Micro 443
*Corynebacterium* and *Listeria*

I. General characteristics - *Listeria, Corynebacterium*

Non-sporeforming, Gram-positive rods (sometimes pleomorphic)
Facultative anaerobes
Catalase positive
Characteristics used to differentiate:
- motility
- sugar fermentation pattern
- nitrate reduction
- urease

II. *Corynebacterium* species

Club-shaped, V-formations, palisades, Gram stain irregularly
Non-motile
Widely distributed; mucous membranes/skin of humans and animals
>45 species

*Corynebacterium diphtheriae*

Pathogen - causes the disease diphtheria; colonizes the upper respiratory tract

Virulence is due to an exotoxin
- Inhibits protein synthesis → kills cells
- Causes necrosis (death) of cells in upper respiratory tract pseudomembrane
- Toxin can be distributed systemically to cause life-threatening damage to organs Phage-encoded

Cutaneous diphtheria, occurs primarily in the tropics, is rarely fatal

Vaccine – toxoid; formalin-inactivated

Culture/identification -
- diagnosis is primarily clinical; physician must suspect that the patient has diphtheria and request that a lab “R/O *C. diphtheriae*”

Colony morphology on blood agar
- small, opaque white, may be hemolytic

Selective/differential medium - often contains tellurite; ex. Cystine tellurite blood agar or Tinsdale

*Corynebacterium* species reduce tellurite to tellurium, a black metallic form
(most normal microbiota is inhibited by tellurite)

(Loefflers slant) – Growth of *C. diphth.* is favored so at 16 hrs. it predominates

Gram stain
- Long pleomorphic, club-shaped rods, often in V formation, may stain irregularly
Methylene blue
Polyphosphate granules (particularly from Loefflers)

Suspect colonies are confirmed with biochemical tests
- sugar fermentation pattern
- motility (-)
- nitrate reduction (+)
- urease (-)

Principles of the biochemical tests
- Sugar fermentation - fermentation → acidic endproducts, sometimes gas as well
- Motility: is the organism motile?
- Nitrate reduction: nitrate as a terminal electron acceptor - NO₃ → NO₂ → N₂, others
- Urease: urea hydrolysis → ammonia (basic)

Assaying for toxin production
Elek test - immunodiffusion

treatment of diphtheria
antitoxin
antibiotics

Other Corynebacterium species
Normal microbiota
- Usually ignored unless special circumstance
- Diphtheroids (diphtheria-like), coryneforms

III. Listeria monocytogenes

very common environmental organism
rare cause of meningitis (outbreaks have been foodborne)
Lab must always R/O Listeria when GPR is seen in CSF or blood
populations at risk:
- pregnant women, neonates, elderly, immunocompromised

Culture/identification
Colony morphology on blood agar
Small, translucent colonies; narrow zone of β-hemolysis (can be mistaken for Strep.)
catalase test readily distinguishes between Streptococcus and Listeria

Motile - tumbling, end over end motility
Biochemical tests used for confirmation
- sugar ferments
- motility + umbrella motility
- nitrate reduction (-)
- urease (-)

Treatment
antibiotics