

Introduction to pyogenic infection

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Pyogenic infection

- Infections of soft tissue are associated with production of pus called pyogenic infection.
- Infection occurs when they evade the host defense, replication of a large numbers of microorganism and attack the host tissues.
- Pyogenic bacteria involved in the formation of pus or postules at the site of abscesses or any types of inflammation.
Pyogenic bacteria may be either Gram negative or Gram positive, aerobes or facultative aerobes.

Pus

The pigmentation of bacteria determines the color of the pus.

- **Pus** is an exudate, typically white-yellow, yellow, or yellow-brown, formed at the site of inflammation during bacterial or fungus infection.
- An accumulation of pus in an enclosed tissue space is known as an abscess, whereas a visible collection of pus within or beneath the epidermis is known as a pustule or pimple .

Pus consists of a thin, protein-rich fluid and dead leukocytes from the body's immune response (mostly neutrophils).

Although pus is normally of a whitish-yellow, changes in the color can be observed under certain circumstances.

Pus is sometimes green because of the presence of myeloperoxidase, an intensely green antibacterial protein produced by some types of white blood cells. Green, foul-smelling pus is found in certain infections of *Pseudomonas aeruginosa* and the greenish color is a result of the bacterial pigment pyocyanin that it produces.

Amoebic abscesses of the liver produce brownish pus. Pus from anaerobic infections can more often have a foul odor.

Pyogenic bacteria:

A great many species of bacteria may be involved in the production of pus. The most commonly found include:

Staphylococcus aureus

Staphylococcus epidermidis

Streptococcus pyogenes

Escherichia coli

Streptococcus pneumoniae

Klebsiella pneumoniae

Salmonella typhi

Pseudomonas aeruginosa

Neisseria gonorrhoeae

Actinomyces

Burkholderia mallei

Mycobacterium tuberculosis



Infection by pus-producing organisms, are most commonly species of Staphylococcus or Streptococcus

-The Surgical or accidental wounds have a tendency to be infected by *S.aureus*, a common multiple drug resistant bacteria in hospital settings.

Pyogenic infection caused by *Staphylococcus aureus*:

1-Impetigo

- Impetigo is a superficial skin infection caused mainly by staphylococci and, less often, streptococci or a combination of both bacteria. The disease is common and more prevalent in children.
- There are two variants of the disease: Nonbullous impetigo and bullous impetigo.
- Staphylococci have been the cause of bullous impetigo and group A streptococci are most frequently the causative organisms in nonbullous impetigo.



In staphylococcal bullous impetigo, small breaks in the skin allow the onset of infection with the formation of blisters caused by staphylococcal exfoliative toxins produced on site.

The disease affects children, most often in the face and legs; however, it can also involve other areas.

Lesions begin as erythematous maculae that progress to superficial blisters with serous content. These blisters rupture easily, leading to the formation of thin, smooth, honey-colored crusts, similar to a coating film, which, upon scaling, do not leave scars. The lesions are small, multiple and in various stages of development.

Staphylococcal bullous impetigo does not jeopardize the general health of the individual, and fever is only present when there are multiple lesions. Locally, there is minor discomfort and itching may occur.



Impetigo

2- Cutaneous abscesses.

-Cutaneous abscesses are collections of pus within the dermis and deeper skin tissues. They are usually painful, tender, and fluctuant red nodules, often surmounted by a pustule and surrounded by a rim of erythematous swelling.

-Cutaneous abscesses are typically polymicrobial, containing bacteria that constitute the normal regional skin flora, often combined with organisms from adjacent mucous membranes. *S. aureus* is present, usually as a single pathogen, in only ~25% of cutaneous abscesses overall.

3- Folliculitis

- Folliculitis is inflammation of the hair follicle caused by infection, chemical irritation or physical injury. It is histologically defined by the presence of inflammatory cells in the inner wall and ostium of the hair follicles, creating a follicular pustule. The inflammation may be superficial, confined to the upper portion of the hair follicle or extend to the entire hair follicle.
- Infection of the hair follicle is probably the most common form of skin infection, and it affects all ages; however, when the host's immune system is weak, the process can be triggered by other microorganisms such as coliform bacilli and coagulase-negative staphylococci.



folliculitis

4- Furuncles and carbuncles.

- Furuncles (or “boils”) are infections of the hair follicle, usually caused by *S. aureus*, in which suppuration extends through the dermis into the subcutaneous tissue, where a small abscess forms.
- They differ, therefore, from folliculitis, in which inflammation is more superficial and pus is present in the epidermis.
- Furuncles can occur anywhere on hairy skin. Each lesion consists of an inflammatory nodule and an overlying pustule through which hair emerges. When infection extends to involve several adjacent follicles, producing a coalescent inflammatory mass with pus draining from multiple follicular orifices, the lesion is called a carbuncle.
- Carbuncles tend to develop on the back of the neck and are especially likely to occur in diabetic persons.



Boils

Lab. diagnosis

- Pus samples were collected from the patients in sterile syringe and test tube.
- Information was obtained from each patient regarding age, sex, occupation, place where they live in.
- The bacterial count was performed by standard method.
- The bacterial identification will proceeded by Gram staining, urease test, citrate utilization test, indole test, Kligler iron agar test, methyl red, voges proskauer and motility test.



Thank you