Course: Clinical Analysis

Lecturer: Dr. Weam Saad

Lecture: Sputum Analysis

Sputum Analysis

Sputum is the matter that coughed up from the airways through the mouth, containing mainly saliva mixed with mucus or discharge; the best sputum samples contain very little saliva in order to avoid contamination with oral normal flora. Sputum sample is used for the diagnosis of respiratory tract infections like pneumonia. It is obtained by coughing deeply and expelling the material that comes from the lungs into a sterile cup.

The sputum may have a thick consistency (viscous), appear discolored, yellow, green, gray, rarely rusty or bloody, and may have an unpleasant odor (especially during bacterial respiratory infections). Moreover pus, it may contain WBCs, cellular debris, epithelial cells from mouth.

Types of sputum:

1- Bloody sputum: occurs when sputum mixed with blood e.g. cases of tuberculosis, lung abscess and lung cancer.
2- Rusty sputum: usually caused by pneumococcal bacteria.
3- Purulent sputum: containing pus. The color can be yellow, green or pink depending on the causative pathogen.

There are only two tests ordered for this sample:

1. **Sputum smear**
2. **Sputum culture**

1. Sputum smear

Sputum smears examining after staining with Gram stain, Acid fast stain and others. The pathogenic microorganisms will be diagnosed. Gram stain and acid fast stain methods are most

common used after doing thin smear and stained with gram stain just like any bacterial smear.

2. **Sputum culture**

A sputum culture is ordered when a doctor suspects that a person has a bacterial infection of the lungs or airways, such as bacterial pneumonia, which may show as changes in the lungs as seen on a chest x-ray. The sputum sample is taken and placed in a medium and incubated to let organisms grow. A positive culture may identify disease causative organisms that may help diagnose bronchitis, tuberculosis, a lung abscess, or pneumonia. If pathogenic bacterial growth identified during a sputum culture, then antimicrobial susceptibility test is usually performed so that the appropriate antibiotics can be prescribed.

The most common pathogens isolated from respiratory tract infections sputum culture include:

☒ **Bacteria**

- *Mycobacterium tuberculosis* (tuberculosis)
- *Streptococcus pneumoniae* (pneumococcus).
- *Staphylococcus aureus*
- *Haemophilus influenzae*
- *Moraxella catarrhalis*
- *Klebsiella pneumoniae*
- *Streptococcus pyogenes*
- *Chlamydia pneumonia*
- *Legionella species*

☒ **Fungi**

- *Cryptococcus neoformans*

☒ **Viruses and parasites** cannot be isolated during routine culture for sputum samples.

The Normal flora that can contaminate sputum culture may be bacteria e.g. *Streptococcus viridans, Staphylococcus epidermidis* and fungi e.g. *Actinomycetes.*