Objectives

- Diagnose and treat skin infestations and insect bites
- Discuss emerging resistance patterns in ectoparasites
- Describe effective insect repellent strategies

“Secret” Objectives

- Disgust you with “creepy crawly” photos
- Make you itch!
Dear Craig and Shannon,

We have done a preliminary treatment on the girls and are now in the process of drying all their bedding and clothing in a hot dryer. The hair fairies will be here tomorrow to recheck Abby and do the big comb thru for Tess. Please overnight new hair brushes and hair ties for both girls. We have had to toss their hair stuff. We have hair ties that we can give them in the interim, but I know they want the ones that they are used to.

Camp Lice Policy

- 60% of summer camps report head lice as an operational burden
- "no nit" policy: 34% of summer camps
- < 20% of children with nits or lice are allowed to stay at camp

Hair Fairies

2 girls treated x2 + 20 girls professionally screened = "prevent spray" x2 + travel fee= $1700


Subject: Re: Lice follow up

The hair fairies are with both girls now. I will give you a call later today. Tess was [cut off] - it has been [cut off] that she has had it. After the initial treatment from our nurse, the lady today found over fifty nits/eggs. The hair fairy will have to come back in a few days for another comb out just to be sure. I had to put all their belongings in a hot dryer yesterday and am having to spray down and shake out Tess's bedding for the next week.

We had both the girls cabins checked and [cut off] to purchase a percent spray for each cabin to calm the sauces of both groups of girls. Your girls were quite reformant with their friends, despite our efforts to keep it quiet. They are awesome young women. I'm going to check in with them now and will call with an update.
Head lice: pediculosis capitis

- 6-12 million head lice infestations annually in the US
  - Mostly ages 3-11 years
  - More common among girls than boys
  - Occurs in all ethnic groups

- Estimated economic burden of lice
  - ~ $1 billion/year (2004)

- Impacts of head lice infestation
  - Scalp itch and irritation
  - Secondary infection
  - Missed school or work
  - Social disruption
  - Embarrassment

Head louse speed: estimated 3.75 inches per minute

# Selfie Spread?

You Tube
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"The Days of Our Lice"

- Head lice die in 1–2 days without feeding
- Nits die within a week if they are not near scalp

Hygiene recommendations
- Machine wash and dry
  - clothing and bedding worn 2 days before treatment
- Seal un-washable items in plastic bag for 2 weeks
- Soak combs and brushes in hot water (≥ 130°F) for 5 minutes
- Vacuum floor and furniture around where infested person sits/leeps
- Do not share hair accessories

"Facts of Lice"

- 100 eggs per pair

Pediculosis capitis: "Super lice"

- Red states: 100% of tested lice resistant
- Orange states: 50–90% of tested lice resistant
- Yellow state: 0% of tested lice resistant
- White states: data not analyzed yet
- Blue states: data not collected yet

Pyrethroids

- Pyrethrin
  - pyrethroid extracts from the chrysanthemum flower
  - Not ovicidal; repeat treatment
  - Approved ages ≥ 2 years

- Permethrin lotion 1%
  - synthetic pyrethroid
  - similar to naturally occurring pyrethrins
  - Not ovicidal; repeat treatment
  - Approved ages ≥ 2 months

Malathion lotion 0.5%

- Organophosphate pesticide
  - Inhibits cholinesterase activity
- Partially ovicidal
- Single application + nit combing
- Apply to dry hair
  - Leave on 8-12 hours then rinse
- May be irritating
- Flammable
- Approved for ≥ 6 years of age
- Malathion resistance reported among head lice in UK

Spinosad 0.9% topical suspension

- Natural insecticide produced by soil bacteria
  - Neem tree
  - Targets nicoic acid and glycine betaine receptors of the insect nervous system
  - Ovicidal
  - Apply to dry hair, leave on scalp 10 min
  - Single application
  - No nit combing
  - Re treatments typically not needed
  - Approved for children ≥ 6 months
Ivermectin lotion 0.5%

- Neurotoxic to lice
- Activates glutamate-gated chloride channels in nerves
- Cell hyperpolarization -> paralysis -> death
- Not ovicidal, but kills nymphs!
- Apply to dry hair, leave on 10 min, rinse
- Single application
- Nit combing optional
- Approved for children ≥ 6 months

Benzyl alcohol lotion 5%

- Aromatic alcohol
- Non-neurotoxic pesticide
- Kills lice via asphyxiation
- Not ovicidal
- Apply to dry hair, leave on 10 min
- Repeat treatment on day 9
- Nit combing optional
- Approved: ages 6 months-60 years

Benzyl alcohol lotion 5%

More Natural Approaches?
Pediculosis Pearls

- Lice crawl
- Lice CANNOT hop or fly!
- Pets do not transmit human lice
- Nits in hair alone do not indicate contagiousness

Essential Oil Alternatives?

- Eucalyptus oil (EO)-lemon tea tree oil (LP)
- Eucalyptus oil: Leptospermum petersonii (EO/LP) blend vs. pyrethrin:piperonyl butoxide
  - EO/LP: twice as effective
  - EO/LP: 100% pediculocidal with 1 application
  - EO/LP: 100% of lice and eggs in vitro
  - Adverse events: transient burning, itching, stinging

Greive KA and TM Barnes, Australas J Dermatol. 2017 Mar 7

re-“cap”: Pediculosis capitis

- “Super head lice!”
- In most of the U.S., head lice show 100% resistance to pyrethroids
- Several FDA approved head lice medications available for pyrethroid resistant lice
  - Malathion 0.5% lotion
  - Ivermectin 0.5% lotion
  - Spinosad 0.9% suspension
  - Benzyl alcohol 5% lotion
- Nit picking
- FDA approved head lice air treatment device
  - AirAllé®
Scabies: *Sarcoptes scabiei var. hominis*

- Common parasitic infestation
- *Sarcoptes scabiei var. hominis*
- Human to human transmission
- Fertilized female mite burrows into epidermis depositing eggs and feces (scybala)
- Eggs hatch in several weeks
- Delayed Type IV hypersensitivity occurs about one month after exposure
- Initial localized itching changes to widespread pruritus
Scabies: Clinical Presentation

- Itchy papules on abdomen, hands, wrists, elbows, axilla, genitalia and interdigital web spaces
- Nodules = exaggerated hypersensitivity reaction
- Children:
  - Face and scalp involvement more frequent
- Infants:
  - Scaly papules and vesicles on palms, soles
  - Eczematous eruptions of face, scalp and trunk
  - Nodules

- Dermoscopy and transillumination to help diagnose scabies infestation

Nodular scabies

“Scabies in babies”
Scabies in babies:
“Foot Fetish”

Bullous scabies

Crusted scabies

Scabies: Diagnosis

- Diagnosis may be made from clinical findings alone
- Contact with persons with similar pruritic eruption supports diagnosis
- Definitive diagnosis from microscopy
  - Scraping of non-excoriated burrow
  - Mineral oil prep
- Presence of mites, eggs or scybala confirm the diagnosis

Scabies prep with Potassium hydroxide (KOH)

- Scabies mite and eggs become clearly visible after treatment with KOH

Treatment: scabies

- Asymptomatic “carriers” in household are common
  - Treat entire household at same time
- Permethrin 5% cream overnight; repeat overnight in 1 week
  - Infants and elderly: head to toes (include scalp and face)
  - Others: neck to toes
  - Pregnancy: category B
- Sulfur (5-10%) compounded in petrolatum x 3 consecutive nights
- Wash clothing, linens and towels used within the previous week in hot water and dry with high heat or seal in airtight bag for 10 days
- “post-scabetic” pruritus may linger ~4 weeks after successful treatment

Scabies Pearls: Think scabies if….

- Severe itch, worse at night
- Multiple family members with itchy bumps
- Intertidal web space involvement
- Inflammatory nodules on genitals or in infants
- Vesicopustules in infants, especially on palms/soles
- Treat everyone in the house
- Permethrin 5% cream overnight x 2 --- (1 week apart)
• 2-year-old healthy child
• Itchy red bumps on arms and legs only
• No one else at home with bumps or itching
• No pets

Papular urticaria
• Insect bite hypersensitivity reaction
• Recurrent nature
• New bites induce delayed hypersensitivity reaction at old sites
• Crops of highly pruritic papules
  • 3-10 mm in diameter
  • Exposed areas of arms and legs
  • Frequently with linear or triangular clusters
  • Central punctum
  • May vesiculate in center then crust
• Resolves with post-inflammatory hyperpigmentation frequently

Insect bite–induced hypersensitivity (papular urticaria)
The SCRATCH Principles

S Symmetric distribution (scalp, neck, face, torso, extremities)
C Crops/clusters of different coloration (erythema, hypo-/hyperpigmentation)
R Reactions not required: pets are not necessary criteria for diagnosis
A Age specific (usually occurring between 2 and 10 y of age)
T Target lesions and time (may take weeks to years to resolve)
C Confused pediatrician/parent: “We don’t have fleas!”
H Household with single family member affected

Bullous arthropod bite reaction

Biting midges: “no see-ums”  “All You Can Eat Buffet” Sign

Hernandez RG and BA Cohen. Pediatrics. 2006 Jul;118(1)
Papular Urticaria/ Bullous arthropod

**Treatment**
- Antihistamines
- Non-sedating antihistamine daily
- Hydroxyzine at bedtime PRN itch
- Cool compresses
- Ultrapotent topical corticosteroid applied twice daily to pruritic areas on extremities

**Prevention**
- Protective clothing
- Insect repellent

**Insect Repellents**
- Select coverage needed to protect from the appropriate biting insect for duration of activity planned
- AAP, CDC: DEET between 20-30% for children >2 months of age to exposed skin
- Apply directly to the child, avoiding open skin and orifices
- No insect repellent use for children < 2 months of age

**DEET alternatives**
- Picaridin 20%
  - Equivalent to 20% DEET
- IR3535 7.5%
  - Not as effective as DEET against the *Anopheles* spp. mosquitoes which transmit malaria
- ‘Oil of Lemon Eucalyptus’ (64% PMD)
  - age > 3 years

**Sunscreen and Insect repellent**
- Combination products are **NOT** recommended
- Sunscreen needs to be
  - applied in larger amounts
  - re-applied more frequently
- Up to 1/3 decrease in sun protection factor (SPF) when DEET-containing insect repellents are used after a sunscreen is applied

**Ineffective Insect repellents**
- Wristbands soaked in chemical repellents
- Garlic or vitamin B1 oral supplements
- Tea tree oil
- *Lemon Eucalyptus Essential Oil*
- Ultrasonic insect repellent devices

“Way-Far Off-label” Mosquito Repellent

- Methyl dihydrojasmonate
- Plant derived fragrant compound
- Lilial
- Synthetic aromatic aldehyde
- Commonly used in cosmetics

- Activate CquiOR136
- Mosquito odorant receptor
- Not recommended as an alternative to DEET


THANK YOU