**IQRA NATIONAL UNIVERSITY**

**DEPARTMENT OF ALLIED HEALTH SCIENCES**

**Final-Term Examination 2020**

**Course Title: microbiology and pathology DPT 4th Instructor: Dr. Imran khan**

**Time: 6 hours Total Marks: 50**

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Q1. What do you know about healing and repair. Explain (15)

**Answer:**

* **Healing :-**

*Healing* is usually a tissue response

(1) to a wound (commonly in the skin)

 (2) to inflammatory processes in internal organs

(3)to cell necrosis in organs incapable of regeneration

**Wound Healing:-**

* Cutaneous wound healing is divided into three phases
* Inflammation (early and late)
* Granulation tissue formation and epithelialization
* Wound contraction ,ECM deposition and remodeling.

**Healing by First Attention:-**

* Clean, surgical incision or other clean narrow cut
* Focal disruption of epithelial basement membrane with little cell damage
* Regeneration dominates fibrosis
* Scabbing with fibrin-clotted blood
* Neutrophils migrate to edges
* Epidermis becomes mitotic and deposits ECM
* Macrophages replace neutrophils
* Vascularization and collagen deposition fills gap

Contraction of collagen minimizes epidermal regeneration.

**Healing By 2nd Attention:-**

* Larger area of tissue injury such as abscess, ulcer, infarction that destroys ECM
* Large clot or scab with fibrin and fibronectin fills gap
* Larger volume of necrotic debris must be removed by more neutrophils and macrophages
	+ Opportunity for collateral damage by phagocytes
* Scar tissue formed from vascular cells, fibroblasts, and myofibroblasts
* Contraction of myofibroblasts distorts tissue

More prone to infection.

 **Wound Contracture:-**

* Formation of a network of actin containing fibroblasts at the edge of the wound.
* Permanent wound contraction requires the action of myofibroblasts.

Contraction of these cells at the wound site decreases the gap between the dermal edges of the wound.

**Factors of wound Healing :-**

 **Local factors:**

* Type, size, location of wound
* Apposition, lack of movement Infection:
* Suppuration, Gangrene,
* Tetanus(Secondary hæmorrhage)
* Blood supply: Arterial, Venous
* Foreign material: dirt, glass, sutures, necrotic tissue.

**General Factors:**

* Age
* General state of health
* chronic diseases e.g. diabetes, rheumatoid arthritis etc.
* Drugs (n.b. steroids) and hormones
* General cardiovascular status
* General dietary deficiencies e.g. protein
* Specific dietary deficiencies.
* Vitamin C sulphur-containing amino acids

**Complications**:-

Inadequate formation of granulation tissue.

**Wound dehiscence**

Rupture of a wound is most common after abdominal surgery and is due to increased abdominal pressure.

Vomiting, coughing , ileus.

**Delayed wound Healing:-**

The most common cause of delayed wound healing is infection, foreign bodies in the wound, mechanical factors, nutritional deficiencies or excess corticosteroids.

* **Repair:-**

Repair may restore some original structures but can cause structural derangements.

Repair is the process by which lost or destroyed cells are replaced by viable cells

Two process:

1. Regeneration
2. Replacement by connective tissue i.e. fibrosis

Regeneration results in the complete restitution of lost or damaged tissue;

 Repair may restore some original structures but can cause structural derangements. In healthy tissues, healing, in the form of regeneration or repair, occurs after any insult that causes tissue destruction, and is essential for the survival of the organism.

**Normal control of Cell Repair:-**

* **Labile cells:** continue to proliferate throughout life : squamous, columnar, transitional epithelia; hematopoietic and lymphoid tissues, oral cavity. Vagina, cervix, ducts draining exocrine organ, uterus, fallopian tubes, urinary tract
* They can regenerate after injury
* **Stable cells:** retain the capacity of proliferation but they don’t replicate normally: parenchymal cells of all glandular organs & mesenchymal cells, lever, kidney , pancreases. Endothelial cell
* They have limited capacity to regenerate
* **Permanent cells**: cannot reproduce themselves after birth: neurons, cardiac muscle cells

Injury is irreversible and cause scare formation.

**Repair By Connective Tissue / Scar Formation:-**

Following are the condition in which tissue repair is achieved by scar formation

1. when resolution( recovery) fails to occur in an acute inflammation

Then parenchymal cell necrosis cannot be repaired by generation because:

* + Necrotic cells are permanent
	+ Stable cells are destroyed
	+ Necrosis is so extensive that no cell are available for regeneration

Three processes that participate in the formation of a scar:

* (1) *emigration and proliferation of fibroblasts in the site of injury*
* (2) *deposition of ECM*
* (3) *tissue remodeling*

**Remolding Of Connective Tissue :-**

* After its synthesis and deposition, the connective tissue in the scar continues to be modified and remodeled
* *The degradation of collagens and other ECM components is* *accomplished by a family of matrix metalloproteinases (MMPs),* which are dependent on zinc ions for their activity.
* Contraction and strengthen:

It is the final phase of scare formation. Contraction decrease the size of scare and enable the surviving cells of the organ to function with maximum effectiveness.

**Control of Repair:-**

Poorly understood.

* Angiogenesis
	+ Various angiogenic cytokines, e.g. VEGF, bFGF ...
* Fibrosis
	+ various pro-fibrotic cytokines, e.g. TGF beta, PDGF, ...
* Limitation of fibrosis and remodelling

Hardly anything known!

**Complications:-**

* Insufficient fibrosis:
	+ Wound dehiscence; hernia; ulceration
* Excessive fibrosis:
	+ Cosmetic scarring; hypertrophic scars; keloid
* Excessive contraction:

Limitation of joint movement (Contractures); obstruction of tubes & channels (Strictures)

Q2. What are hemodynamic disorders? Explain any 3 (10)

**Answer:**

**Hemodynamic Disorders:**

The health and well-being of cells & tissues depend not only on an intact circulation to deliver nutrients but also on normal fluid hemostasis. This chapter reviews the major disturbances involving the hemodynamic system.

**Hemorrhage:-**

[brain hemorrhage](https://www.webmd.com/brain/brain-hemorrhage-bleeding-causes-symptoms-treatments) is a type of [stroke](https://www.webmd.com/stroke/default.htm). It's caused by an [artery](https://www.webmd.com/heart/picture-of-the-arteries) in the [brain](https://www.webmd.com/brain/picture-of-the-brain) bursting and causing localized bleeding in the surrounding tissues. This bleeding kills [brain](https://www.webmd.com/brain/ss/slideshow-concussions-brain-injuries) cells.

Top of Form

Bottom of Form

When blood from trauma irritates [brain](https://www.webmd.com/brain/video/brain-training) tissues, it causes swelling. This is known as cerebral [edema](https://www.webmd.com/heart-disease/heart-failure/edema-overview). The pooled blood collects into a mass called a [hematoma](https://www.webmd.com/skin-problems-and-treatments/guide/bruises-article). These conditions increase pressure on nearby brain tissue, and that reduces vital blood flow and kills brain cells.

Bleeding can occur inside the brain, between the brain and the membranes that cover it, between the layers of the brain's covering or between the skull and the covering of the brain.

**Causes:-**

* [**Head trauma**](https://www.webmd.com/fitness-exercise/guide/head-injuries-causes-and-treatments). Injury is the most common cause of bleeding in the brain for those younger than age 50.
* [**High blood pressure**](https://www.webmd.com/hypertension-high-blood-pressure/default.htm). This chronic condition can, over a long period of time, weaken blood vessel walls. Untreated [high blood pressure](https://www.webmd.com/hypertension-high-blood-pressure/ss/slideshow-hypertension-overview) is a major preventable cause of brain hemorrhages.
* [**Aneurysm**](https://www.webmd.com/heart-disease/understanding-aneurysm-basics). This is a weakening in a blood vessel wall that swells. It can burst and bleed into the brain, leading to a [stroke](https://www.webmd.com/stroke/ss/slideshow-stroke-overview).
* **Blood vessel abnormalities**. (Arteriovenous malformations) Weaknesses in the blood vessels in and around the brain may be present at birth and diagnosed only if symptoms develop.
* **Amyloid angioplasty**. This is an abnormality of the blood vessel walls that sometimes occurs with aging and [high blood pressure](https://www.webmd.com/hypertension-high-blood-pressure/hypertension-assessment/default.htm). It may cause many small, unnoticed bleeds before causing a large one.
* **Blood or bleeding disorders**. [Hemophilia](https://www.webmd.com/a-to-z-guides/understanding-hemophilia-basics) and [sickle cell anemia](https://www.webmd.com/webmd/consumer_assets/controlled_content/healthwise/major/sickle_cell_disease-topic_overview_major_hw254176.xml) can both contribute to decreased levels of blood platelets.
* [**Liver**](https://www.webmd.com/digestive-disorders/picture-of-the-liver)**disease**. This condition is associated with increased bleeding in general.
* [**Brain tumors**](https://www.webmd.com/cancer/brain-cancer/brain-tumors-in-adults)**.**

**Symptoms:-**

* [Weakness](https://www.webmd.com/webmd/consumer_assets/controlled_content/healthwise/symptom/Weakness_and_Fatigue-Topic_Overview.xml) in an arm or leg
* [Nausea](https://www.webmd.com/children/ss/nausea-vomiting-remedies-treatment) or [vomiting](https://www.webmd.com/digestive-disorders/digestive-diseases-nausea-vomiting)
* Decreased alertness; lethargy
* Changes in [vision](https://www.webmd.com/eye-health/default.htm)
* Tingling or numbness
* Difficulty speaking or understanding speech
* Difficulty swallowing
* Difficulty writing or reading
* Loss of fine motor skills, such as hand tremors
* Loss of coordination
* Loss of balance
* An abnormal sense of taste
* Loss of consciousness

**Treatment:-**

Treatment depend on which part of brain is affected based on your symptoms.

Doctors may run a variety of imaging tests, such as a [CT scan](https://www.webmd.com/webmd/consumer_assets/controlled_content/healthwise/medicaltest/computed_tomography_ct_scan_of_the_body_medicaltest_hw233596.xml), which can reveal [internal bleeding](https://www.webmd.com/first-aid/internal-bleeding-causes-signs) or blood accumulation, or an [MRI](https://www.webmd.com/webmd/consumer_assets/controlled_content/healthwise/medicaltest/magnetic_resonance_imaging_mri_medicaltest_hw214278.xml). A neurological exam or [eye exam](https://www.webmd.com/eye-health/eye-tests-exams), which can show swelling of the optic nerve, may also be performed

Treatment for bleeding in the brain depends on the location, cause, and extent of the hemorrhage. Surgery may be needed to alleviate swelling and prevent bleeding. Certain [medications](https://www.webmd.com/drugs/index-drugs.aspx) may also be prescribed. These include painkillers, corticosteroids, or [diuretics](https://www.webmd.com/hypertension-high-blood-pressure/guide/diuretic-treatment-high-blood-pressure) to reduce swelling, and anticonvulsants to control seizures.

**Prevention**:-

* Don’t smoke.
* Don’t use drugs. [Cocaine](https://www.webmd.com/drugs/2/drug-1383/cocaine%2Btopical/details), for example, can increase the risk of bleeding in the brain.
* Drive carefully, and wear your seat belt.
* If you ride a motorcycle, always wear a helmet.

# 2). **Hyperemia and Congestion**

Definition: Both of them can be defined as a local increase in volume of blood in a particular tissue.

# Hyperemia (active)

 Is an active process resulting from an increased inflow of blood into a tissue because of arteriolar vasodilation. commonly occurs in exercising skeletal muscle or acute inflammation. Affected tissue becomes red as there is engorgement with oxygenated blood.

# Congestion (passive)

 Is a passive process resulting from impaired outflow of blood from a tissue occurs systemically as in cardiac failure or locally as in isolated venous obstruction. Affected tissue appears blue-red due to accumulation of deoxygenated blood. It may be acute or chronic.

- In long-standing congestion (also called chronic passive congestion states), poorly oxygenated blood causes hypoxia → results in parenchymal cell degeneration or cell death. Ex:

**a) Pulmonary congestion** Cut surface: hemorrhagic & wet.

1. Acute pulmonary congestion:

 Alveolar capillaries engorged with blood

 septal edema

1. Chronic pulmonary congestion:
* Thickened & fibrotic septa
* Alveolar spaces contain hemosiderin-laden macrophages resulting in an appearance termed **brown indurations.**
* Can result in pulmonary hypertension. **b) Hepatic congestion** 1) Acute hepatic congestion:
* Central vein & sinusoids are distended
* There may be even central hepatocyte degeneration.
* Peripheral hepatocytes better oxygenated & develop only fatty changes.

2) Chronic passive congestion of liver:

- Central lobules grossly depressed because of loss of cells and take white pale color whereas the surrounding hepatic tissue appear red brown this give picture of (**nutmeg liver**).

**3). Edema:-**

**Edema**"is the medical term for swelling. Body parts swell from injury or inflammation. It can affect a small area or the entire body. Medications, pregnancy, infections, and many other medical problems can cause **edema**. **Edema** happens when your small blood vessels leak fluid into nearby tissues.

**Types Of Edema :-**

**Peripheral edema.** This usually affects the legs, [feet](http://www.webmd.com/pain-management/picture-of-the-feet), and [ankles](http://www.webmd.com/fitness-exercise/picture-of-the-ankle), but it can also happen in the arms. It could be a sign of problems with your circulatory system, [lymph nodes](http://www.webmd.com/a-to-z-guides/tc/swollen-lymph-nodes-topic-overview), or [kidneys](http://www.webmd.com/kidney-stones/picture-of-the-kidneys).

**Pedal edema.** This happens when fluid gathers in your feet and lower legs. It’s more common if you’re older or pregnant. It can make it harder to move around in part because you may not have as much feeling in your feet.

[**Lymphedema**](http://www.webmd.com/breast-cancer/side-effects-lymphedema)**.** This swelling in the arms and legs is most often caused by damage to your lymph nodes, tissues that help filter germs and waste from your body. The damage may be the result of [cancer](http://www.webmd.com/cancer/) treatments like surgery and [radiation](http://www.webmd.com/cancer/what-to-expect-from-radiation-therapy). The [cancer](http://www.webmd.com/cancer/ss/does-this-cause-cancer) itself can also block lymph nodes and lead to fluid buildup.

[**Pulmonary edema**](http://www.webmd.com/lung/the-facts-about-pulmonary-edema)**.** When fluid collects in the air sacs in your [lungs](http://www.webmd.com/lung/picture-of-the-lungs), you have pulmonary edema. That makes it hard for you to [breathe](http://www.webmd.com/lung/how-we-breathe), and it’s worse when you lie down. You may have a fast heartbeat, feel suffocated, and [cough](http://www.webmd.com/first-aid/coughs) up a foamy spittle, sometimes with [blood](http://www.webmd.com/heart/anatomy-picture-of-blood).

**Cerebral edema.** This is a very serious condition in which fluid builds up in the [brain](http://www.webmd.com/brain/picture-of-the-brain). It can happen if you hit your head hard, if a [blood](http://www.webmd.com/a-to-z-guides/rm-quiz-blood-basics) vessel gets blocked or bursts, or you have a tumor or [allergic reaction](http://www.webmd.com/allergies/allergic-reaction-causes).

**Mechanism of edema formation:**

Approximately 60% of the lean body weight is water, two-thirds of which is intracellular with the remainder in the extracellular compartment.

The capillary endothelium acts as a semipermeable membrane and highly permeable to water & to almost all solutes in plasma with an exception of **proteins**. Proteins in plasma and interstial fluid are especially important in controlling plasma & interstitial fluid volume. Normally, any outflow of fluid into the interstitium from the arteriolar end of the microcirculation is nearly balanced by inflow at the venular end. Therefore, normally, there is very little fluid in the interstitium.

**Edema formation** is determined by the following factors:

1. Hydrostatic pressure
2. Oncotic pressure
3. Vascular permeability
4. Lymphatic channels
5. Sodium and water retention

We will discuss each of the above sequentially.

**Causes:-**

* Congestive heart failure.
* Cirrhosis.
* Kidney disease.
* Kidney damage.
* Weakness or damage to veins in your legs.
* Inadequate lymphatic system.
* Severe, long-term protein deficiency.

**Symptoms:-**

* Swelling or puffiness of the tissue directly under your skin, especially in your legs or arms
* Stretched or shiny skin
* Skin that retains a dimple (pits), after being pressed for several seconds
* Increased abdominal size

**Treatment:-**

Edema from a block in fluid drainage can sometimes be treated by getting the drainage flowing again. A [blood clot](http://www.webmd.com/dvt/blood-clot-symptoms) in the leg is treated with [blood thinners](http://www.webmd.com/heart-disease/ss/slideshow-tips-for-taking-blood-thinners). They break down the clot and get drainage back to normal. A tumor that blocks blood or lymph can sometimes be shrunk or removed with surgery, [chemotherapy](http://www.webmd.com/cancer/chemotherapy-what-to-expect), or radiation.

Leg edema related to congestive heart failure or [liver](http://www.webmd.com/hepatitis/rmq-know-your-liver) disease can be treated with a [diuretic](http://www.webmd.com/hypertension-high-blood-pressure/guide/diuretic-treatment-high-blood-pressure) (sometimes called a ''water pill'')

**Medication**:-

Many medicines can cause edema, including:

* [NSAIDs](http://www.webmd.com/arthritis/features/pain-relief-how-nsaids-work) (such as ibuprofen and [naproxen](http://www.webmd.com/drugs/mono-1289-NAPROXEN%2B-%2BORAL.aspx?drugid=5173&drugname=Naproxen+Oral))
* [Calcium](http://www.webmd.com/drugs/2/drug-1575/calcium%2Boral/details) channel blockers
* Corticosteroids (like [prednisone](http://www.webmd.com/drugs/mono-9383-PREDNISONE%2B-%2BORAL.aspx?drugid=6007&drugname=prednisone+oral) and [methylprednisolone](http://www.webmd.com/drugs/drug-6470-methylprednisolone%2Boral.aspx))
* [Pioglitazone](http://www.webmd.com/drugs/drug-17406-pioglitazone%2Boral.aspx) and [rosiglitazone](http://www.webmd.com/drugs/drug-17298-rosiglitazone%2Boral.aspx)
* [Pramipexole](http://www.webmd.com/drugs/drug-3680-pramipexole%2Boral.aspx)

What is renewal and regeneration? (10)

**Answer:**

**Renewal:-**

Self-renewal is a kind of cell division specific to stem cells, so cell division is a general term. When self-renewal occurs, a stem cell divides into two cells, one of which is still a stem cell (which can display differentiation potential into one or more types of differentiated cells (stemless/potency) and divides almost indefinitely = self-renewal), and another is a differentiated cell, which may or may not divide, but its divisions (if any) are not self-renewal because (1) no stem cell (i.e. a cell with developmental potential) is produced, and (2) these divisions are finite (so they are not self-renewal, because self-renewal is indefinite yet controlled proliferation). In sum, self-renewal is a stem cell's 'unlimited' division while retaining its developmental potential.

**Stem Cells:-**

Stem cells are characterized by their self-renewal properties and by their capacity to generate differentiated cell lineages.

To give rise to these lineages, stem cells need to be maintained during the life of the organism.

Such maintenance is achieved by two mechanisms:

1. obligatory asymmetric replication, in which with each stem cell division, one of the daughter cells retains its self-renewing capacity while the other enters a differentiation pathway, and
2. stochastic differentiation, in which a stem cell population is maintained by the balance between stem cell divisions that generate either two self- renewing stem cells or two cells that will differentiate.

**Regeneration:-**

Regeneration results in the complete restitution of lost or damage tissue.

* The replacement of the destroyed tissue by the parenchymal cells of the same type is called regeneration

The replacement of destroyed cells by proliferation of surrounding undamaged cell of the same type is called regeneration

* Regeneration refers to the proliferation of cells and tissues to replace lost structures, such as the growth of an amputated limb in amphibians. In mammals whole organs and complex tissues rarely regenerate after injury, and the term is usually applied to processes such as liver growth after partial resection or necrosis, but these processes consist of compensatory growth rather than true regeneration.

Tissues with high proliferative capacity, such as the hematopoietic system and the epithelia of the skin and gastrointestinal (GI) tract, renew themselves continuously and can regenerate after injury, as long as the stem cells of these tissues are not destroyed.

Q4. Write a detailed note on staphylococcus and streptococcus (15)

**Answer:-**

**Staphylococcus:-**

Bacteria in the genus *Staphylococcus* are pathogens of man and other mammals. Traditionally they were divided into two groups on the basis of their ability to clot blood plasma (the coagulase reaction). The coagulase-positive staphylococci constitute the most pathogenic species *S aureus*. The coagulase-negative staphylococci (CNS) are now known to comprise over 30 other species. The CNS are common commensals of skin, although some species can cause infections. It is now obvious that the division of staphylococci into coagulase positive and negative is artificial and indeed, misleading in some cases.

*S aureus* expresses a variety of extracellular proteins and polysaccharides, some of which are correlated with virulence. Virulence results from the combined effect of many factors expressed during infection. Antibodies will neutralize staphylococcal toxins and enzymes, but vaccines are not available. Both antibiotic treatment and surgical drainage are often necessary to cure abscesses, large boils and wound infections. Staphylococci are common causes of infections associated with indwelling medical devices.

**Structure:-**

Staphylococci are Gram-positive cocci about 0.5 – 1.0 μm in diameter. They grow in clusters, pairs and occasionally in short chains. The clusters arise because staphylococci divide in two planes. The configuration of the cocci helps to distinguish micrococci and staphylococci from streptococci, which usually grow in chains. Observations must be made on cultures grown in broth, because streptococci grown on solid medium may appear as clumps. Several fields should be examined before deciding whether clumps or chains are present.

**Pathogeneses:-**

*S aureus* expresses many potential virulence factors.

(1) Surface proteins that promote colonization of host tissues.

(2) Factors that probably inhibit phagocytosis (capsule, immunoglobulin binding protein A).

(3) Toxins that damage host tissues and cause disease symptoms. Coagulase-negative staphylococci are normally less virulent and express fewer virulence factors. *S epidermidis* readily colonizes implanted devices.

**Epidemiology:-**

Epidemiological tracing of *S aureus* is traditionally performed by phage typing, but has limitations. Molecular typing methods are being tested experimentally.

**Diagnosis:-**

Diagnosis is based on performing tests with colonies. Tests for clumping factor, coagulase, hemolysis and thermostable deoxyribonucleic are routinely used to identify *S aureus*. Commercial latex agglutination tests are available. Identification of *S epidermidis* is confirmed by commercial bio typing kits.

**Treatment:-**

Infections acquired outside hospitals can usually be treated with penicillinase-resistant β-lactams. Hospital acquired infection is often caused by antibiotic resistant strains and can only be treated with vancomycin.

**Streptococcus:-**

Streptococci are gram-positive aerobic organisms that cause many disorders, including pharyngitis, pneumonia, wound and skin infections, sepsis, and endocarditis.

 Symptoms vary with the organ infected. Sequelae of infections due to group A beta-hemolytic streptococci may include rheumatic fever and glomerulonephritis.

**Classification Of streptococcus:-**

* Three different types of streptococci are initially differentiated by their appearance when they are grown on sheep blood agar:
* Beta-hemolytic streptococci produce zones of clear hemolysis around each colony.
* Alpha-hemolytic streptococci (commonly called viridans streptococci) are surrounded by green discoloration resulting from incomplete hemolysis.
* Gamma-hemolytic streptococci are non hemolytic.

**Factors Of streptococcus:-**

Many streptococci elaborate virulence factors, including streptolysins, DNAases, and hyaluronidase, which contribute to tissue destruction and spread of infection. A few strains release exotoxins that activate certain T cells, triggering release of cytokines, including tumor necrosis factor-alpha, interleukins, and other immunomodulators. These cytokines activate the complement, coagulation, and fibrinolytic systems, leading to shock, organ failure, and death.

**Diseased Caused by Streptococcus:-**

The most common acute diseases due to GABHS ( Group A Beta hemolytic Streptococci)are:

* Pharyngitis
* Skin infections

In addition, delayed, non supportive complications ([rheumatic fever](https://www.msdmanuals.com/professional/pediatrics/miscellaneous-bacterial-infections-in-infants-and-children/rheumatic-fever), [acute glomerulonephritis](https://www.msdmanuals.com/professional/genitourinary-disorders/glomerular-disorders/postinfectious-glomerulonephritis-pign)) sometimes occur ≥ 2 weeks after infection..

Other diseased of streptococci caused less prevelant or soft tissue infection.

**Streptococcal Skin Infection:-**

Skin infections include

* [Impetigo](https://www.msdmanuals.com/professional/dermatologic-disorders/bacterial-skin-infections/impetigo-and-ecthyma)
* [Erysipelas](https://www.msdmanuals.com/professional/dermatologic-disorders/bacterial-skin-infections/erysipelas)
* [Cellulitis](https://www.msdmanuals.com/professional/dermatologic-disorders/bacterial-skin-infections/cellulitis)

**Impetigo** is a superficial skin infection that causes crusting or bullae.

[**Erysipelas**](https://www.msdmanuals.com/professional/dermatologic-disorders/bacterial-skin-infections/erysipelas) is a superficial cellulitis that also involves the lymphatics. Patients have shiny, red, raised, indurated lesions with distinct margins. It is most often caused by GABHS,

[**Cellulitis**](https://www.msdmanuals.com/professional/dermatologic-disorders/bacterial-skin-infections/cellulitis) involves the deeper layers of skin and may spread rapidly because of the numerous

lytic enzymes and toxins produced mainly by group A streptococci.

**Diagnosis:-**

* Culture
* Sometimes rapid antigen tests or antibody titers
* Streptococci are readily identified by culture on a sheep blood agar plate.

**Treatment:-**

**Penicillin** is the drug of choice for pharyngeal GABHS infections. No isolate of GABHS has shown penicillin resistance clinically. some streptococcal strains appear to have in vitro tolerance to penicillin (ie, significantly decreased bactericidal effect of penicillin).