

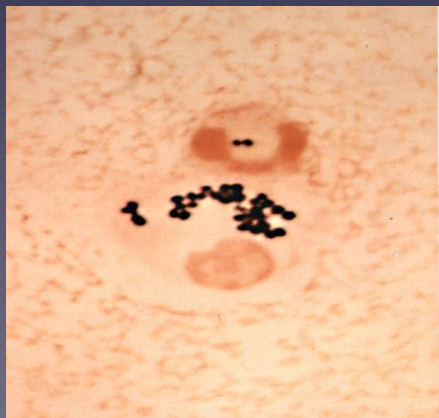
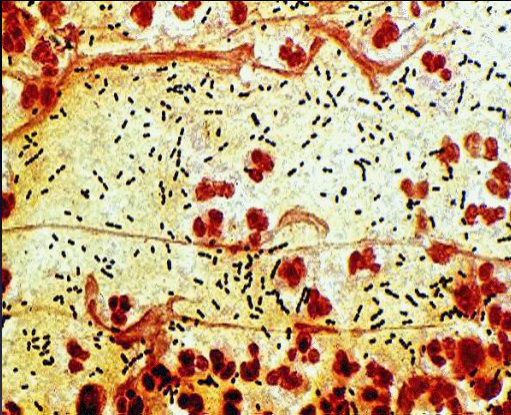
Clinical Microbiology

ACOI Board Review 2018

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(No Disclosures)

Staphylococcal skin/soft tissue infection:



- abscess, rather than diffuse cellulitis, w/ purulent drainage
- common in diabetes
- “Community-acquired” (CA) MRSA more likely scenario
- body contact sports
- hx of “spider bite”

Rx of MSSA bacteremia?

- Nafcillin (side effect: AIN; dx: eosinophils in urine)

Rx if non-anaphylactic rxn (rash) to PCN?

- Cephalosporin - cefazolin

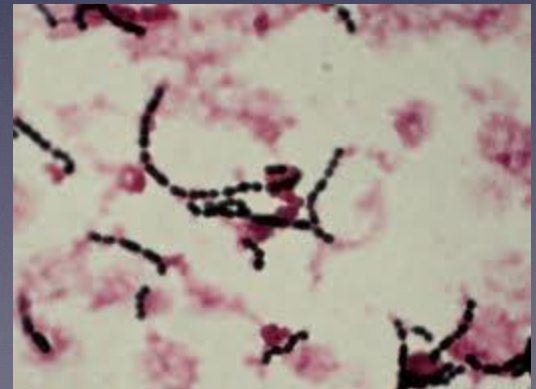
Rx if MRSA (if susceptible)?

- Vancomycin
- Daptomycin (but NOT pneumonia)
- Linezolid (but NOT bacteremia)
- Trimethoprim/sulfa - especially SSTI
- Clindamycin - especially SSTI
- Quinolones (?) - not Cipro

Rx of acute parotiditis (*S. aureus* most common);
assoc. w/ surgery, dehydration, mouth breathing

Typical streptococcal SSTI (Grp A, B, G):

- Intense erythema
- (Often recurrent) cellulitis rather than abscess
- Lymphangitis
- Often (preceding) systemic symptoms
- Areas of pre-existent lymphedema, venous insufficiency
- Drainage, when present, often watery or serous



Erysipelas

(superficial cellulitis of Streptococcal etiol.)



Rx: penicillin
if allergy:
cephalosporin
vancomycin
clindamycin

Additional Streptococcal Syndromes:

- “Viridans” strep bacteremia - endocarditis
- S bovis/gallolyticus bacteremia - GI malignancy
- Grp A strep - necrotizing fasciitis “flesh eating bacteria”
- TSS - source usually obvious; often + blood culture (as can S. aureus - but....source often not obvious; blood cultures negative)
- Note: 1/3 of Grp B strep are resistant to clindamycin (e.g. diabetic foot infection)

Necrotizing Soft Tissue Infections

- Group A strep: pain out of proportion to initial clinical findings
- Clostridium perfringens: progression over hours
- Mixed flora, most always including anaerobes
 - Most commonly in diabetics; obesity
 - Wounds involving/crossing mucous membranes
 - Foul odor
 - Mixed flora on gm stain
 - Delayed or no growth on culture

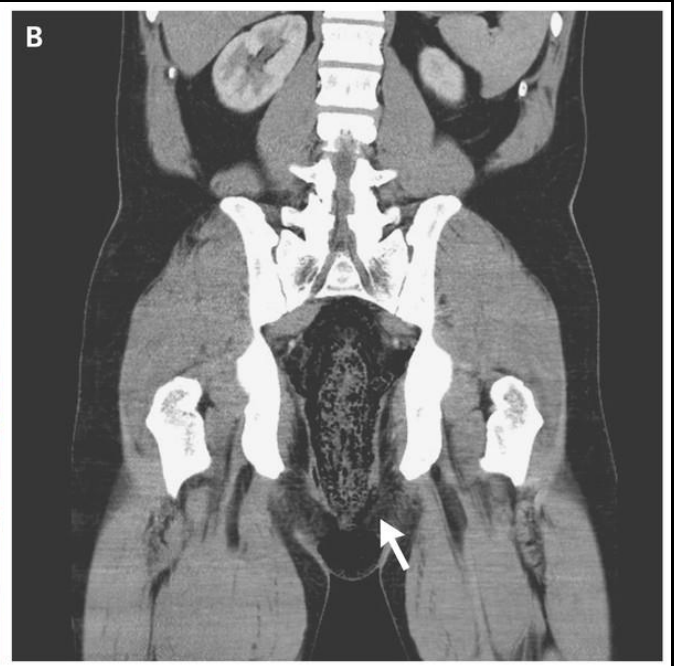
Diabetic Foot

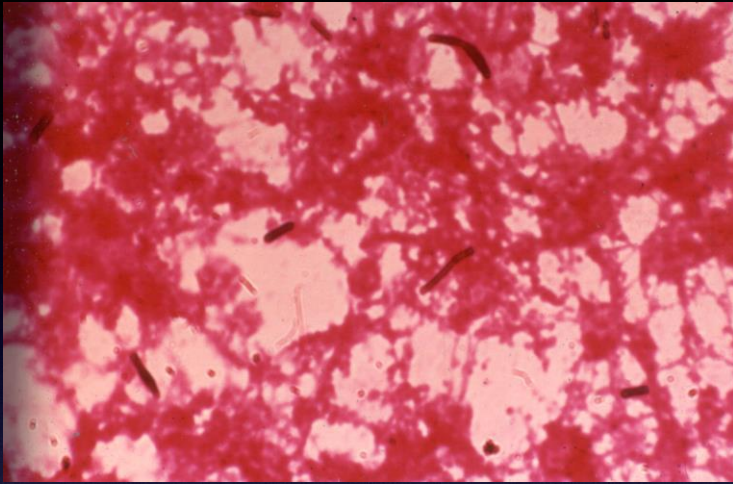
- Usually polymicrobial, w/ foul odor -
 - Anaerobes
 - Gm negatives
- Many feel **pseudomonas** commonly involved
- **Rx (including pseudomonas coverage)?**



Hx, Gm stain, speed of progression, location of wound,
useful in predicting organism(s)

Now what?





C. perfringens “gas
gangrene” Rx:

Surgery

+

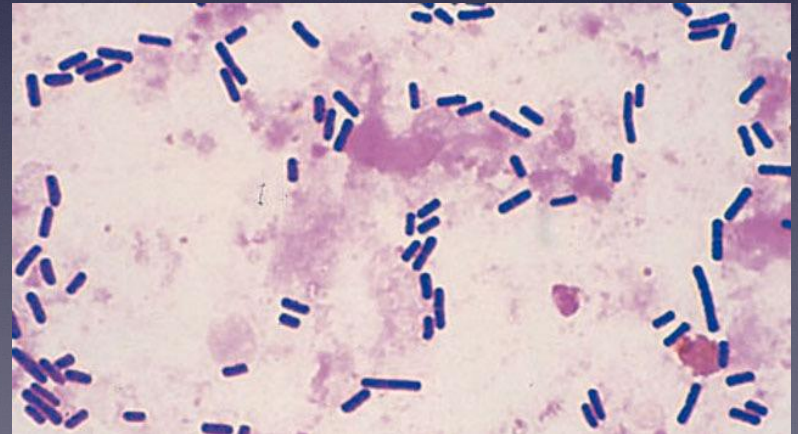
Penicillin

+

Clindamycin

+

? IVIG, HBO?



- *C. perfringens* -> gas gangrene
- *C. septicum* bacteremia/sepsis
 - GI/gyn malignancy (sometimes occult),
 - chemotherapy-induced neutropenia
- *C. botulinum* -> skin popping w/ “black tar” heroin

Cat Bite

- Pasteurella multocida
- Rapid onset - painful, throbbing cellulitis
- gm neg rod
- RX:
 - amoxicillin +/- clavulanate
 - cefuroxime
 - doxycycline
 - quinolones
 - NOT CEPHALEXIN (Keflex®)



Additional “Pearls” re: Bites

- Dog bites/splenectomy: overwhelming sepsis due to *Capnocytophaga* sp. (DF-2)
- Human bites: *Eikenella* - can't use clindamycin
- Snake bites: gm negs
- Rabies - any wild carnivore
 - most common domestic animal? - cat
- Lagomorphs don't get rabies (exception: woodchucks)

Aeromonas hydrophila

- Gm neg rod
- Fresh water injuries, medicinal uses of leeches

Rx:

- fluoroquinolone
- 3rd gen cephalosporin
- trimethoprim/sulfa







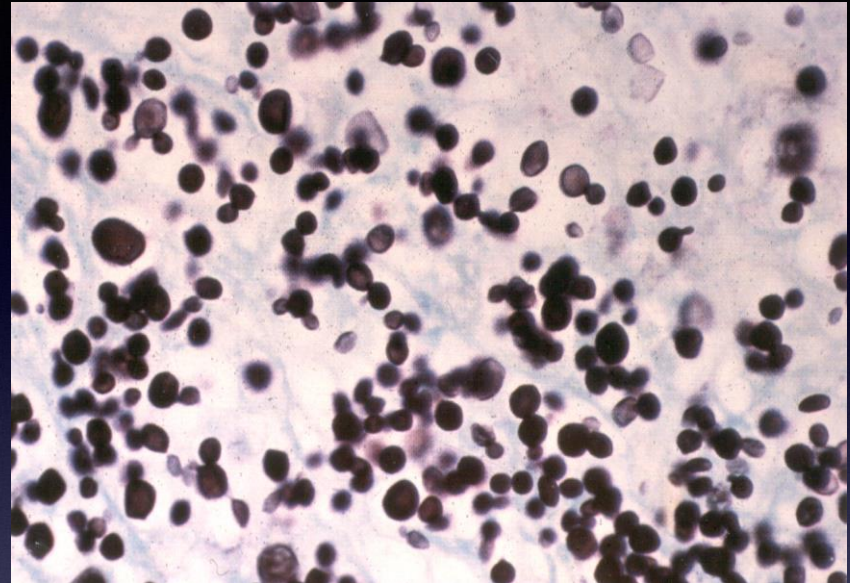
“Nodular” lymphangitis

Working in yard:
Dx?
Tx?



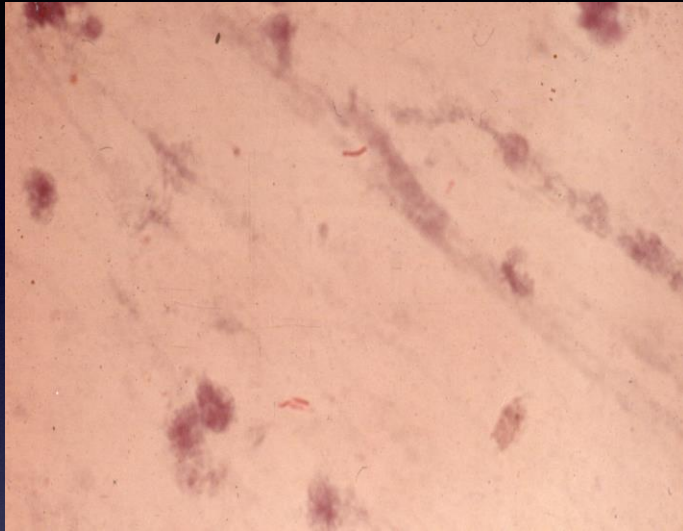
D/D nodular lymphangitis

- Staph, strep
- **Sporotrichosis**: 1° lesion is painless
- Nocardia: 1° lesion is a tender ulceration
- **M. marinum**: 1° lesion is a tender papule
- Tularemia: 1° lesion is a painful ulceration, w/ systemic symptoms (classically associated w/ skinning rabbits)



Sporotrichosis:

- minor trauma from roses or sphagnum moss
 - variable size yeast cells w/ multiple buds
- Tx: itraconazole



Mycobacterium
marinum: cleaning fish
tanks, water injuries,
fish hooks, splinter from a
boat



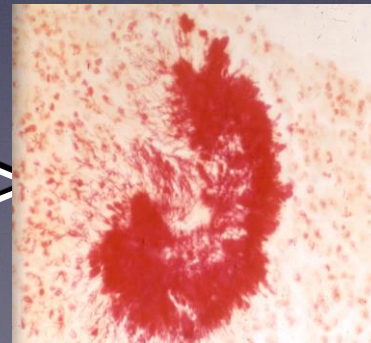
Rx:

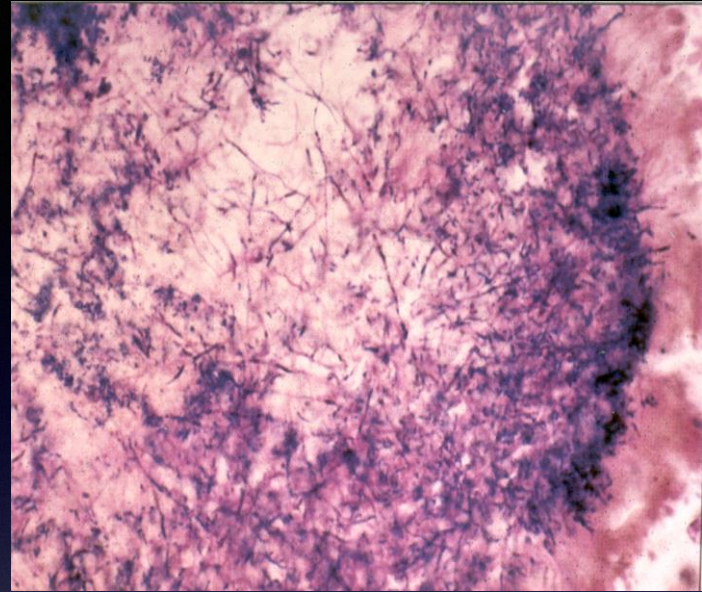
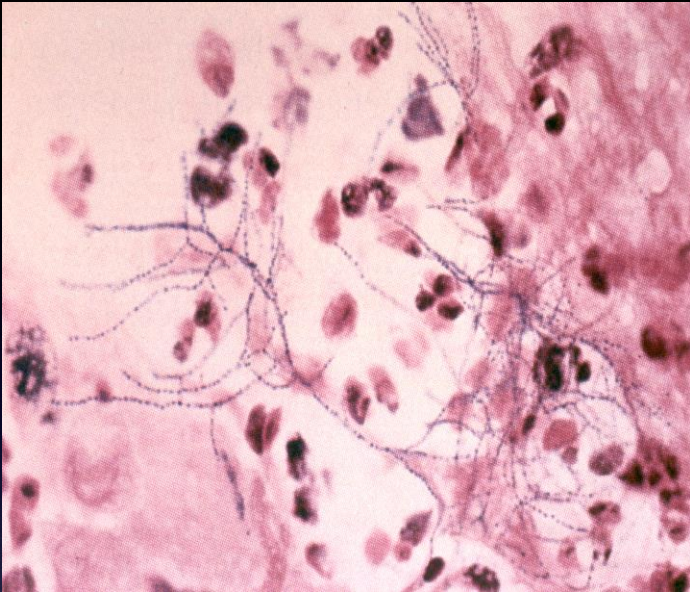
- Clarithromycin
- Doxycycline
- Minocycline
-

Rifampin/ethambutol

Actinomyces

- Spontaneous drainage from head (“lumpy jaw”), neck, or chest
- Often dental or oral mucosal origin
- Indolent, “wooden” mass effect; often confused w/ malignancy
- Assoc. w/ IUD's
- “sulfur granules”





Actinomyces:

- Gm + anaerobic, filamentous, beaded rods
- not acid fast
(vs Nocardia: aerobic, weakly acid fast)
- Tx - prolonged course of:
 - Ampicillin
 - Doxycycline
 - clindamycin



H. Zoster



Source: Comp Ophthalmol Update © 2004 Comprehensive Ophthalmology Update, LLC



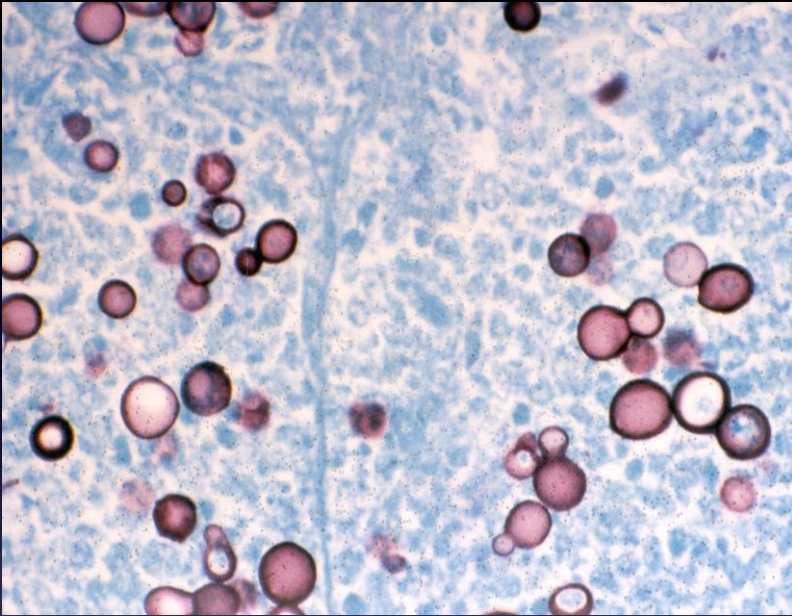
- Type of isolation?
- **Hutchinson's sign**
- Ramsey Hunt syndrome (H. zoster oticus), involving facial nerve (VII), w/ facial palsy, otalgia, dermatomal vesicles, occasional hearing loss

Blastomycosis



Mackowiak P A et al. Clin Infect Dis. 2012;55:1390-1391

Blastomycosis



- single, broad-based buds
- decaying vegetation, e.g. beaver dams
- Tx: Itraconazole



- often involves skin, bone; GU tract in males
- regardless of presentation, always considered as disseminated disease, w/ lungs being the primary entry site

Neutropenia/immunosuppression

....including initial approach to the febrile neutropenic patient as well as the persistently febrile patient

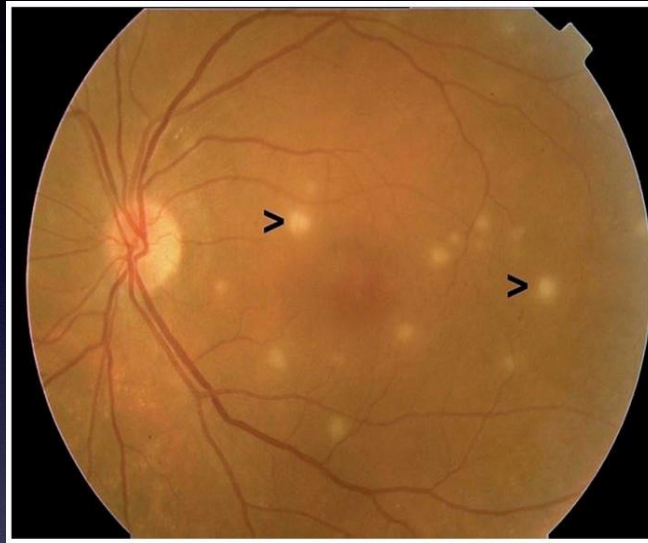
- most common bacteremia: E. coli
- most lethal organism: pseudomonas - initial empiric rx always includes anti-pseudomonas coverage
- when remains febrile: antifungals

Ecthyma gangrenosum

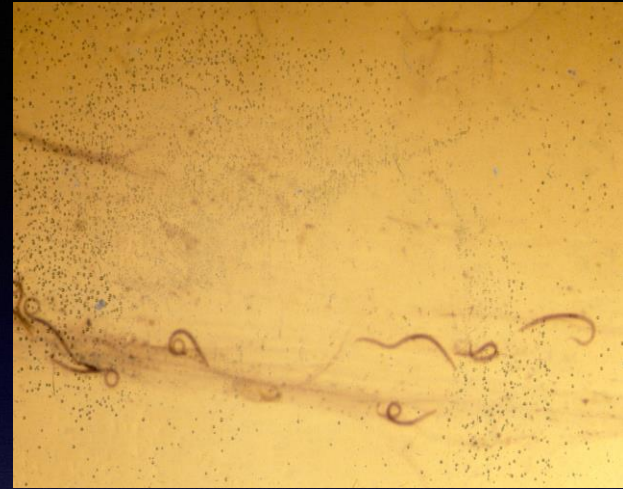
- Most frequently assoc. w/ **pseudomonas** bacteremia
- Neutropenia, or other severely impaired immunity
- Erythematous / hemorrhagic pustule, evolving into central necrosis



Candida endophthalmitis



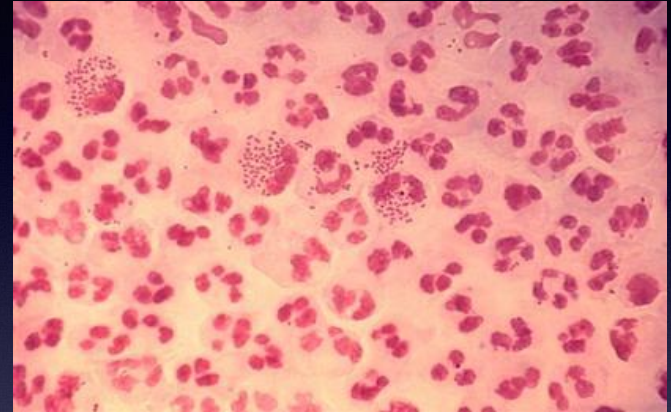
- severe neutropenia; may become apparent as neutrophils are recovering
- other setting/risk factors: ICU, multiple IVs/central lines, multiple antibiotics, TPN
- initial rx: echinocandins



Strongyloides:

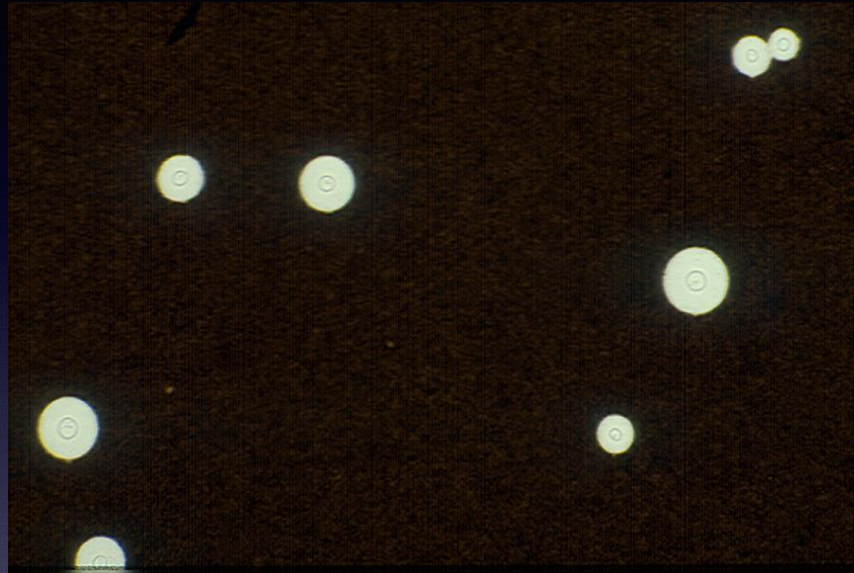
- diffuse pulmonary infiltrates in an immunosuppressed host
- NOT grossly visible ...
- Rx: ivermectin / albendazole

CNS Presentations



Neisseria meningitidis:

- acute meningitis w/ rash; Rx: ceftriaxone
- sepsis syndrome/bacteremia associated w/ terminal compliment deficiencies ($C_5 - C_9$), as well as splenectomy



Cryptococcus

- HIV+, other dx assoc. w/ t-cell deficiencies; sub-acute headache, mental status changes
- tx: amphotericin B + flucytosine / fluconazole

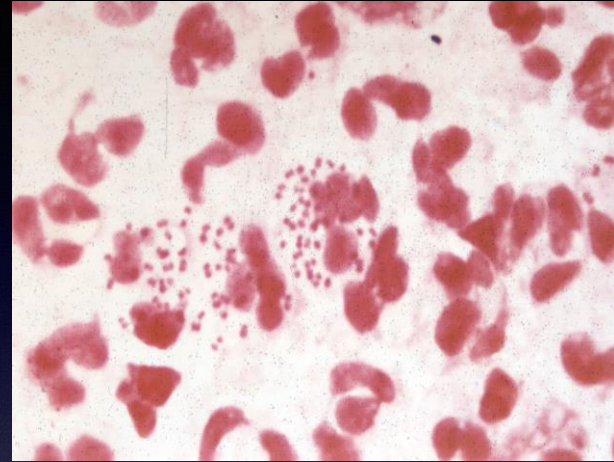
Additional potential CNS questions:

Interpretation of CSF results in a patient with fever, CNS findings

- Bacterial, viral, fungal, TB
- Meningitis vs encephalitis
- HSV encephalitis
- Meningitis w/ highest mortality
- Complement deficiency
- Most common cause of lymphocyte-predominant meningitis in a young, otherwise healthy individual
- *Listeria* scenarios - who? CSF results, including gm stain w/ gm + rods? Rx?

D/D of Meningitis

	Bacterial	Viral	TB/Fungal
Cell count	increased; neutrophil predominant	sl. increased; lymphocyte predominant	increased; lymphocyte predominant
Glucose	decreased	normal or sl. decrease	decreased
Protein	elevated	normal or minimally elevated	elevated



N. gonorrhoeae

- gm neg intracellular diplococci
- painful urethral/cervical discharge
- pustular rash
- **Late compliment deficiency**
- Tx: cefixime (?) / ceftriaxone



Primary Syphilis:

- painless (usually genital) ulcer
- darkfield microscopy; PCR
- serology usually negative



Badri T, Ben Jennet S. N Engl J Med 2011;364:71-71.

T. pallidum

- 2° stages and beyond -> dx by serology
- rash includes palms and soles
- RPR or VDRL to screen
- FTA as confirmatory (though being replaced by TP-PA)



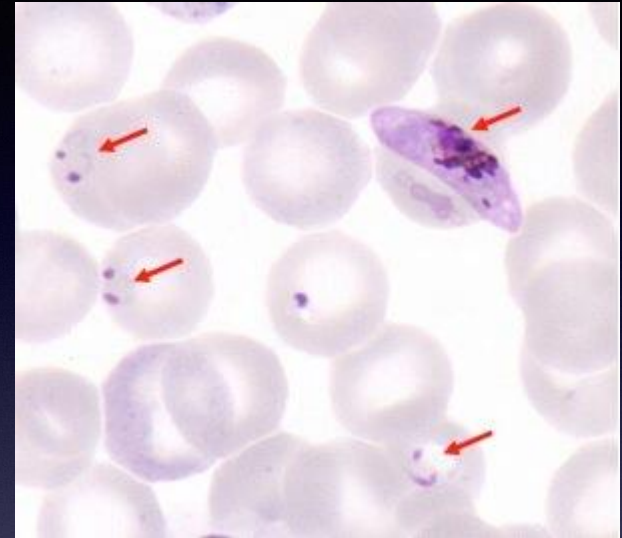
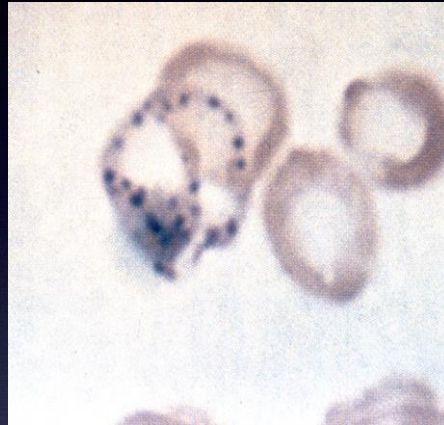
Treatment of Syphilis

- Less than 1 yr's duration (includes primary, secondary and early latent): benzathine PCN 2.4 mill units i.m. x 1
If HIV +, some treat weekly x 3
Allergy: doxycycline, ceftriaxone
- Greater than 1 yr's duration (or unknown duration); late latent: benzathine PCN 2.4 mill units weekly x 3 Allergy: ceftriaxone, doxycycline

Treatment of Syphilis

- Neurosyphilis: 10-14 days IV PCN G, 18 - 24 mill. units/day
- If PCN allergic: desensitize or...ceftriaxone probably effective
- In pregnancy, if PCN allergy - must desensitize (though ceftriaxone probably effective)
- Jarish-Herxheimer rxn

Malaria



- appropriate travel hx
- “black water fever”
- speciation by PCR at the CDC
- D/D Babesiosis

Banana
gametocyte: *P.*
falciparum

Babesiosis

(*B. microti*; *B. divergens*)

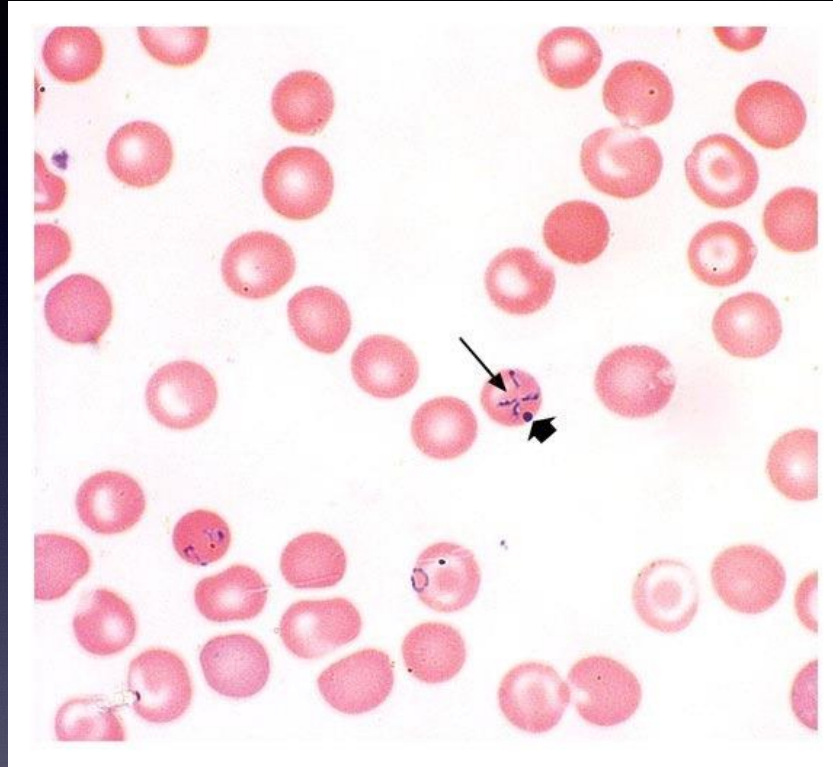
- Non-specific illness w/ headache, myalgia, malaise, fever after travel to coastal northeastern U.S. in late spring, early summer, particularly if hx of tick exposure 1 - 4 weeks earlier; much more severe illness if splenectomized
- Occasionally transmitted by transfusion
- Tick vector: *Ixodes scapularis*
- Reservoir host: white footed mouse
- Note: this same tick also transmits Lyme dx (*Borrelia burgdorferi*) and anaplasmosis. Consider if severe dx or poor response to treatment for these other diseases

Babesiosis*

- Hemolytic anemia, thrombocytopenia
- No rash
- Dx: RBC inclusion bodies ~ malaria on blood smear; however, tetrads (“Maltese cross formations”) NOT seen in malaria
- Dx: PCR
- Rx: atovaquone + azithromycin if mild; IV clindamycin + p.o. quinine +/- exchange transfusion if severe

*Vannier & Krause. NEJM 2012;366: 2397-2407

Babesiosis



Noskoviak K, Broome E. N Engl J Med 2008;358:e19.



The NEW ENGLAND
JOURNAL of MEDICINE

Lyme Disease

(*Borrelia burgdorferi*)



Erythema migrans

Lyme Disease

- > 300,000 cases/yr in U.S.
- Systemic symptoms, rash, joint, CNS involvement
 - erythema migrans > 90%
 - carditis w/ conduction defects <10%
 - various neurologic presentations ~15%
 - cranial neuropathies; esp. **bilateral VII nerve palsey**; meningitis; radiculopathy
- IF chronic disease exists, may be due to immune dysregulation (elevated IL-23 and/or other)
- Prophylaxis: 200mg doxycycline x 1

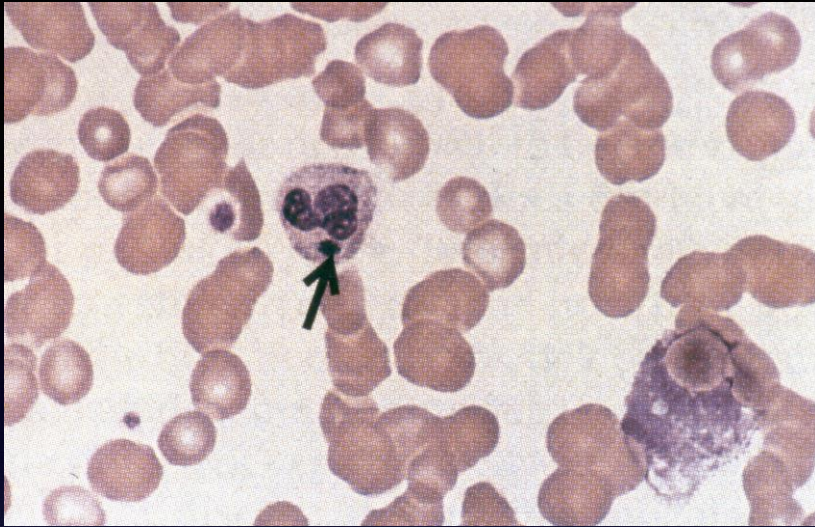
Ehrlichiosis/Anaplasmosis

Human Monocytic Ehrlichiosis:

- E. chaffeensis
- Monocytes
- macrophages of liver, spleen and bone marrow
- S.E, south-central, mid-Atlantic U.S.

Human Granulocytic Anaplasmosis:

- Anaplasma phagocytophilum
- seen on peripheral smear (granulocytes)
- upper-midwest, N.E., California, Europe
- E. ewingii: as above except geography of HME



Ehrlichiosis/Anaplasmosis:

- following tick exposure
- flu-like illness w/ leukopenia,
- thrombocytopenia
- spring/summer
- hyponatremia, elevated LFT's

- Note: “**morulae**” - cytoplasmic inclusions of “elementary bodies”
Common only w/ **anaplasma**
- Diagnosis by PCR, blood smear
- Tx: doxycycline



Treatment

Warning: Questions about treatment failure

Lyme Dx:

- Amoxicillin/cefuroxime
- Ceftriaxone
- Doxycycline

Ehrlichiosis/Anaplasmosis:

- Doxycycline

Babesiosis:

- Atovaquone + azithromycin



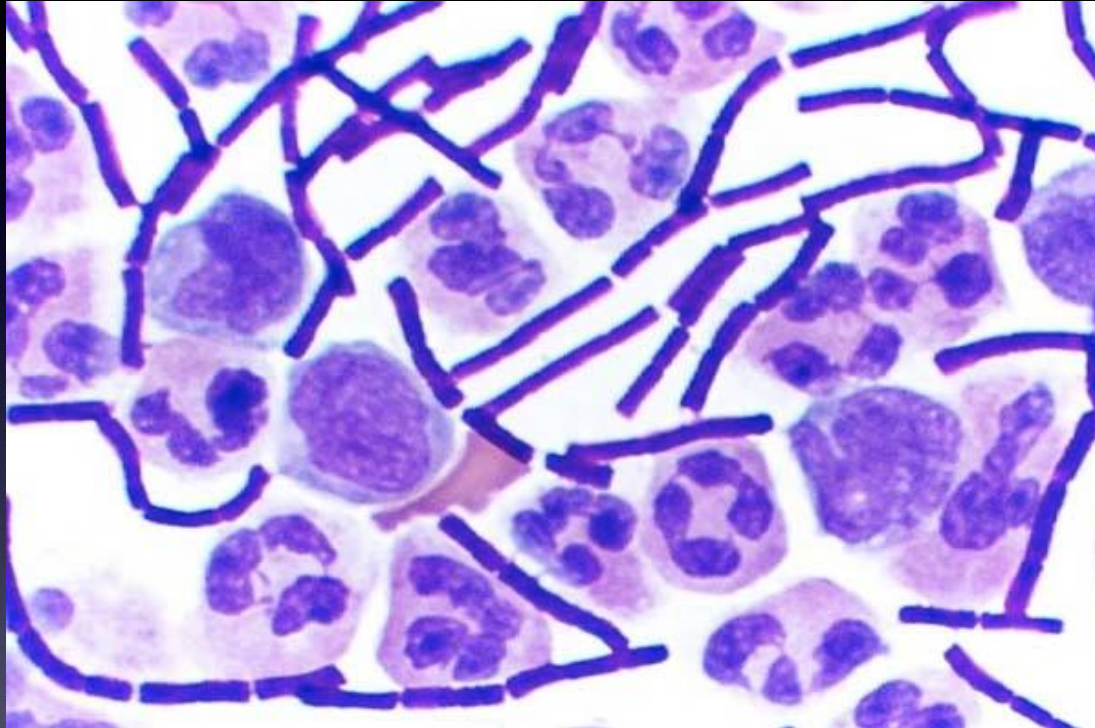
Esfandbod M, Malekpour M. N Engl J Med
2009;361:178-178.

Cutaneous anthrax

- systemically ill
- painless eschar w/ marked, localized edema
- contaminated soil, livestock

Bioterrorism-related Anthrax

- Multiple, previously healthy pts, w/ severe, rapidly fatal, flu-like illness
- “pneumonia” uncommon
- **Widened mediastinum**
- Large hemorrhagic pleural effusions
- Hemorrhagic meningitis
- Tx: penicillin / ciprofloxacin / doxycycline



CSF Gm stain - Anthrax
(JAMA; 2001)

Smallpox

- Severe illness w/ painful, nodular rash
- **Severe back pain**
- All lesions in the same stage
- Rash most prominent on face and extremities, **including** palms and soles

