# Gram Positive Bacilli

## Large gram positive bacilli

***History -> colony -> incubation condition -> gram stains, spore -> (motility) -> API 20A/ref lab***

### Bacillus cereus

**Endophthalmitis– emergency!** (mostly after trauma - intravitreal injection of 1 mg of vancomycin and 2 mg of cefuroxime + topical fortified vancomycin)
Contaminant.
Beta haemolytic colony.
Aerobic.
Spore present, the spore will not distend the bacteria.
Motile.
Put it on a urease slope and incubate 24 hr/35 degC/air – see spore.

### Bacillus anthracis

IVDU, Bioterrorism, Profession (animal related), lab worker.

No beta haemolysis.
Aerobic.
Big chunky GPR, may be in chains. Spore may be present (not distending the organism).
Non motile.
Cat 3, Send to ref lab.
**Management 3/5 drugs**. (Ref to PHE guideline)
New IVDU related cases may not get eschar.
HPU, Infection control, DIPC.

### Clostridium

Foul smelling broth, spreading edge colony.
Anaerobe/ some may be fac an.
Forms spore, which may distend the bacteria. However Cl. perfringens may not form spore in clinical specimens.
**Metronidazole sensitive.**
API 20A.

## Lactobacillus

Alpha haemolytic.
Microaerophilic/fac anerobe.
Could be pleomorphic.
Catalase negative.
Rarely motile.
Vancomycin R.
Vaginal swab : Normal flora.

# Small pleomorphic gram positive rod

***Clinical scenario -> colony -> Catalase -> motility -> (Modified ZN) (Urease) (Aesculin plate) -> API Coryne.***

## Listeria

Fac anaerobe.
Group B strep like colony, flat, tight zone of beta haemolysis.
Catalase positive.
Oxidase negative.
**Put a few colonies in nutrient broth/BHI and keep on the bench for 4 hours.**
**– do hanging drop for tumbling motility.**
Plate a bile aesculine agar.
API coryne.
**Sens – E test**
Immunocompromised, alcoholic, old age, diabetic, paeds, NH resident – outbreak, pregnant.
CNS infection.
In pregnant women produces mild symptom – if suspected ask for BC and start treatment.
HPU.
Amox + gent/cotrimoxazole.

## Corynebacterium

If history suggestive of diphtheria, haemolytic colony (even nonhaemolytic –gravis), send the isolate to ref lab for further testing and toxin testing.
*C diphtheria, ulcerans, pseudotuberculosis* – could be toxigenic .
Suggestive history?–>cat 3 room.
Fac anaerobe.
Non motile.
Catalase +.

PYR neg.
*Ulcerans/pseudotb* : urease +, diphth: urease negative.
*C striatum, jeikium*
Catalase +.
Urease –ve.
API coryne.
CRBSI, prosthesis related infection,immunocompromised, erythrasma.

## Rhodococcus

Usually salmon pink/red colony. (But may not always produce typical colony – e.g. Grayish colony).
CAMP test positive
Pleomorphic – very small bacilli but may present as branched (rudimentary branching) rod as well.
Catalase positive.
Non motile.
Partially acid fast.
API coryne.
R. equi is usually susceptible in vitro to erythromycin, rifampin, flouroquinolones, aminoglycosides, glycopeptides, and imipenem
If having problems with identification– send to ref lab.
Immunocompromised, HIV, necrotising pneumonia.

## Arcanobacterum

Facultative anaerobe.
Beta haemolytic.
Catalase negative.
Non – motile.
API coryne.
Rec/non resolving throat infection.

## Erysipellothrix (young culture)

Fac anaerobic.
Catalase negative,
Non-motile,
Urease negative.
**Vancomycin R.** Penicillin/Ceftriaxone proved to have an effect. Pen allergic patients ciprofloxacin alone or erythromycin in combination with rifampin may be used.

API coryne.
Animal exposure, skin infection, bacteraemia, endocarditis. Sensitivity test is not validated – treat with penicillin/cephalosporin.

**Other similar organism – Do API coryne**

**Rothia** –Fac an, dry/mucoid colony aerobically, spider-like colonyanaerobically, difficult to dislodge, cat +,non motile.

**Aureobacterium** (catalase +, aerobe, vanc R),
**Bifidobacterium** (anaerobe, catalase negative, non – motile),
**Brevibacterium** (Aerobic, catalase +, non-motile),

## Branched/spider like gram positive bacilli

**Clinical history ->Incubation condition ->colony->Catalase -> Indole -> modified AFB -> Plate on SAB -> API 20A/API Coryne -> ref lab (16s RNA).**

**Actinomycetes**

Anaerobic, fac an.
Branched rod (difficult to distinguished from Nocardia by gram stain).
Catalase neg (except canis, viscosus).
Not acid fast.
**Always resistant to metronidazole.**
Spot indole – negative.
API20A.
Patients with actinomycosis require prolonged (6- to 12-month) high doses (to facilitate the drug penetration in abscess and in infected tissues) of penicillin G or amoxicillin, but the duration of antimicrobial therapy could probably be shortened to 3 months in patients in whom optimal surgical resection of infected tissues has been performed.
Mouth, neck infection, abscess, pulmonary involvement, IUCD,canaliculitis.

**Nocardia**

Dry chalky looking colony.
Strictly aerobic.
Catalase positive.
Partially acid fast.
Optional – Plate on SAB, co2/check after 24, 48 –
N asteroid – salmon pink- orange.

N brasiliensis – orange tan.
N otitidiscavurum – pale tan.
N transvalensis – pale tan to purple.
API coryne.
Could be a coloniser of skin/resp tract/lab contaminant – isolation doesn't mean infection (unless sterile site).
Immunocompromised, transplant, IVDU.– invasive disease, pulmonary infection, necrosis, abscess; brain abscess.
Immunocompetent – skin and lymphatic involvement.
Septrin (can also try - amikacin, imipenem, meropenem, ceftriaxone, cefotaxime, minocycline, moxifloxacin, levofloxacin, linezolid, tigecycline, and amoxicillin-clavulanic acid)

**Propionibacterium**
Curved rod, short branch.
Anaerobic but could be aerotolerant.
Catalase positive.
Spot indole positive.
Not acid fast.
**Metronidazole resistant.**
API 20A

Prosthetic joint infection (shoulder). immunocompromised.
Surgical wound infections
Invasive deep seated infections, usually in the setting of implantable devices (eg, pacemakers, shunts, etc) vancomycin + clindamycin
CNS - Empiric initial coverage with vancomycin plus ceftazidime, cefepime, or meropenem would be appropriate.

Other bacteria, which can have similar gram stain appearance

**Corynebacterium,**
**Rhodococcus,**
**Arcanobacterium,**
**Lactobacillus,**
**Erysipelothrix**
**Streptomyces** – aerobic, catalase + (see nocardia), not AFB.Spore may be present.
**Rothia** – could be filamentous on solid media.