

Diseases due to *Neisseria* spp

Generally two major diseases,
meningitis and gonorrhea

Neisseria

- General Characteristics:
 - Gram-negative diplococci, in pairs, with adjacent sides flattened (kidney-bean shaped)
- Pathogenic *Neisseria* are:
 - *N. meningitidis*
 - meningitis, and meningococemia
 - arthritis, endocarditis & primary pneumonia, purpura fulminans, hemorrhagic skin and gangrene
 - can kill within hours of infection
 - *N. gonorrhoeae*
 - gonorrhea
 - The above are pyogenic (pus forming) and very sensitive to environmental factors.

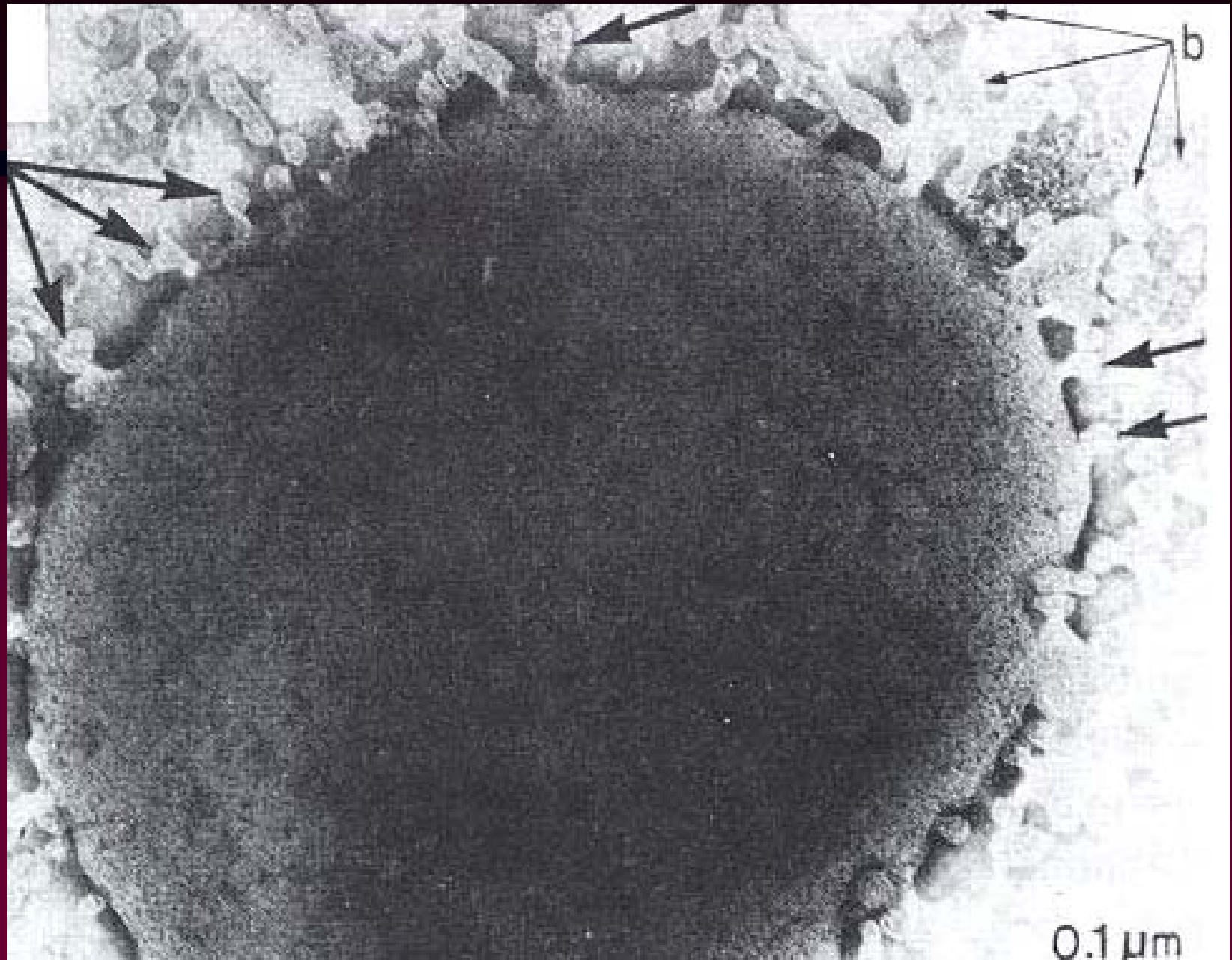
N. meningitidis Disease

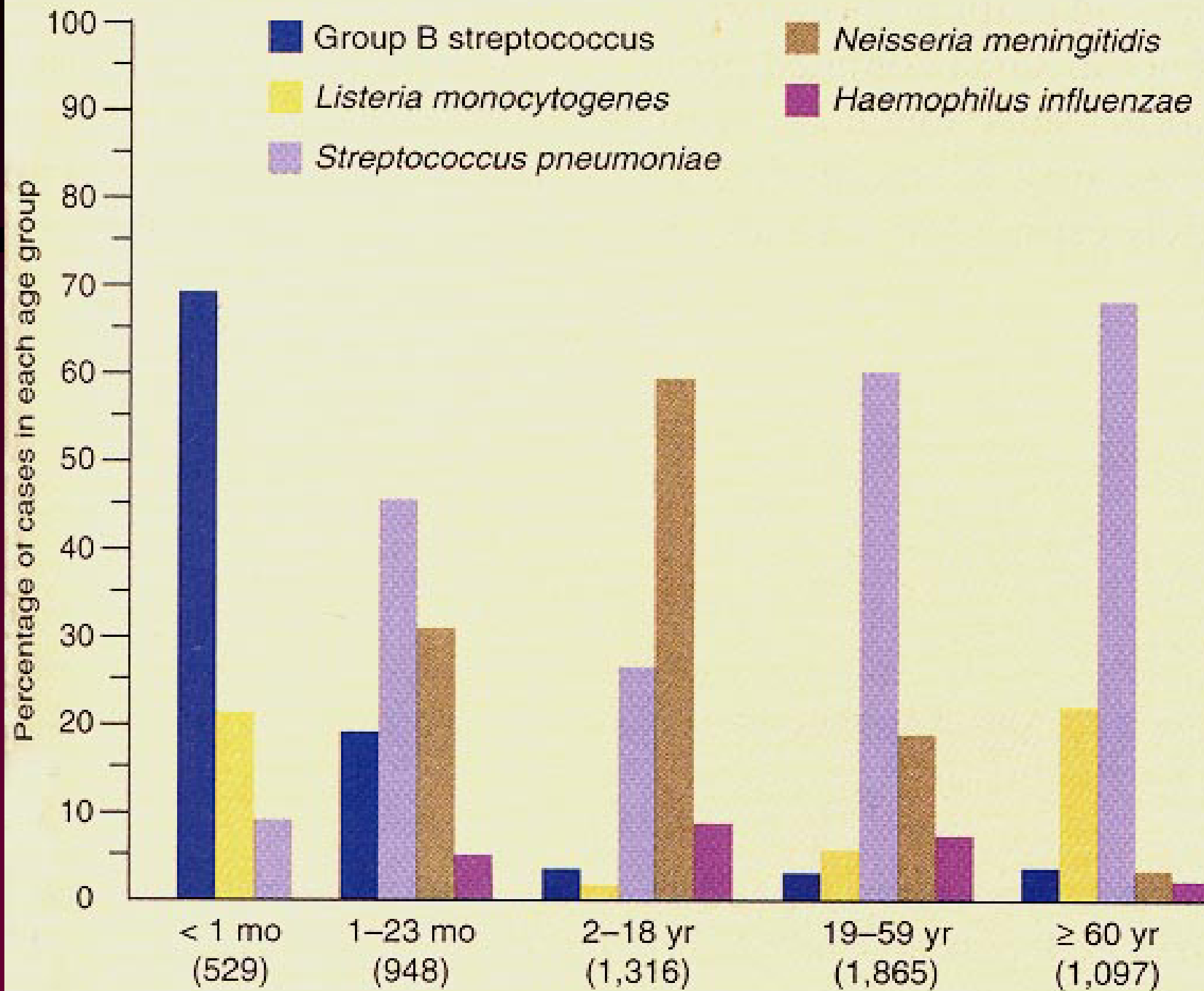
- Virulence factors: capsule and endotoxin
- 13 capsular serotypes; carrier rate is 3-30%
- Carrier rate higher in military personnel
- Disseminated disease (meningococcemia) may occur with or without meningitis
- Meningitis mortality rate may be 100% untreated; 8-10% with treatment
- Transmission is by aerosol droplets; close contact facilitates transmission
- Susceptible age groups: 6-24 mo.; 10-20 yrs.

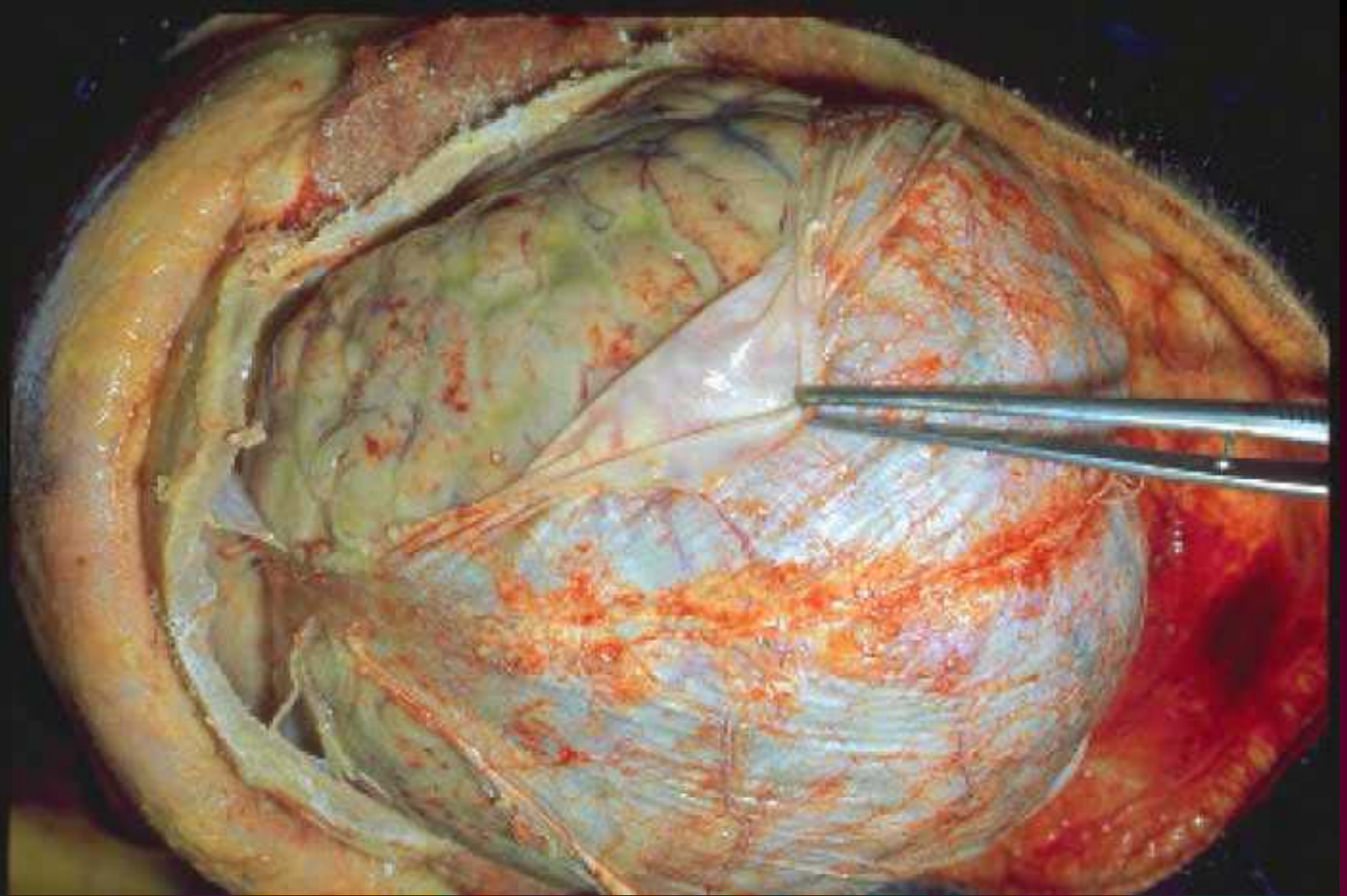
Neisseria Meningitis

- Carrier state in some children, Nearly normal flora
 - Epidemics in schools & military camps
- Nasal invasion to brain
 - invades mucosal cells then blood stream
 - IgA1 protease
- LPS induces intense endotoxemia of brain due to **TNF, IL-1**
 - **fevers, headache, coma, petechia= pathognomonic**
 - **spinal tap confirms**
- Meningococccemia:
 - Vascular collapse with DIC leading to
 - skin petechiae & ecchymoses
 - numerous emboli**
 - Shock**
 - multiple infarcts
 - purpura fulminans
 - May induce death within hours
- Gram smears of CSF
 - typical Gm- diplococci
- Treatment: anti-inflammatory & penicillin

Neisseria meningitidis with hyper-blebbing of LPS

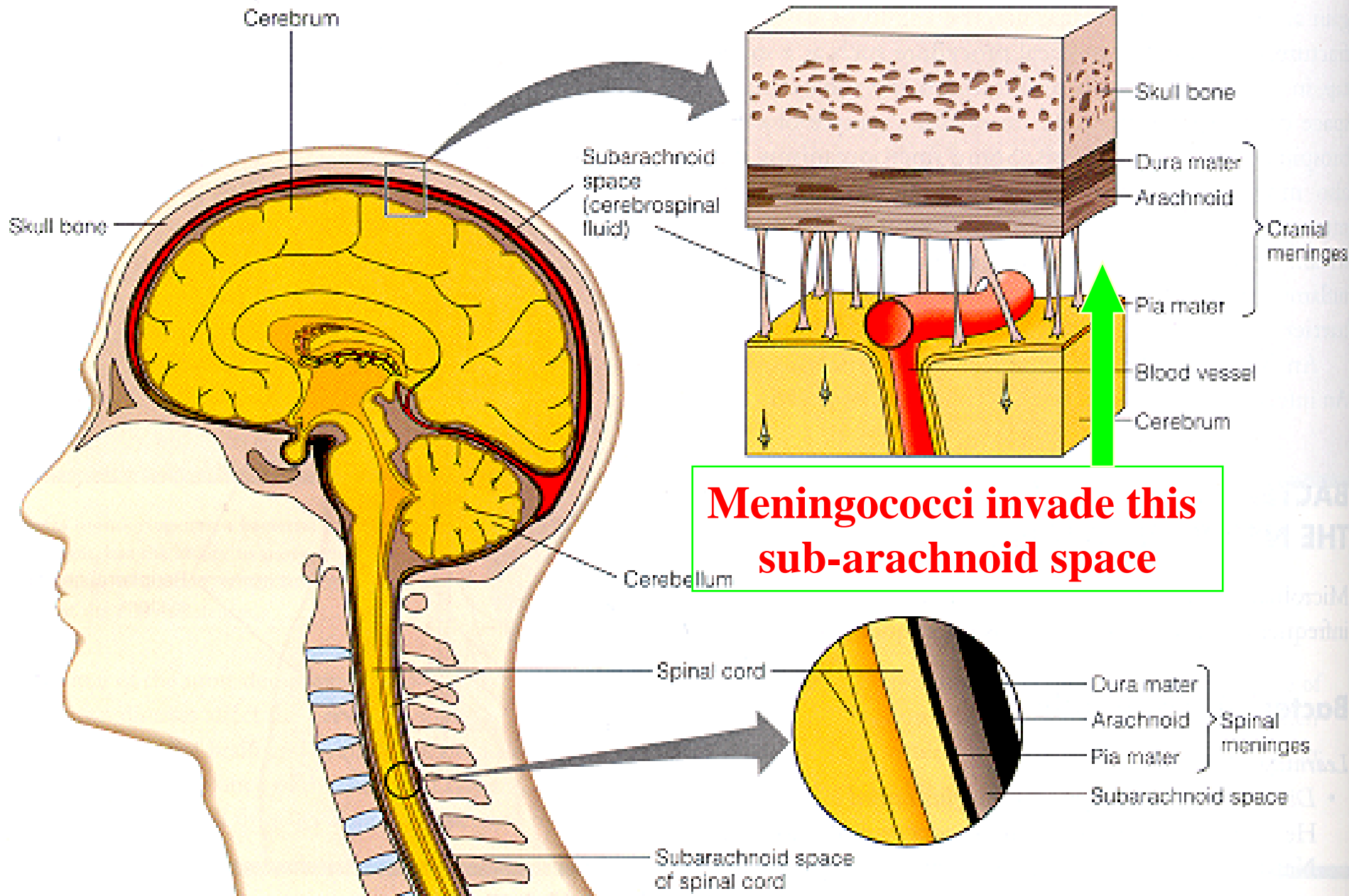




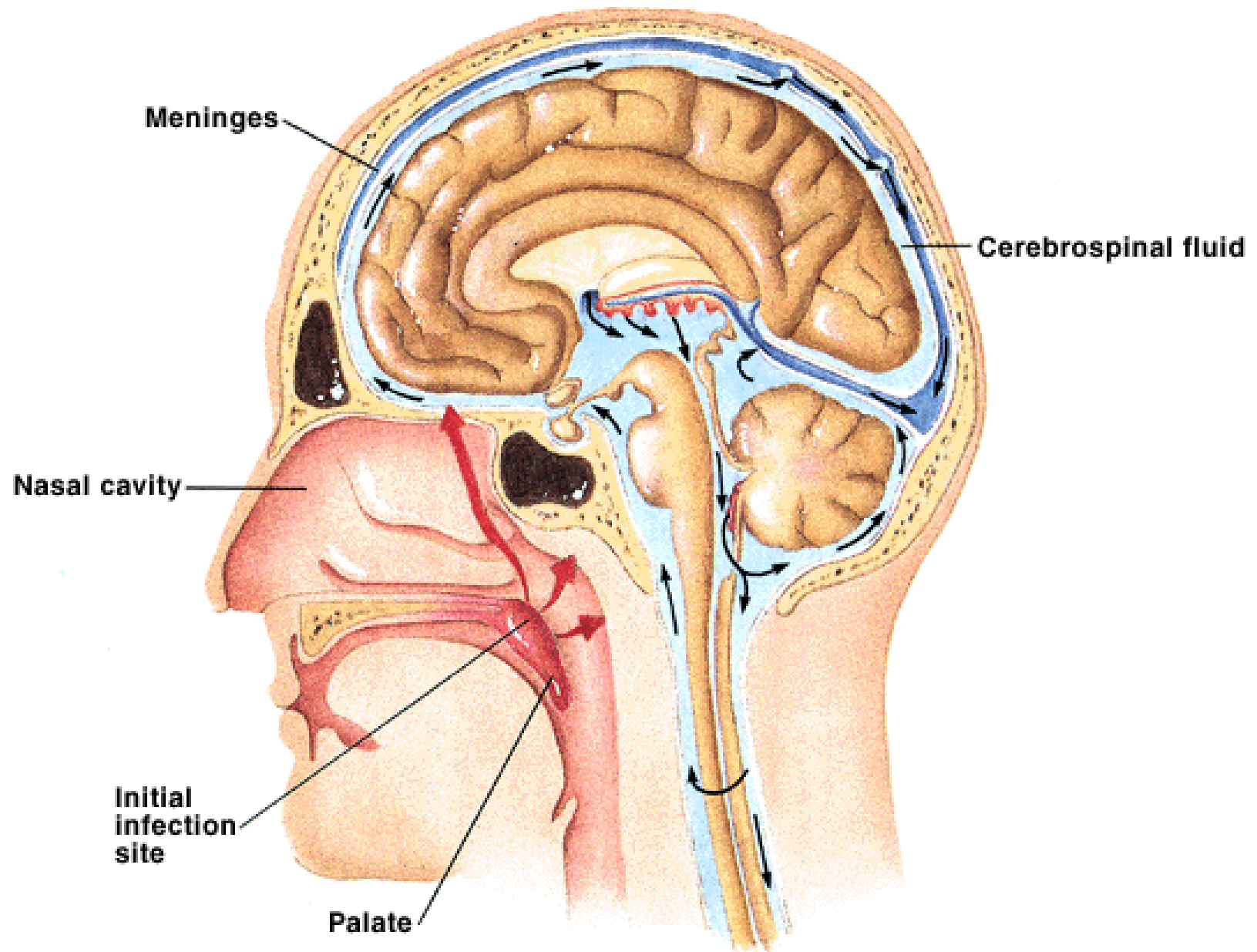


**Pneumococcal meningitis, purulent material below
dura mater due to invasion of brain by
Strept in an alcoholic**

Construction of the CNS



Dissemination of the Meningococcus. Figure 18.27 (T)



Meningococemia showing subcutaneous hemorrhaging



Petechia

Ecchymoses

**Loss of limbs from meningococcal
purpura fulminans**



**Fatal mening
confluent he**

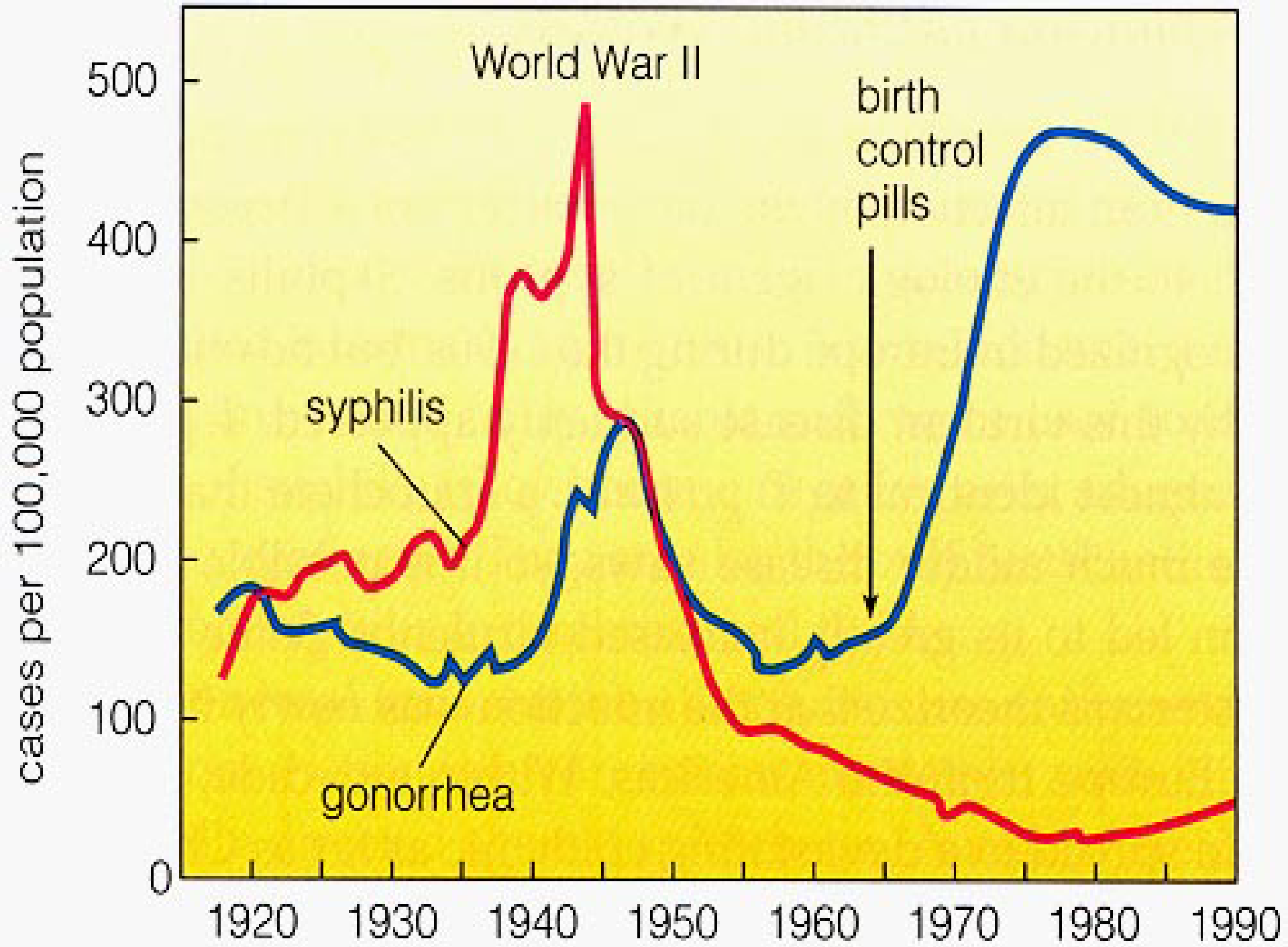




Terminal meningococcal septicemia with DIC and scattered petechiae over abdomen and trunk

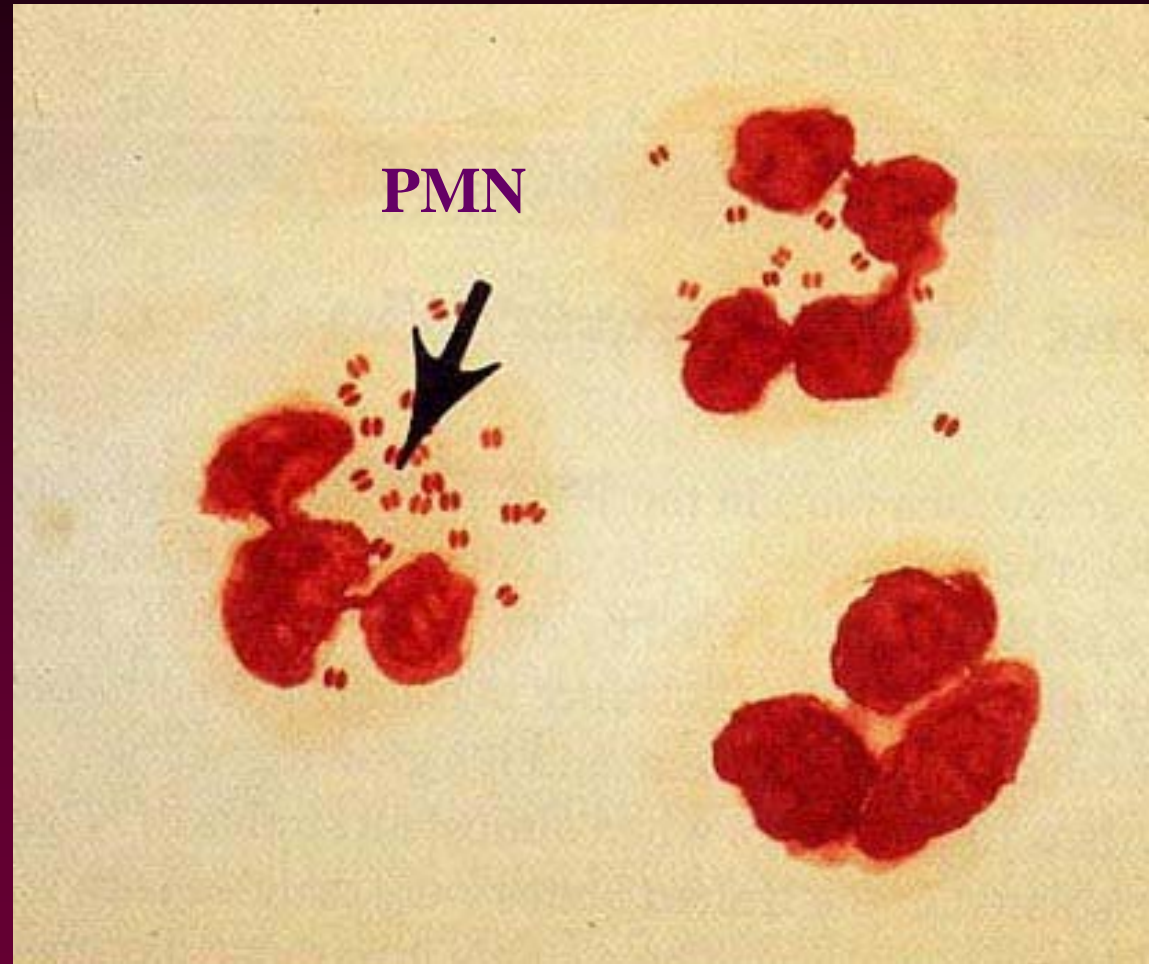
Neisseria gonorrhoeae

- Historical**
- Typical Gm - cocci
 - numerous pili
- 200 per 100,000 (this is high!!)
- annually 1 case per 100 females
- difficult to control*
 - penicillin resistance
- Infection risk:
 - men=20-35%
 - women=60-90%
 - Also spread via anal, oral sexual behavior
- Public apathy is serious problem
 - “its only clap”
 - No. 2 reportable disease in USA
- More symptomatic in males than females
- Not part of normal flora
- *N. gonorrhoeae* are environmentally sensitive
 - no fomite transmission
 - Virulence factors: LPS, IgAase, pili, proteases, etc.



Gonococcal Disease

- Pyogenic (WHAT??)
 - LPS stimulates PMN activity
- pili adhere to columnar epithelium
 - males=urethra
 - females=cervix*
 - invasion thru or between cells
- antigenic variation
 - no vaccine
- mucosal infection not limited to genitals
 - eyes, mouth, anus



Neisseria diplococci in gonorrhea pus

• Urethritis **Gonorrhea in males**

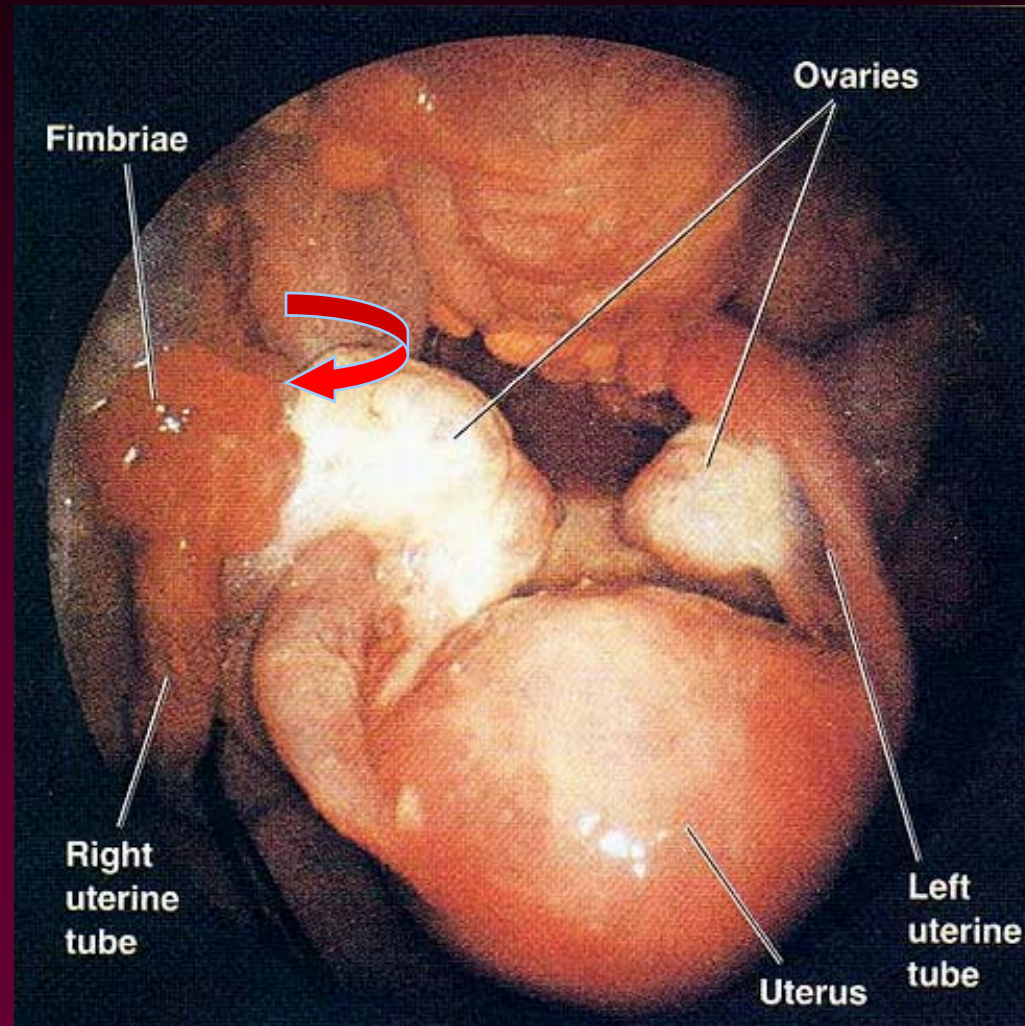
- 2-7 days after infection
 - dysuria*
 - purulent discharge
 - strictures*
- rectal gonorrhea
 - tenesmus*
 - bleeding
 - discharge
 - Disseminated gonococcal Infection
 - septicemia
 - polyarthritits
 - endocarditis
 - conjunctivitis



Urethral discharge, primary symptom

Gonorrhea in Females

- 80% Asymptomatic
- Inflammation of vaginal cervical junction
 - dysuria, abdominal pain, discharge, 50% rectal infection, **PID***
- CMI induces severe scarring of mucosal surfaces
 - Infection may spread to fallopian tubes
 - **salpingitis**
 - **ectopic pregnancies**
 - (20% sterility rate)



Salpingitis in a female (laparoscopy)

Gonorrhea-scared fallopian tube



Sometimes sterility is the first indication of infection

Pelvic inflammatory Disease, PID

- Gonorrhea only one cause
- fever, chronic lower abdominal pain, leukocytosis, salpingitis pelvic abscesses,
- Infertility, ectopic pregnancies, etc.
- 275,000 cases per year in USA
- Other causes: *Chlamydia trachomatis*

Other issues of gonorrhea

- Pharyngeal gonorrhea
 - from oral sex
- Meningitis
- Epididymitis, etc
- 45% penicillin resistance
- In Children*
- Conjunctivitis
 - **Ophthalmia neonatorum**
 - in past major cause of blindness >50%*
 - Silver nitrate or antibiotic treatment for all neonates
- Treatment issues*



Ophthalmia neonatorum in untreated week old child