

# Animal Bites and Zoonosis

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# Disclosures

- Views are my own opinion, and not those of the U.S. Army or the 82<sup>nd</sup> Civil Affairs BN
- I have no financial relationships with any of the products / companies discussed

# Acknowledgements

- COL James Cummings
- LTC Pat Hickey

# Outline

- Rabies
- Dogs
- Cats
- Other pets
- Exotics
- Most dangerous animal in the jungle
- Review

A few cases along the way...

# BLUF

- When presented with a bite injury:
  - Wash well with soap and water
  - Evaluate rabies risk
  - Evaluate risk of other infections
- Animals can cause many diseases. Include animal exposures in the history of present illness.

# Definitions

- Bite Infections

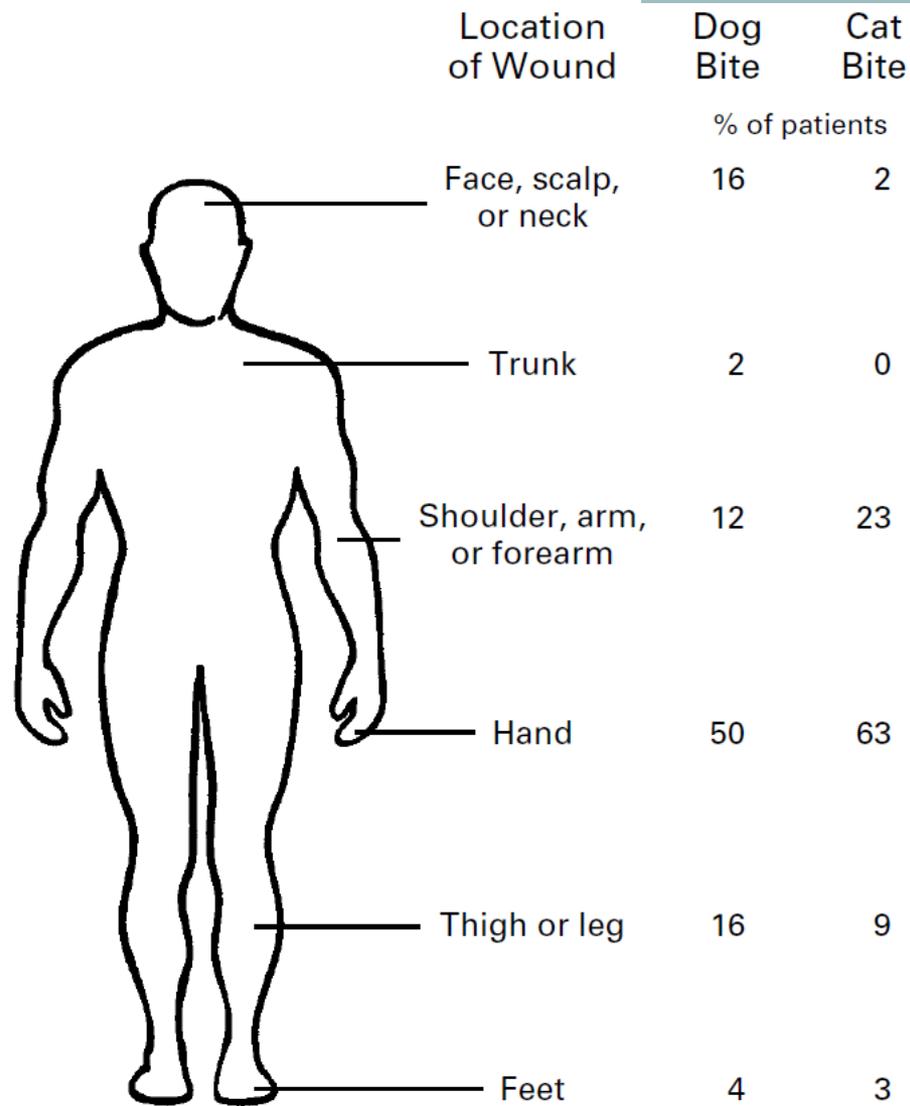
- Mix of anaerobes and aerobes from patient's skin and animals oral cavity

- Zoonosis

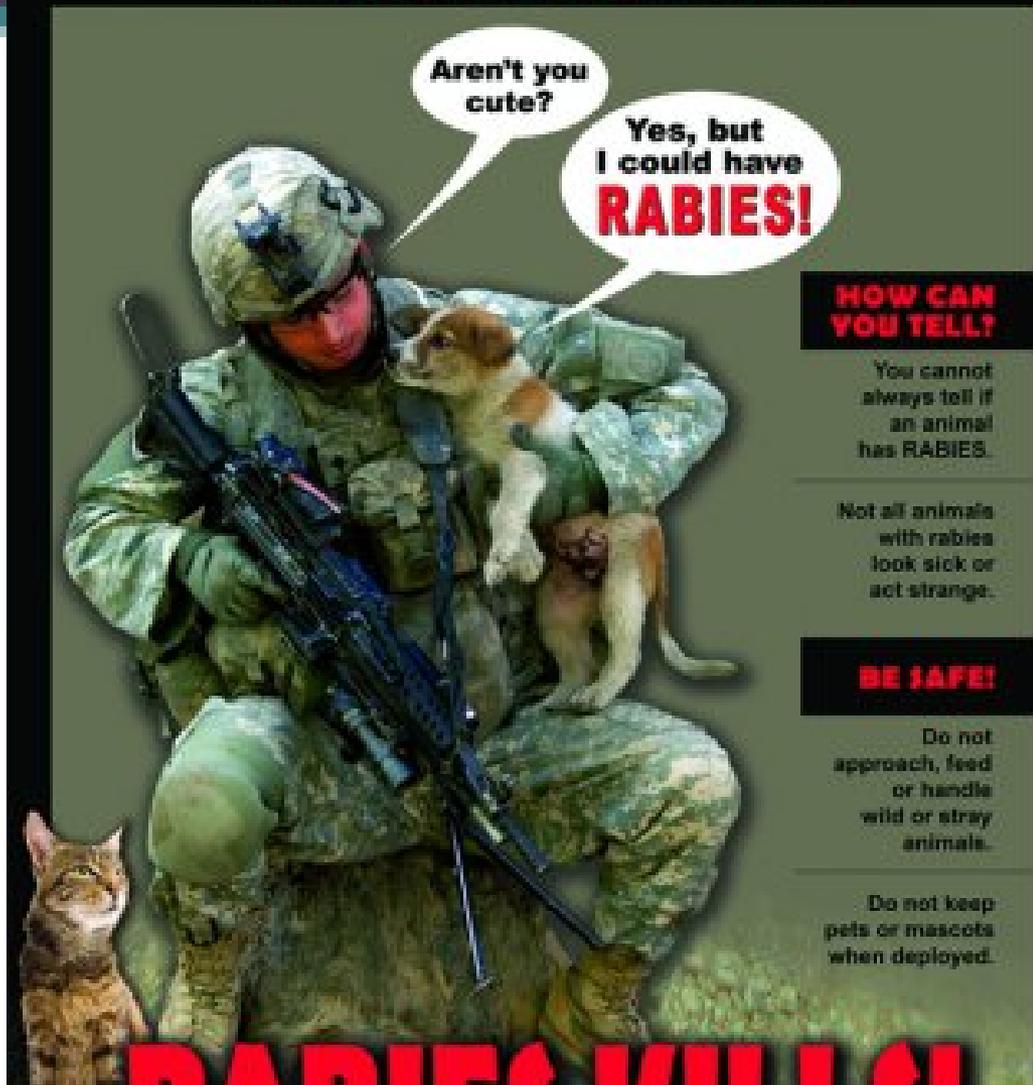
- Animal disease that is transmissible to humans (humans are usually an accidental host)
- Spread by aerosols, feces, urine, insects, and direct skin contact

# Bites

- 1% of all ER visits
  - 2% of those need hospitalization
  - Costs \$53.9 million annually
  - 10-20 bite-related deaths annually
- 80% related to dogs, 5-10% cats
- Dog bites account for \$1 Billion/year in USA
- Age and gender
  - Age <20 and males more frequent victims for all bites
  - Females and elderly more common in cat bites
- Exotic animals



**Figure 1.** Location of Wound Infections in 50 Patients Bitten by Dogs and 57 Patients Bitten by Cats.



**HOW CAN YOU TELL?**

You cannot always tell if an animal has RABIES.

Not all animals with rabies look sick or act strange.

**BE SAFE!**

Do not approach, feed or handle wild or stray animals.

Do not keep pets or mascots when deployed.

# RABIES KILLS!

If you are **BITTEN** or if an **ANIMAL'S SALIVA** contacts your broken skin, eyes or mouth, immediately wash the area with soap and water and seek medical attention.

 Scan this QR code for more information on rabies.  
<http://go.usa.gov/1999>

# Rabies

- Acute, progressive encephalomyelitis
- Highest case fatality rate of any infectious disease
- WHO estimates >55,000 deaths/yr
- 1.74 million DALYs lost
- Approx. 15 million cases get PEP annually
  - 23,000 in U.S.
  - Prevents ~327,000 cases
- Single course of prophylaxis costs 4-6% of annual income in developing world

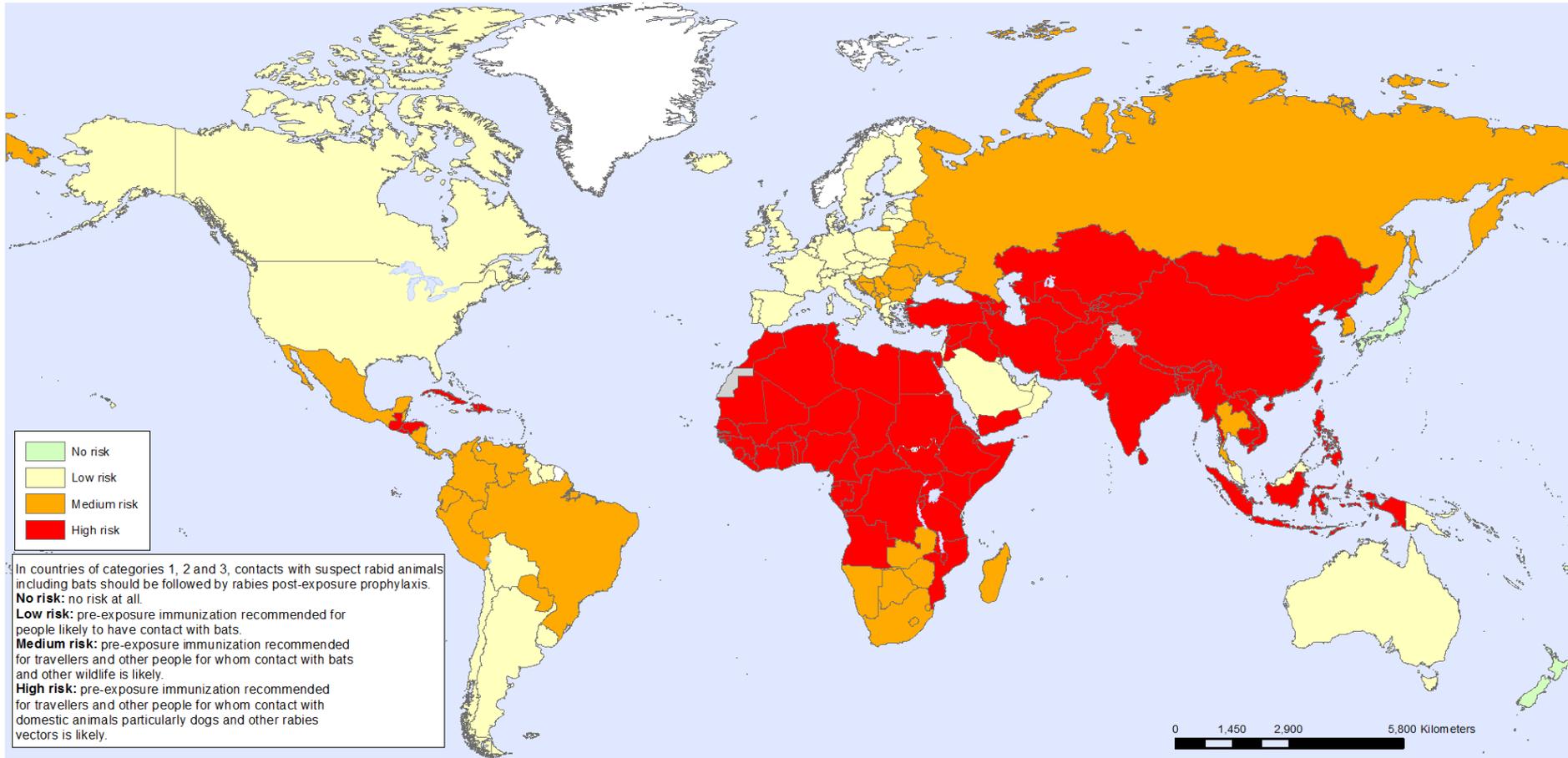
# Rabies Pathogenesis

- Neurotropic virus, enters peripheral nerves through inoculation injury
- Travels centripetally to CNS by retrograde flow in axoplasm of nerves
  - Approx. 50-100 mm per day
- Virus replicates in CNS
- Flows centrifugally to innervated organs, including salivary glands, where virus reproduces

# Rabies Epidemiology

- Human epidemiology reflects animal epidemiology
  - If dogs not vaccinated, typical source is dogs
  - If dogs vaccinated, typical source is wildlife
  - Any mammal can be rabid
- Worldwide, dogs are the most common source
- U.S., most cases due to bats (bite typically unrecognized)
- Most cases are via bite from rabid animal
  - Bat bites are often inapparent
  - Less commonly via lick into mucous membrane or open wound
  - Rarely via aerosolization or transplantation

## Rabies, countries or areas at risk



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: WHO Control of Neglected Tropical Diseases (NTD)  
 Map Production: Health Statistics and Information Systems (HSI)  
 World Health Organization



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## Postexposure Prophylaxis for Non-immunized Individuals

Treatment	Regimen
<b>Wound cleansing</b>	All postexposure prophylaxis should begin with immediate thorough cleansing of all wounds with soap and water. If available, a virucidal agent such as povidine-iodine solution should be used to irrigate the wounds.
<b>RIG</b>	If possible, the <b>full dose</b> should be infiltrated around any wound(s) and any remaining volume should be administered IM at an anatomical site distant from vaccine administration. Also, RIG should not be administered in the same syringe as vaccine. Because RIG might partially suppress active production of antibody, no more than the recommended dose should be given.
<b>Vaccine</b>	HDCV or PCECV 1.0 mL, IM (deltoid area ), one each on days 0 , 3, 7, and 14.

## Postexposure Prophylaxis for Previously Immunized Individuals

Treatment	Regimen
<b>Wound cleansing</b>	All postexposure prophylaxis should begin with immediate thorough cleansing of all wounds with soap and water. If available, a virucidal agent such as povidine-iodine solution should be used to irrigate the wounds.
<b>RIG</b>	RIG should <b>not</b> be administered.
<b>Vaccine</b>	HDCV or PCECV 1.0 mL, IM (deltoid area), one each on days 0 and 3.

# Dogs



# Dogs

- Risk of Bite injury
- Type of dog
  - Larger dogs capable of inflicting most damage, and thus are most frequently reported
  - Working dogs and aggressive breeds at higher risk
- Age of victim
  - Young boys (age 5 - 9)
- Area of bite
  - Children: face, head and neck
  - Adults: hand, face, scalp, neck, thigh, leg
- Type of bite
  - Severe crushing injury can cause depressed skull frx, severe scalp and intracranial bleed, facial disfigurement, damage to the great vessels and nerves



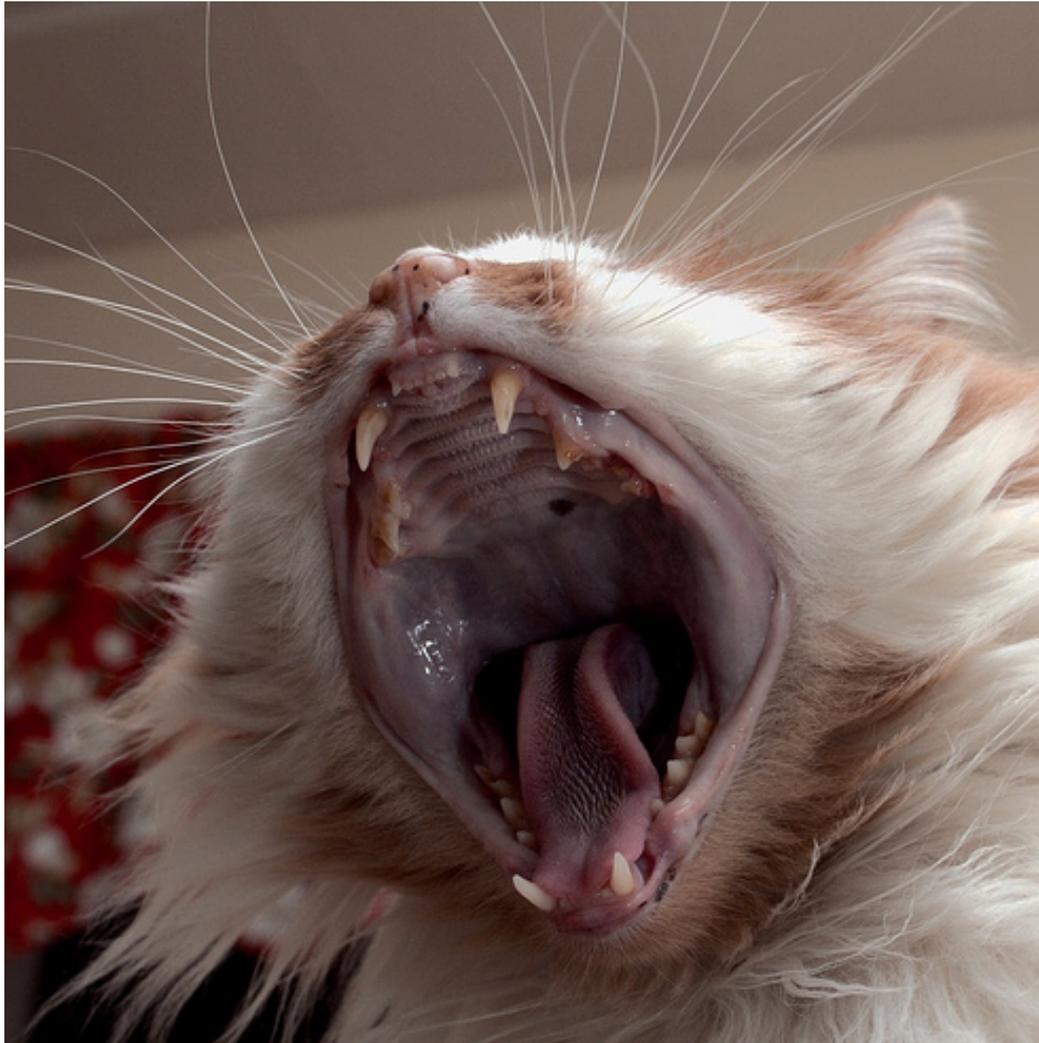
# Dog Bites - organisms

- Aerobic
  - *Pasteurella spp*
  - *Streptococcus spp*
  - *Staphylococcus spp*
  - *Neisseria*
- Anaerobic
  - *Fusobacterium*
  - *Bacteriodes*
  - *Porphyromonas*
  - *Prevotella*
  - *Capnocytophaga canimorsus*

# Dog Bites

- Only 2 - 10% get infected
- *Pasteurella spp*
  - Resistant to: cephalexin, clinda, diclox, emycin
  - Susceptible to: PCNs, FQs, Doxy, TMP/SMX
- *Capnocytophagia spp*
  - Resist to: TMP/SMX, ?Vanco
  - Susceptible to: Amox/Clav, PCN G, Clinda
- Prophylaxis?
  - Yes for bites to the hand and high-risk wounds
  - Consider for average-risk wounds
  - Amox/Clav bid for 3-7 days is first line

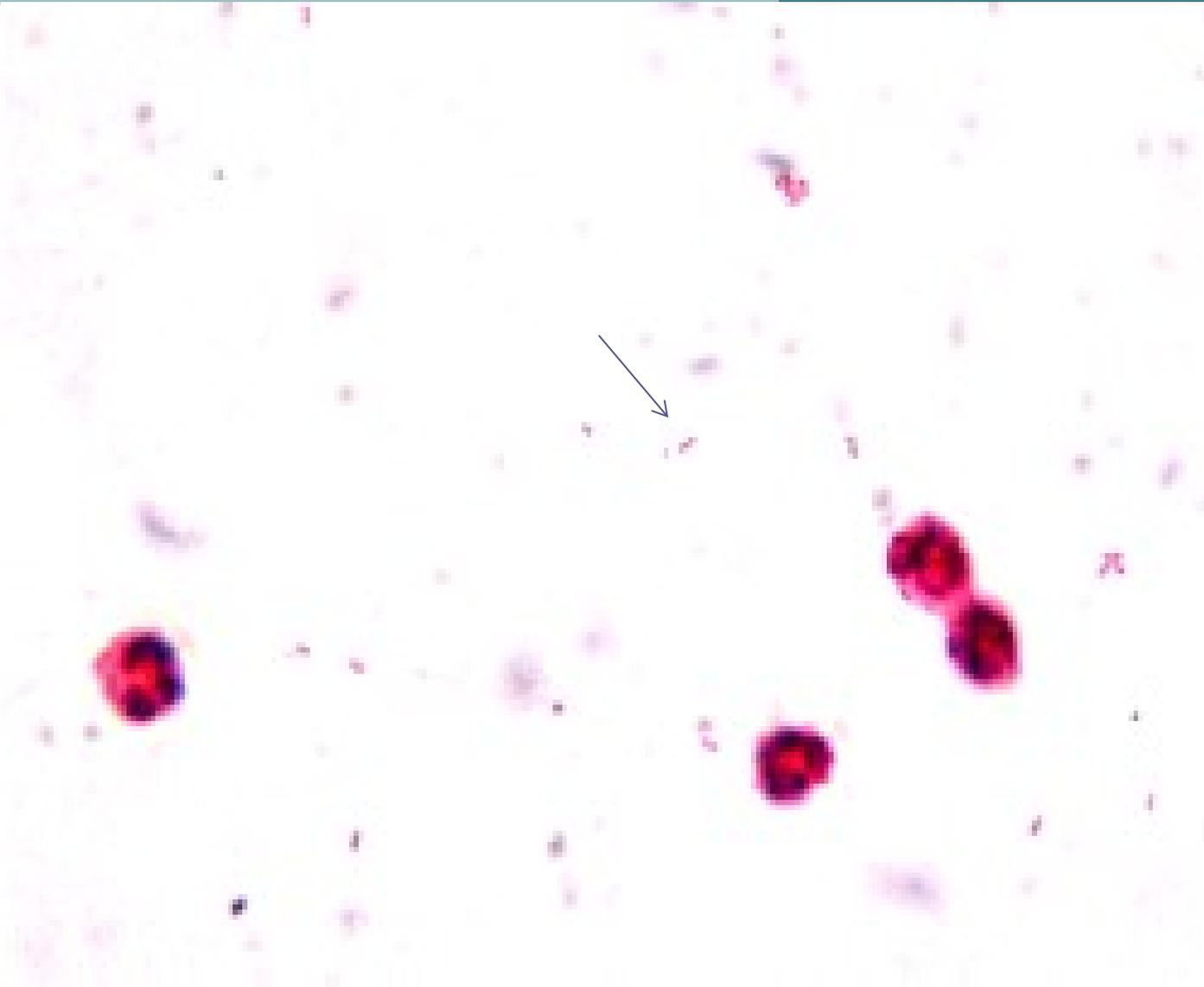
# Cat Bites



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# Cat Bites - organisms

- Aerobic
  - *Pasteurella spp,*
  - *Streptococcus spp*
  - *Staphylococcus spp*
  - *Bartonella henselae*
  - *Neisseria*
- Anaerobic
  - *Fusobacterium*
  - *Bacteriodes*
  - *Porphyromonas*
  - *Prevotella*



Gram-negative, non-spore-forming bacilli consistent with *Pasteurella multocida*

# *Pasteurella multocida*

- In saliva of >90% of cats, over 80% of wounds get infected
- Different species, *Pastuerella canis*, in saliva of 50% dogs, only 2 - 8% get infected
- Small aerobic GN bacilli
- Amoxicillin sensitive
- Cat bites should always receive prophylaxis  
Amox/Clav

# *Pasteurella multocida*

- Cause serious infections
  - Necrotising fasciitis
  - Septic arthritis
  - Osteomyelitis
  - Less commonly, sepsis, septic shock, and meningitis.
- Severe infection (ie, sepsis and septic shock) can be seen in:
  - Infants
  - Pregnant women
  - Patients on chronic steroids,
  - HIV-positive individuals
  - Organ-transplant recipients
  - Other immunocompromised patients

# *Pasteurella multocida*

- Bacteremia
  - Occurs in 25–50% of patients with pneumonia, meningitis, and septic arthritis due to *P. multocida*.
  - Many patients with bacteremia have evidence of notable liver disease.
  - Rare cases of bacteremia have also in previously healthy individuals. In such cases, **mortality remains substantial at 25%**.

# Cats



Septic arthritis of left first proximal interphalangeal joint

# Girl vs Cat

- 15 yo female with wound from cat on forearm
- Seen in ED, wound cleaned, treated with amox/clav orally
- Wound slowly became worse, somewhat ulcerative. Patient now back in ED for further evaluation.
- Upon further questioning, she had a hx of recurrent infections





**MRSA infection of the left forearm of a 15-year-old**

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Cat had developed recurrent MRSA culture-positive skin lesions of the perineal area

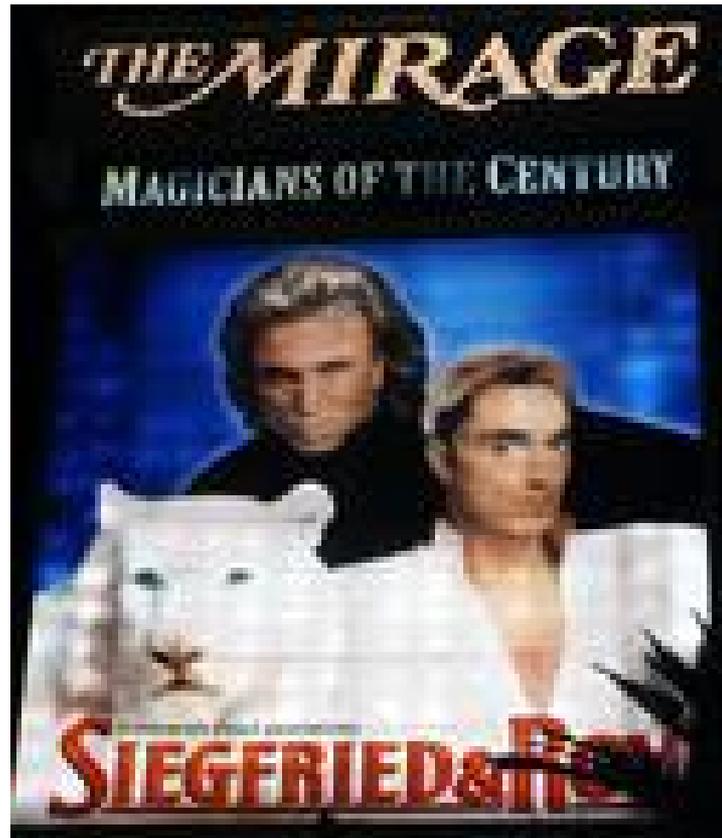
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**TABLE 2. TYPES OF MICROORGANISMS ISOLATED FROM 50 DOG BITES AND 57 CAT BITES, ACCORDING TO THE TYPE OF INFECTION.\***

TYPE OF MICROORGANISMS	ABSCESS		PURULENT WOUND		NONPURULENT WOUND	
	DOG BITE (N=6)	CAT BITE (N=11)	DOG BITE (N=29)	CAT BITE (N=22)	DOG BITE (N=15)	CAT BITE (N=24)
	number of bites (percent)					
Aerobes only	1 (17)	3 (27)	10 (34)	7 (32)	10 (67)	8 (33)
Anaerobes only	1 (17)	0	0	0	0	0
Aerobes and anaerobes	4 (67)	8 (73)	18 (62)	14 (64)	2 (13)	14 (58)
No growth on culture	0	0	1 (3)	1 (5)	3 (20)	2 (8)

\*Because of rounding, not all percentages total 100.

# Roy Horn of Siegfried and Roy attacked by tiger

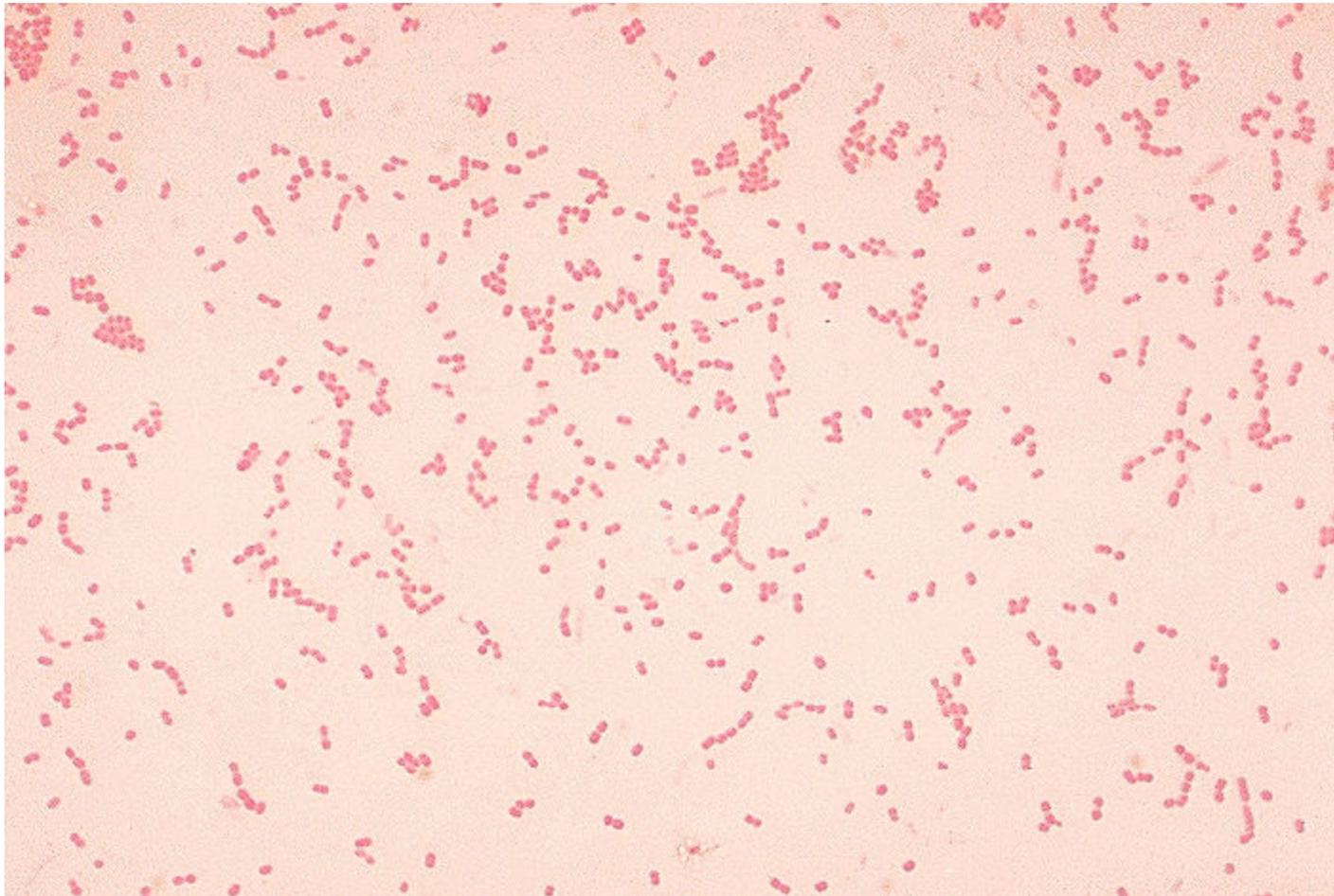


# Don't try this at home...or abroad



# Tiger Bite

- September 18, 2003, a group of U.S. Army Reserve soldiers and Iraqi police were patrolling in the zoo after it had closed.
- A soldier had his right arm severely mauled by a male Bengal tiger; he had reportedly attempted to feed the tiger a chicken kabob
- Bystanders, seeing the attack, shot and killed the animal
- Bleeding was stopped, wound debrided, placed on broad spectrum ABX and patient MEDEVACed to WRAMC for further debridement and therapy.



fastidious gram negative bacillus

# *Acinetobacter baumannii*

- Environmentally present
- Occurs in many of the wounded coming in from theater
- Treated with further wound revision, broad spectrum ABX to include Amp/Sulbact and Colistin, wound eventually healed.
- Sustained a substantial amputation of arm in sequential surgical revisions.

# Horses



# Fecal Transmission

- Unlikely, but considered in those with close equine contacts
  - *Salmonella*
    - Usually mild, self limited disease
    - Severe cases (septicemia, meningitis) in immunocompromised
  - *Campylobacter*
    - Incubation 1 - 7 days
    - Abd pain and bloody diarrhea
  - *Cryptosporidium*
    - Rarely from healthy horses
    - Intracellular protozoan parasite
    - *C. parvum* and *C. hominis* are the likely human pathogens
  - *Giardia lamblia*
    - directly or thru contaminated water

# Aerosol Transmission

- *Rhoddococcus equi*
  - GP pleomorph: coccoid on solid, rods/filaments in liquid
  - Found in the soil contaminated with herbivore manure
  - Horses have lung disease, UC and mesenteric adenitis
  - Humans - pulmonary infection most common occurs in immunocompromised
- *Brucella suis* and *abortus*
  - Unlikely, but occurs with exposure to blood and body fluids
- *Coxiella burnetti*
  - Q fever
  - Generally flulike illness, pneumonia, hepatitis
  - Chronic infxn results in endocarditis

# Mosquito-Borne Diseases

- Eastern Equine Encephalitis: low/undetect viremia
- Western Equine Encephalitis: low/undetect viremia
- West Nile: low/undetect viremia
- Venezuelan Equine Encephalitis: horse is primary amplification host
  - Prevent by immunizing horses
  - Found in FL to South America
  - Incubate 1-6 days in man
  - 0.5% adults on 4% children develop encephalitis

# Rabbits

- Video Available at <https://www.youtube.com/watch?v=Nvs5pqf-DMA>

# Rabbits

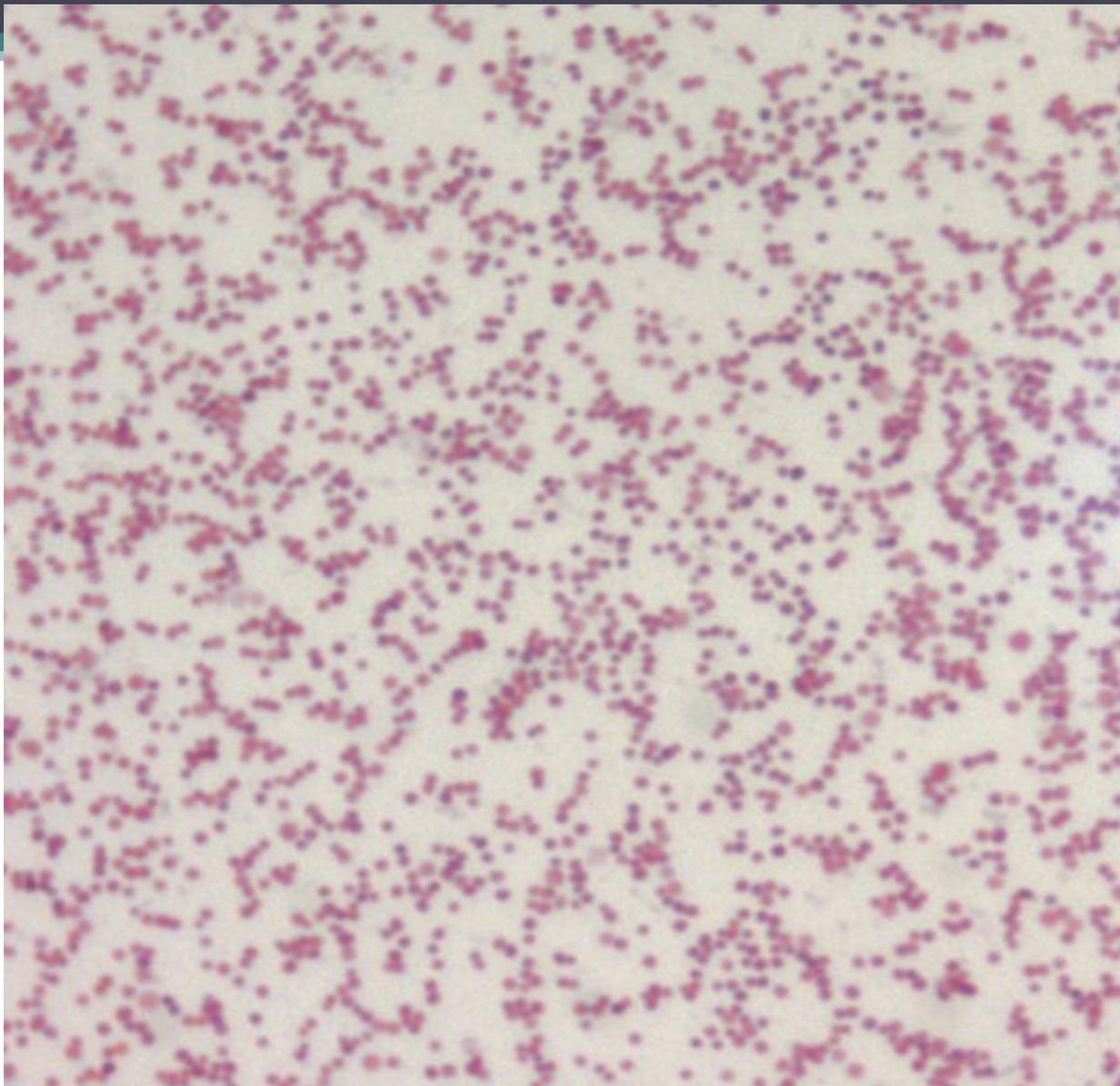
- GI
  - *Salmonella*, *Yersinia pseudotuberculosis*, *Crypto*
- Respiratory
  - *Pasturella multocida* (no rabbit to man transmission) causes eye infections and snuffles in rabbits
  - *Bordetella bronchiseptica* respiratory infection that can trans to man
- Neurologic
  - Rabies reported in 7 rabbits
- Cutaneous
  - Dermatophytes transmitted by direct skin contact
- Zoonoses
  - *Tularemia*
  - *Babesiosis*

# Rabbits?

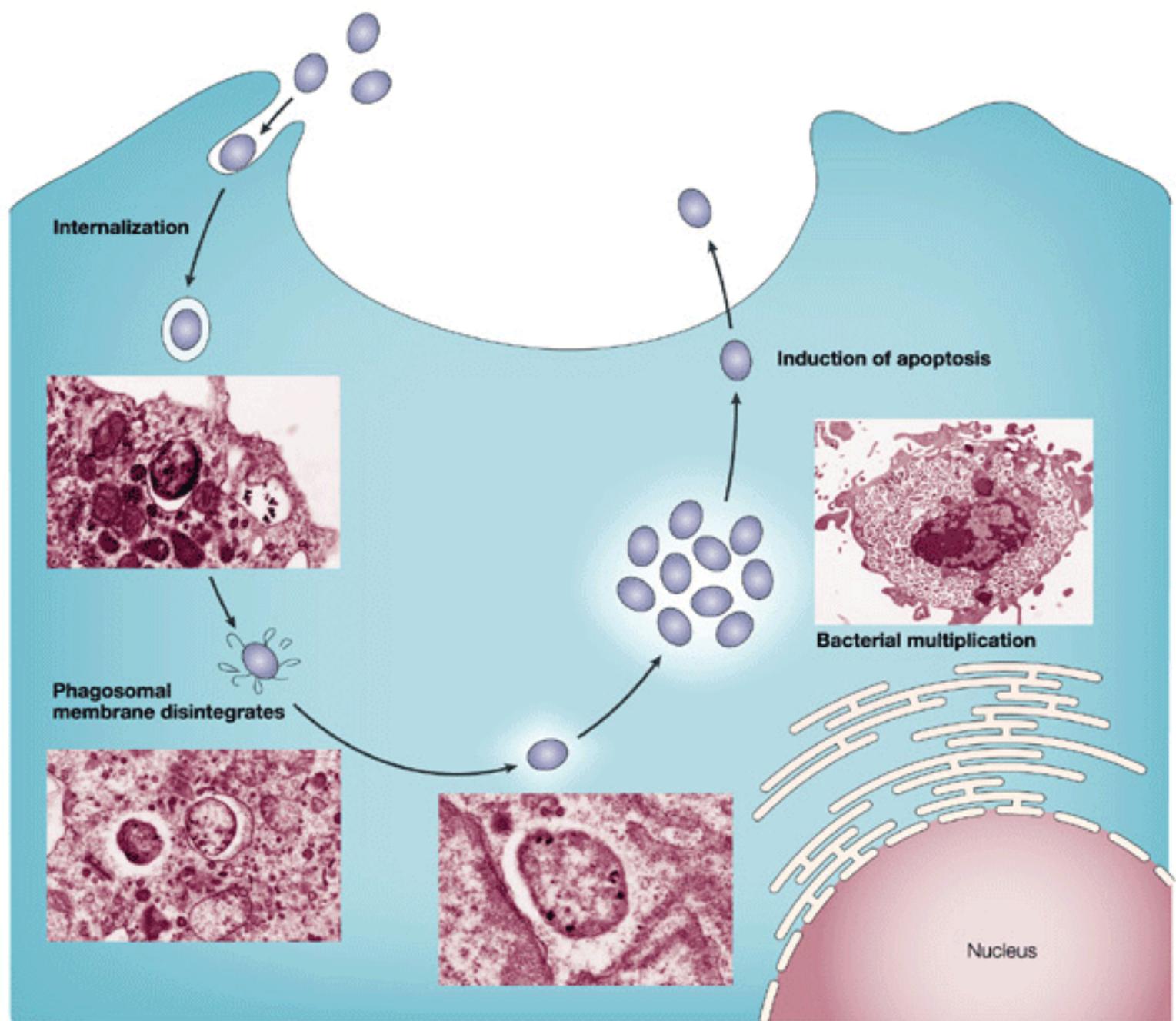
- 22 yo male acute fever, lymphadenopathy, malaise, and dry, non-productive cough in Martha's Vineyard.
- 5 pack-year smoker, mows lawns at the Golf club. No reports of running over any animals nor handling animal carcasses
- CXR showed RLL pneumonia, with some findings on LLL (Bilat?)

# Differential

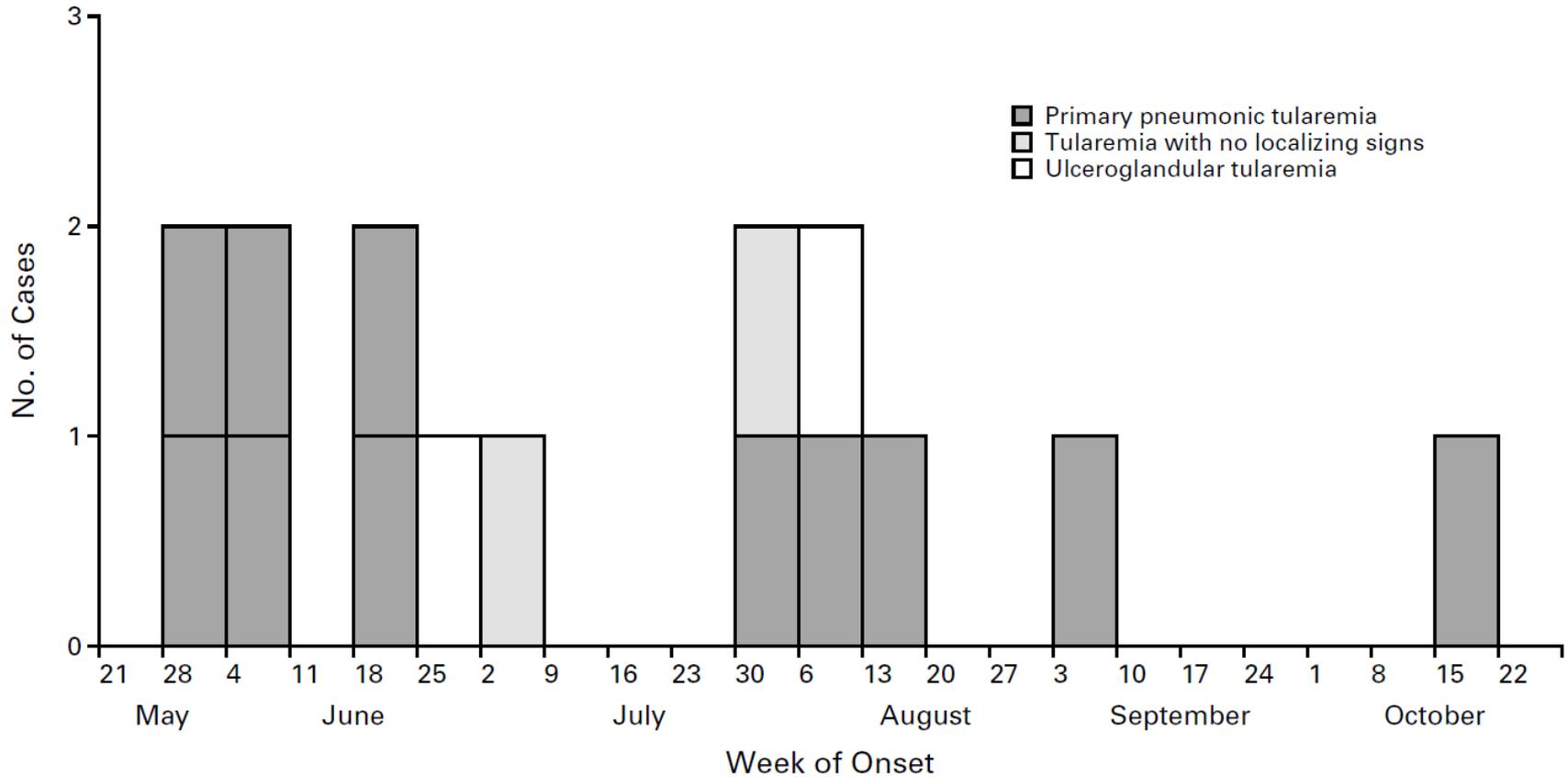
- Typhoidal syndromes such as salmonellosis or rickettsial infections should be included in the differential diagnosis.
- Other causes of pneumonia such as infection with *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, *Legionella pneumophila*, and *Coxiella burnetii*, or *Chlamydia psittaci*, as well as exposure to *staphylococcal* enterotoxin B
- In fulminant pneumonias, plague and inhalational anthrax



Tiny, pleomorphic, poorly staining gram-negative coccobacillus (0.2 to 0.5 by 0.7 to 1.0 microns). In clinical specimens, these forms can be found intracellularly (facultative intracellular pathogen)



## AN OUTBREAK OF PRIMARY PNEUMONIC TULAREMIA ON MARTHA'S VINEYARD



**Figure 1.** Cases of Primary Pneumonic Tularemia, Tularemia with No Localizing Signs, and Ulceroglandular Tularemia on Martha's Vineyard, May 21 through October 28, 2000, According to the Week of Onset of Illness.

# Tularemia

- Although *F. tularensis* does not form spores, it can survive in water, soil, and decaying animal carcasses
- The organism persists in water and mud for as long as 14 weeks, in straw for 6 months, and in oats for 4 months
- *F. tularensis* was shed in animal excreta, persisted in the environment, and infected people after being mechanically aerosolized and inhaled

# Tularemia: 6 Presentations

- Ulceroglandular (skin entry)
  - Regional lymphadenopathy with a papule that develops into an ulcer at the site of entry
  - Fever, chills, headache, malaise, anorexia, and fatigue usually are the first symptoms
- Glandular
  - Regional lymphadenopathy
  - No skin lesions
- Oculoglandular (Conjunctivae entry)
  - Painful, often purulent, conjunctivitis with lymphadenopathy especially in the periauricular, submandibular, and cervical areas

# Tularemia: 6 Presentations (cont'd)

- Typhoidal
  - Bacteremia with fever, chills, headache, myalgias, malaise, sore throat, and anorexia.
  - Abdominal pain, nausea, vomiting, and diarrhea may be present
- Pneumonic (respiratory entry)
  - Dry, non-productive cough, dyspnea, pleuritic chest pain, and fever.
  - Physical examination may reveal rales, consolidation, and a friction rub or signs of effusion
- Oropharyngeal (GI entry)
  - Painful sore throat; there may also be abdominal pain, nausea and vomiting

# Diagnosis

- *F. tularensis* is difficult to culture on standard media
  - Lab hazard: let them know if *F. tularensis* is suspected
- Definitive diagnosis is usually made by serology
  - Titers are usually negative during the first week of infection
  - Titers pos 50-70% of cases in the second week, and reach a maximum in 4-8 weeks
  - Cross-agglutination can occur with *Brucella* and *Proteus* species
- Early post-exposure (0-24 hours) nasal swabs, sputum and induced respiratory secretions may be collected for PCR and for direct fluorescent antibody (FA) assay

# Tularemia

- Treatment:
  - Streptomycin 30 mg/kg qd IM for 10-14 days, or gentamicin 3-5 mg/kg qd IV for 10-14 days.
- Post-Exposure Prophylaxis:
  - A live, attenuated vaccine available as an investigational new drug is administered once by scarification
  - Doxycycline 100 mg PO BID x 14 days, or
  - Ciprofloxacin 500 mg PO BID x 14 days

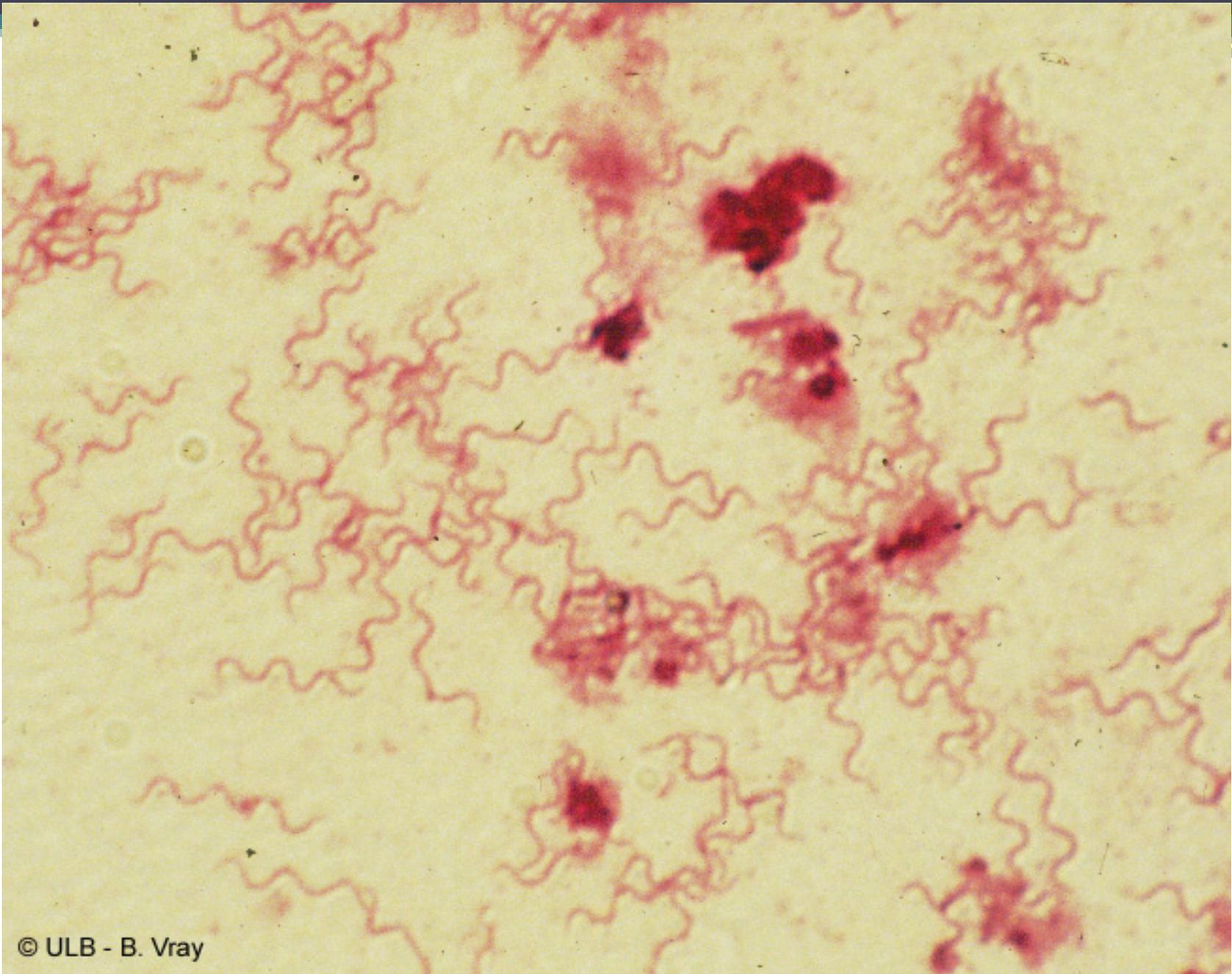
# Rodents



- Infected saliva
  - Tularemia
  - Rat bite fever
  - Rabies (VERY rare) 2005 case report of rabies in guinea pig in NY
- Direct contact or aerosol
  - LCMV (lymphocytic choriomeningitis virus)
    - Trans to man thru direct contact with fomites
  - LCV
    - asymp donor to organ recipients
  - Monkeypox
    - Prairie dogs in the flea market
  - Cowpox
  - Ringworm
  - Hantavirus

# “Clubbing with the rat pack”

- 48 yo male, in Asia, comes to the clinic with fevers and severe polymyalgia
- He had been drugged while at a club, roughed up, robbed and left in a back alley, awakening in his own filth, shoes, valuables, and ID all stolen
- No evidence of sexual assault
- On PE, animal bite marks around R ankle
- Faint rash on extremities
- Within 24hrs, blood cultures positive for pleomorphic GNR



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# Rat Bite fever

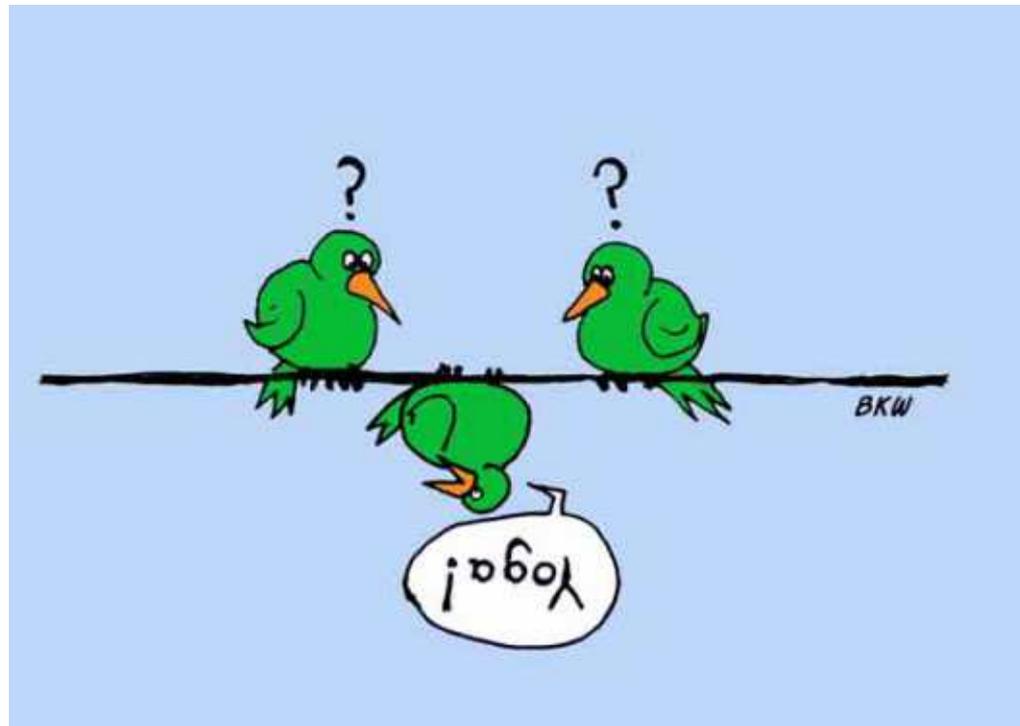
- *Spirillum minus* in Asia
- *Streptobacillus moniliformis* in USA
- Bites or contaminated food/water
  - Haverhill Fever
- Sxs:
  - Fever
  - Ext rash (mac/pap, pustular, petechial, purpuric)
  - Polyarthralgia
- Treatment:
  - PCN, Doxy



# Birds

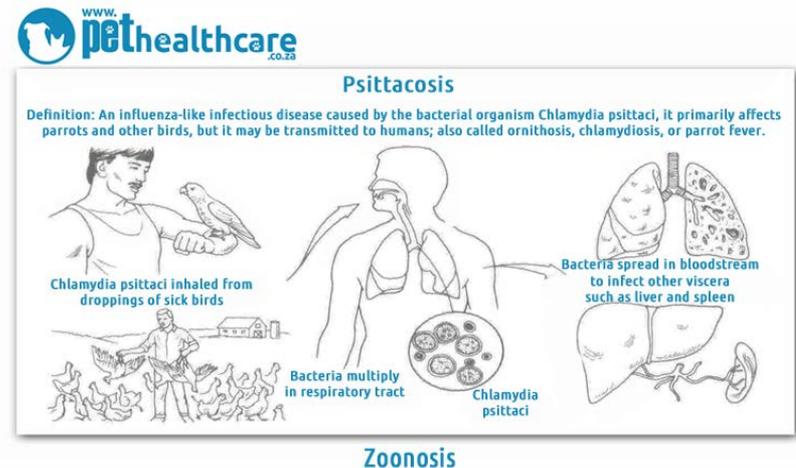
- Pet birds
- *Chlamydophila psittaci*:
  - found in almost all pet birds, shed in feces and nasal discharge
  - 1988-2003, 935 human cases in USA
- *Cryptococcus*
  - Found in soil, from bird feces
  - Inhalation of basidiospores or poorly encapsulated yeast
  - Generally in the immunocompromised
- Wild birds
  - Avian influenza
  - West Nile virus

# Birds



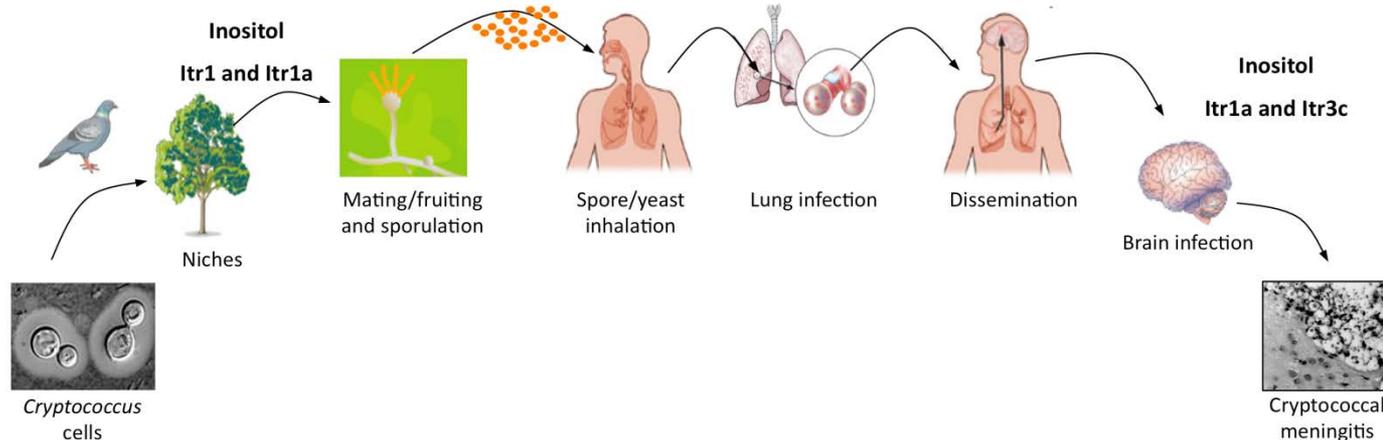
# Psittacosis

- Sx: Fever, HA, and dry cough with recent bird exposure
- Pharyngitis, diarrhea and rarely encephalitis
- DX: serology, DFA, MIF, Monoclonal AB, PCR
- **Do NOT culture:** grade 3 pathogen
- Tx: Tetracycline. Erythromycin as alternative.



# Cryptococcus

- Sx: Cough, chest pain, fever, wt loss, hemoptysis
  - Uncommon: dyspnea, rash, night sweats
- DX: histology, fungal culture, serum crypto ag, x-ray
- Tx: fluconazole, itraconazole, posaconazole, voriconazole in immunocompetent pt



# Exotics



- Ferrets
  - Influenza: aerosols from infected ferrets
  - *Giardia*
  - *Mycobacterium microte* (vole TB)
  - No rabies trans documented (vaccinate!)
- Hedgehogs
  - Dermatophytes
- Flying squirrels
  - Toxo, Staph and *R. prowazeckii* (epidemic typhus)
- Chinchillas
  - Dermatophytes
  - *Klebsiella pneumo* and *Pseudomonas* (no known trans)

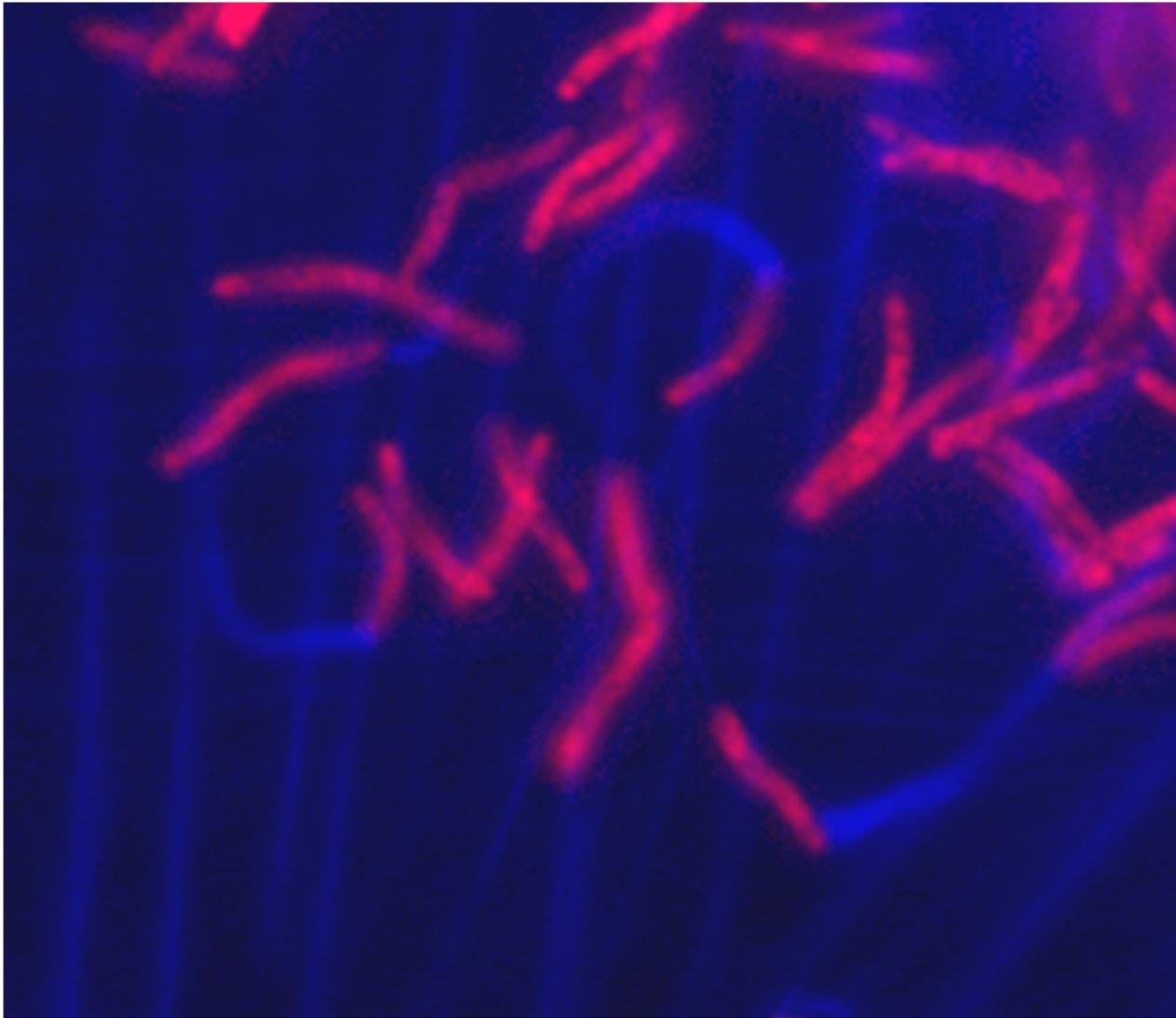
# Fish

- Water exposures:
  - *Mycobacterium marinum*
  - *Aeromonas hydrophilia*
  - *Edwardsiella tarda*
  - *Erysipelothrix rhusiopathiae*
- Shell fish insult
- Parasites

# Tanks a lot...

- 22 year old grad student had an after work job at pet shop (fired 3 weeks ago)
- Sustained minor abrasion on underside of tank/plastic branch, while cleaning aquarium
- Now with lesion on dorsum of hand, limited healing, not responsive to topical abx ointment and cephalexin





Acid fast stain

# *Mycobacterium marinum*

- Causes fish TB and contaminates aquarium water
- “Fish tank granuloma” caused while sustaining minor injury or abrasion while cleaning fish tank
- Infections in humans present as cutaneous lesions (soft skin papules, pustules and ulcers developing weeks after an injury/exposure)
- Treatment of infection by *M. marinum* is oral antibiotics. Medication options include rifampin plus ethambutol, tetracyclines, TMP-SMX , clarithromycin and fluoroquinolones
  - Duration: Based on clinical response
  - 6-8 weeks minimum. May require a year

# Fishy case of shellfish?

- 53 yo gulf bay fisherman, alcoholic with cirrhosis, has abrasions on arm/leg while harvesting oysters
- Few hours later, red, painful skin, hemorrhagic bullae begin to develop on legs and hands/arms
- Comes into the clinic not well 36 hrs later, in pain



# *Vibrio vulnificus*

- Leading cause of shellfish associated deaths in USA
- 50 confirmed cases, 45 serious illnesses, and 16 deaths are reported each year from the Gulf Coast states.
- Liver disease, hemochromatosis, and exposure to estuaries are major risk factors
- Infected wounds manifest as bullae in 75% of cases. Primary bacteremia also occurs
- Treatment : doxy + ceftriaxone or FQ

# *Vibrio vulnificus*

- Do not expose open wounds or cuts to warm seawater. When swimming or wading, the wound should be covered with a watertight wrap.
- Wear gloves when handling raw shellfish and avoid cross-contamination of raw shellfish with other foods.
- Cook shellfish thoroughly. Individuals in the high risk category should not consume raw oysters or other shellfish.
- Illness caused by *V. vulnificus* is relatively rare and most healthy persons do not become ill when the organism is ingested.

# Fear the Turtle



# Reptiles

- 74-90% colonized with *Salmonella*
- Intermittently shed in feces
- Responsible for 6% (74,000 cases) of *salmonella* in U.S.
- *Yersinia, Campylobacter, Aeromonas*
- Sale of turtles < 4" banned in 1975 resulted in decrease of *Salmonella* cases in children by 100k



# Monkeys

- Few reports of disease transmission from pet monkeys
- *Shigella* and *Salmonella* have been transmitted from spider monkeys
- Herpes B
  - Cercopethicine herpes virus 1
  - Transmitted directly from rhesus macaques through bites or scratches or from tissues or fluids
  - 80 - 90% of adult macaques infected.  
Asymptomatic

# B virus

- In monkeys, either no lesions or oral/genital lesions (HSV for monkeys)
- Viral shed is lifelong in oral and genital secretions and from conjunctiva
- In humans, leads to encephalitis, fatal in 80% without treatment
- Majority of cases are in those who work with non-human primates

# B Virus - Who is at risk?

- Monkey handlers
- Travelers exposure to free ranging monkeys
  - India, Indonesia and Nepal
  - Puerto Rico and the Caribbean
- Those with monkeys kept as pets

# B Virus - 3 clinical manifestations

- 1
  - Vesicular or ulcerative lesions
  - Tingling, pain or itching at site
  - Local lymphadenopathy
- 2
  - Influenza like illness (fever and myalgias)
  - Numbness, paresthesias, fever, conjunctivitis, abd pain, hepatitis, pneumonitis, CNS sx
- 3
  - Nausea and vomiting
  - CNS sx including HA, CN deficits, dysarthria, dysphagia, seizures, paralysis, respiratory failure and coma

# B Virus: Post exposure Indications

- Skin or mucosal exposures to animals that are at high risk of shedding B virus (ill or immunocompromised macaques, animals with oral or genital lesions, or animals known to be shedding virus)
- Inadequately cleaned skin or mucosal exposures
- Lacerations of the head, neck, or torso
- Deep puncture bites
- Needlestick injuries in which the needle was exposed to macaque tissue or fluid from the central nervous system (CNS), mucosa, or eyes
- Lacerations or puncture wounds with objects contaminated with macaque fluid from oral or genital lesions, CNS tissues, or known to contain B virus
- Exposures in which post-cleansing cultures are positive for B virus

# B Virus: Post exposure

- Wash wound for 15 minutes
  - Skin with detergent or bleach 1:20, then detergent
  - Eyes, mucous membranes: flush with water
- Post wash cultures of wound
- Treatment / prophylaxis (based on rabbit studies)
  - Acyclovir 800 mg po qid x2 weeks if 1 day post exp (PREGNANCY)
  - Valacyclovir 1g po tid x2 weeks (preferred for all others)
  - Suppressing tx lifelong : valacyclovir 500 mg po qd or acyclovir 400 mg po tid
- Treatment/disease
  - If no CNS or PNS findings: IV Acyclovir
  - If CNS or PNS findings: IV Ganciclovir

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*"We'll have to clean that out immediately...  
there's nothing dirtier than a lawyer bite."*

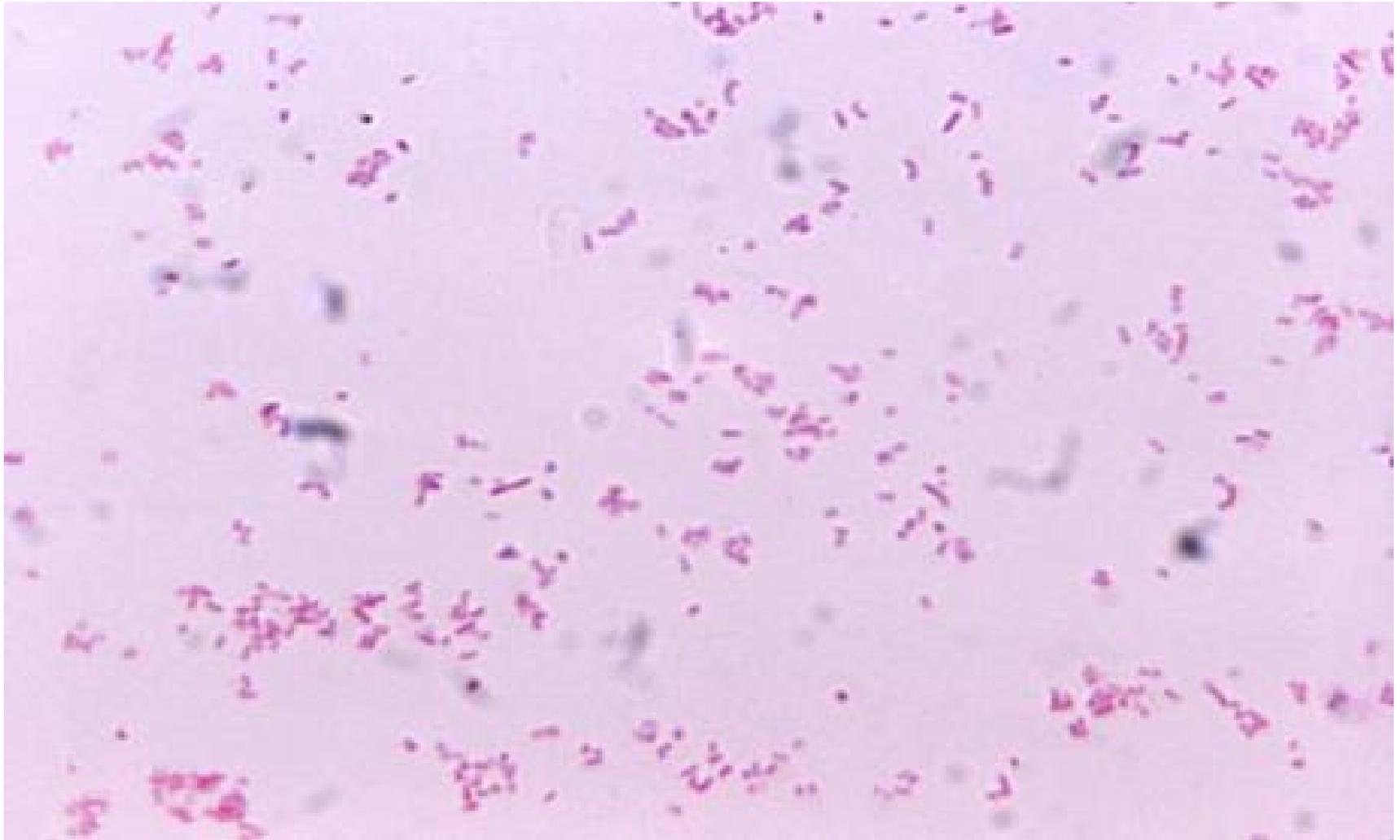
# Human Bites

- 52 yo male suffers a hand injury in brawl at tailgate party in Baltimore
- Presents 12 hrs later with a swollen, red, painful fist. Seen in a medi clinic. Xray indicated boney frags. Wound cleaned and given cephalixin, ice, rest.
- Returns to ER 5 days later tachycardia, hypotension, fever, confuse (Glasgow scale 13/15). At ED, clinical observation
  - secretion through a small injury on the dorsal aspect of the proximal phalanx of 3 finger in left hand
  - increase of local temperature
  - slow capillary reflux
  - edema on the forearm
  - flictenas on dorsum of hand and forearm
  - exacerbated pain at finger mobilization
  - decrease in distal sensibility (median nerve territory)
  - no crepitation was detected.



- As soon as clinical evaluation was finished, anti-tetanic immunization was performed, and patient transferred to surgery room
- Pressure in dorsal compartment 20mm Hg and in palmar compartment 42 mm Hg
- Purulent material (about 120 ml) drained from pre-retinacular space
- 1 g amp-sulbact IV q 6 hours





Anaerobic Small GNR

# *Eikenella corrodens*

- Anaerobic small GN bacilli
- Common in human oral flora
- Resist to:
  - Cephalexin, Clinda, Erythro, Flagyl
- Suscept to:
  - PCN, FQs, TMP/SMX, Doxy, ESC



9/29/2014

# Review

- Cat and Dog Bites
- Exotic animal Bites
- Zoonosis

# Management and Treatment of Animal Bites

- **Cultures**

Gram stain, aerobic, and anaerobic cultures are indicated if abscess, severe cellulitis, devitalised tissue, or sepsis present

- **Irrigation**

Normal saline irrigation copiously with high-pressure jet from syringe

- **Debridement**

Debride necrotic tissue and remove any foreign bodies

- **Imaging**

Plain radiographs, MRI, or CT if fracture or bone penetration, to rule out osteomyelitis

- **Wound closure**

Primary wound closure is not usually indicated

# Management and Treatment of Animal Bites

- **Antimicrobial therapy**

Prophylactic antibiotics in selected cases. Coverage based on patient type and specific animal involved

- **Hospitalization**

Indications include fever, sepsis, spreading cellulitis, substantial edema or crush injury, loss of function, immunocompromised status, or noncompliance

- **Immunizations**

- Tetanus booster if original three-dose series has been given but none in the past year. Give primary series and tetanus immunoglobulin if the patient was never vaccinated

- Human diploid rabies vaccine (days 0, 3, 7 and 14) with rabies immunoglobulin may be required (assess exposure risk)

## Empiric oral antibiotic therapy for animal bites

Antibiotic agents	Adults
<b>Agent of choice</b>	
Amoxicillin-clavulanate	875/125 mg twice daily
<b>Alternate empiric regimens include:</b>	
<b>One of the following agents with activity against <i>P. multocida</i>:</b>	
Doxycycline*	100 mg twice daily
TMP-SMX*	1 double strength tablet twice daily
Penicillin VK	500 mg four times daily
Cefuroxime	500 mg twice daily
Moxifloxacin	400 mg once daily
<b>PLUS</b>	
<b>One of the following agents with anaerobic activity:</b>	
Metronidazole	500 mg three times daily
Clindamycin*	450 mg three times daily

## Empiric intravenous antibiotic therapy for animal bites

### Adults

#### Options for empiric gram-negative and anaerobic coverage include:

Monotherapy with a beta-lactam/beta-lactamase inhibitor, such as one of the following:

Ampicillin-sulbactam 3 g every six hours

Piperacillin-tazobactam 4.5 g every eight hours

Ticarcillin-clavulanate 3.1 g every four hours

A third generation cephalosporin such as ceftriaxone 1 g IV every 24 hours

#### **PLUS**

Metronidazole 500 mg IV every eight hours

#### Alternative empiric regimens include:

A fluoroquinolone (eg, ciprofloxacin 400 mg IV every 12 hours or levofloxacin 500 mg IV daily) **PLUS** metronidazole 500 mg IV every eight hours

Monotherapy with a carbapenem•, such as one of the following:

Imipenem-cilastatin 500 mg every six hours

Meropenem 1 g every eight hours

Ertapenem 1 g daily

# References

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- “Bites and zoonoses from pets other than dogs and cats” , Kotten CN, UpToDate 2010, 9/12/2010
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- 15<sup>th</sup> Annual Comprehensive Review of Infectious Diseases Syllabus
- Images from online sources and personal library

# Questions?

