome)
- 10/28 with significant rise in IgM and IgG titers
 - Only three with varicella-zoster DNA by PCR
- Reactivation of varicella-zoster (zoster sine herpete) may play a role in a percentage of children with Bell’s palsy

Ruruta Y, et al. Varicella-zoster virus reactivation is an important cause of acute peripheral facial paralysis in children. *Pediatr Inf Dis J*. 2005;24:97-101

Monkeypox in the U.S.

- Monkeypox first recognized in 1958 in captive primates, first human cases in 1970 in Congo
- Not reported outside of Africa
- Outbreak of monkeypox in 11 patients in the Midwest
- Index case was a 3-year-old girl from Wisconsin who was bitten by her pet prairie dog
- All of the cases were linked to an infected Gambian giant rat which infected pet prairie dogs and subsequent contacts

Reed KD, et al. The detection of monkeypox in humans in the western hemisphere. *N Engl J Med*. 2004;350:342-50



- Ill Gambian giant rat imported from Ghana by distributor 1 in northern Illinois
- Distributor 1 asked distributor 2 to transport the rat to an exotic-animal veterinarian, eventually died
- Transported with 15 prairie dogs purchased elsewhere, reportedly in a separate cage with no direct contact

I think I
have
herpes!



I don't feel
good!



- Sold to 2 pet stores who later reported that the animals were ill with watery eyes, congestion and skin lesions



Distributor #2
and his wife

Parents and 3-year-old child

Pet store #1 employee

Pet store #2 employee

Veterinarian

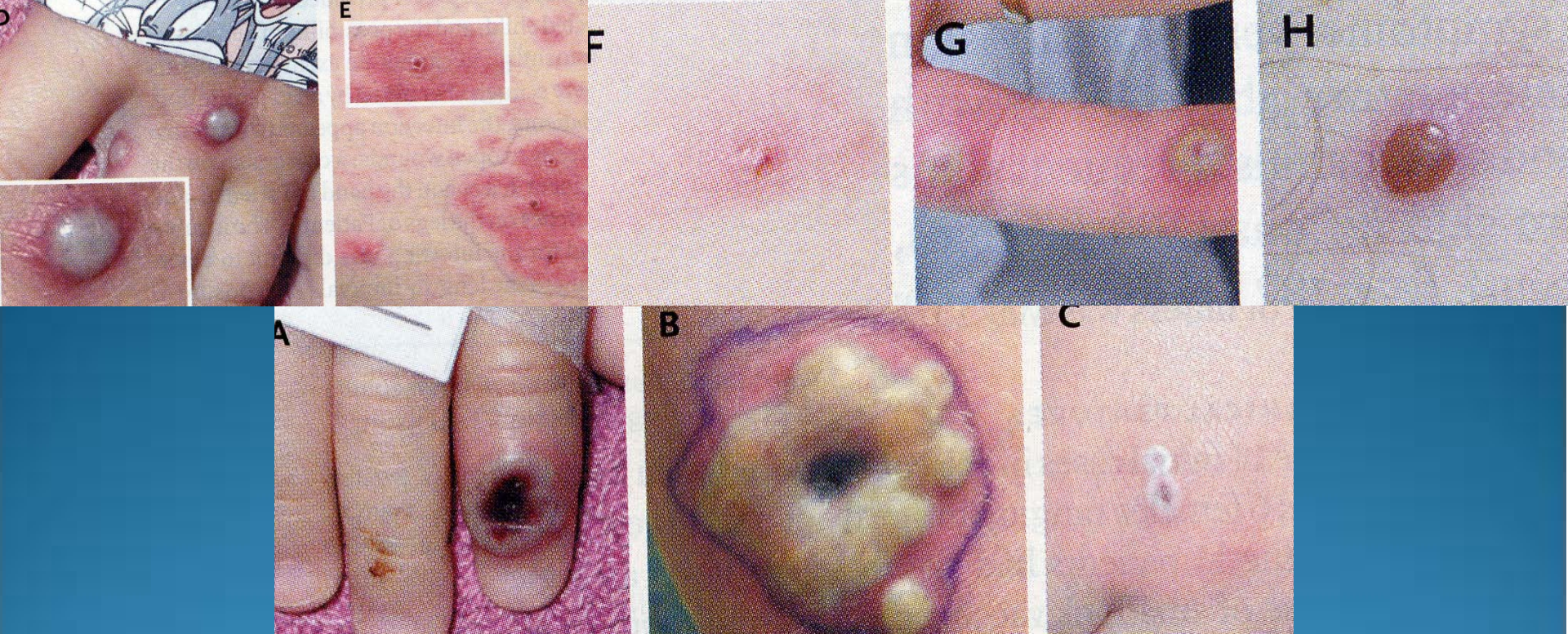
Customer and guest

Veterinarian



Monkeypox in the U.S.

- Two patients scratched or bitten by prairie dog
- Three patients through open wounds
- Parents of the 3-year-old girl may have been inoculated while caring for their daughter
- Signs and symptoms
 - Fever (above 38 °C), drenching sweats and chills
 - Skin lesions
 - Persistent cough
 - Lymphadenopathy
 - Sore throat



- 1-50 lesions starting as papules evolving to vesicopustules, some with erythematous flares
- Serous or hemorrhagic crusts
- Different stages of evolution
- Larger lesions left central scars



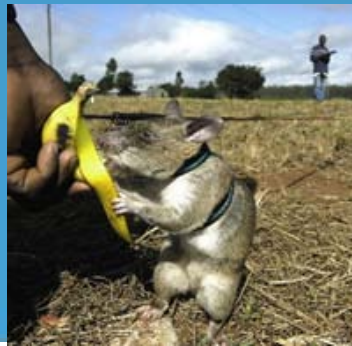
Monkeypox in the U.S.

- Pathology
 - Ballooning degeneration of keratinocytes
 - Epidermal necrosis and spongiotic edema
 - Multinucleation
 - Occasional eosinophilic cytoplasmic inclusions
- Orthopoxviral antigen on immunohistochemistry
- Electron microscopy typical of orthopoxvirus
- PCR suggested a monkeypox-like Old World orthopoxvirus

Monkeypox in the U.S.



- All 11 cases self-resolved
- Only 5/11 had previously received smallpox vaccination
- Very limited person-to-person spread so not self-sustaining in human populations
- Outbreaks in Illinois, Indiana, Kansas, Missouri, Ohio in addition to Wisconsin



Monkeypox in the U.S.

The Saga Continues



- The 6-year-old girl and infected parents part of index cases reported from Indiana
- Older sibling who did not live in the home but helped purchase and transport the prairie dogs
- Prairie dogs brought to a veterinarian, one prairie dog died in the office
- The house of the 3-year-old girl was a child care facility for 26 other children
- The pet prairie dogs were taken to school and shown to 2 classes, 40 total kindergarten students

Kile JC, et al. Transmission of monkeypox among persons exposed to infected prairie dogs in Indiana in 2003. *Arch Pediatr Adolesc Med.* 2005;159:1022-1025

Monkeypox in the U.S.

The Saga Continues



- Older sibling who did not live in the home but helped purchase and transport the prairie dogs
 - Vesicular rash, probable case
- Prairie dog brought to a veterinarian
 - Confirmed case
- The house of the 3-year-old girl was a child care facility for 26 other children
 - 4 suspect cases, a 1-year-old had negative PCR and negative serologies
- The pet prairie dogs were taken to school and shown to 2 classes, 40 total kindergarten students
 - No cases



In Vitro Comparison of Pediculicidal Agents

- Live lice collected from 25 children and adults at a lice and nit removal service (Lice Source Services, Inc)
- Lice exposed to pediculicidal agent on cotton disk
 - Malathion
 - Permethrin, diluted and undiluted
 - Pyrethrin, Rid and A-200
 - Lindane

Meinking et al. Comparative *In Vitro* pediculicidal efficacy of treatments in a resistant head lice population in the United States. *Arch Dermatol.* 2002;138:220-4

In Vitro Comparison of Pediculicidal Agents

Agent	Dead 20 min	Dead 1 hr	Dead 3 hr
Malathion	100%	100%	100%
A-200	60%	82%	100%
Undilute Nix	10%	49%	74%
Dilute Nix	8%	18%	46%
RID	8%	21%	34%
Lindane	2%	8%	17%

*A-200 contains benzyl alcohol and RID does not

Reduced Application Time of Ovide

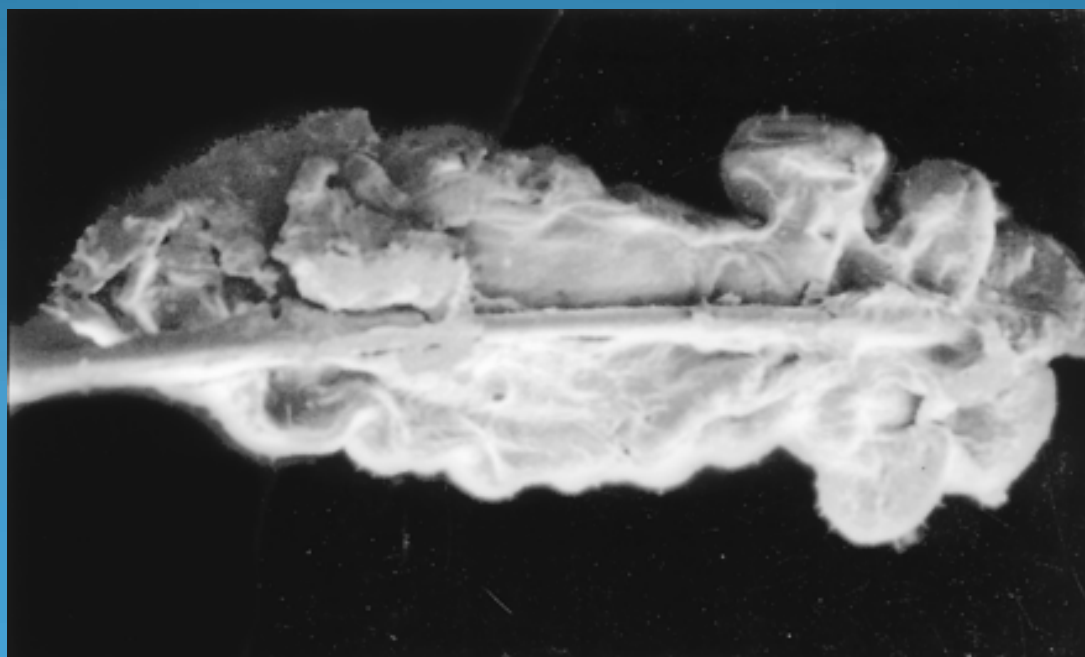
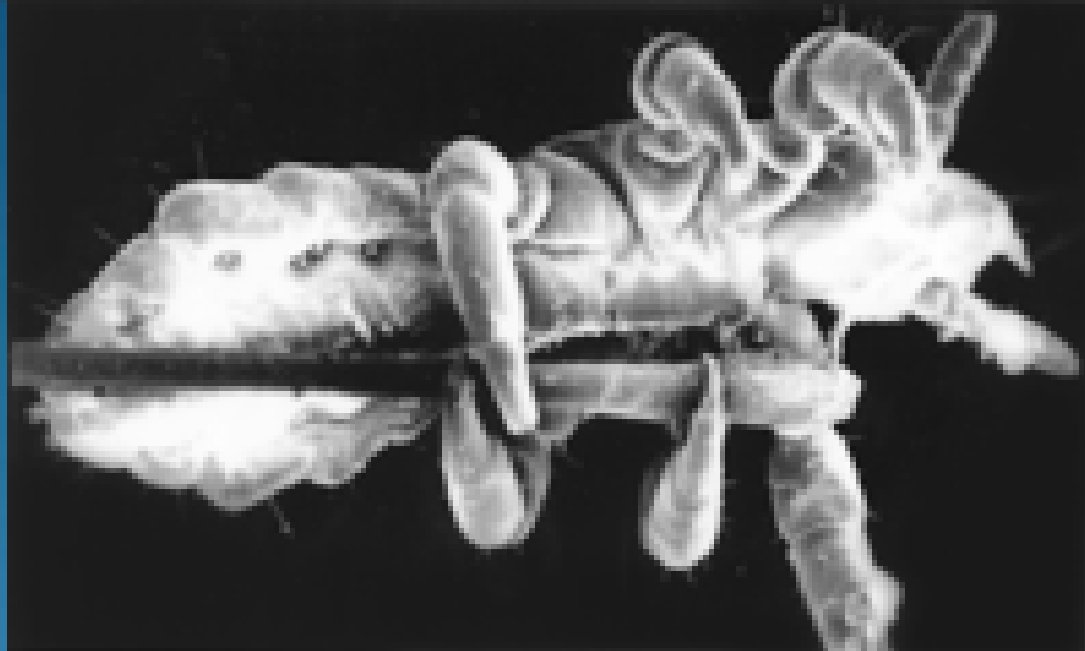
- Application time of 20 minutes rather than overnight
- Repeat treatment at one week if not cured
- Cure rate 98% with Ovide compared to 55% with Nix
- Reinfestation 0% with Ovide and 33% with Nix

Meinking TL, et al. Efficacy of a reduced application time of Ovide lotion (0.5% malathion) compared to Nix creme rinse (1% permethrin) for the treatment of head lice. *Pediatr Dermatol.* 2004;21:670-674

A New Suffocation-Based Pediculicide

- Nuvo lotion- applied wet and then blown dry with hair drier
- “Shrink wrap” seal suffocates the louse
- Leave on overnight and wash in the morning
- Repeat up to three times on weekly intervals
- Ingredients- stearyl alcohol, propylene glycol, sodium lauryl sulfate, cetyl alcohol, water, methyl 4-hydroxybenzoate, propyl *p*-hydroxybenzoate, butyl *p*-hydroxybenzoate”
- All recognized as safe by the FDA

Pearlman DL. A simple treatment for head lice: dry-on, suffocation-based pediculicide. *Pediatrics*. 2004;114:e275-9



A New Suffocation-Based Pediculicide

- 133 subjects (subjects paid \$200 refundable deposit to participate)
 - Trial 1- 93 patients comb with LiceMeister
 - Trial 2- 40 patients regular comb
- Cure 97% trial 1 and 95% trial 2
- Parents reported that treatment took about half the time of previous treatments
- Able to go to school without looking funny while the solution was in the scalp

A New Suffocation-Based Pediculicide News Break



- Nuvo lotion is Cetaphil cleanser
- Transfer to squirter bottle like a condiment container
- More information www.nuvoforheadlice.com

Pearlman, D. Cetaphil cleanser (Nuvo Lotion) cures head lice. *Pediatrics*. 2005;116:1612

Suffocation of Head Lice with 4% Dimeticone Lotion

- Clear, odorless fluid that dries by evaporation
- Two overnight applications, 7 days apart
- Cure rate of 70%

Burgess IF, Brown CM, Lee PN. Treatment of head louse infestation with 4% dimeticone lotion: randomised controlled equivalence trial. *BMJ*. 2005;330:1423-1426

“Bug Busting” to Treat Head Lice

- Bug busting compared to OTC head lice treatments (0.5% malathion or 1% permethrin) in Great Britain
- Bug busting = use of fine toothed comb on wet hair, four combings, three day intervals between each
- Cure rates 57% for bug busting and 13% for chemical methods

Hill N, et al. Single blind, randomized, comparative study of the Bug Buster kit and over the counter pediculicide treatments against head lice in the United Kingdom. *BMJ*. 2005;331:384-387



Nicotine for the Treatment of Head Lice

- Nicotine used in the control of poultry lice
- In vitro study on human head lice
- Did not work well as an insecticide
- Did cause muscle twitches that may cause loss of grip on the hair shaft facilitating removal of adult lice

Burkhart CG, Burkhart CN. Use of topical nicotine for treatment of *Pediculus humanus capitis*. *J Med Entomol*. 2004;37:170-1

Tea Tree Shampoo is a wonderfully luxurious shampoo proven to help solve tough scalp problems. It can even be used to combat head lice! Tea Tree Oil is a natural oil derived from the Tea Tree Bush found only in certain areas of Australia. Because the Tea Tree bush grows so rapidly it is a natural, renewable resource. Swiss Tea Tree Shampoo has been specially formulated with natural source Tea Tree Oil.



Tea Tree Oil for the Treatment of Head Lice

- Many pediculicidal agents work by inhibition of acetylcholinesterase
- Tea Tree oil found to have inhibitory effect on acetylcholinesterase

Mills C, Cleary BJ, Gilmer JF, Walsh JJ. Inhibition of acetylcholinesterase by Tea Tree oil. *J Pharm Pharmacol.* 2004;56:375-9

Ingestion of Tea Tree Oil

- Tea tree oil (*Melaleuca* oil) used as a topical antiseptic and antifungal agent
- Four-year-old Amish boy accidentally given 2 tsp orally
- Ataxic then unconscious requiring intubation
- Recovered

Morris MC, Donoghue A, Markowitz JA, Osterhoudt KC.
Ingestion of Tea Tree oil (*Melaleuca* oil) by a 4-year-old boy.
Pediatr Emerg Care. 2003;19:169-70

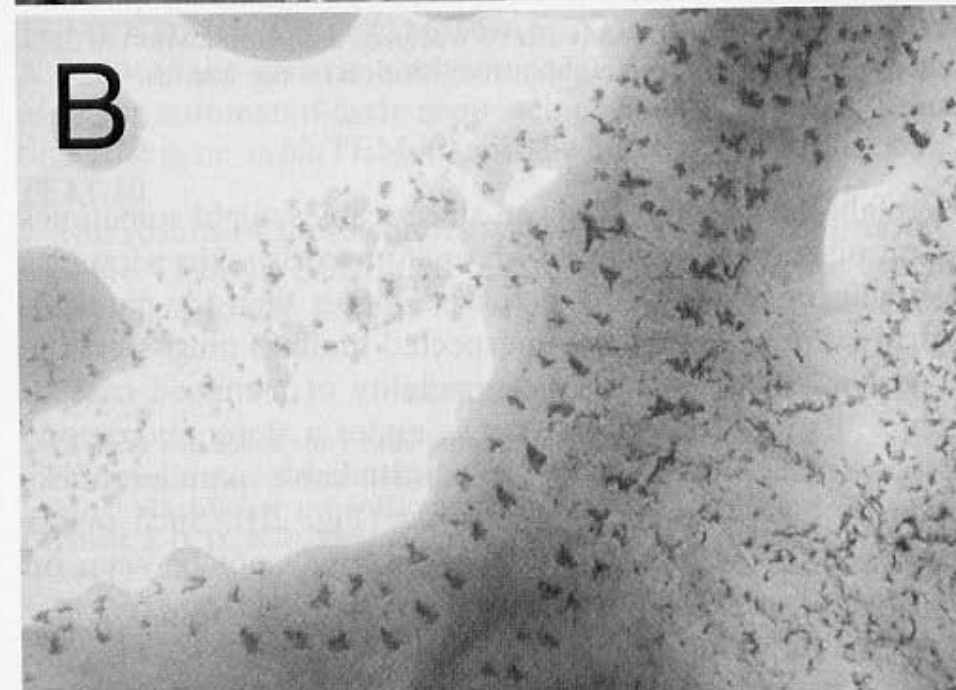
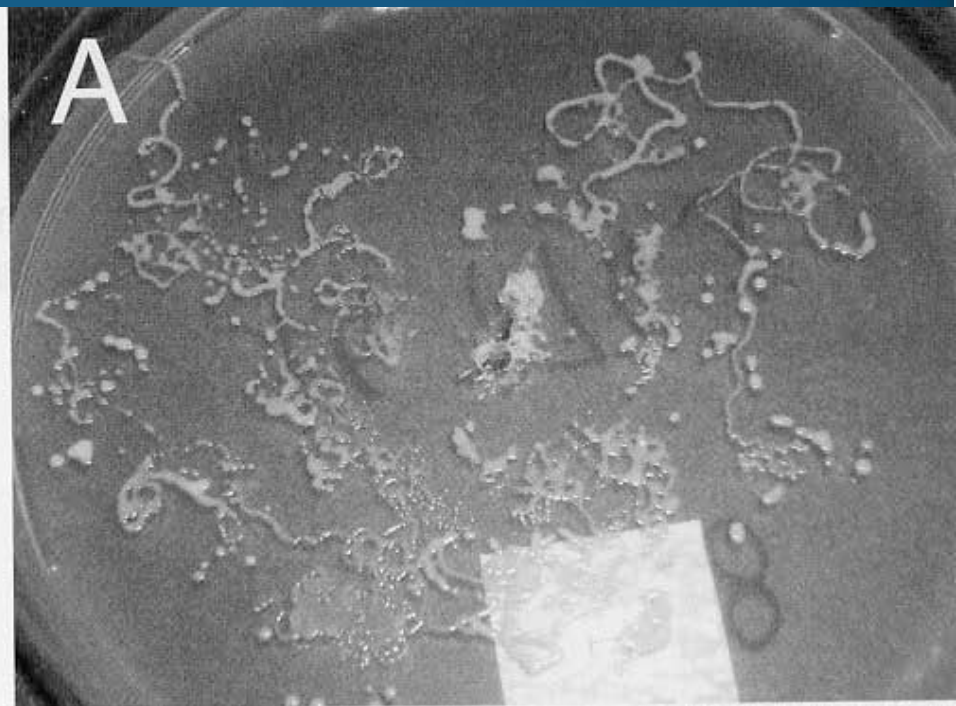


Ivermectin-resistant Scabies

- Two case reports out of separate Aboriginal communities in Australia
- 36 yo woman and 47 yo man with 30 and 58 doses of ivermectin respectively for crusted scabies
- Neither was immunosuppressed
- Lack of *in vivo* efficacy and *in vitro* resistance demonstrated to ivermectin
- Multiple agents used to eventually clear the infestation, including Tea Tree oil

Currie BJ, Harumal P, McKinnon M, Walton SF. First documentation of *in vivo* and *in vitro* ivermectin resistance in *Sarcoptes scabiei*. *Clin Infect Dis*. 2004;39:e8-12

A Wong SS, Woo PC, Yuen KY.
J Clin Microbiol.
2005;43:2542-2544



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Wong SS, Woo PC, Yuen KY. *J Clin Microbiol*. 2005;43:2542-2544



Lindane Ingestions

- Case reports from Sentinel Event Notification System for Occupational Risks-Pesticides (SENSOR-Pesticides) program and the Toxic Exposure Surveillance System (TESS)
- 870 cases of lindane ingestion from 1998 to 2003
- Rx should be filled in no more than 2 oz bottles

CDC. Unintentional topical lindane ingestions– United States, 1998-2003. *MMWR*. 2005;54:533-555



Mosquito Repellent

Outdoor Activities Without Mosquitoes and Black Flies

Use for: Backyard, Picnic Area, Campsite, Hike, and Other Outdoor Activities

Provides 12-15 Hours of Mosquito Protection For Up to 12 Hours

Includes:

- 1 Rechargeable Battery
- 1 Battery Cartridge
- 1 Insect Repellent Mat

ACTUAL MOSQUITO PROTECTION TESTED IN THE LABORATORY

KEEP OUT OF REACH OF CHILDREN

CAUTION: Do not use in enclosed spaces. Do not use near food or drink.

Cordless - Portable

ThermaCELL Mosquito Repellent

REFILLS

Includes:

- 1 Rechargeable Battery
- 1 Battery Cartridge
- 1 Insect Repellent Mat

ACTUAL MOSQUITO PROTECTION TESTED IN THE LABORATORY

KEEP OUT OF REACH OF CHILDREN

CAUTION: Do not use in enclosed spaces. Do not use near food or drink.



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Insect Repellents

What Works the Best?

- DEET is the best and duration of action is dependent upon concentration
 - OFF Deep Woods (23.8%) 300 minutes
 - OFF Skintastic (6.65%) 112 minutes
 - OFF Skintastic for kids (4.75%) 88 minutes
- Bite Blocker for kids (2% soybean oil) 95 minutes
- Citronella and Skin So Soft products did not do well
- All wrist band products were worthless

Fradin MS, Day JF. Comparative efficacy of insect repellents against mosquito bites. *New Engl J Med.* 2002;347:13-18