EQUINE GRANULOCYTIC ANAPLASMOSIS IN A NEW BRUNSWICK HORSE

Canadian Animal Health Laboratorians Network Annual Meeting
Winnipeg, June 2012

Joan Bourque and Dr. James P. Goltz
Provincial Veterinary Laboratory,
Department of Agriculture, Aquaculture and Fisheries,
Fredericton, New Brunswick
CLINICAL HISTORY

• 12 year old Paint gelding horse, resident of Gagetown for at least 2 years
• Early November, 2011: Horse easily winded with exercise
• Decreasing energy, progressively worsening over past week
• Examined by veterinarian on 15 November 2011:
  – Dull but responsive
  – Bilateral nasal discharge
    • Clear and serous from right nostril
    • Serosanguinous from left nostril
  – Temperature 98.8°F, Heart rate 36 bpm, Respiratory rate 24 bpm (↑)
  – Mucous membranes tacky but pink
  – Capillary refill time <2 sec
• Blood sample submitted for CBC and chemistry profile
• Leukopenia (moderate)
  – WBC – 2.17 X 10^9/L *(Normal 5.5-12.5)*

• Neutropenia (marked)
  – Neutrophils – 0.98 X 10^9/L *(Normal 2.7-6.7)*

• Anemia (mild)
  – RBC – 5.19 X 10^{12}/L *(Normal 6.5-12.5)*
  – Hemoglobin – 92.0 g/L *(Normal 110-190)*
  – Hematocrit – 0.255 L/L *(Normal 0.32-0.52)*

• Hypoalbuminemia (slight)
  – Albumin – 25 g/L *(Normal 27-36)*

• AST – mild decrease – 173 IU/L *(Normal 205-530)*

• Hyperbilirubinemia (mild)
  – Total bilirubin – 49 µmol/L *(Normal 10-43)*

• Hyponatremia (mild)
  – Sodium – 133.8 mmol/L *(Normal 136-145)*
DIAGNOSIS

- Confirmed at National Microbiology Laboratory in Winnipeg
  - PCR +ve for *A. phagocytophilum*
  - PCR -ve for *Borrelia burgdorferi*
- (Equine) Granulocytic Anaplasmosis
- Cause: *Anaplasma phagocytophilum*
  - A small obligate intracellular Gram negative bacillus
  - Formerly *Ehrlichia phagocytophilum*
  - First resides in an early endosome, where it acquires nutrients for binary fission and grows into small groups called morulae
  - Predilection for myeloid or granulocytic cells
  - A tick-borne rickettsial disease
- Main vector: Black-legged Tick (*Ixodes scapularis*)
FOLLOW UP

• **Treatment:** tetracycline (Oxymycine LP) 7 mg/kg IV q24 hr for 7 days
• **Catheter installed for duration of treatment**
• **Outcome:**
  – One week after treatment stopped
    • improvement in energy and responsiveness, exercise intolerance regressing but still noted
  – 3 weeks post treatment
    • normal behaviour and attitude restored
  – Completely recovered
PREVALENCE DATA

- Unknown, not reportable in domestic animals in Canada
- 3rd reported equine case in Canada (1 Saskatchewan, 1 Nova Scotia)
- Several dogs in Canada with clinical disease
- Many more dogs seropositive – significance?
- Only one human case confirmed in Canada (Human Granulocytic Anaplasmosis) – Alberta
- Who is looking?
- 1.5 to 1.6% of Black-legged Ticks in New Brunswick are infected with this organism
- Infection rate in established populations of ticks is higher (roughly 2X greater in NB)
- Has been associated with blood transfusions in humans
New Brunswick Locations for *Anaplasma*-infected Ticks 1990 through 2011

Numbers indicate # of positive *Ixodes scapularis* tick submissions from each locality.

Red dot indicates location of infected horse.
Ixodes scapularis

COLLECTION LOCATIONS IN NB

• 2011
  – 144 locations throughout New Brunswick
• Mostly thought to be distributed (dropped off) by migrating birds
• Also transported by people, pets, other wildlife
# of adult *Ixodes scapularis* submissions, NB by month (1994 to Sept. 2009)
EQUINE GRANULOCYTIC ANAPLASMOSIS: TYPICAL CLINICAL SIGNS

• Initial
  – Fever (38.5-41.5°C)
  – Mild Depression

• Later
  – Fever, fluctuating (38.5-41.5°C)
  – Anorexia
  – Ataxia
  – Lethargy
  – Reluctance to move
  – Anemia
  – Icterus
  – Swollen stiff legs (limb edema)
  – Cardiac arrhythmias (ventricular tachycardia, premature ventricular contractions)
  – Petechiae

Hematology:
Leukopenia
Anemia
Thrombocytopenia
EQUINE GRANULOCYTIC ANAPLASMOSIS: DIFFERENTIAL DIAGNOSES

- Lyme Disease (Borreliosis)
- Encephalitis
- Hepatic disease
- Purpura hemorrhagica
- Equine Infectious Anemia (EIA)
- Equine Viral Arteritis
SYMPTOMS OF HUMAN GRANULOCYTIC ANAPLASMOSIS

• Symptoms appear 1 to 3 weeks after the bite of an infected tick and may include:
  – High fever
  – Muscle aches
  – Weakness
  – Headache
  – Maybe also
    • Confusion
    • Nausea
    • Vomiting
    • Joint Pain

• Illness may be mild to moderately severe
• Rash is not common (unlike Lyme disease)
• Not every exposure results in infection

Thrombocytopenia
Leukopenia
Elevated liver transaminases

No reported human cases yet in New Brunswick
ONE HEALTH: DEFINITION AND VISION

• the collaborative effort of multiple disciplines
• working locally, nationally, and globally
• to attain optimal health for people, animals and the environment
• “a movement to forge co-equal, all inclusive collaborations between (among) physicians, osteopaths, veterinarians, dentists, nurses and other scientific-health and environmentally related disciplines”
• http://www.onehealthinitiative.com/
• Veterinary laboratories play crucial role in detection of emerging zoonotic diseases
# ONE HEALTH

**NB GOVERNMENT-FUNDED LABORATORY RESOURCES**

<table>
<thead>
<tr>
<th>Resource</th>
<th>Human</th>
<th>Animal</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Funding</td>
<td>$82.7 million</td>
<td>$954 thousand</td>
<td>$1.7 million</td>
</tr>
<tr>
<td># of Laboratory Technologists</td>
<td>660*</td>
<td>4*</td>
<td>1* (+19)</td>
</tr>
<tr>
<td># of Laboratory Assistants</td>
<td>~300</td>
<td>0.25</td>
<td>1</td>
</tr>
<tr>
<td># of Laboratories</td>
<td>23 (-2?)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td># of Pathologists</td>
<td>41</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

*registered licensed medical laboratory technologists
PHILOSOPHICAL MUSINGS

• How can we more fully integrate and utilize all of our One Health resources? In New Brunswick? In Canada? In North America? Globally?
• Does New Brunswick need a One Health super laboratory encompassing human, animal and environmental health?
• How can we collectively gain access to resources of agencies that have better/more resources (RCMP, CFIA) but whose mandates are very restricted?
• What can New Brunswick do to better contribute to One Health prevention at the national and global level?
• What can Canada do to better contribute to One Health prevention at the global level?
ACKNOWLEDGMENTS

• Dr. Mike Rennick
• Justin Carr
• Dr. Gale Hines
• Dr. L. Robbin Lindsay