Animal and Human Bites

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Why animal bites discussion?

Wound management

Who gives you what?

Antibiotic management

Vaccines – Rabies
Epidemiology

- 1% of ER visits
- 97% are from dogs
- 2% are from cats
- 65,000 deaths across globe
Bites

- Age <20 and males more frequent victims for all bites
- Females and elderly - cat bites.
# Human Deaths in Asia

<table>
<thead>
<tr>
<th>Country</th>
<th>Deaths</th>
<th>Rate/million</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>20,000</td>
<td>20.0</td>
</tr>
<tr>
<td>Pakistan</td>
<td>2,490</td>
<td>17.0</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>1,550</td>
<td>12.0</td>
</tr>
<tr>
<td>Myanmar</td>
<td>196</td>
<td>4.1</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>76</td>
<td>4.0</td>
</tr>
<tr>
<td>Phillippines</td>
<td>248</td>
<td>3.3</td>
</tr>
<tr>
<td>China</td>
<td>3000</td>
<td>2.4</td>
</tr>
<tr>
<td>Nepal</td>
<td>44</td>
<td>2.2</td>
</tr>
<tr>
<td>Lao People’s Democratic Republic</td>
<td>2</td>
<td>1.3</td>
</tr>
<tr>
<td>Vietnam</td>
<td>86</td>
<td>1.1</td>
</tr>
<tr>
<td>Cambodia</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>Mongolia</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>Indonesia</td>
<td>40</td>
<td>0.2</td>
</tr>
<tr>
<td>Thailand</td>
<td>11</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Total: 28,006</strong></td>
<td><strong>Average: 5.3</strong></td>
</tr>
</tbody>
</table>

*Human rabies deaths in Asia: 2005*
Globally, 2 persons die every hour due to rabies.

40% of people who are bitten by suspect rabid animals are children under the age of 15 years.

It is estimated that in the absence of post-exposure prophylaxis, about 3,27,000 persons would die from rabies in Asia and Africa each year.

Roughly 36% of the world’s rabies deaths occur in India each year. Most animal bites in India (91.5%) are by dogs, of which about 60% are strays and 40% pets.

The annual number of person-days lost because of animal bites is 380 lakh, and the cost of post-bite treatment is about INR 140 crore in India.
## ANIMALS TRANSMITTING RABIES IN INDIA

<table>
<thead>
<tr>
<th>Domestic</th>
<th>Peridomestic</th>
<th>Wild</th>
<th>Not reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dogs &amp; Cats</td>
<td>Cows &amp; Buffaloes</td>
<td>Foxes &amp; Jackals</td>
<td>Bats *</td>
</tr>
<tr>
<td></td>
<td>Sheep &amp; Goats</td>
<td>Monkeys</td>
<td>Rodents *</td>
</tr>
<tr>
<td></td>
<td>Pigs</td>
<td>Mongoose</td>
<td>Birds</td>
</tr>
<tr>
<td></td>
<td>Donkeys</td>
<td>Bears</td>
<td>Squirrel</td>
</tr>
<tr>
<td></td>
<td>Horses</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Camels</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

All exposures in wild are considered as category III exposures.

* Bite by Bats or Rodents do not ordinarily necessitate rabies vaccination. However, bites by Bats or rodents in unusual circumstances may be considered for vaccination in consultation with an expert in the field of rabies.
Cause of death in rabies?

Insufficient knowledge about rabies dangers and prevention

particularly prompt PEP

wound management

Case -1

• 30 yr/F

• H/o of dog bite while she was getting back her home from office.

• She is not able to recognize the dog, it has bitten her at multiple sites around her left leg near ankle, on examination multiple abrasions were present.

• She presented to your clinic 2 hours after bite.
What would you do now?

1. TT
2. Rabies vaccine + TT
3. TT, Vaccine & antibiotics
4. No need to clean wound is > 2hrs
5. Suture immediately
6. TT, rabies Vaccine, antibiotics and RIG
Case Study 1..

- She came back showing her pregnancy report showing positive. She started itching following second dose injection.
- She came on day 7 telling that bitten dog was died yesterday after biting two more persons.
- What will you do now?
Pregnancy and Rabies

Specific testing of reproductive outcomes has not been performed, but pregnancy is not a contraindication to postexposure prophylaxis against rabies.

Vaccination has not been associated with adverse outcomes.

Prophylaxis is appropriate after exposure to protect the life of the mother and the fetus.

Exposure, or the diagnosis of rabies in the mother, is not an indication for termination of the pregnancy.

Prophylaxis should not be discontinued after the development of local or mild systemic signs.
General principles on animal bite management

**HELICOPTER: An Acronym for Management of Animal Bite Wounds**

<table>
<thead>
<tr>
<th>H</th>
<th>History</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Examination</td>
</tr>
<tr>
<td>L</td>
<td>Liberal cleansing and</td>
</tr>
<tr>
<td>I</td>
<td>Irrigation</td>
</tr>
<tr>
<td>C</td>
<td>Closure, culture consideration</td>
</tr>
<tr>
<td>O</td>
<td>Operative cleansing and closure</td>
</tr>
<tr>
<td>P</td>
<td>Prophylactic or therapeutic antimicrobial agent use</td>
</tr>
<tr>
<td>T</td>
<td>Tetanus immunization status</td>
</tr>
<tr>
<td>E</td>
<td>Elevation</td>
</tr>
<tr>
<td>R</td>
<td>Rabies risk</td>
</tr>
</tbody>
</table>

W- wound A- antibiotic prophylaxis R- rabies PEP T- Tetanus PEP
History taking

- Circumstances of the injury (provoked or unprovoked)
- Animal involved
- Current location of the animal/ ownership/ vaccination status
- Patient’s underlying medical conditions
## WHO Classification of Bite

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat 1</td>
<td>licking, touching, on intact skin</td>
<td>None</td>
</tr>
<tr>
<td>Cat 2</td>
<td>saliva on scratches or abrasions on the skin without bleeding; or nibbling of uncovered skin</td>
<td>Clean wound</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Immediate rabies vaccination</td>
</tr>
<tr>
<td>Cat 3</td>
<td>Bites or scratches that penetrate the skin. Exposure (coming in contact) of the eye or mouth to saliva from licks.</td>
<td>Clean wound</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Immediate rabies vaccination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Immediate rabies immunoglobulin</td>
</tr>
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</table>
### Do’s

<table>
<thead>
<tr>
<th>Physical</th>
<th>Wash with running water</th>
<th>Mechanical removal of virus from the wound(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical</td>
<td>Wash the wound(s) with soap and water</td>
<td>Inactivation of the virus</td>
</tr>
<tr>
<td></td>
<td>Apply disinfectant</td>
<td></td>
</tr>
</tbody>
</table>

### Biological

| Infiltrate immunoglobulin into the depth and around the wound(s) in Category III exposures | Neutralization of the virus |

### Don’ts
- Touch the wound(s) with bare hand
- Apply irritants like soil, chilies, oil, lime, herbs, chalk, betel leaves, etc.

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**National Guidelines on Rabies Prophylaxis**
Number of post exposure doses of vaccine

- Revised CDC recommendation is 4 doses of vaccine on 0, 3, 7, and 14
- 0, 3, 7, 14, and 28 in Immunocompromised

Question to the panelists

- What are the vaccines which are approved/reccomended.
- What is available in india?
Would you do skin closure?
Suturing of wound should be avoided as far as possible. If surgically unavoidable, minimum loose sutures should be applied after adequate local treatment along with proper infiltration of rabies immunoglobulins.
When & What antibiotic will you start now?
Antibiotic prophylaxis

Prophylactic antibiotics reduce the rate of infection due to some animal bites, especially cat/human bites.

Although routine antibiotic prophylaxis is not recommended, prophylaxis is warranted in certain high-risk wounds.

- Deep puncture wounds (especially due to cat bites)
- Moderate to severe wounds with associated crush injury
- Wounds in areas of underlying venous and/or lymphatic compromise
- Wounds on the hand(s), genitalia, face, or in close proximity to a bone or joint (particularly the hand and prosthetic joints)
- Wounds requiring closure
- Bite wounds in compromised hosts (eg, immunocompromised, absent spleen or splenic dysfunction, and adults with diabetes mellitus)
Bacteria commonly isolated from Dog/Cat bite

Aerobes:

- Streptococci species
- Staph aureus and other species
- Pasteurella multocida
- Moraxella species
- Corynebacterium species
- Neisseria species

Anaerobes:

- Actinomyces
- Bacteroides
- Fusobacterium
- Peptostreptococcus
- Prevotella
- Capnocytophaga species
- Eikenella corrodens
<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Staphylococcus aureus</th>
<th>Eikenella corroden</th>
<th>Anaerobes</th>
<th>Pasteurella multocida</th>
<th>Capnocytophaga canimorsus</th>
<th>Staphylococcus intermedius</th>
</tr>
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<tbody>
<tr>
<td>Penicillin</td>
<td>10</td>
<td>99</td>
<td>50/95</td>
<td>95</td>
<td>95</td>
<td>30</td>
</tr>
<tr>
<td>Dicloxacillin</td>
<td>99</td>
<td>5</td>
<td>50&lt;sup&gt;%&lt;/sup&gt;</td>
<td>30</td>
<td>NS</td>
<td>70</td>
</tr>
<tr>
<td>Amoxicillin/clavulanic acid</td>
<td>100</td>
<td>100</td>
<td>100&lt;sup&gt;%&lt;/sup&gt;</td>
<td>100</td>
<td>95</td>
<td>70</td>
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<td>40&lt;sup&gt;%&lt;/sup&gt;</td>
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<td>NS</td>
<td>95</td>
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<tr>
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<td>70</td>
<td>40&lt;sup&gt;%&lt;/sup&gt;</td>
<td>90</td>
<td>NS</td>
<td>NS</td>
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<td>95</td>
<td>100&lt;sup&gt;%&lt;/sup&gt;</td>
<td>95</td>
<td>95</td>
<td>NS</td>
</tr>
<tr>
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<td>20</td>
<td>40&lt;sup&gt;%&lt;/sup&gt;</td>
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<tr>
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<td>60&lt;sup&gt;%&lt;/sup&gt;</td>
<td>90</td>
<td>95</td>
<td>NS</td>
</tr>
<tr>
<td>TMP-SMX</td>
<td>100</td>
<td>95</td>
<td>0&lt;sup&gt;%&lt;/sup&gt;</td>
<td>95</td>
<td>V</td>
<td>NS</td>
</tr>
<tr>
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<td>40&lt;sup&gt;%&lt;/sup&gt;</td>
<td>95</td>
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<td>100</td>
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<tr>
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<td>60&lt;sup&gt;%&lt;/sup&gt;</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<tr>
<td>Moxifloxacin</td>
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<td>85&lt;sup&gt;%&lt;/sup&gt;</td>
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</tr>
<tr>
<td>Azithromycin</td>
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<td>80</td>
<td>70&lt;sup&gt;%&lt;/sup&gt;</td>
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<td>NS</td>
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<tr>
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<td>70&lt;sup&gt;%&lt;/sup&gt;</td>
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<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Clindamycin</td>
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<td>0&lt;sup&gt;%&lt;/sup&gt;</td>
<td>0</td>
<td>95</td>
<td>95</td>
</tr>
</tbody>
</table>
Questions to panelists

• What antibiotics are appropriate in following categories
  • Penicillin allergy
  • Pregnancy
  • children
Case 2

- 50 year female, She was bitten by her pet dog, when she try to feed food.
- She has vaccinated her dog.

What would you do now?
1. No need for ARV
2. Observe the dog for 10 days
3. Check dog antibody titre
4. Give rabies immunoglobulin and vaccine
Provoked versus unprovoked bites: Whether a dog bite was provoked rather than unprovoked should not be considered a guarantee that the animal is not rabid as it can be difficult to understand what an attacking dog considers provocation for an attack.

Vaccination status of the biting animal: Although unvaccinated animals are more likely to transmit rabies, vaccinated animals can also do so if the vaccination of the biting animal was ineffective for any reason. A history of rabies vaccination in an animal is not always a guarantee that the biting animal is not rabid. Animal vaccine failures may occur because of improper administration or poor quality of the vaccine, poor health status of the animal, and the fact that one vaccine dose does not always provide long-lasting protection against infection in dogs.
25 year old gentleman comes with a h/o dog bite (street dog ) (grade 3) 2 days ago

Visits a hospital and received rabies vaccination (gluteal ) and tetanus toxoid

Comes to you with fear of developing rabies

On examination healed teeth mark over right calf
What would you do?

1) Finish rest of the rabies vaccination as per schedule

2) Give rabies immunoglobulin and finish rabies vaccination as per schedule

3) Give rabies immunoglobulin and restart rabies vaccination from 0 dose
Indications for Passive Immunization

• All category III exposures, irrespective of status of biting animal.
• All proven rabid animal bites/exposures.
• Do not administer 7 days after starting anti-rabies vaccination.
• Serum is a life saving drug, particularly in immune compromised individuals or in 3rd degree bites where nerve endings are involved.
Advantage of passive immunization

Fig 9. Rabies virus neutralizing antibody titres following administration of single doses of vaccine on days 0, 3, 7, 14, 28 (adapted from \( ^{14} \)).
Question to the panelists

• Difference between equine and human rabies Immunoglobulin.

• What to prefer?
Case 3

- 34 year old gentleman comes to you with h/o dog bite (unknown dog) one month back
- Grade 2 bite in leg
- Patient has received tetanus toxoid
• Do we need to vaccinate?

• Immunoglobulin?
<table>
<thead>
<tr>
<th>STAGE</th>
<th>DURATION (% OF CASES)</th>
<th>ASSOCIATED FINDINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incubation Period</td>
<td>➢ 30 d (25%)</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>➢ 30 d – 90 d (50%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>➢ 90 d – 1 yr (20%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>➢ &gt; 1 yr (5%)</td>
<td></td>
</tr>
</tbody>
</table>
Time period of vaccination

- Prophylaxis should be instituted whenever exposure is suspected, and it is warranted regardless of the interval between exposure and presentation.

- Delays in initiating prophylaxis are associated with treatment failure.

- Typical incubation periods are between one and three months; in rare cases, incubation periods are less than two weeks or exceed one year.

- The extent of delay that renders postexposure prophylaxis ineffective is not known.
Case 4

• A person had a stray dog bite 5 years back and had received the full vaccination schedule.

• He has a cat bite this time.
What would you do?
1. Reinitiate the whole vaccine series of 4 doses.
2. Give both RIG and Vaccine series.
3. Not give any vaccination.
4. Give only TT.
5. Will give only 0 and 3 days doses.
WHO 2005: Stamp of approval for potency

**Rabies post-exposure treatment of previously vaccinated persons**

- Local treatment of wound
- Vaccination schedule (with vaccines fulfilling WHO requirements)
  - one dose on days 0 and 3. The dose is either 1 standard intra muscular dose (which may be 1 ml or 0.5 ml depending on vaccine type) or one intradermal dose of 0.1 ml per site
  - no RIG should be applied

  - However full treatment should be given to persons:
    - who received pre-or post-exposure treatment with vaccines of unproven potency or
    - who have not demonstrated an acceptable rabies neutralizing antibody titer.
Case 5

- 45 year old male, known case of DCLD, walking on a road, after a rainy day.
- He was bitten by a rat.
- Minor bleeding.
- Now developed fever.
- What antibiotic would you prefer?
Rat bite fever

- Fever, rigors, and polyarthralgias.
- *Streptobacillus moniliformis*(USA)
- *Spirillum minus*(ASIA)
Untreated-10% mortality
Streptobacillus moniliformis+S Minus
Rat bite fever

• Diagnosis
  – Gram or Giemsa stain blood, joint fluid, pus.
  – Culture
  – Serology
  – PCR

• Treatment
  – Penicillin, ceftriaxone, clindamycin
  – Rabies PEP not indicated.
Question to the panelist

• In which animal bites we can safely avoid rabies vaccine?
Case study 6

- 10 year old girl, while playing with her pet cat, got a scratch in her left hand.
- Now presented with history of swelling in the axilla and fever of 5 days.
Bartonella henselae
Cat Scratch Disease (CSD)

- Affect both normal and immunocompromised hosts.
- 80% of cases occur in children.
- Linked to exposure to cats, especially kitten and cats with fleas. CSD can result from a cat scratch or bite, as well as from a fleabite.
- Characterized by self-limited regional lymphadenopathy near the site of organism inoculation.
- Occasionally life threatening manifestations (5-14%) include visceral organ, neurologic, and ocular involvement because of the dissemination of organism. In AIDS patients: Bacillary angiomatosis
- Diagnosis: a positive *B. henselae* antibody titer or a positive Warthin Starry stain or PCR analysis of tissue. Very difficult to isolate from tissue specimens.
Bartonella henselae
Cat Scratch Disease (CSD)

Treatment

• **Antibiotics are not indicated in most cases** but they may be considered for severe or systemic disease.

• Reduction of lymph node size (no REDUCTION in the duration of symptoms) has been demonstrated with a 5-day course of azithromycin and may be considered in patients with severe, painful lymphadenopathy.

• **Immunocompromised patients should be treated with antibiotics:**
  - Trimethoprim-sulfamethoxazole, Gentamicin, Ciprofloxacin, Rifampin

• **B. henselae is generally resistant to penicillin & amoxicillin**
Case 7

- A immunocompromised patient is bitten by a dog not rabid comes to ER with high grade fever and blood cultures are growing GNB.
- Most likely organism would be............
• *Capnocytophaga canimorsus* with sepsis.

• Some of these are betalactamases producers and BL+BLI combination preferred. (Amoxy-clav)
Cat Bites
CASE 8

A 44 years female is evaluated in the Emergency room after sustaining a cat bite 2 days ago that has resulted in a tender, red and warm right calf wound.

Radiographs of the distal right lower extremity show no gas or foreign body.

The most likely organism to infect is.................
Gram-negative, non-spore-forming bacilli consistent with *Pasteurella multocida*
**Pasteurella multocida**

Small aerobic GN baccili

**Cause serious infections in immunocompromised host**
- Necrotising fasciitis
- Septic arthritis
- Osteomyelitis

- Amoxycillin sensitive.
Case 9

• Couple returning after a movie-drunk driver picks up a fight
• Man gets bitten on the neck and elbow
What will you do now?

1. Wash the wounds and take TT
2. Above plus Rabies vaccine
3. Wash, TT, rabies vaccine & antibiotics
4. Option 3 + HBV vaccine
5. Option 4 + HIV PEP
HIV, HBV infection following human bite

- Any unvaccinated patient or individual negative for anti-HBs antibodies who is bitten by an individual positive for HBsAg should receive both hepatitis B immune globulin (HBIG) and hepatitis B vaccine.

- If the source is unknown or not available for testing, the clinician should initiate the hepatitis B vaccine series.

- In addition, although the risk for transmitting HIV through saliva is extremely low, infection is of concern if there is blood in the saliva. Counseling regarding post-exposure HIV prophylaxis is appropriate in this setting.

JAIDS 1993
Eikenella corrodens

• Anaerobic small GN bacilli
• Common in human oral flora
• Resist to:
  – Cephalexin, Clinda, Erythro, Metronidazole.
• Suscept to:
  – Amoxyclov, FQs, TMP/SMX, Doxy.
Case no 10

• 22 yr male acute fever, lymphadenopathy, malaise, and dry, non-productive cough 7 days after bitten by a rabbit

• CXR showed RLL pneumonia, with some findings on LLL

• What is your diagnosis?
Tularemia

• *F. tularensis* can survive in water, soil, and decaying animal carcasses for a long time.

• Tularemia: 6 Presentations

  Typhoidal

  Pneumonic

  Oculoglandular

  Oropharyngeal

  Ulceroglandular

  Glandular
Tularemia / F.Tularensis

• Treatment:
  – Streptomycin 30 mg/kg qd IM for 10-14 days, or gentamicin 3-5 mg/kg qd IV for 10-14 days.
Case 11

- A fisherwoman comes with a swollen thumb had accidental injury while handling the fish.
- What is the most likely organism?
Antibiotics

- Pen V
- Amoxicillin
- Cipro/levo
- Clinda
- Resistant to Vanco and TMP-SMX
Summary

- Wash the wound thoroughly with soap and water for 10-15 minutes.
- Do not bandage.
- Do not suture.
- Tetanus vaccination
- Rabies vaccination only for 2\textsuperscript{nd} degree and RIG and vaccination for 3\textsuperscript{rd} degree wounds.
- Amoxy-clav. for 3\textsuperscript{rd} degree wounds.
- Wound care is most important
- If unavoidable, you can suture
- No time period for vaccination
<table>
<thead>
<tr>
<th>Animal</th>
<th>Wound</th>
<th>Antibiotics</th>
<th>Rabies</th>
<th>TT</th>
<th>Others</th>
</tr>
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<tbody>
<tr>
<td>Dog</td>
<td>Yes</td>
<td>+/-</td>
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<td>Yes</td>
<td>Capnocytophagia</td>
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<td>Cat</td>
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<td>+/-</td>
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<td>Yes</td>
<td>Pasturella/Bartonella</td>
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<tr>
<td>Rat</td>
<td>Yes</td>
<td>+/-</td>
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<td>Yes</td>
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<tr>
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