

SKIN INFECTIONS

Infections of the skin can result from:

1. Microbial invasion from an external source
2. Organisms reaching the skin through the bloodstream as part of a systemic disease.

Blood-borne involvement is **evidenced by rashes** in many viral and bacterial infections, such as measles and secondary syphilis, or may yield more **chronic granulomatous skin lesions** in blastomycosis, tuberculosis, and syphilis. Skin lesions remote from sites of infection can be produced by some **bacterial toxins**, such as the pyrogenic exotoxins of group A streptococci and *Staphylococcus aureus*. They can also result from immunologic responses to microbial antigens that have reached the skin.

Systemic bacterial diseases with rashes or cutaneous lesions.

1. Scarlet fever/*Strep. pyogenes*. Clinical symptoms are a fine sand paper body rash with pharyngitis with or without nausea.
2. Toxic shock syndrome (TSS)/ *S aureus*. Case definition requires the presence of a diffuse macular rash that desquamates, especially on extremities. Streptococcal TSS may also have rash.
3. Petechial rash (Petechia is a spot on your skin that may be red to purple in color) with septicemia with either *N. meningitides* or *N. gonorrhoeae*.
4. Secondary syphilis. Mucocutaneous lesion cover all surfaces including palms and soles.

Impetigo: this infection of the epidermis often starts with bug bites or eczematous lesions. Its caused by:

1. *S aureus* which is characterized by bullae (fairly large fluid- filled vesicular lesions)
2. *Strept pyogenes* which is characterized by lesions that have an old varnished appearance also described as honey crusted.
3. Commonly, mixed infections of the two.

Folliculitis: is a minor infection of the hair follicles and is usually caused by *S. aureus* and *Pseudomonas aeruginosa*.

Furuncles/ Carbuncles: commonly called boils; often start with an infected hair follicle. Carbuncles are the larger, coalescing aggregates of boils.

Erysipelas and cellulitis.

Erysipelas is a painful cellulitis involving **blockage of the dermal lymphatics** so lesions have sharp raised borders. **Cellulitis** is infection of the deeper dermis and subcutaneous fat. Cellulitis may develop on any location on the body and may be infected by many different bacteria, where erysipelas is normally just caused by streptococcus pyogenes as well as merely developing in the face and legs.

WOUND INFECTIONS

Wounds subject to infection can be surgical, traumatic, or physiologic. The latter include the endometrial surface, after separation of the placenta, and the umbilical stump in the neonate. Traumatic wounds comprise such diverse damage as deep cuts, compound fractures, frostbite necrosis, and thermal burns.

Sources of infection include (1) the patient's own normal flora; (2) material from infected individuals or carriers that may reach the wound on fomites, hands, or through the air; and (3) pathogens from the environment that can contaminate the wound through soil, clothing, and other foreign material.

Trauma: Clostridium, Enterobacteriaceae, Pseudomonas aeruginosa

Surgical: Staphylococcus aureus, Enterobacteriaceae, Group A streptococci

Burns: Pseudomonas aeruginosa, Staphylococcus aureus, Enterobacteriaceae

EYE INFECTIONS

Ocular infections can be divided into those:

- That primarily involve the external structures— eyelids, conjunctiva, sclera, and cornea.
- Those that involve internal sites.

The major **defense mechanisms** of the eye are the **tears and the conjunctiva**, as well as the **mechanical cleansing** that occurs with blinking of the eyelids. **The tears** contain secretory **IgA and lysozyme**, and the **conjunctiva** possesses numerous **lymphocytes, plasma cells, neutrophils, and mast cells**, which can respond quickly to infection by inflammation and production of antibody and cytokines. **The internal eye** is protected from external invasion primarily by the physical barrier imposed by the **sclera and cornea**. If these are breached (eg, by a penetrating injury or ulceration), infection becomes a possibility. In addition, **infection may reach the internal eye via the blood-borne route to the retinal arteries and produce chorioretinitis and/or uveitis. Such infections are a particularly common problem in immunocompromised patients.** Other causes of inflammation of the external or internal eye can involve autoimmune or allergic mechanisms, which may be provoked by infectious agents or diseases such as rheumatoid arthritis.

Blepharitis is an acute or chronic inflammatory disease of the eyelid margin. Mainly caused by *Staphylococcus aureus*

Dacryocystitis is an inflammation of the lacrimal sac. Mainly caused by *Streptococcus pneumoniae, S. aureus*

Conjunctivitis (S. pneumonia) is a term used to describe inflammation of the conjunctiva; it may extend to involve the eyelids, cornea (**keratitis/ Haemophilus influenzae**).

Ophthalmia neonatorum is an acute, sometimes severe, conjunctivitis or keratoconjunctivitis of newborn infants. (*N. gonorrhoeae, Chlamydia trachomatis*)

EAR INFECTIONS

Otitis and sinusitis are commonly caused by normal flora (NF). Since the bacteria do not travel through the bloodstream to reach the middle ear or sinuses, capsules are not a required virulence factor.

Pediatric pneumococcal and Haemophilus vaccinations have only slightly reduced the incidence of acute otitis media. (Nonencapsulated H. influenzae is part of normal oropharyngeal flora.)

Agents:

- A. *Strep. pneumoniae* and *H. influenzae*.
- B. *Moraxella catarrhalis* is a Gram-negative diplococcus (microscopically indistinguishable from *Neisseria*) found in the normal oropharyngeal flora.
- C. Less commonly, *Strep. pyogenes* and *Staph. aureus*.

Disease: Otitis media:

Following viral ear infection, inflammation often causes blockage of sinus or eustachian tube, allowing fluid to accumulate that serves as a lush growth medium for NF whose bacterial growth creates pressure and pain.

Dental Disease

Dental plaque/Viridans streptococci.

Features:

1. Alpha-hemolytic streptococci neither inhibited by optochin nor bile soluble.
2. Normal oral flora.
3. The most common species are *Streptococcus salivarius*, *Streptococcus mutans*, *Streptococcus mitis*, and *Streptococcus sanguis*.

Disease: dental plaque:

1. *Strep. mutans* (a major player) secretes dextran and levan capsules which fix the bacteria to teeth dental enamel, facilitating destruction of enamel and dissolution of underlying dentin. 2. If not treated (removal and filling), this invasion ultimately provides access to the tooth root and bloodstream with a high risk of serious infections, including endocarditis.

