One Health: It’s a Small World Health After All

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Zoonotic and Vectorborne Disease Program
One Health Is What?

The collaborative effort of multiple disciplines working locally, nationally, and globally to attain optimal health for people, animals and our environment.

Courtesy David Pearce Escambia CHD
I solemnly swear to use my scientific knowledge and skills for the benefit of society through the protection of animal health, the relief of animal suffering, the conservation of animal resources, the promotion of public health, and the advancement of medical knowledge.
Zoonotic and Vectorborne Diseases reportable to FL DOH

- Anthrax
- Brucella
- Campylobacter
- Cryptococcus
- Dengue
- Ehrlichiosis
- Giardiasis
- Novel Influenza (AI)
- Leptospirosis
- Lyme
- Malaria
- Mosquitoborne encephalitis
  - EEE, SLE, VEE, WEE, WN
- Plague
- Psittacosis / avian chlamydiosis
- Q fever
- Rabies
- Rocky Mountain spotted fever
- Salmonella
- Toxoplasmosis
- Trichinellosis
- Tuberculosis
- Tularemia
- Murine typhus
- Outbreak events

Red font=reportable to FDACS & FDOH
Baylisascaris procyonis
Raccoon Roundworm
Baylisascaris

- Encephalitis in >130 species (mammals and birds)
- Prepatent period 9 weeks
- Eggs take >11 day to reach infectious stage and can persist in the environment for > 6 yrs
- Intermediate hosts such as rodents, lagomorphs and some birds can be infectious if ingested by raccoons
Baylisascaris in Humans

• Uncommon but limited treatment options once infection established
  – Albendazole effective if administered within 3 days of exposure

• Reported cases often involve children

• Larvae continue to migrate until they become eosinophilic granulomas
  – 300-1,900 µm

• Neuro, ocular and visceral syndromes

• Symptoms within 4 weeks of exposure
  – Muscle ache, fever, pneumononitis, neuro or vision abnormalities, eosinophilia
Baylisascaris procyonis

1. Eggs passed in feces
2. Embryonated egg with larva
3. Adults in small intestine
4. Larvae encyst in tissue
5. Small mammals (woodchucks, rabbits, etc.) and birds
6. Dogs can also serve as definitive hosts as they harbor infections and shed eggs
7. Eggs in external environment (2-4 weeks until infective)
8. Eggs
9. In humans, eggs hatch after ingestion, and larvae penetrate the gut wall and migrate to a wide variety of tissues and cause VLM and OLM

CDC

http://www.dpd.cdc.gov/dpdx

Florida Health
**Baylisascaris procyonis**

- Present in most states that have raccoons
- Prevalence from 22% up to 94% of raccoons, except in SE including FL
- Adults can also develop in some dogs resulting in patent infections
- Detected in NW, Central & SE FL raccoons

M. Yabsley, UGA Warnell School of Forestry
South FL Kinkajou Breeding Facility

- 4/8/10 alerted by TN DOH of positive FL kinkajou
- 4/12/10 Inspection with USDA AC and County Health Department Epi
  - Broodstock from Guyana last imported 2008
  - Facility fenced; kinkajou area separate from other stock and pet dogs
  - Raised caging with nest box, mesh flooring above bare ground
    - 2 animals per cage
    - 44 animals and 21 cages
  - Housing cleaned daily; steam cleaned once/week
  - Adults de-wormed twice a year; juveniles reportedly de-wormed pre-shipping
South FL Breeding Facility

- Questionnaire Miami-Dade EIS administered
  - Contact limited to 2 persons
  - No gloves, but regular hand washing
  - Asymptomatic

- Testing
  - 4/30 submitted 21 kinkajou samples (1 per enclosure) by veterinarian
    - All negative
  - 5/25 soil samples under cages of the 2 juveniles sent to TN by facility veterinarian & USDA AC
    - Sample 1 a single *Baylisascaris* egg
    - Sample 2 many *Baylisascaris* eggs
Central FL Wildlife Rehabilitation Center

- Two kinkajous from TN & 2 others
  - 5/13/10 Joint inspection with USDA AC and Hernando CHD
  - Public animal display
    - raccoons, coatimundi, ringtail, NHP’s, big cats
  - Kinkajou contact possible with wildlife, domestic animals (dog), and the public
  - Annual de-worming for animals
  - Provided educational information
  - 5/17/10 kinkajou fecal submitted
    - negative
Baylisascaris Testing Performed at Purdue

- TN Pet Store neg (3/3 kinkajous & 1 pooled puppy fecal)
- TN Breeders neg (3/3)
- TN Breeders (ND)
- FL Breeder Miami-Dade 21/44 kinkajous neg / 2+ (soil)
- Wild Caught Guyana
- FL Wildlife Facility Hernando neg (4/4)
- Kentucky Resident ?
- Michigan Resident ?
- North Carolina Resident ?
- TN Resident + kinkajou (1/1)

ND=Testing Not Done
Baylisascaris Resources

• Information from CDC: http://www.cdc.gov/parasites/baylisascaris/index.html
• Electronic handout
• MMWR. 2011. Raccoon Roundworms in Pet Kinkajous --- Three States, 1999 and 2010;60:302-05. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6010a2.htm?s_cid=mm6010a2_e%0d%0a
• Raccoon Roundworm Encephalitis—Chicago, Illinois and Los Angeles, California, 2000. MMWR January 4, 2002/50(51);1153-5. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5051a1.htm
• Raccoon feces in pools
  -- http://www.cdc.gov/healthywater/swimming/pools/animals/raccoons-and-pools.html
Zoonotic Fecal Parasites

• Hookworms
  – *Ancylostoma braziliense*, *A. caninum*, *A tubaeforme* in people
  – Easily preventable in pets with regular veterinary care

• Cutaneous larval migrans
• Contact transmission
• Intensely pruritic and often leaves scars
• Roundworms, *Toxoplasma*, enteric bacteria, etc.

<table>
<thead>
<tr>
<th>Case #</th>
<th>Age</th>
<th>Gender</th>
<th>Exposure Date</th>
<th>Location 1</th>
<th>Location 2</th>
<th>Symptom Onset</th>
<th>Lesion Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>F</td>
<td>July/August</td>
<td>Site 1</td>
<td>Playground</td>
<td>1st wk September</td>
<td>Hands, Back, Buttocks</td>
</tr>
<tr>
<td>2</td>
<td>43</td>
<td>M</td>
<td>July 4th</td>
<td>Site 1</td>
<td>BBQ area</td>
<td>Early August</td>
<td>Feet</td>
</tr>
<tr>
<td>3</td>
<td>41</td>
<td>F</td>
<td>July 4th</td>
<td>Site 1</td>
<td>BBQ area</td>
<td>Early August</td>
<td>Feet, Legs</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>F</td>
<td>July/August</td>
<td>Site 1</td>
<td>Playground BBQ area</td>
<td>Early September</td>
<td>Feet, Legs</td>
</tr>
<tr>
<td>5</td>
<td>23</td>
<td>F</td>
<td>1st wk July</td>
<td>Site 2</td>
<td>Beach</td>
<td>1 wk after exposure</td>
<td>Buttocks, Legs, Feet</td>
</tr>
<tr>
<td>6</td>
<td>21</td>
<td>M</td>
<td>1st wk July</td>
<td>Site 2</td>
<td>Beach</td>
<td>4 wks after exposure</td>
<td>Back, Legs</td>
</tr>
<tr>
<td>7</td>
<td>22</td>
<td>F</td>
<td>1st wk July</td>
<td>Site 2</td>
<td>Beach</td>
<td>2-3 wks after exposure</td>
<td>Feet, legs</td>
</tr>
<tr>
<td>8</td>
<td>22</td>
<td>M</td>
<td>1st wk July</td>
<td>Site 2</td>
<td>Beach</td>
<td>2-3 wks after exposure</td>
<td>Feet, back</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>F</td>
<td>Early November</td>
<td>Site 3</td>
<td>Beach</td>
<td>4 wks after exposure</td>
<td>Left arm, Feet</td>
</tr>
</tbody>
</table>

** All were diagnosed and treated successfully

** All had residual scarring and discoloration in area of lesions
Zoonotic Parasite Prevention

• Regular veterinary care for pets including monthly dewormer product and fecal screens
• Remove fecal material from the environment regularly
• Wear gloves or other barriers (shoes, clothing) coming into contact with material with potential fecal contamination and wash well after removing gloves and other barriers
• Seek medical care immediately if ingestion of Baylisascaris eggs is suspected
Brucellosis in Florida

- **Cattle** *B. abortus*
  - 1998 last case in Florida cattle
- **Feral swine** *B. suis*
  - particularly in central and southern FL regions
  - Cross-over into people, “domestic” pigs, cattle
    - 10-15 positive cattle annually
- **Dogs** *B. canis* especially sexually intact animals
- **Marine mammals** *B. ceti* (and *B. pinnipedialis*)
- **Imported**-people exposed in other countries
  - Domestic animals in developing countries
    - *B. melitensis* (goats/sheep)
    - *B. abortus* (cattle)

Courtesy Cindy Seegers
In total, 47 cases of Florida-acquired brucellosis were reported from 2008 to 2012.
**Brucella in Animals**

- Reportable to FDACS
- Infectious material from animals
  - Animal reproductive tissues, products of parturition, milk (localize in udder), blood and meat (greater risk with *B. suis*?)
  - *B. suis* infected pigs
    - continuous bacteremia 5 wks
    - intermittent bacteremia up to 34 wks
    - often followed by persistent local infection
Brucellosis in FL Historically

- 936 human cases from 1930-1975
- 505 cases identified between 1940-1949
- USDA Cattle Brucellosis Eradication Program 1949
- 1963-1975 61 reported cases
  - 61% occupational
  - 31% cattle related
  - 39% swine related
  - 13% pig hunters
**Brucella suis 1999-2008**

*(n=36*)

- *B. suis* risk factors
  - 81% (29) hunting, handling raw hog meat
  - 25% (9) cuts
  - 25% (9) eating hog meat; 6% (2) undercooked
  - 17% (6) No gloves; 6% (2) with gloves
  - 6% occupational (1 vet tech, 1 taxidermist)
  - Sexual transmission?

- Clusters
  - Private hunting facility
  - Two families (MMWR, father-daughter-lab)
  - Hunter- spouse??

*33 culture confirmed, 1 epi-linked, 2 serologic confirmation*
Proportion of Brucella Positive Feral Swine, 1997-2009

Seroprevalence in Feral Swine
- 0%
- 1-10%
- 11-25%
- >25%
- Not tested

Labels on tested counties indicate number of human cases reported during the time period.

Testing was opportunistic and does not reflect the true prevalence of Brucella countywide.
FL Cases 1999-2008 Clinical Presentation

- Fever
- Weight Loss
- General Jt. Pain
- Monoarthropathy
- Anorexia
- GI
- Urogenital
- Cardiovascular
- CNS

*Brucella melitensis* vs. *Brucella suis*
FL Cases 1999-2008 Prescribed Treatment & Outcome

Doxycycline
Rifampin
Aminoglycoside
Monotherapy
Doxycycline tx > 6 weeks
Relapse
Fatal

Brucella melitensis
Brucella suis
Hunter Prevention

- Avoid all contact with visibly ill animals or those found dead.
- Use clean, sharp knives for field dressing and butchering.
- Wear eye protection and rubber or latex gloves (disposable or reusable) when handling carcasses.
- Avoid direct contact (bare skin) with fluid or organs from the hog.
- Burn or bury disposable gloves and inedible parts of the carcass after butchering.
- Wash hands as soon as possible with soap and warm water for 20 seconds or more and dry hands with a clean cloth.
- Clean all tools and reusable gloves used in field dressing and butchering with a disinfectant—such as dilute bleach.

Courtesy CDC
Brucellosis

- *B. suis* canine cases and management
- NASPHV *B. canis* white paper
  [http://www.nasphv.org/documentsCompendia.html](http://www.nasphv.org/documentsCompendia.html)
- *Brucella ceti* in dolphins
Rabies

Florida DOH Rabies Guide and other resources:
http://www.doh.state.fl.us/environment/medicine/rabies/rabies-index.html

Courtesy David Pearce Escambia CHD
Rabies Virus Variants

- Minor antigenic and genetic differences
- Usually maintained in a single animal species
- Spillover into any susceptible mammal
- A variety of bat variants nationwide
### Animal Rabies FL

<table>
<thead>
<tr>
<th>Year</th>
<th>Bat</th>
<th>Bobcat</th>
<th>Cat</th>
<th>Coyote</th>
<th>Dog</th>
<th>Fox</th>
<th>Horse</th>
<th>Otter</th>
<th>Raccoon</th>
<th>Skunk</th>
<th>Total</th>
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<tbody>
<tr>
<td>2009</td>
<td>23</td>
<td>2</td>
<td>11</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>1</td>
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<td>92</td>
<td>2</td>
<td>154</td>
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<td>2010</td>
<td>15</td>
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<td>0</td>
<td>0</td>
<td>15</td>
<td>1</td>
<td>3</td>
<td>75</td>
<td>0</td>
<td>128</td>
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<tr>
<td>2011</td>
<td>18</td>
<td>2</td>
<td>11</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>79</td>
<td>1</td>
<td>119</td>
</tr>
<tr>
<td>2012</td>
<td>14</td>
<td>3</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>11</td>
<td>2</td>
<td>0</td>
<td>59</td>
<td>2</td>
<td>102</td>
</tr>
<tr>
<td>20 yr avg</td>
<td>18</td>
<td>2</td>
<td>14</td>
<td>0</td>
<td>3</td>
<td>24</td>
<td>1</td>
<td>1</td>
<td>123</td>
<td>1</td>
<td>188</td>
</tr>
</tbody>
</table>

Only suspect rabid animals having contact with humans or domestic animals are tested.
Reported Animal Rabies in Florida
January 1, 2013 - May 31, 2013

Number of Cases by Animal

Rabid Animal:  # of Cases:

- CAT 1
- SKUNK 1
- BAT 7
- RACCOON 34

Number of Cases by County

TOTAL

- 0
- 1
- 2
- 4
- 5
- 7

Twenty-four counties reported a total of 43 animal rabies cases as of May 31, 2013. Raccoons accounted for 34/43 cases. Unvaccinated outdoor cats are the domestic animal particularly at risk for developing rabies in Florida.

For more detailed information, please see the 2013 table at: http://www.doh.state.fl.us/Environment/medicine/rabies/rabies-charts.htm

Preliminary data - subject to change
Animals are only tested for rabies if they expose a person or pet. Only cases with accurate geographic data are displayed.
Rabies Pre-Exposure Vaccination

- At risk persons in rabies endemic areas
  - Veterinarians & staff
  - Animal Services
  - Wildlife biologists
  - Lab Staff
  - Travelers

- Vaccination Series
  - 3 doses IM in deltoid
  - days 0, 7, & 21 (or 28)

- Post-Exposure Vx
  - Pre-vx after 1981
  - 2 doses IM days 0 & 3
Rabies Serology

- **Frequent Risk:** vets and staff, animal control officers, wildlife and animal workers, spelunkers
  - Titer every 2 years
  - Booster <1:5 Rapid Fluorescent Focus Inhibition Test (RFFIT)

- **Infrequent Risk:** Travelers
  - Serology not necessary

- **Serology Labs**
  - KSU Rabies Lab & Atlanta Health Associates
Veterinarians at greater risk for infections with:

Veterinarians as case reports
Veterinary Expert

• Parasitology (and other zoonoses), comparative medicine, population medicine training
  – Ethical and legal
• Protecting clients from pet infections
  – Rabies, enterics, parasites, vector-borne......
• And pets from client infections
  – MRSA, TB, H1N1
• Important role in early detection of disease activity
  – WNV, EEE, rabies, TB, AI....
So Please Remember-It’s all One Health!
Questions?

• Dr. Danielle Stanek 850-245-4117
  Zoonotic and Vectorborne Disease Program
• Dr. Carina Blackmore 850-245-4732
  State Public Health Veterinarian