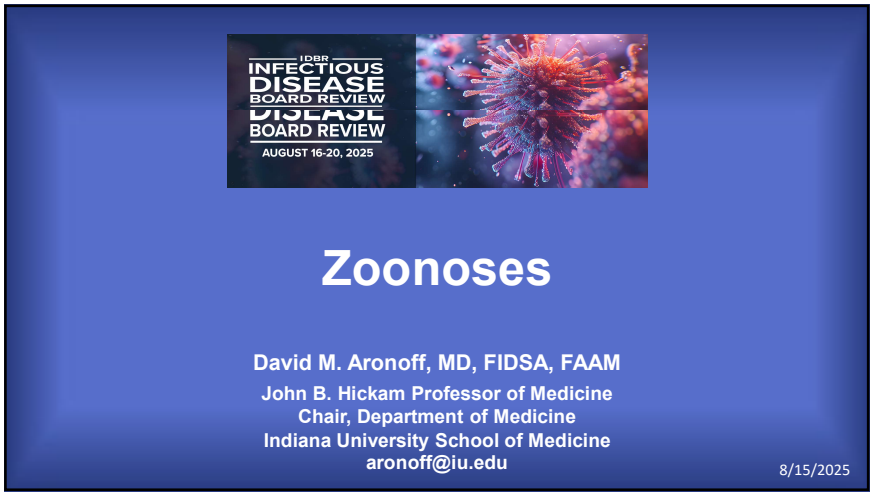
# 23 Zoonoses

*Speaker: David Aronoff, MD, FIDSA, FAAM*

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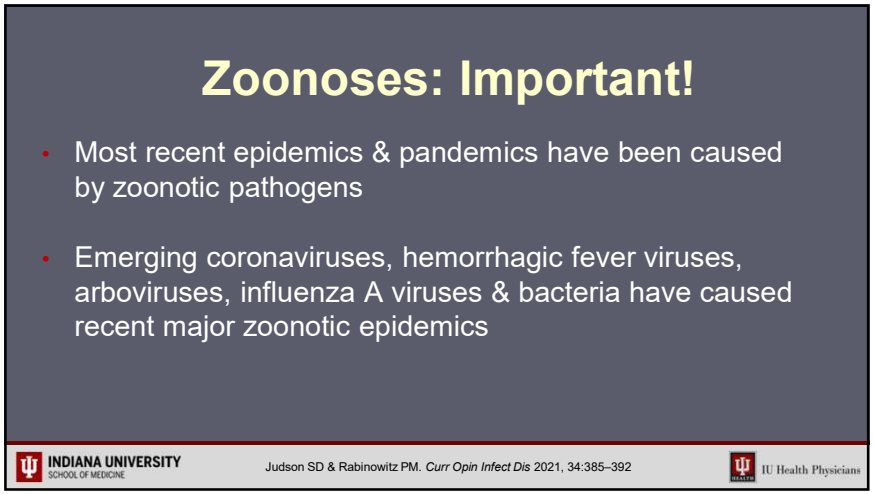


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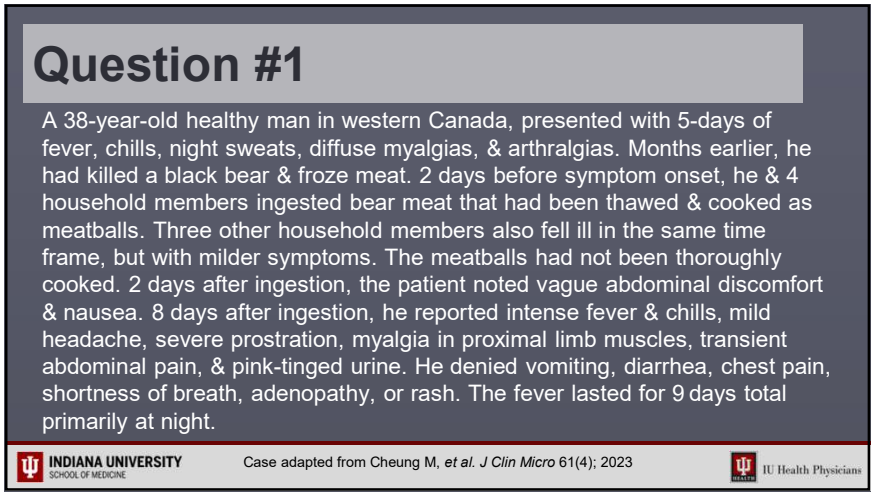


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## Question #1

P/E: VS & exam findings normal

Labs: mildly increased WBC count (10.4*$10^9$/L), with hypereosinophilia (3.3*$10^9$/L; normal <0.50). AST = 61U/L (normal 15 to 45), creatine kinase (762 U/L; normal 55 to 170), & CRP (64.6 mg/L; normal <10).

Bilirubin, creatinine, & INR normal.

HIV screening & blood cultures at 5 days of incubation negative.

*Trichinella* serology on a sample 1 week after ingestion of bear meat was **negative**.

INDIANA UNIVERSITY SCHOOL OF MEDICINE Case adapted from Cheung M, *et al. J Clin Micro* 61(4); 2023 IU Health Physicians

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## Question #1

**Which of the following is the most likely infectious diagnosis?**

A. Acute trichinellosis from ingestion of viable *Trichinella* larvae
B. *Coxiella burnetii* infection (Q fever) from ingesting raw bear meat
C. Bacteremic *Streptobacillus moniliformis* from inadvertent cutaneous inoculation while preparing bear meat
D. Acute *Necator americanus* infection

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## Question #1

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## Question #1

Given the clinical suspicion for *Trichinella* infection, empirical treatment with mebendazole (400 mg po TID) was initiated on day 12 of illness, for a total of 13 days

The diagnosis of acute trichinellosis was subsequently confirmed with repeat serological testing performed 6 weeks after having consumed the bear meat

Remember *Trichinella* organisms not killed by freezing or drying/curing. Cooking thoroughly is important

INDIANA UNIVERSITY SCHOOL OF MEDICINE Case adapted from Cheung M, *et al. J Clin Micro* 61(4); 2023 IU Health Physicians

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# 23 Zoonoses
*Speaker: David Aronoff, MD, FIDSA, FAAM*

**Table 1.** Zoonotic pathogens causing recent epidemics

| Zoonotic pathogen | Reservoir host/Vector | Disease (key syndromes) | Major recent epidemics |
|---|---|---|---|
| SARS-CoV | Likely bats | SARS (pneumonia) | Global (2002–2003) |
| MERS-CoV | Dromedary camels | MERS (pneumonia) | Saudi Arabia, South Korea (2012–2019) |
| SARS-CoV-2 | Unknown | COVID-19 (pneumonia) | Global (2020–present) |
| Ebola virus | Likely bats | Ebola virus disease (haemorrhagic fever) | West Africa (2013–2016) DRC (2018–2020) |
| Lassa virus | Multimammate rat | Lassa fever (haemorrhagic fever) | Nigeria (2018) |
| Rift valley fever virus | *Aedes* and *Culex* mosquitoes | Rift valley fever (haemorrhagic fever) | East Africa (2006–2007) |
| Zika virus | *Aedes* mosquitoes | Zika virus disease (arthralgia/myalgia, rash) | Brazil, Americas (2015–2016) |
| Chikungunya virus | *Aedes* mosquitoes | Chikungunya fever (arthralgia/myalgia, rash) | Indian Ocean Islands, India (2004–2007) |
| Dengue virus | *Aedes* mosquitoes | Dengue fever (arthralgia/myalgia, rash, haemorrhage) | Americas (2010) |
| West Nile virus | Birds/*Culex* mosquitoes | West Nile disease (meningitis/encephalitis, paralysis) | United States (2002) |
| Influenza A viruses | Waterfowl, Poultry, Pigs | Influenza (pneumonia) | Global (2009) |
| *Yersinia pestis* | Rats/Fleas | Plague (sepsis, pneumonia) | Madagascar (2017) |
| *Brucella* spp. | Cattle, sheep, goats | Brucellosis (undulant fever, endocarditis) | China (2020) |
| *Coxiella burnetii* | Cattle, sheep, goats | Q fever (pneumonia, hepatitis) | Netherlands (2007) |

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Judson SD & Rabinowitz PM. *Curr Opin Infect Dis* 2021, 34:385–392

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THERE ARE MANY

**TABLE 1. Bacterial zoonoses by transmission mechanism and causative agent(s)**

| | Causative agent(s) |
|---|---|
| **Bacterial zoonoses transmitted by direct contact with animals or infected animal materials** | |
| Anthrax | *Bacillus anthracis* |
| Brucellosis | *Brucella* spp. |
| Cat scratch disease | *Bartonella* spp. |
| *Erysipelothrix* infections | *Erysipelothrix rhusiopathiae* |
| Glanders and melioidosis | *Burkholderia mallei* and *Burkholderia pseudomallei* |
| Leptospirosis | *Leptospira interrogans* spp. |
| Mycobacterioses | *Mycobacteria* spp. |
| Q fever | *Coxiella burnetii* |
| **Bacterial zoonoses transmitted principally by animal bites or scratches** | |
| Pasteurellosis | *Pasteurella multocida* and other spp. |
| *Capnocytophaga* infections | *Capnocytophaga canimorsus* |
| Cat scratch disease | *Bartonella henselae* |
| Rat bite fever | *Spirillum minus* and *Streptobacillus moniliformis* |
| **Vector-borne bacterial zoonoses** | |
| Lyme borreliosis | *Borrelia burgdorferi* sensu lato (incl. *Borrelia garinii, Borrelia afzelii*) |
| Tick- and louse-borne relapsing fever borreliosis | *Borrelia recurrentis, Borrelia turicatae, Borrelia hermsii,* others |
| Plague | *Yersinia pestis* |
| Tularaemia | *Francisella tularensis* |
| Rickettsioses | Spotted fever and typhus group *Rickettsia* species |
| Ehrlichiosis and Anaplasmosis | *Ehrlichia chaffeensis, Anaplasma phagocytophilum* |
| Scrub typhus | *Orientia tsutsugamushi* |
| **Foodborne bacterial zoonoses and intoxications** | |
| Salmonellosis | *Salmonella enteritidis* |
| Campylobacteriosis | *Campylobacter* spp. |
| Listeriosis | *Listeria monocytogenes* |
| *Escherichia coli* O157:H7 infections | *Escherichia coli* STEC |
| *Yersinia enterocolitica* infections | *Yersinia enterocolitica* |
| *Clostridium perfringens* gastroenteritis | *Clostridium perfringens* |
| Botulism | *Clostridium botulinum* |
| Staphylococcal food poisoning | *Staphylococcus aureus* |

Chikeka & Dumler *Clin Microbiol Infect* 2015; 21: 404–415

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**CATS**
- *Bartonella henselae*
- *Pasteurella multocida*
- *Yersinia pestis*
- *Francisella tularensis*

**BIRDS**
- *Chlamydophila psitacci*
- *Chlamydia*

**FARM ANIMALS** (sheep, cows, horses, goats, chicken, *etc*)
- *Bacillus anthracis*
- *Brucella*
- *Coxiella burnetii*
- *Campylobacter*
- *E. coli* (Shiga toxin+)
- *Erysipelothrix rhusiopathiae*
- *Hepatitis E*
- *Leptospira*
- *Parapoxviruses (orf, etc)*
- *Rhodococcus*
- *Salmonella*
- *Trichinella*

**FISH**
- *Erysipelothrix rhusiopathiae*
- *Mycobacterium marinum*
- *Streptococcus iniae*
- *Vibrio*

**DOGS**
- *Pasteurella multocida*
- *Capnocytophaga canimorsus*
- *Campylobacter*
- *Leptospira*
- *Staph intermedius/pseudintermedius*

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Adapted from *Comprehensive Review of Infectious Diseases* (2020), Elsevier.

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**LEECHES**
- *Aeromonas hydrophila*

**RABBITS**
- *Francisella tularensis*

**REPTILES**
- *Salmonella*

**BEARS**
- *Trichinella spiralis*

**RODENTS**
- *Leptospira*
- *Mpox*
- *Salmonella*
- *Spirillum minus*
- *Streptobacillus moniliformis*
- *Yersinia pestis*

**CAMELS**
- MERS-CoV

**BATS**
- *Rabies*
- *Nipah virus*

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Adapted from *Comprehensive Review of Infectious Diseases* (2020), Elsevier.

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## Zoonoses: Various Routes of Infection

- **Direct contact with animal or animal tissue**
  - Cat scratch disease, anthrax, tularemia, brucellosis
- **Contact with insect vector**
  - Tularemia, plague
- **Intact skin contact with animal urine**
  - Leptospirosis
- **Ingestion of animal product**
  - Brucellosis, hepatitis E
- **Inhalation of animal product**
  - Q Fever

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## Direct Contact with Animal or Animal Tissue

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## Question #2

25-year-old male presented in July with painful right inguinal mass of one week's duration. He is otherwise well. Married. Monogamous. No hx penile or skin lesion. Fishing last week in Northern Virginia creek, hiked through wooded area. Picked ticks off legs & neck. Has kitten & dog. Exam: T37°C, 5 cm tender red mass in right midinguinal area, fixed to skin. Genitalia normal. Aspiration of soft center: 5 cc yellow pus. Gm stain neg. cephalexin 250 mg qid. One week later: mass unchanged. Culture neg. Syphilis FTA & HIV neg.

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## Question #2

**What is the most likely dx?**

A. *Bartonella henselae*
B. *Treponema pallidum*
C. *Haemophilus ducreyi*
D. *Francisella tularensis*
E. *Klebsiella (Calymmatobacterium) granulomatis*

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## Question #2

### What is the most likely dx?

A. ***Bartonella henselae** **
B. *Treponema pallidum*
C. *Haemophilus ducreyi*
D. *Francisella tularensis*
E. *Klebsiella (Calymmatobacterium) granulomatis*

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## Purulent Inguinal Node

- *Bartonella henselae*: young cats
  - **Stellate abscess** on bx. **Warthin Starry** stain positive early
  - Dx: serology, PCR, or DFA on pus
- Tick borne tularemia ("glandular"): this case *could be* tularemia
  - Exposure to wild animals or their ticks
  - Gram stain, routine culture negative
  - Patient should be **systemically ill** (fevers, chills, malaise common)
  - **Uncommon**: 100-200 cases per year in the USA
- Chancroid: painful genital ulcer with adenopathy (can be purulent)
- No suppurative lymph nodes in syphilis or granuloma inguinale (*Klebsiella granulomatis*) (painless ulcers)

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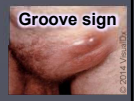
## Purulent Inguinal Node (continued)

- *Staphylococcus aureus*. Gram stain of pus & culture positive. Distal lesion may be present.
- Lymphogranuloma venereum (LGV)-
  - Sexually transmitted (no history in this case)
  - *Chlamydia trachomatis* L1-L3: genital lesion usually inapparent
  - Painful inguinal &/or femoral lymphadenopathy. "Groove sign"
  - Can form "Stellate abscesses" on bx
  - (+) Nucleic acid amplification test on urine, rectal swab, or wound




INDIANA UNIVERSITY SCHOOL OF MEDICINE | Image from https://www.skinsight.com/skin-conditions/adult/lymphogranuloma-venereum-lgv | IU Health Physicians

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## Cat Scratch Disease

- *B. henselae* causes most cases
- >13,000 cases in the USA per year[1]
- 80% <21 yrs old
- Clinical findings:
  - Acute suppurative lymphadenitis proximal to bite, scratch, lick of young cat
  - Fever, headache, poor appetite, & exhaustion
  - Cats have chronic bacteremia but seem healthy
- Cat fleas may transmit between cats & occasionally to humans

INDIANA UNIVERSITY SCHOOL OF MEDICINE | 1. Nelson CA, *at al. Emerging Infectious Diseases* 22 (2016) Cat photo from http://www.catscratchmed.com Cartoon from CDC.gov | IU Health Physicians

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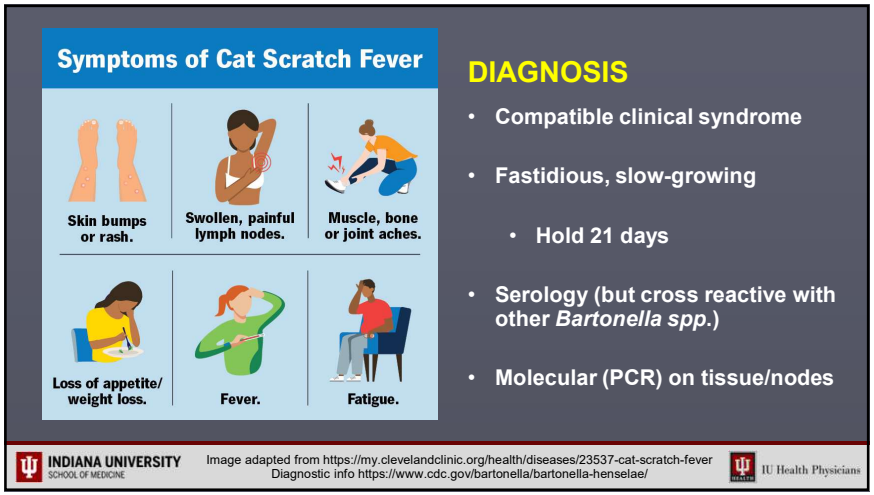


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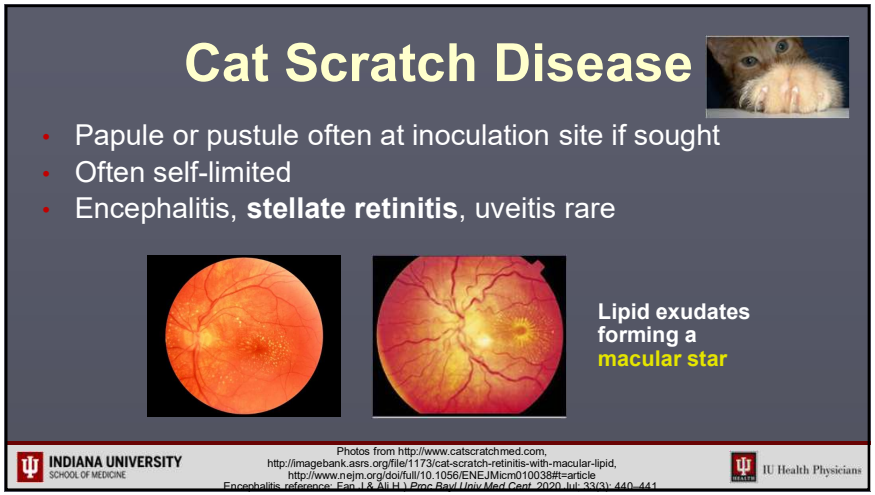


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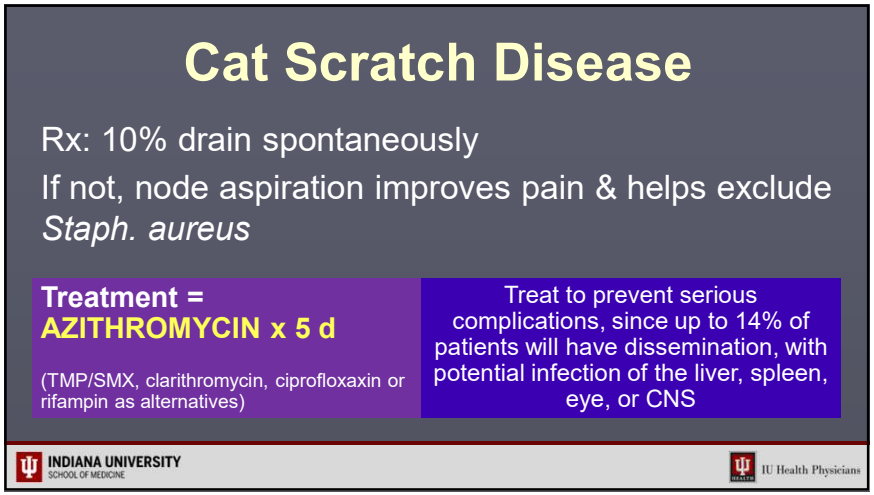


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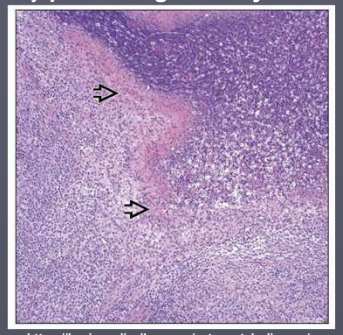
**Cat Scratch Lymphadenopathy**
**Stellate** abscesses, necrotizing granulomas
Necrotic area with neutrophils surrounded by **palisading histiocytes**


**Lymph nodes showing central abscess formation surrounded by palisaded histiocytes**

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# Treatment of *B. henselae*

- The combination of doxycycline + rifampin is a principal treatment for ***disseminated*** *B. henselae* infections (as is doxy + gent)
- But a recent study reported a 39% treatment failure rate

INDIANA UNIVERSITY SCHOOL OF MEDICINE — Pizzuti M, *et al. Infection* (2024) 52:1307–1314 — IU Health Physicians

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# Anthrax


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# Anthrax

- *Bacillus anthracis:* Aerobic, encapsulated, sporulating **Gram positive** bacillus

- Usually infects cattle & sheep
- Human exposure may be through agriculture, or from related industry
- Those at highest risk are shepherds, farmers, & workers in facilities that use animal products, esp. contaminated goat hair, wool, or bone
- Incubation period about a week
- 2º meningitis reported in ~10% of pts hospitalized w/ cutaneous anthrax

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# Anthrax

- Skin (**95%**): pruritic papule on skin exposed to goat hair, animal hides. Small **vesicles around an ulcer**. +/- pain. **Edema**. Mild systemic symptoms usually
- Inhalation anthrax results from the inhalation of spores when aerosolized while working with contaminated animal products (wool, hair, hides)
- DX: Can be seen on smear, culture of vesicle fluid (alert the lab!)
- Inhalation (**5%**), ingestion (<1%)
- Anthrax rare in USA

INDIANA UNIVERSITY SCHOOL OF MEDICINE https://www.pcds.org.uk/clinical-guidance/anthrax Wilson KH, *UpToDate* (2025) IU Health Physicians

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# Anthrax

- **Systemic anthrax**:
- Pt. suspected of having inhalational, GI, injection anthrax, or anthrax meningitis should be treated urgently with intravenous antimicrobial combination therapy & antitoxin (raxibacumab, obiltoxaximab, or anthrax immunoglobulin) from CDC
- Empiric regimen = combination of 2 bactericidal agents + 1 protein-synthesis inhibitor
  - **MEROPENEM** + **FQ** (cipro/levo) + **TCN** (mino/doxy)
  - 2 weeks (>3 weeks for meningitis)
- **Cutaneous anthrax**: **FQ** (cipro/levo) or **TCN** (mino/doxy) x 7-10 days

INDIANA UNIVERSITY SCHOOL OF MEDICINE Wilson KH, *UpToDate* (2025) IU Health Physicians

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http://www.pcds.org.uk/clinical-guidance/anthrax

**Edema**
**Vesicles**
**Necrotic ulcer**


https://www.nejm.org/doi/full/10.1056/NEJMicm0802093

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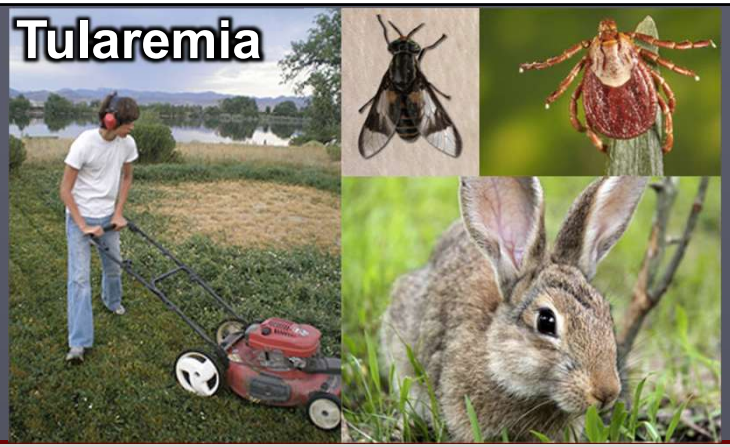


INDIANA UNIVERSITY SCHOOL OF MEDICINE Image from cdc.gov IU Health Physicians

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## Tularemia

- Highly infectious gram-negative **coccobacillus** *Francisella tularensis*
- Tier 1 select agent with potential for misuse as bioweapon
- Vectors = **Ticks** (*Dermacentor variabilis* > *Amblyomma americanum*) & **Deerflies**
- Direct inoculation = rabbits, squirrels, muskrats, beavers, cats (bites)
- Hunters **skinning animals** (old days); farmers, veterinarians
- Red tender local lymph node inoculation site may form ulcer
- **Ulceroglandular** is the most common manifestation
- Risk of bioweaponization

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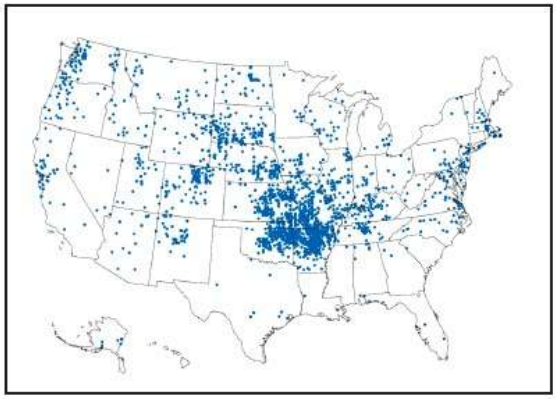
~200 cases per year in the USA

FIGURE 1. Reported tularemia cases, by county of residence* — United States, 2011–2022

Rich SN, *et al. MMWR* (2025)



* Cases are indicated randomly within county of residence.

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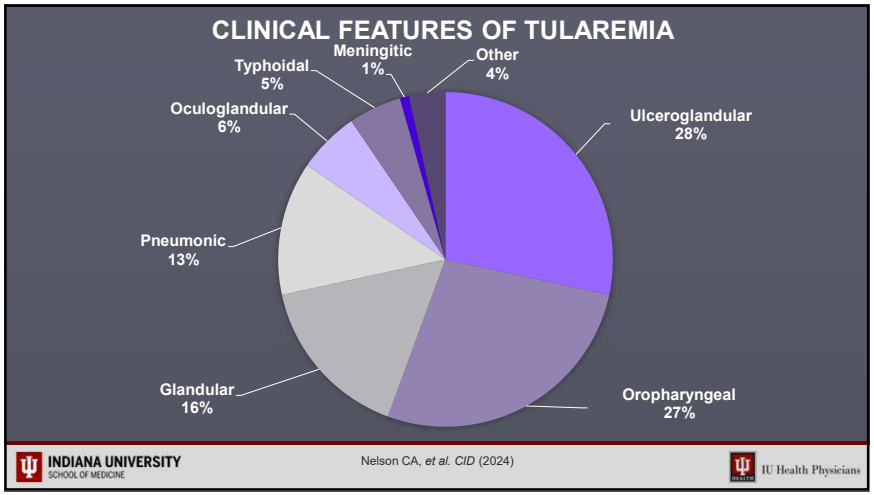


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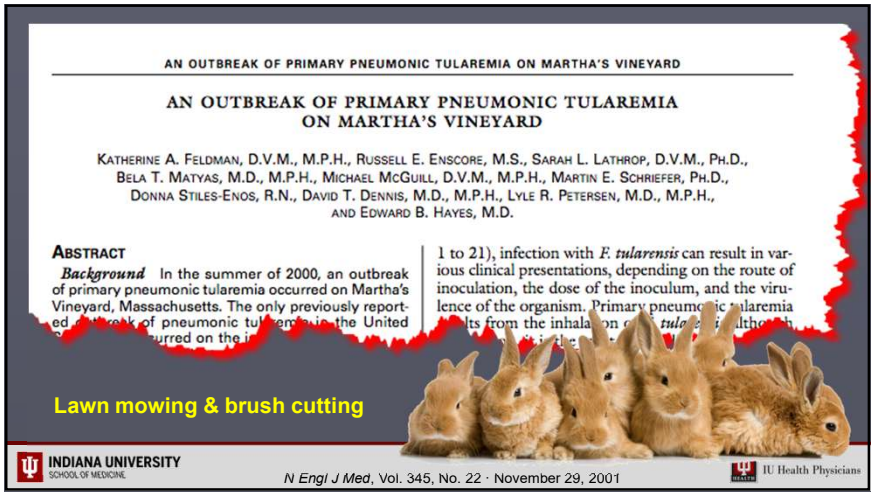


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## Tularemia

- Incubation period: 3-5 days but up to 3 weeks
- DX: Serology; PCR; culture; DFA on clinical specimen
- Culture of *F. tularensis* is lab hazard. Notify the lab!
- Neg routine culture, needs chocolate agar or BCYE (like *Legionella*)
- RX: **gentamicin** (or streptomycin), **FQs**, **doxycycline**
- Prophylaxis (bioterrorism) doxycycline

BCYE – buffered charcoal yeast extract

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Maurin & Gyuranecz. *Lancet* (2016)
Nelson CA, *et al. CID* (2024)
Rich SN, *et al. MMWR* (2025)

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## Glandular Tularemia

68-year-old with 1 wk fever then 2 mo progressive, painful swelling on R. side of neck

Exposure to a sick cat

Diagnosis made by + IgM (1:1280)

Improved with 4 wk doxycycline

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Marks, Laura, & Spec. "Glandular Tularemia." *New England Journal of Medicine* 379.10 (2018): 967-967.

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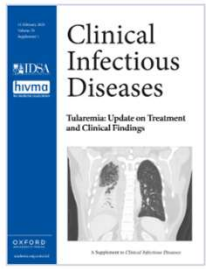


Volume 78, Issue Supplement_1
15 February 2024

**SUPPLEMENT**
**Volume 78, Issue Supplement_1, 15 February 2024**
**Tularemia: Update on Treatment and Clinical Findings**

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## Contact with Insect Vector

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## Plague


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## Plague

- *Yersinia pestis*
- Endemic in MADAGASCAR & DRC
- Exists in the USA
  - Rodent **flea bite**
  - **Prairie dogs, cats (outdoor/indoor)**
- Fever, nausea & swollen, painful lymph nodes
- Sepsis, pneumonia-hematogenous or aerosol in crowded conditions


(Michael Smith, Getty Images)


(Eye of Science/Science Source)

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## Plague

- Gram negative coccobacillus
- **Bipolar-staining** bacilli
- **Safety pin** appearance
  - *Yersinia pestis*: lab hazard
- Dx: PCR, Ag assay, culture
- Treatment: **Streptomycin or FQs** >> doxy




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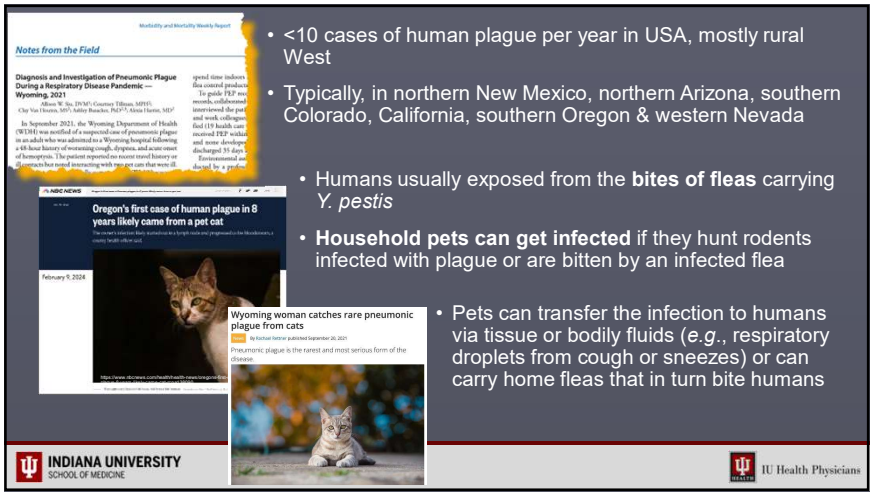


- <10 cases of human plague per year in USA, mostly rural West
- Typically, in northern New Mexico, northern Arizona, southern Colorado, California, southern Oregon & western Nevada
  - Humans usually exposed from the **bites of fleas** carrying *Y. pestis*
  - **Household pets can get infected** if they hunt rodents infected with plague or are bitten by an infected flea
- Pets can transfer the infection to humans via tissue or bodily fluids (*e.g.*, respiratory droplets from cough or sneezes) or can carry home fleas that in turn bite humans

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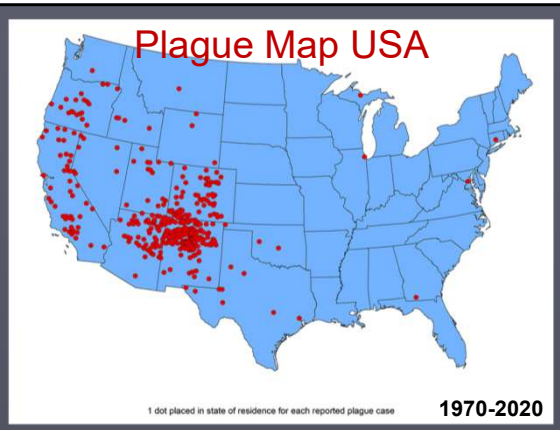


INDIANA UNIVERSITY SCHOOL OF MEDICINE | https://www.cdc.gov/plague/maps/index.html | IU Health Physicians

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**Pneumonic form:** Rapid Progression of Pneumonic Plague on CXR over 13 Hours

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**Bubonic form**

Wikipedia image

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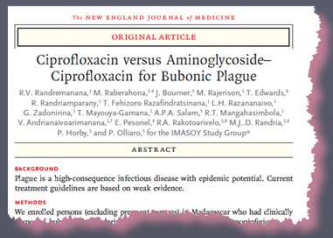
## Treatment


The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Ciprofloxacin versus Aminoglycoside–Ciprofloxacin for Bubonic Plague

ABSTRACT

BACKGROUND

Plague is a high-consequence infectious disease with epidemic potential. Current treatment guidelines are based on weak evidence.

METHODS

Randremanana RV, *et al. NEJM* (2025)

RCT aminoglycoside (SM) x 3d -> FQ (cipro) x 7d vs FQ alone x 10 days

**Cipro alone was noninferior**

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## Intact Skin Contact with Animal Urine

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## Question #3

PREVIEW QUESTION

IDBR INFECTIOUS DISEASE BOARD REVIEW 2025

- 28-year-old old male presents with temp 39°C, diffuse myalgia, headache, malaise. Returned 2 days ago from "Iron Man" race with running, biking, swimming in lake, climbing in Hawaii. Numerous mosquito bites. Exam: Conjunctival suffusion but no other localizing findings.
- WBC 14,500 with 80%PMN, no eos or bands. Platelets 210k.
- Bili 2.4, ALT 45, AST 52, Alk Phos 120, Cr 1.6. Hct 45%. BC neg. UA: normal

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## Question #3

PREVIEW QUESTION

IDBR INFECTIOUS DISEASE BOARD REVIEW 2025

**What is the most likely diagnosis?**

A. Malaria
B. Dengue
C. Ehrlichiosis
D. Leptospirosis
E. Zika

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## Question #3

PREVIEW QUESTION

IDBR INFECTIOUS DISEASE BOARD REVIEW 2025

**What is the most likely diagnosis?**

A. Malaria
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C. Ehrlichiosis
D. **Leptospirosis ***
E. Zika

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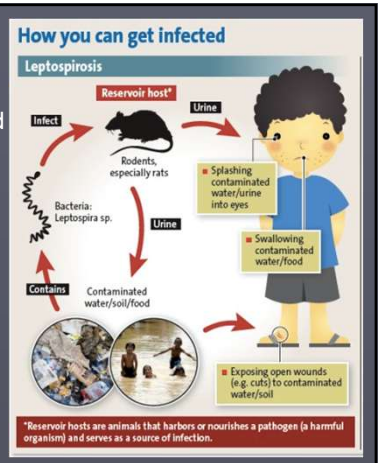
## Leptospirosis

- Spirochetes excreted in urine of infected host & able to survive in wet environment
- Exposed intact skin to animal urine in water: veterinarians, farmers, loggers, triathletes, white water rafting, trapping
- Urine from cows, pigs, dogs, raccoons, rats, mice.
  - Summer & early Fall




http://wiki.ggc.edu/wiki/Leptospirosis_Fall_%2713

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## Leptospirosis

- Fever, myalgia, headache (aseptic meningitis late in course)
- **Conjunctival suffusion**, +/- rash
- In severe cases: jaundice (Weil syndrome), azotemia, pulm. hemorrhage
  - Jaundice: *bilirubin is high out of proportion to transaminase elevation*
- Lab: serology by agglutination test, culture urine in Fletcher's medium
  - PCR & sequencing emerging (Ciurariu E, *et al. Microorganisms* 2025)
- Rx: **doxycycline** for outpatients, IV penicillin for inpatients
  - Jarisch-Herxheimer in first 2 hr

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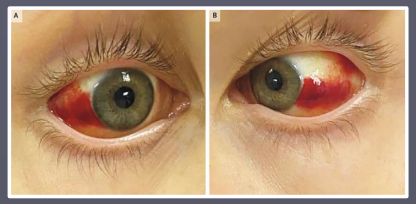
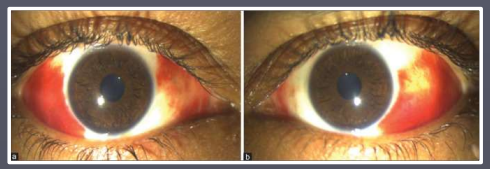
## Conjunctival suffusion & Leptospirosis



Rijnink E, *et al. N Engl J Med* 2022;387: e71



Khurana S, *et al. Indian J Ophthalmol*. 2020 Sep; 68(9): 1971.

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# Ingestion of Animal Products

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## Question #4

A 41-year-old car salesperson from Baltimore was admitted for a febrile illness & found to have *Brucella melitensis* in their blood culture. They had attended a dinner a month prior where some family members from Greece had brought food from home.

About two weeks prior to onset of fever, they had bought some lamb & beef at a farmer's market outside Baltimore.

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## Question #4

**Which of the following is the most likely source of the brucellosis?**

A. Home made sausage from Greece
B. Home made goat cheese from Greece
C. Cole slaw from a Baltimore delicatessen
D. Beef tartar, meat from the farmer's market
E. Lamb kabobs, meat from the farmer's market

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## Brucellosis

- Brucellosis is primarily transmitted through **direct contact** with infected animals or their bodily fluids, including vaginal discharges, aborted materials & semen
- Brucellosis can also be transmitted through the **ingestion** of raw or unpasteurized dairy products from infected animals, including milk & cheese (unpasteurized)
- Those who work closely with livestock, such as farmers, veterinarians & livestock handlers, are at a heightened risk

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## Brucellosis

- An illness characterized by acute or insidious onset of fever & one or more of the following: fever, night sweats, arthralgia, headache, fatigue, anorexia, myalgia, weight loss, arthritis/spondylitis, meningitis, or focal organ involvement (endocarditis, orchitis/epididymitis, hepatomegaly, splenomegaly).
- Nodes, liver, spleen may be enlarged
- Rare in the US, with 80–120 cases reported annually; most of these are associated with *Brucella* exposures abroad

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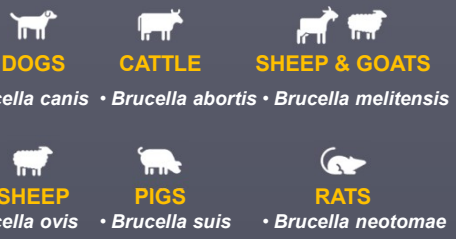
## Animal Sources of *Brucella*

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## Brucellosis

**Later onset lesions in bone, liver**

**Epididymo-orchitis[1], endocarditis**

**sacroiliitis, tenosynovitis, meningitis**

**Biopsy needle**

***Malodorous perspiration (uncommon) "pathognomonic"[2]***

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1. Ip CCK, *et al. BMJ Case Rep* 2019;12:e230007. doi:10.1136/bcr-2019-230007
2. 2. Pappas G, *et al. NEJM* (2005)

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## Brucellosis (cont.)

- WBC normal or low, anemia, plt can be low
- DX: Bone marrow/blood/tissue culture, serology, PCR
  - ***LET THE LAB KNOW YOU ARE WORRIED ABOUT BRUCELLA*** *(lab safety issue!)*
- RX: Doxy plus rifampin or strep/gent
  - TMP-SMX in pregnant or young children

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## Question #5

**What common cause of acute hepatitis is acquired via fecal-oral transmission or from undercooked meats, especially pig/wild boar?**

It is particularly severe in pregnant patients, causing stillbirths & maternal mortality.

A. Epstein Barr virus
B. Cytomegalovirus
C. Hepatitis E virus
D. Hepatitis A virus

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## Inhalation of Animal Products

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## Question #6

- A 22-year-old previously healthy male contractor returned from Afghanistan one week prior to presentation. He had a three-day history of fever, myalgia, arthralgia, mild headache & cough. He had vomited once & had mild midepigastric, nonradiating pain.
- The facility he was hired to guard was adjacent to the path that the local sheep & goat herders used on their way to market & he had purchased a wool rug from one of the locals. He remembers shaking it hard to get rid of the dust.
- He reported that some members of his guard unit also had flu-like illness from which they recovered without treatment.

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## Question #6

- Examination was normal except for a variable temperature up to 102$^{o}$F
- WBC **3.3**K, platelets **121**K, creatinine 1.2, AST **144**, ALT **154**, alk phos 88, total bilirubin 0.6
- Admission chest X-ray was normal
- Ceftriaxone was begun but the patient remained febrile & had the chest CT shown on the next slide

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## Question #6


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## Question #6

**Which of the following is the most likely diagnosis?**

A. Brucellosis
B. Anthrax
C. Leptospirosis
D. Q fever
E. Visceral leishmaniasis

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## Question #6

**Which of the following is the most likely diagnosis?**

A. Brucellosis
B. Anthrax
C. Leptospirosis
D. **Q fever ***
E. Visceral leishmaniasis

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## Q Fever

- *Coxiella burnetii*: tiny cocco baccilus
  - Infects cows, sheep, goats, cats, etc.
- Spores survive in straw, manure, meat, *parturient tissue* for months.
  - Aerosol, ingest raw milk
- Acute pneumonia (in half cases), fever, headache, hepatosplenomegaly
- **Chronic endocarditis** on native or prosthetic valves
- **Granulomatous hepatitis**
  - **Doughnut granulomas**
- DX: serology, valve PCR; specific tissue stain; hard to culture
- RX: acute: Doxycycline or levofloxacin or azithromycin
- Chronic: doxycycline plus hydroxychloroquine

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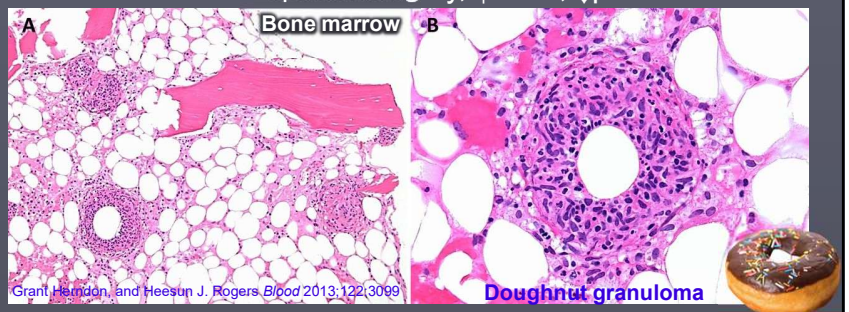
A 54-year-old man with a history of multiple myeloma presented with intermittent fevers, chills, fatigue, & weight loss for 1 month. +splenomegaly, ↑LFTs, ↓plt

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## The End

## Thank you!

aronoff@iu.edu

@DMAronoff (Bluesky)
david.aronoff (Insta, Threads)

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