Neisseria meningitidis

Workup

Process Improvement Project
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Learning Objectives

After completing this N. *meningitidis* workup training session, the user will be able to:

1- Describe the culture growth conditions for N. *meningitidis*

2- Identify the proper steps required for a suspected N. *meningitidis* culture.

Nature of the problem

Exposure to *Neisseria meningitidis* is a serious hazard in the microbiology laboratory. Medical technologists may become exposed to this pathogen without knowing while working up patient specimens.

The goal of this project is to inform the staff about the proper procedure for handling specimens suspicious of containing *N. meningitidis*.

Ensuring the staff safety was the main reason behind choosing this issue to work on.

The project will address the following points:

- Description of *Neisseria meningitidis* pathogenicity
- Comparison to other morphologically similar organisms
- Breakdown for the procedure

An MTS module will be created with review questions for the staff to complete as part of their mandatory assignments in the lab.

Neisseria meningitidis

- *Neisseria meningitidis* is an opportunistic pathogen which can colonize the mucous membranes of humans and may cause significant infection.
- Medical laboratory technologists are at increased risk of acquiring infections when dealing with *N. meningitidis* isolates.
- Requires 35-37C, with 5-10% CO2 for growth in the laboratory
- Growth on Chocolate, Modified Thayer Martin (MTM) and Blood agars

Neisseria meningitidis

- *Neisseria meningitidis* is a leading cause of bacterial meningitis and sepsis in the United States. It can also cause focal disease, such as pneumonia and arthritis.

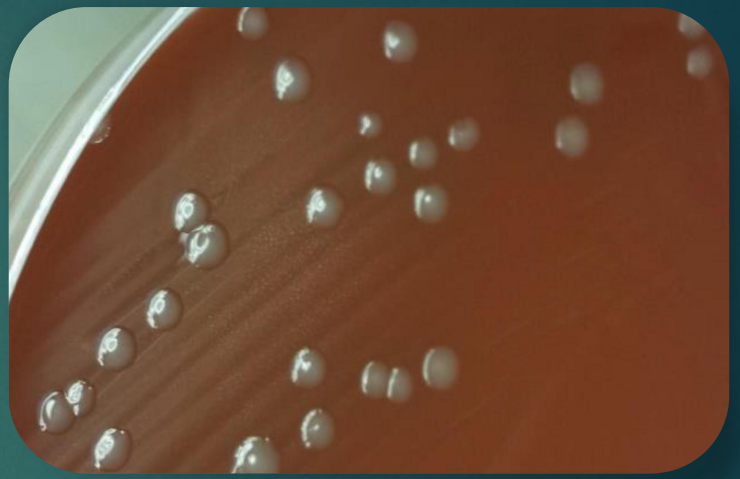
Meningococcal Disease (very serious and can be fatal)

Symptoms include sudden fever, headache, and stiff neck. Other symptoms can include nausea, vomiting, increased sensitivity to light, and confusion.

Morphology

- Chocolate agar

  1-2 mm creamy and gray colonies



- Blood agar

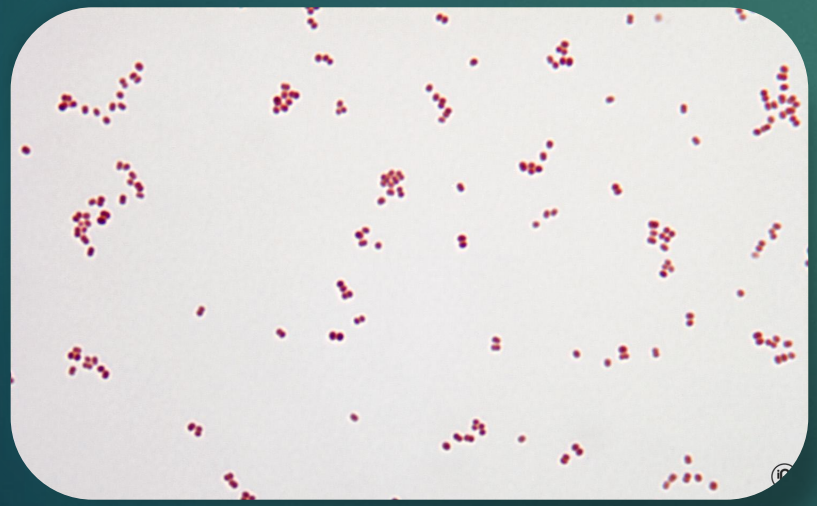
  Grey and non pigmented and appear

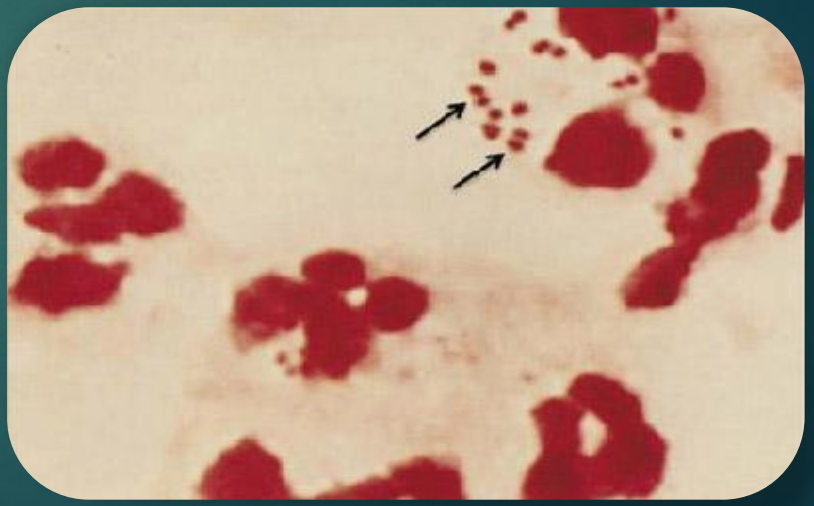
  round, smooth, moist, glistening, and convex

N. gonorrhoeae may have similar morphology on Chocolate agar, but shouldn't grow on blood agar except in rare cases.

Gram Stain

Gram-negative diplococcus
May be seen intracellularly in PMN's





Workup

Suspected colony on Chocolate agar + Growth on blood agar

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Move to BSC hood

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Perform Oxidase test on the suspected organism

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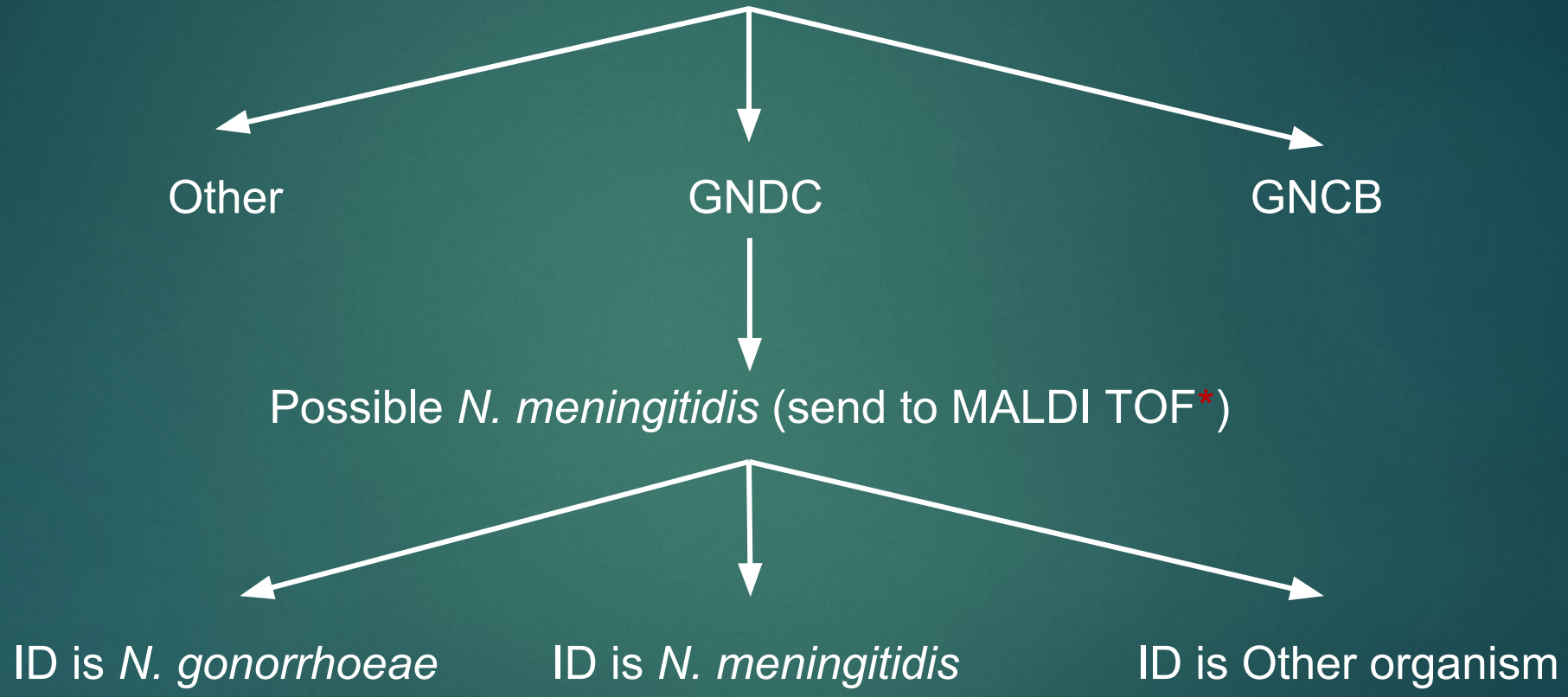
Positive

↓

perform gram stain on the suspected morphology

Workup - continued



- If MALDI is not available, perform RapID NH.

Workup - continued

ID is *N. gonorrhoeae*

↓

Report as presumptive *N. gonorrhoeae* and send to MDHHS

ID is *N. meningitidis*

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Report result according to appropriate procedure. Send to MDHHS only if from sterile site

ID is Other organism

↓

Workup as appropirate

Identification Flowcharts Attachment 10: Gram Negative Diplococci and Gram Negative Coccobacilli

Workup in the RED box must be done in the BSC.[c]

Start Here

Suspect colony growing on Chocolate

- (+) Growth on BAP
  - Oxidase = Positive
    - Gram Stain = Gram Negative Diplococci → POSSIBLE *N. MENINGITIDIS!* Perform MALDI[a].
      - ID = *N. meningitidis* → Report result according to appropriate procedure. Send to MDHHS.[b]
      - ID = *N. gonorrhoeae* → Report as Presumptive *N. gonorrhoeae*. Send to MDHHS[b].
      - ID = Other organism: Work up as appropriate.
    - Gram Stain = Gram Negative Coccobacilli → Possible *Haemophilus* Perform MALDI. Report as appropriate.
    - Gram Stain = Other → Work up as appropriate.
  - Oxidase = Negative Work up as appropriate.
- (-) No Growth on BAP
  - Oxidase = Positive
    - Gram Stain = Gram Negative Diplococci → Possible *N. gonorrhoeae* Perform MALDI.
      - ID = *N. gonorrhoeae*
        - Genital Source: Report as *N. gonorrhoeae*. Send to MDHHS[b].
        - Non-Genital Source: Report as Presumptive *N. gonorrhoeae*. Send to MDHHS[b].
      - ID = Other organism: Work up as appropriate.
    - Gram Stain = Gram Negative Coccobacilli
  - Oxidase = Negative
    - Gram Stain = Gram Negative Coccobacilli → Possible *Haemophilus* Perform MALDI. Report as appropriate.
    - Gram Stain = Other → Work up as appropriate.

KEY

a: Until *N. meningitidis* has been ruled out, the MALDI target must be innoculated with test organism within the BSC hood. Once organism is dry on target, reagents can be added on the bench. All preparation steps of the extractions must be performed in the hood.

b: MDHHS (Michigan Department of Health and Human Services). *N. meningitidis* from sterile sources and all isolates of *N. gonorrhoeae* must be forwarded to MDHHS for confirmatory testing.

c: BSC (Biological Safety Cabinet) must be utilized until *N. meningitidis* is successfully ruled out.

Training Test

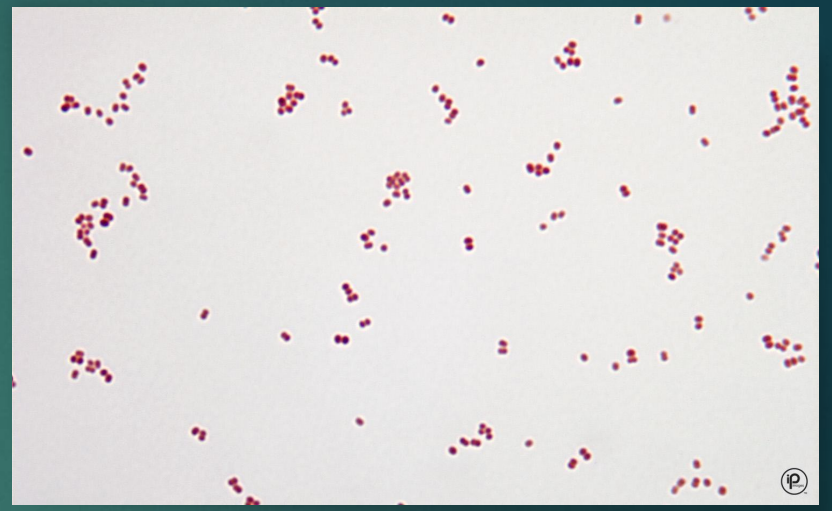
1. The gram stain shown to the right is:

   a. Gram positive diplococci

   b. Gram positive cocci

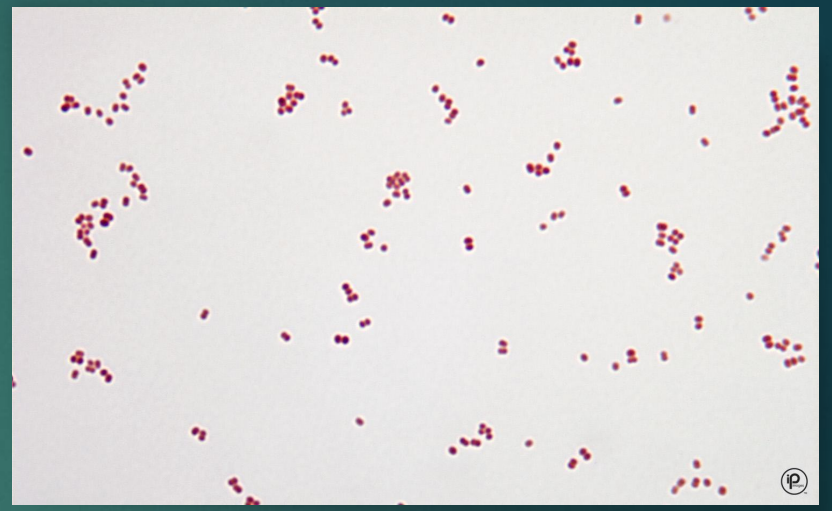
   c. Gram negative diplococci

   d. Gram negative bacilli



Training Test

2. The gram stain shown to the right is suggestive of which organism?



   a. *Neisseria meningitidis*
   b. *Haemophilus influenzae*
   c. *Haemophilus haemolyticus*
   d. *E. coli*

Training Test

3. Growth of suspicious creamy gray colonies noticed on Chocolate agar with similar colonies on blood agar, The next appropriate step a tech should do is:

    a. Re Incubate the plates for an additional day

    b. Perform gram stain

    c. Move the plates to bio safety cabinet (BSC) for processing

    d. Send the suspected organism to MALDI

Training Test

4. *Neisseria meningitidis* should be reported to MDHHS in the following cases:

    a. All the time

    b. Isolated from pediatric patients' specimens

    c. Isolated from sterile sites' specimens

    d. Isolated from urine specimens

Training Test

5. You have a suspected colony growth on chocolate agar in addition to blood agar. The organism is gram negative diplococci oxidase positive. The laboratory technologist sent the specimen to MALDI. The next step the tech should do if the MALDI is not available is:

    a. Send the specimen to MicroScan

    b. Send the specimen to molecular testing

    c. Perform RapID NH test

    d. Report results based on gram stain and morphology