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VIROLOGY AND IMMUNOLOGY

MATERIALS FOR PREPARING TO LICENSE EXAMINATION «KROK-1» ON MICROBIOLOGY, VIROLOGY AND IMMUNOLOGY FOR ENGLISH-MEDIUM STUDENTS OF THE FACULTIES OF MEDICINE AND DENTISTRY

Part 1

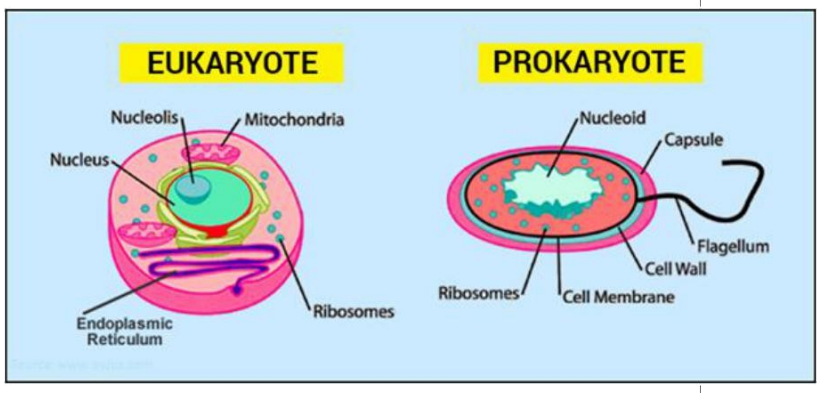
Kharkiv 2018

Materials for preparing to license examination “KROK-1” on microbiology, virology and immunology for English-medium students of the faculties of medicine and dentistry (guidelines for students) Part 1 / M.M. Mishyna, Yu.A. Mozgova, A.M. Kuzmenko. – Kharkiv: KNMU, 2018. – 48 p.

Morphology

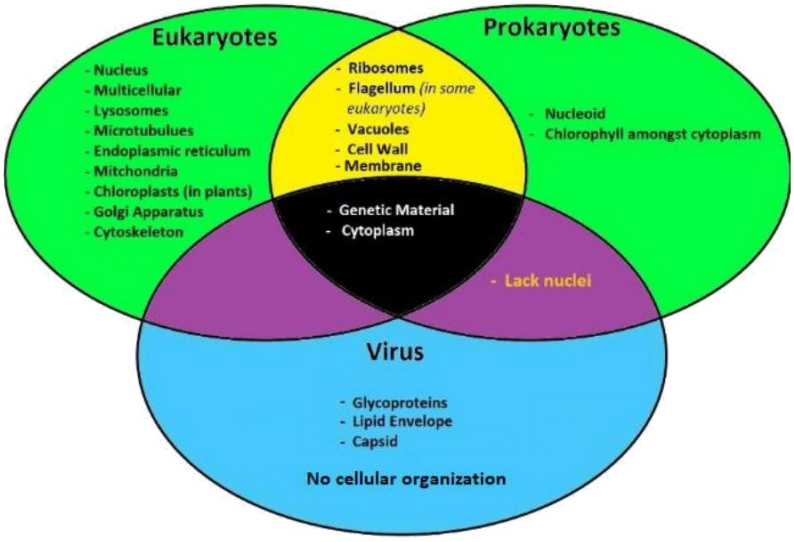
The organisms to be identified have a nucleus surrounded by a nuclear membrane. Genetic material is concentrated predominantly in the chromosomes which consist of DNA strands and protein molecules. These cells divide mitotically. Identify these organisms:

A. Eukaryotes
B. Bacteriophages
C. Prokaryotes
D. Viruses
E. Bacteria



Infectious agents of various ultrastructures can be etiological agents of infectious diseases. Which of the groups named below HAS NO cellular structure, protein synthesizing, enzyme and energy systems?

A. Viruses
B. Fungi
C. Bacteria
D. Protozoa
E. Rickettsia



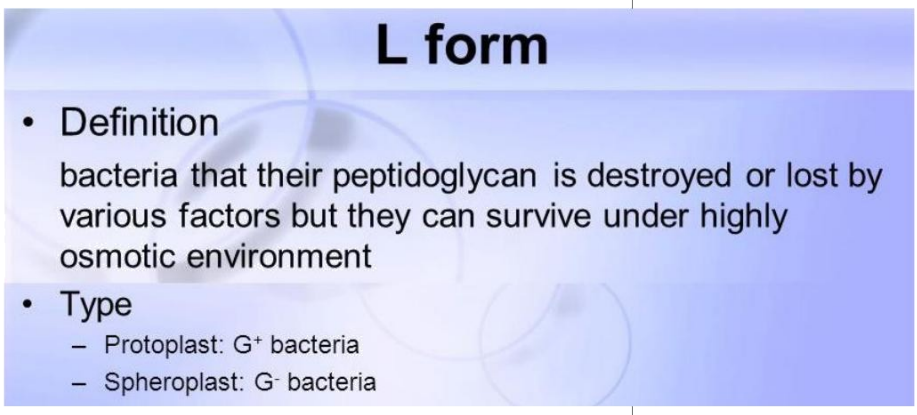
Etiological factors for the infectious diseases are often microorganisms with various ultrastructure. Which of the following microorganism groups relates to the eukaryotes?

A. Protozoa
B. Viruses
C. Viroids
D. Prions
E. Scotobacteria

Prokaryotes	Eukaryotes
• Bacteria & archaea	• Fungi, protozoa, algae, helminths
• Lack a nucleus, one circular chromosome, no nuclear membrane	• True nucleus, several linear chromosomes, in nuclear membrane
• No histones	• Histones
• 70S ribosomes	• 80S ribosomes
• No organelles	• Organelles
• Peptidoglycan cell walls most bacteria (archaea cell walls are not PG)	• Polysaccharide cell walls (if any) / sterols in cell membranes
• Divide by binary fission	• Divide by mitosis

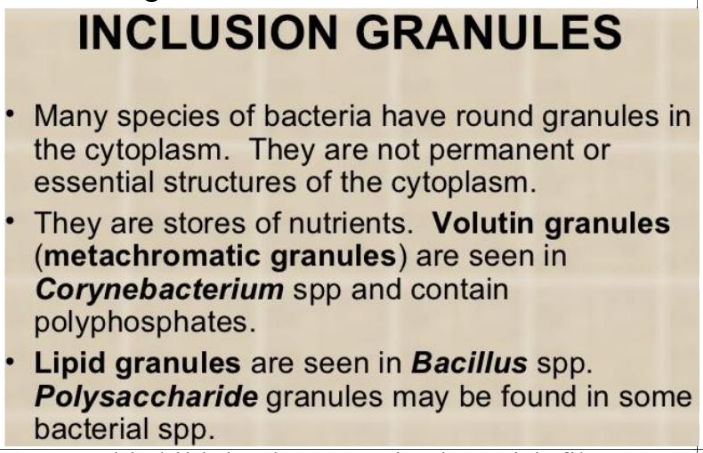
In course of long-term treatment of an infectious patient with penicillin, the pathogen transformed into the L-form. What changes occur in the pathogen cell in case of L-transformation?

A. Absence of a cell wall
B. Absence of flagella
C. Absence of a capsule
D. Absence of a spore
E. Absence of inclusions



A child is presumably ill with diphtheria. A specimen of affected mucous membrane of his pharynx was taken for analysis. The smear was stained and microscopic examination revealed yellow rods with dark blue thickenings on their ends. What structural element of a germ cell was revealed in the detected microorganisms?

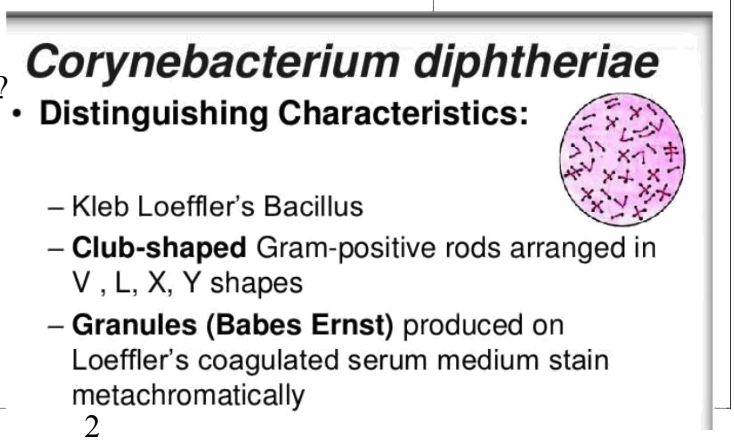
A. Volutin granules
B. Plasmids
C. Capsule
D. Spores
E. Flagella



On examination of a 6-year-old child the doctor noticed greyish film on the child's tonsils. Microscopy of the smear stained by Neisser method detected there Corynebacterium diphtheria. What morphologic feature was the most indicative for determining the type of the agent? A. Fence-like position of the agent's cells
B. Spores that exceed cells in diameter
C. Localization of the causative agent within macrophages
D. Polar placement of volutin granules
E. Presence of the capsule

A smear from the tonsillar coating of a patient with suspected diphtheria was found to contain blue
bacilli with a thickening at the poles.
What method of smear staining was used?

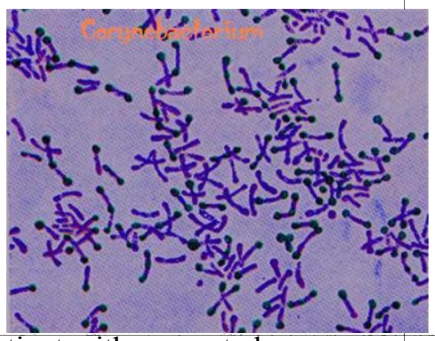
A. Leffler
B. Burri
C. Hins
D. Gram
E. Neisser



Microscopy of smear preparation stained with methylene blue revealed bacilli with clublike expansions on their ends similar to C.diphtheriae. What additional method of staining should be used to verify this assumption?

A. Neisser
B. Kozlovsky
C. Ziehl-Neelsen
D. Zdrodovsky
E. Aujeszky

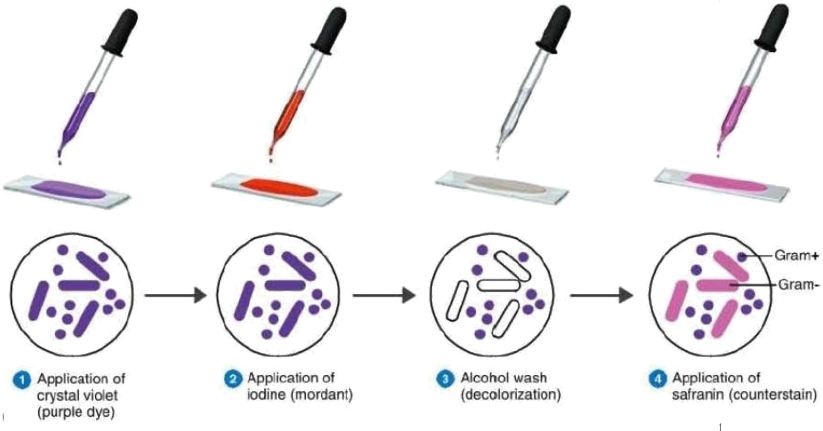
There are several cases of children from boarding school suffering from sore throat. Microscopy of tonsil smears stained according to Neisser method has revealed thin yellow bacilli with dark brown grains on their ends placed in the shape of Roman numeral five. What infection can be suspected in this case?



A. Diphtheria
B. Infectious mononucleosis
C. Listeriosis
D. Tonsillitis
E. Scarlet fever

During the staining of sputum smear of a patient with suspected croupous pneumonia the following reactives and stainers were used: gential violet solution, Lugol's solution, 96^0 spiritus and water fuchsin. What method of staining is used in this case?

A. Leffler's
B. Gram's
C. Ziehl-Neelsen's
D. Neisser's
E. Romanovsky's



A smear of sputum from the patient with suspected lobar pneumonia was stained with the use of the following stains and reagents: solution of gentian violet, Lugol's solution, 96^o alcohol, watermagenta. What staining method was applied in this case?

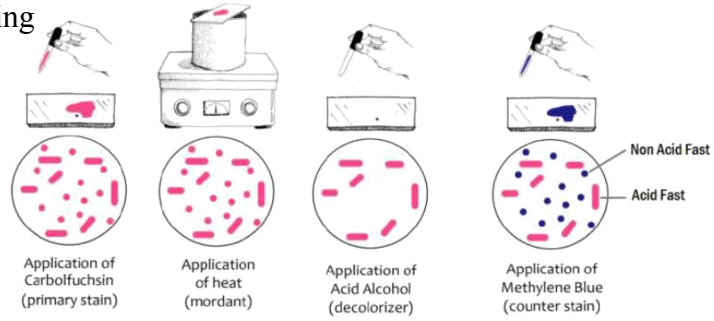
A. Gram
B. Ziehl-Nielsen
C. Romanovsky
D. Neisser
E. Leffler

In a bacteriological laboratory some bacterial smears had to be stained by Gram's method. For this purpose the following reagents were prepared: gentian violet, Lugol's solution, aqueous fuchsin solution. What other reagent is required?

A. **96% ethanol**
B. 5% sulfuric acid
C. Methylene blue solution
D. Carbolic fuchsin
E. 3%hydrogen peroxide

Specimen of a patient's sputum was stained with the following dyes and reagents: Ziehl's solution, methylene blue solution, 5% solutoin of sulfuric acid. What staining method was applied?

A. Ziehl-Neelsen
B. Burri's
C. Gram's
D. Peshkov's
E. Neisser's

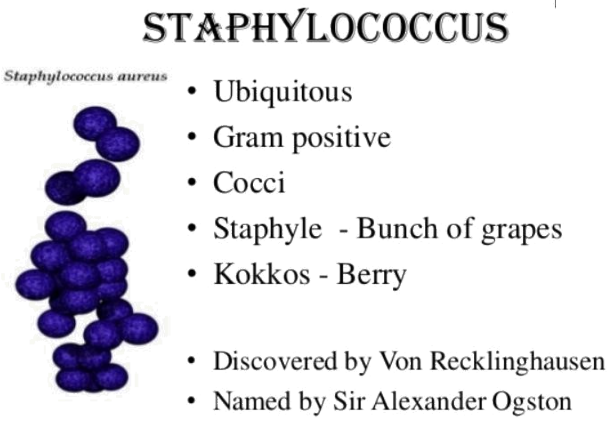


A consumptive patient has an open pulmonary form of disease. Choose what sputum staining should be selected for finding out the tubercle (Koch's) bacillus?

A. Method of Ziel-Neelsen
B. Method of Romanowsky-Giemsa
C. Method of Gram
D. Method of Neisser
E. Method of Burry-Gins

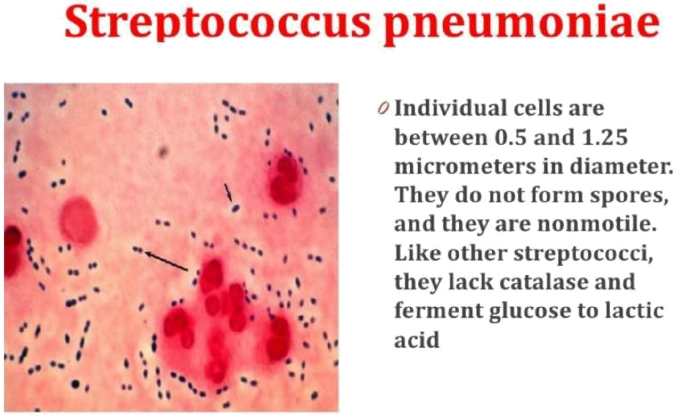
Microscopy of a smear obtained from a patient with acute purulent periostitis revealed gram-positive bacteria arranged in clusters resembling bunch of grapes. What microorganisms is this morphology typical for?

A. Staphylococci
B. Sarcina
C. Tetracocci
D. Candida fungi
E. Streptococci



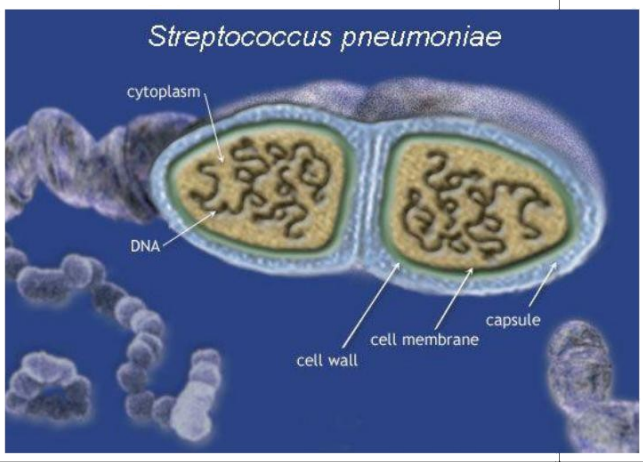
Analysis of sputum taken from a patient with suspected pneumonia revealed rather elongated gram-positive diplococci with somewhat pointed opposite ends. What microorganisms were revealed in the sputum?

A. Streptococcus pneumoniae
B. Staphylococcus aureus
C. Klebsiella pneumoniae
D. Neisseria meningitidis
E. Neisseria gonorrhoeae

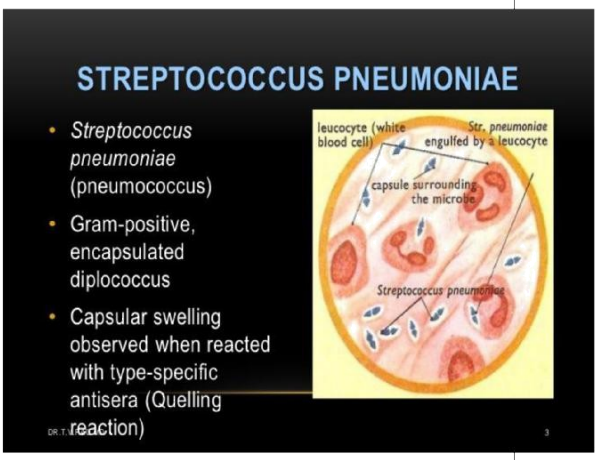


Analysis of sputum taken from a patient with suspected pneumonia revealed slightly elongated gram-positive diplococci with tapered opposite ends. What microorganisms were revealed in the sputum?

A. Stretpococcus pneumoniae
B. Neasseria gonorrhoeae
C. Neisseria meningitidis
D. Staphylococcus aureus
E. Klebsiella pneumonia

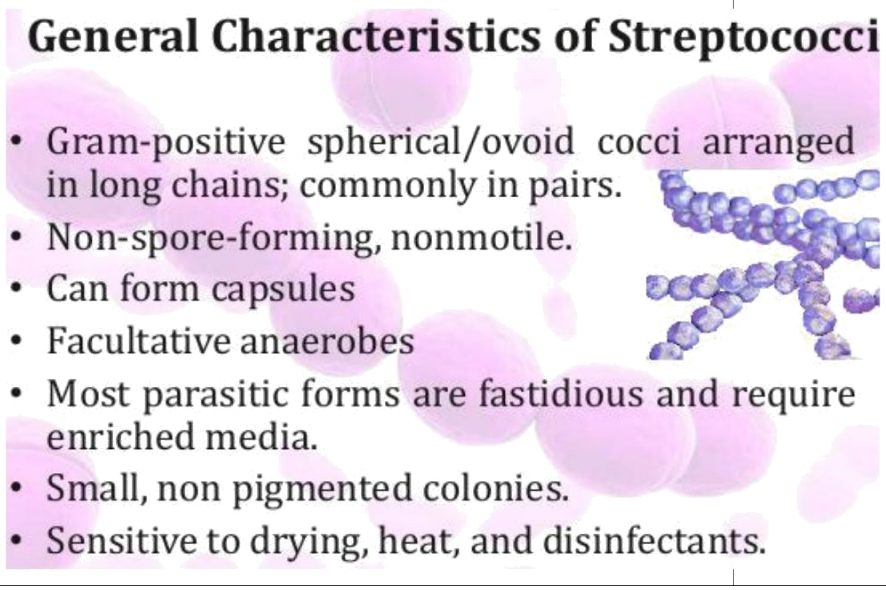


A patient has a suspected pneumonia. In his sputum there were revealed grampositive diplococci, prolonged with the slightly pointed opposite ands. What microorganisms are revealed in the sputum? A. Staphylococcus aureus
B. Neisseria gonorrhoeae
C. Neisseria meningitidis
D. Klebsiella pneumoniae
E. Streptococcus pneumonia



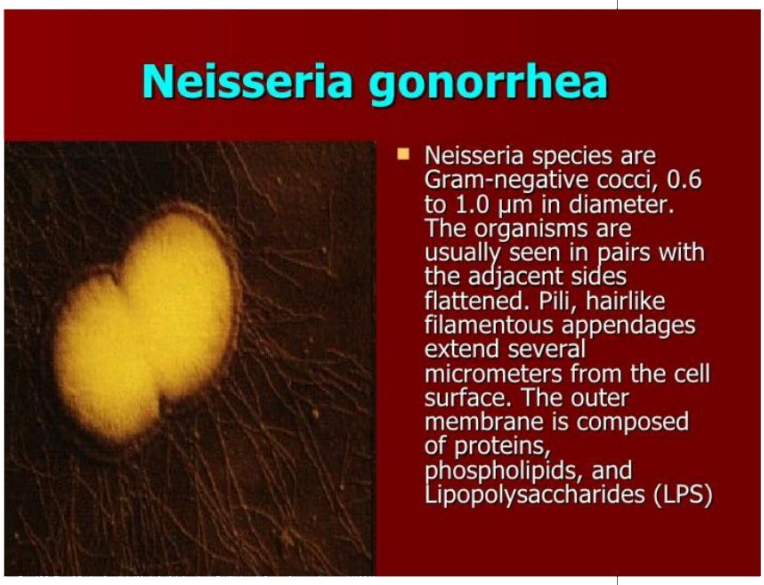
Blood of a patient with presumable sepsis was inoculated into sugar broth. There appeared bottom sediment. Repeated inoculation into blood agar caused growth of small transparent round colonies surrounded by hemolysis zone. Examination of a smear from the sediment revealed gram-positive cocci in form of long chains. What microorganisms are present in blood of this patient?

A. Streptococci
B. Micrococci
C.Staphylococci
D.Tetracocci
E. Sarcina



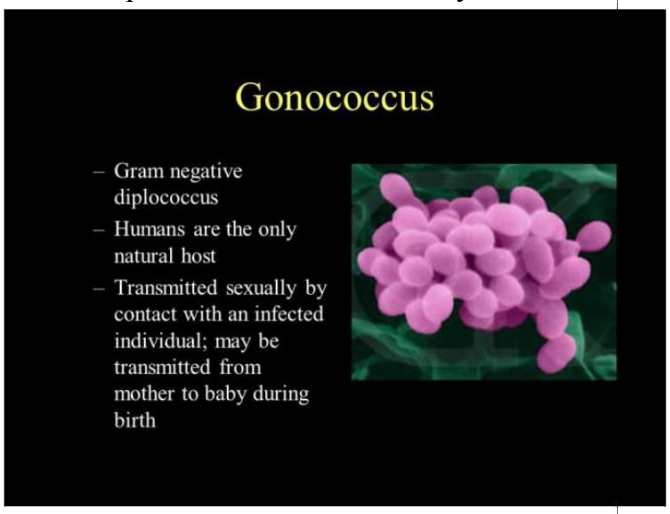
Gramnegative bin-shaped diplococcus inside and outside of leucocytes were detected on bacteriological examination of the purulent exudates from the cervix of the uterus. Name the causative agent of purulent inflammation of the cervix of the uterus.

A. Haemophilus vaginalis
B. Chlamidia trachomatis
C. Calymmatobacterium granulomatis
D. Neisseria gonorrhoeae
E. Trichomonas vaginalis



Microscopic study of discharges from urethra of a patient suffering from acute urethritis revealed bean-shaped microorganisms up to 1 micrometer in diameter arranged in pairs and placed inside the leukocytes. What microorganisms are these?

A. Gonococci
B. Meningococci
C. Tetracocci
D. Streptococci
E. Staphylococci



While studying blood and mucus samples from the nasopharynx, a bacteriologist took certain measures to conserve the pathogens in the material. Bacterioscopic study revealed the presence of gram-negative cocci looking like coffee beans and arranged in pairs or tetrads. Name the pathogen that was isolated by the bacteriologist:

A. Neisseria meningitidis
B. Staphylococcus aureus
C. Neisseria gonorrhoeae
D. Moraxella lacunata
E. Acinetobacter calcoaceticus

DIFFERENCES BETWEEN GONOCOCCUS AND MENINGOCOCCUS

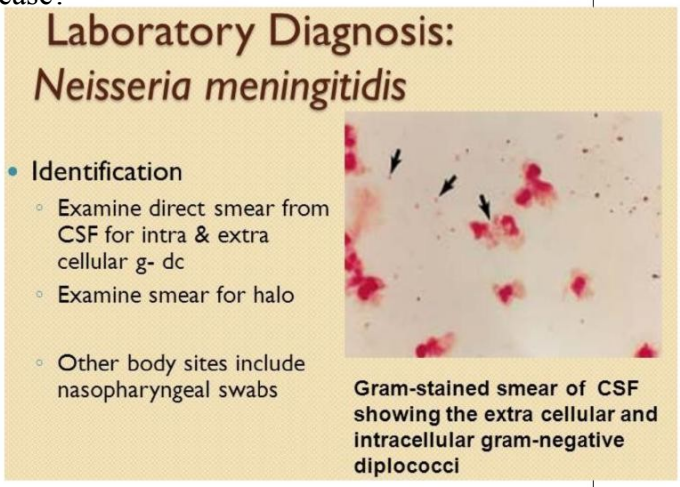
1. Gonococcus grow more slowly, forms smaller colonies.
2.Gonococcus produces acid in glucose only, while meningococcus produces acid in both glucose and maltose.
3. Gonococcus is less toxic to mice and guinea pigs than meningococcus.

SIMILARITIES BETWEEN GONOCOCCUS AND MENINGOCOCCUS

1. Both are strict parasite and causes diseases only for man
2. They may show little differences in resistance to injurious agents.
3. Their distribution in the inflammatory exudates is the same.
4. They grow on artificial media with a little differences.

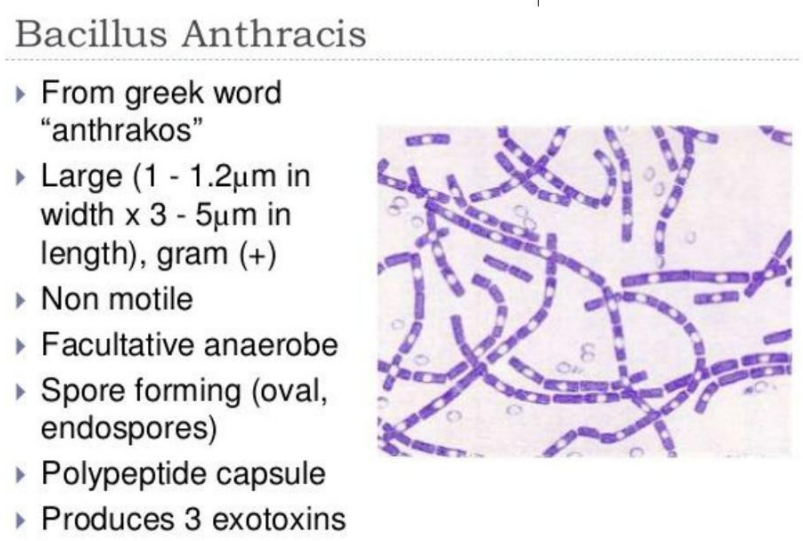
A young woman suddenly developed fever up to 39°C accompanied by a strong headache. Examination revealed marked nuchal rigidity. Spinal puncture was performed. Gram-stained smear of cerebrospinal fluid contained many neutrophils and Gram-negative diplococci. What bacteria could be the cause of this disease?

A. Neisseria meningitidis
B. Streptococcus pneumoniae
C. Haemophilus influenza
D. Staphylococcus aureus
E. Pseudomonas aeruginosa



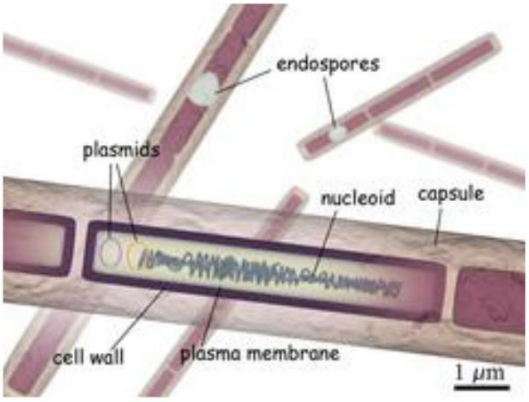
A patient complained about a carbuncle on his face. Examination results: neither dense nor painful edema of subcutaneous cellular tissue, there is black crust in the middle of the carbuncle and peripheral vesicular rash around it. Bacteriological examination revealed presence of immobile streptobacilli able of capsulation. What microorganisms are causative agents of this disease?

A. Bacillus anthracis
B. Staptylococcus aureus
C. Bacillus anthracoides
D. Bacillus megaterium
E. Bacillus subtilis



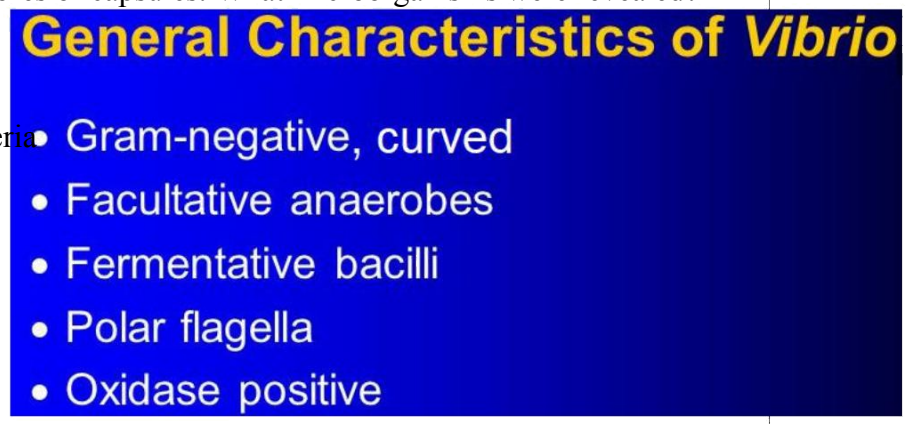
A 34 year old male patient consulted a doctor about face carbuncle. Objectively: a loose, painless edema of hypodermic tissue; black crust in the center of carbuncle, vesicular rash around it. Microbiological examination revealed static streptobacilli capable of capsule building. What microorganisms are the causative agents of this disease?

A. Bacillus anthracis
B. Staptylococcus aureus
C. Bacillus subtilis
D. Bacillus anthracoides
E. Bacillus megaterium



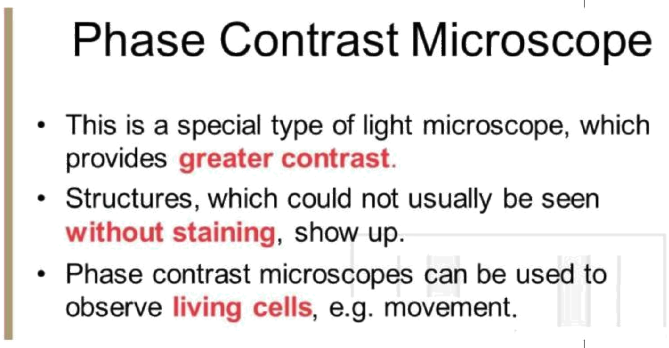
Microscopy of a smear taken from the film that appeared on the peptone water 6 hours after seeding and culturing of a fecal sample in a thermostat revealed mobile gram-negative bacteria curved in form of a comma that didn't make spores or capsules. What microorganisms were revealed?

A. Vibrios
B. Spirochetes
C. Clostridia
D. Corynebacteria
E. Spirilla



2. Vomiting matters of a patient suspected of having cholera were delivered to the bacteriological laboratory. The material was used for preparing a "hanging drop" specimen. What type of microscopy will be applied for identification of the causative agent by its mobility?

A. Phase-contrast microscopy
B. Electron microscopy
C. Immune and electron microscopy
D. Fluorescence microscopy
E. Immersion microscopy

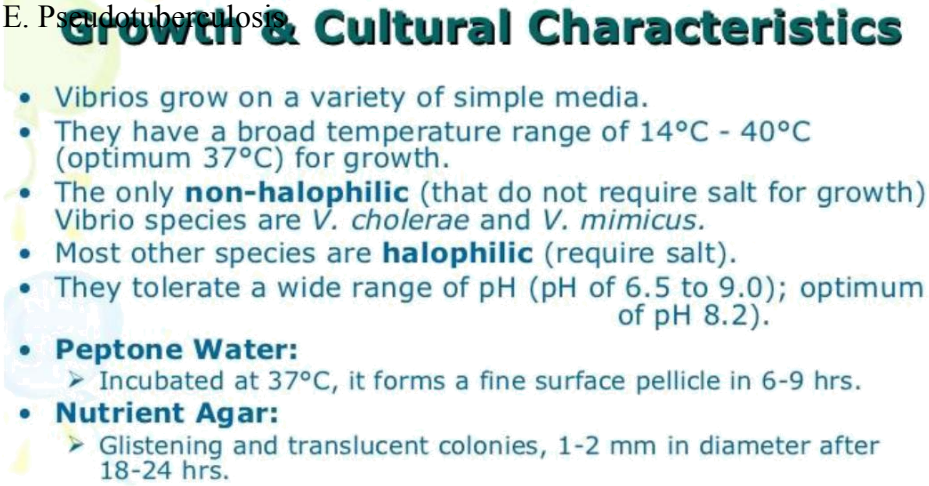


Patient with diarrhoea was admitted to the infection unit. Gramnegative curved rod-like bacteria were founded on bacterioscopic examination of faecal masses. What is the most likely disease in this patient? A. Typhoid fever

B. Cholera
C. Diphtheria
D. Intestinal form of plague
E. Salmonellosis gastroenteritis

A man is suffering from diarrhea. In summer he spent his vacation in the south at the sea coast. Bacteria with the following properties were detected in his feces: gram-negative curved mobile monotrichous bacilli that do not produce spores or capsules. They are undemanding to nutrient medium but require alkaline reaction (pH 8,5-9,5). Described are the agents of the following enteric infection:

A. Cholera
B. Shigellosis
C. Typhoid fever
D. Colienteritis
E. Pseudotuberculosis

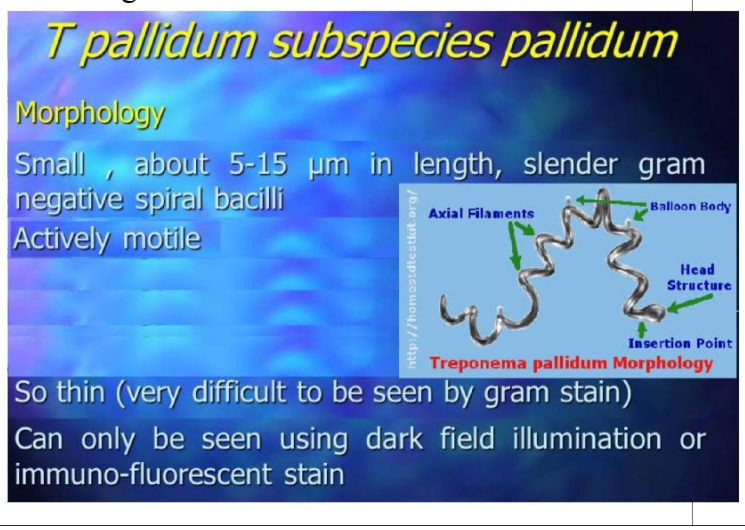


From the feces of a patient with acute gastroenteritis a pure culture of microorganisms was obtained. The microorganisms are small mobile slightly curved gram-negative bacilli that within 6 hours grow into a light blue film on the 1% alkaline peptone water. Such properties are characteristic of the following microorganism:

A. Bacillus
B. Clostridium
C. Spirochete
D. Spirillum
E. Vibrio

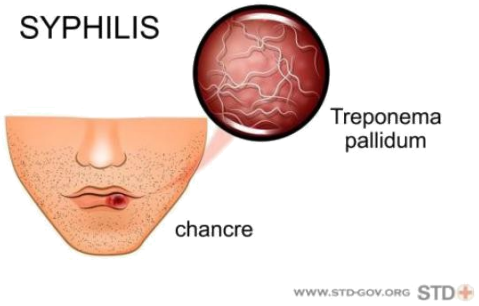
While studying a microslide obtained from the punctuate of a regional lymph node and stained by Romanovsky-Giemsa method a physician revealed some light pink thin microorganisms with 12-14 regular spiral coils and pointed ends, up to 10-13 micrometer long. This might be the causative agent of the following disease:

A. Syphilis
B. Trypanosomiasis
C. Leptospirosis
D. Relapsing fever
E. Leishmaniasis



In the micropreparation made from patient's regional lymph node punctate and stained according to Romanovsky-Giemsa method, the doctor found out thin microorganisms with 12-14 equal ringlets and pale-pink sharp pointes 10-13 mkm in length. The pathogen of what disease is it about?

A. Leishmaniasis
B. Leptospirosis
C. Surra
D. Syphilis
E. Relapsing fever



In a microslide of the patient's regional lymph node stained with Giemsa method a doctor detected thin microorganisms with 12-14 uniform tendrils with pointed tips, 10-13 micrometers in length, pale pink in color. In this case they can be identified as infectious agents of the following disease:

A. Syphilis
B. Trypanosomiasis
C. Leptospirosis
D. Relapsing fever
E. Leishmaniasis

Bacterioscopic examination of chancre material revealed some mobile, long, convoluted microorganisms with 8-12 regular coils. These features are typical for:

A. Treponema
B. Borrellia
C. Leptospira
D. Vibrios
E. Campylobacter

A man died from an acute infectious disease accompanied by fever, jaundice, haemorrhagic rash on the skin and mucous membranes as well as by acute renal insufficiency. Histological examination of renal tissue (stained by Romanovsky-Giemsa method) revealed some convoluted bacteria looking like C and S letters. What bacteria were revealed?

A. Leptospira
B. Treponema
C. Spirilla
D. Borrelia
E. Campilobacteria

Leptospira interrogans

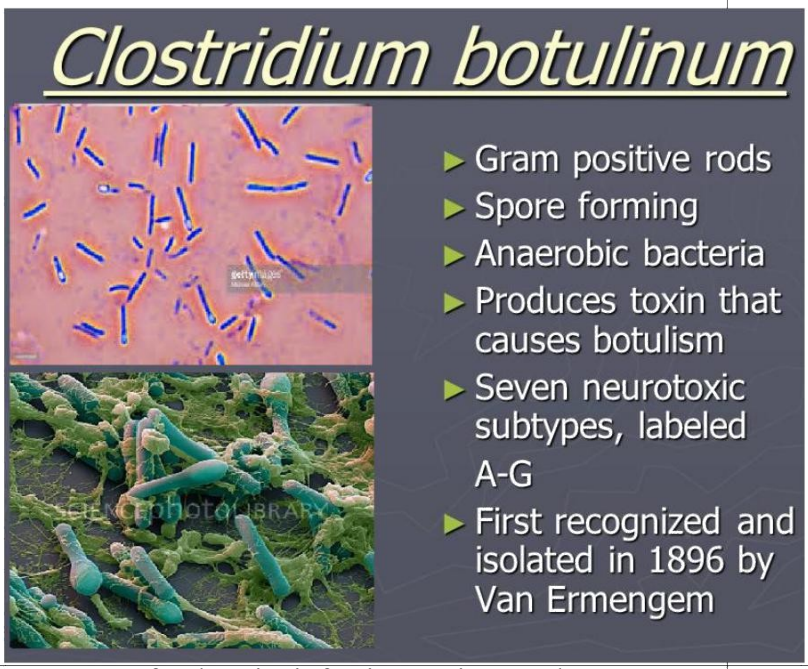
- Morphology – stained with Giemsa/ silver impregnation, hooked ends resemble umbrella handles
- Culture – media (semi solid/ liquid) enriched with rabbit serum - Fletcher's medium
- Pathogenicity – causes Weil' disease (leptospirosis)

Microscopic examination of a microbial culture revealed fusiform spore-forming microorganisms that get violet-blue Gram's stain. What microorganisms were revealed?

A. Clostridia
B. Streptococci
C. Spirochaete
D. Actinomycete
E. Diplococci

On microscopic examination of leftovers of the canned meat eaten by patient with severe food toxicoinfection the following was detected: gram-positive bacilli with subterminal staining defect and configuration alteration of bacilli generally resembling a tennis racket. What agent was detected?

A. C.botulinum
B. P.vulgaris
C. E.coli
D. S.aureus
E. S.enteritidis



Botulism agent causes severe food toxicoinfection. Point out the most characteristic morphologic feature of botulism agent.

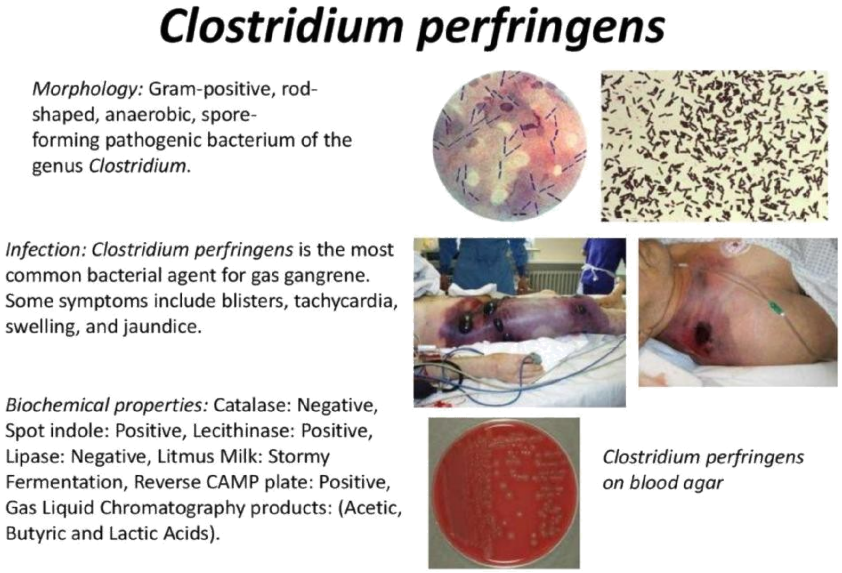
A. Gram-positive spore-forming bacilli with subterminal spore
B. Thick gram-positive non-sporeforming bacilli
C. Gram-positive spore-forming bacilli with terminal spore
D. Thin mobile spore-forming bacilli with central spore
E. Thick gram-positive non-sporeforming bacilli

The causative agent of botulism causes severe food poisoning. Specify the most characteristic morphological feature of botulism causative agent:

A. Gram-positive bacillus with subterminal spore
B. Thick gram-positive non-spore-forming bacillus
C. Gram-positive bacillus with terminal spore
D. Thin mobile bacillus with central spore
E. Thick gram-positive bacillus without spores and flagella

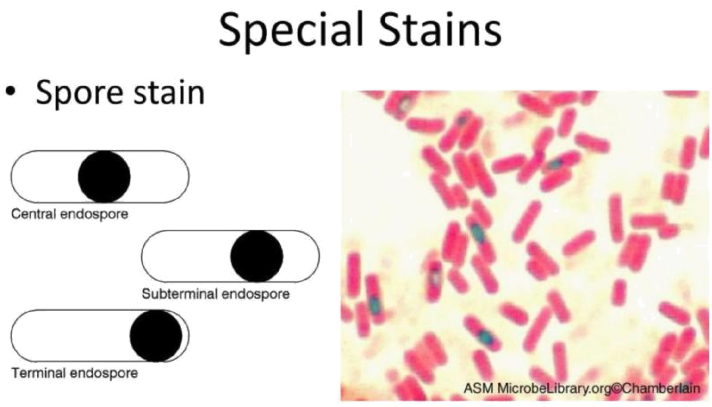
A patient has food poisoning. Laboratory analysis revealed a culture of anaerobic gram-positive spore-forming bacteria. What is the most likely kind of the isolated causative agent?

A. C. perfringens
B. Proteus vulgaris
C. P. mirabilis
D. Vibrio parahemolyticus
E. Esherichia coli



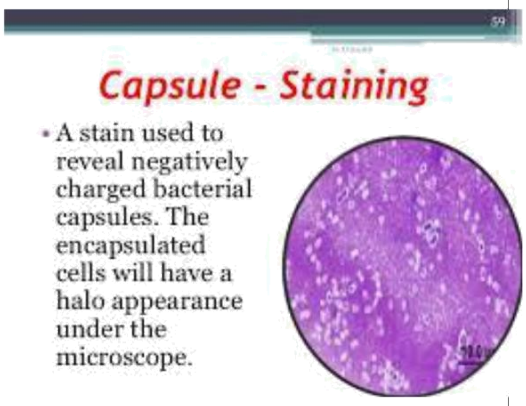
A smear of streptobacillus preparation stained by Ozheshko method has been studied microscopically with oil immersion. What structural feature of the bacteria has been studied?

A. Spores
B. Capsule
C. Flagella
D. Inclusions
E. Structure of cell wall



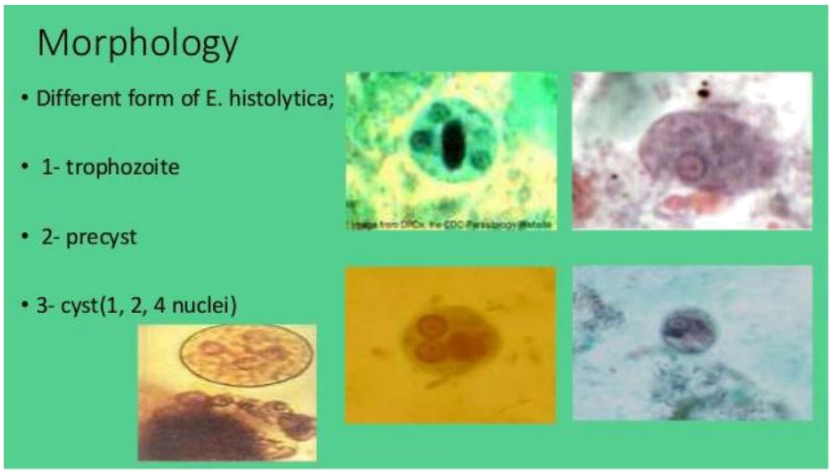
A specimen stained by Ozheshko method contains rod-like microorganisms stained blue with round terminal components stained red. What are these components called?

A. Spores
B. Cilia
C. Flagella
D. Capsules
E. Mesosomas

The laboratory for especially dangerous infections conducts microscopic examination of pathological material from a patient with suspected plague. The sample was stained by Burri-Gins technique. What property of the causative agent can be identified by this technique? **A. Capsule formation** B. Spore formation C. Acid resistance D. Alkali resistance E. Presence of volutin granules 	
When a smear is stained by Burry- Gins method a mucous structure that is tightly bound with the cellular wall of bacteria and has well-defined outer boundaries can be detected. This element of a bacteria cell is called: **A. Capsule** B. Spore C. Filaments D. Ribosomes E. Episomes	
Capsuliferous bacteria has been detected during microbiological inspection of crude drugs. What method of staining has been used to detect capsules? **A. Burri-Gins** B. Ziehl–Neelsen C. Neisser D. Gram E. Aujeszky	
During microbiological inspection of crude drugs encapsulated bacteria were revealed. What method was applied for capsule detection? **A. Burry-Gins** B. Ziehl-Neelsen C. Neisser D. Gram E. Ozheshko	
Microbiological analysis of medicinal raw materials revealed capsular bacteria. What stain method was used to detect the capsules? **A. Gin's** B. Ziehl-Neelsen's C. Neisser's D. Gram's E. Ozheshko's	

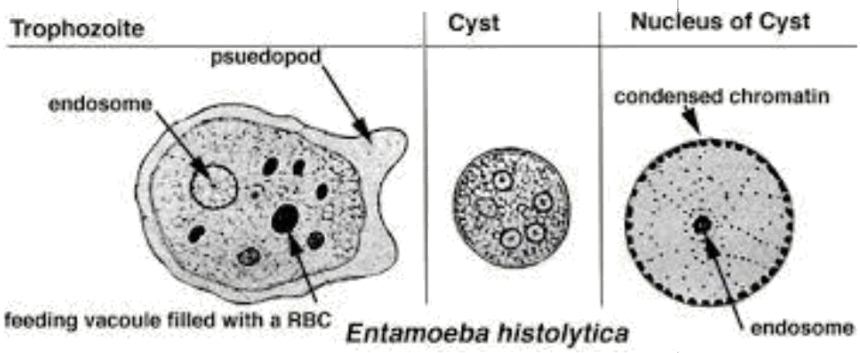
Patients with similar complaints applied to the doctor: weakness, pain in the intestines, disorder of GIT. Examination of the feces revealed that one patient with four nucleus cysts should be hospitalized immediately. For what protozoa are such cysts typical?

A. Lamblia
B. Dysenteric amoeba
C. Balantidium
D. Trichomonas
E. Intestinal amoeba



5. Several patients with similar complaints came to the doctor. They all present with weakness, pain in the intestines, indigestion. Feces analysis revealed the need for urgent hospitalization of the patient, who had microbial cysts with four nuclei detected in his samples. Such cysts are characteristic of the following protozoon:

A. Entamoeba histolytica.
B. Entamoeba coli.
C. Balantidium.
D. Trichomonad.
E. Lamblia



Microscopy of dental plaque revealed unicellular organisms. Their cytoplasm had two distinct layers, barely visible core, wide pseudopodia. The patient is most likely to have:

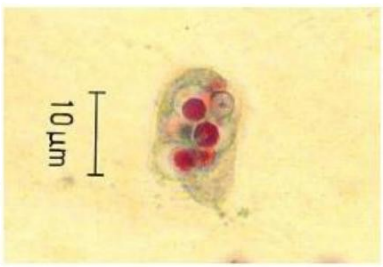
A. Entamoeba gingivalis
B. Entamoeba histolytica
C. Trichomonas tenax
D. Lamblia
E. Entamoeba coli

Entamoeba gingivalis

Hosts: Prevalence is from 50 to 95%.

Stage:

Trophozoite lives on the surface of teeth and gums. Parasites feed on epithelial cells of the mouth, bacteria, food debris, and other cells available to them.



Organisms are more common in persons with pyorrhea (gum disease) but they are not the cause of the condition.

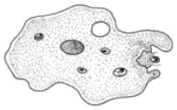
Carious cavities of a 29-year-old patient contain the parasitic protozoa. It is established that they relate to the Sarcodina class. Specify these single-celled organisms:

A. Entamoeba gingivalis
B. Entamoeba histolutica
C. Entamoeba coli
D. Amoeba proteus
E. Lamblia intestinalis

A patient complains of acute spastic abdominal pain, frequent urge to defecate, liquid bloody feces with mucus. Laboratory analysis of fecal smear revealed inconstant in shape organisms with erythrocyte. What is the most likely diagnosis?

A. Amebiasis.
B. Lambliasis.
C. Schistosomiasis.
D. Intestinal trichomoniasis.
E. Balantidiasis.

Amebiasis



Amebiasis is infection with ***Entamoeba histolytica***.

This organism can cause:

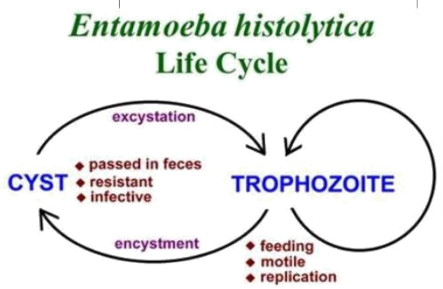
Asymptomatic intestinal infection.

Mild to moderate colitis.

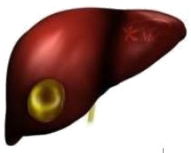
Severe intestinal infection (dysentery).

Ameboma (a tumor-like mass in the intestines in amebiasis which results in a large local lesion of the bowel).

Liver abscess and other extraintestinal infection.



Ameboma

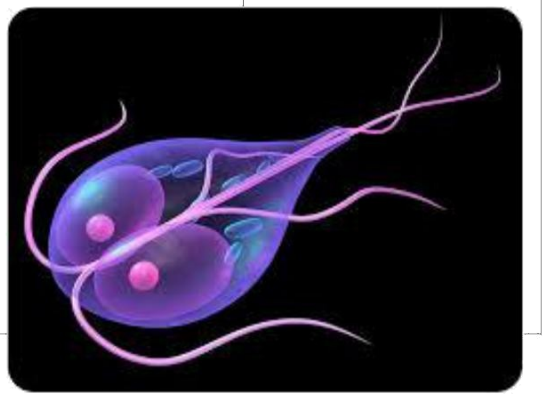


A 40-year-old patient presents with abdominal pain, frequent loose stools with mucus and blood. Stool analysis revealed vegetative forms of some protozoa sized 30-40 microns, with short pseudopodia, containing large amounts of phagocytosed erythrocytes. What protozoan disease does the patient have?

A. Amebiasis
B. Leishmaniasis
C. Trichomoniasis
D. Giardiasis
E. Toxoplasmosis

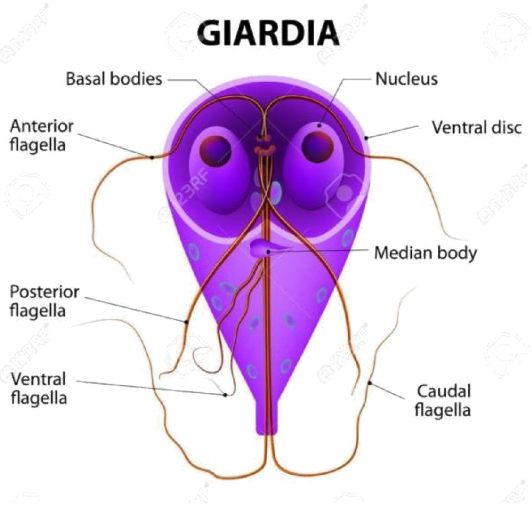
Examination of duodenal contents revealed some pyriform protozoa with twin nuclei and four pairs of flagella. There were two supporting filaments between the nuclei and a suctorial disc on the ventral side. What representative of protozoa was revealed in this patient?

A. Lamblia
B. Toxoplasma
C. Leishmania
D. Intestinal trichomonad
E. Trypanosome



Examination of the duodenal contents revealed some pear-shaped protozoa with two nuclei and four pairs of flagella. The organisms had also two axostyles between the nuclei and a ventral adhesive disc. What protozoan representative was found in the patient?

A. Lamblia
B. Toxoplasma
C. Leishmania
D. Intestinal trichomonad
E. Trypanosome



A duodenal content smear of a patient with indigestion contains protozoa 10-18 mcm large. They have piriform bodies, 4 pairs of filaments, two symmetrically located nuclei in the broadened part of body. What kind of the lowest organisms is it?

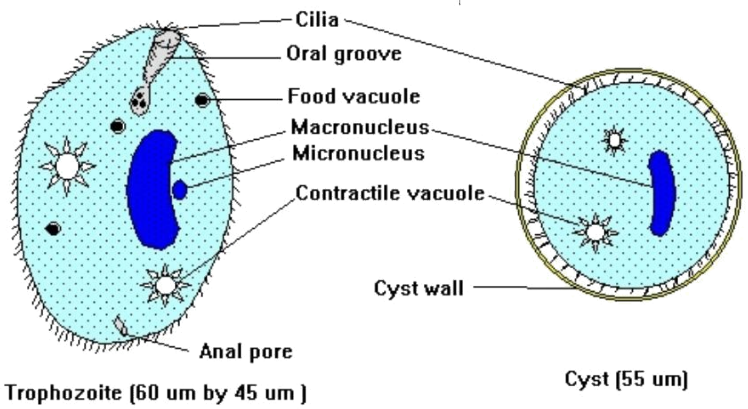
A. Lamblia
B. Dysentery ameba
C. Trichomonas
D. Intestinal ameba
E. Balantidium

A 13 year old child complains about poor appetite, pain in the right subcostal area. Microscopical examination of duodenal contents revealed big pyriform cells with two nuclei. What microorganism was revealed?

A. Lamblia
B. Trichomonas
C. Amoeba
D. Trypanosoma
E. Toxoplasma

27. Sanitary assessment of a pond, where the children from a recreation summer camp take their swims, detected there oval cysts 50-60 micron in diameter, with 2 nuclei visible in their cytoplasm (macronucleus and micronucleus). What protozoa do these cysts belong to?

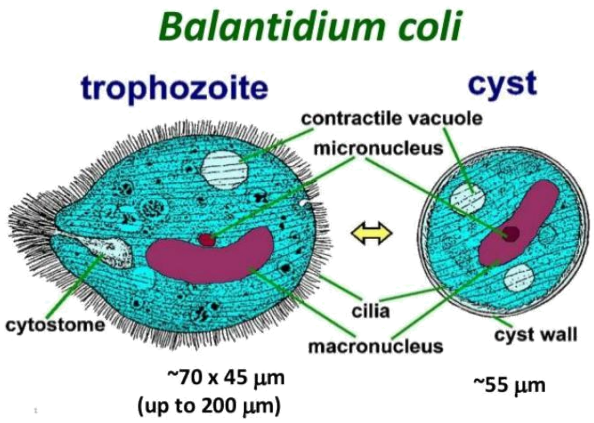
A. Toxoplasma
B. Amoeba
C. Balantidium
D. Lamblia
E. Euglena



Balantidium coli

A patient working at a pig farm complains about paroxysmal abdominal pain, liquid feces with admixtures of mucus and blood, headache, weakness, fever. Examination of large intestine revealed ulcers from 1 mm up to several cm large, feces contained oval unicellular organisms with cilia. What disease should be suspected?

A. Balantidiasis
B. Amebiasis
C. Toxoplasmosis
D. Lambliasis
E. Trichomoniasis



Slime, blood and protozoa 30-200 microns of length have been revealed in a man's feces. The body is covered with cilias and has correct oval form with a little bit narrowed forward and wide round shaped back end. On the forward end a mouth is visible. In cytoplasm there are two nucleuses and two short vacuoles. For whom are the described attributes typical?

A. Balantidium
B. Lamblia
C. Dysenteric amoeba
D. Trichomonas
E. Intestinal amoeba

A patient has symptoms of inflammation of urogenital tracts. Examination of a vaginal smear revealed big monocellular, pear-shaped organisms with the pointed spike at the posterior end of body, big nucleus and undulating membrane.
What protozoa were found in the smear?

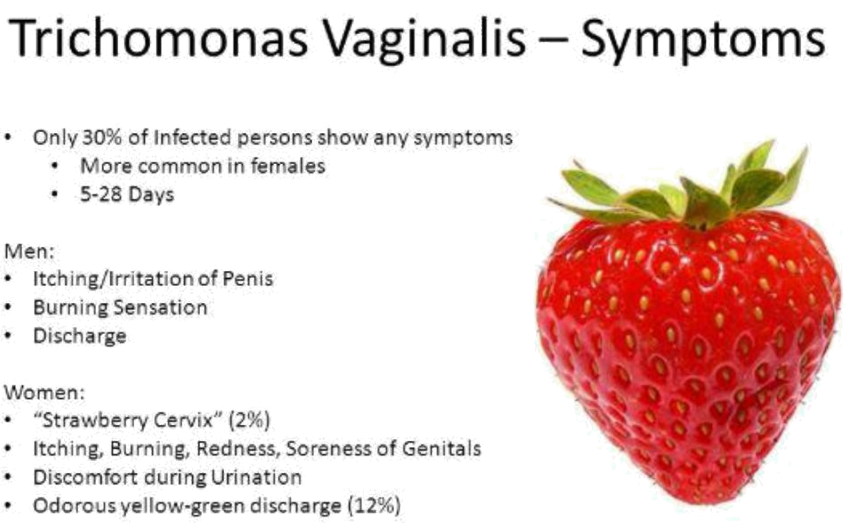
A. Trichomonas vaginalis
B. Trichomonas hominis
C. Trichomonas buccalis
D. Trypanosoma gambiense
E. Lamblia intestinalis

A gynaecologist was examining a patient and revealed symptoms of genital tract inflammation. A smear from vagina contains pyriform protozoa with a spine, flagella at their front; there is also an undulating membrane. What disease can be suspected?

A. Urogenital trichomoniasis
B. Lambliasis
C. Intestinal trichomoniasis
D. Toxoplasmosis
E. Balantidiasis

A female patient has symptoms of inflammation of urogenital tracts. A smear from the vaginal mucous membrane contained big unicellular pyriform organisms with a sharp spike on the back end of their bodies; big nucleus and undulating membrane. What protozoa were revealed in the smear?

A. Trichomonas vaginalis
B. Trichomonas hominis
C. Trichomonas buccalis
D. Trypanosoma gambiense
E. Lamblia intestinalis

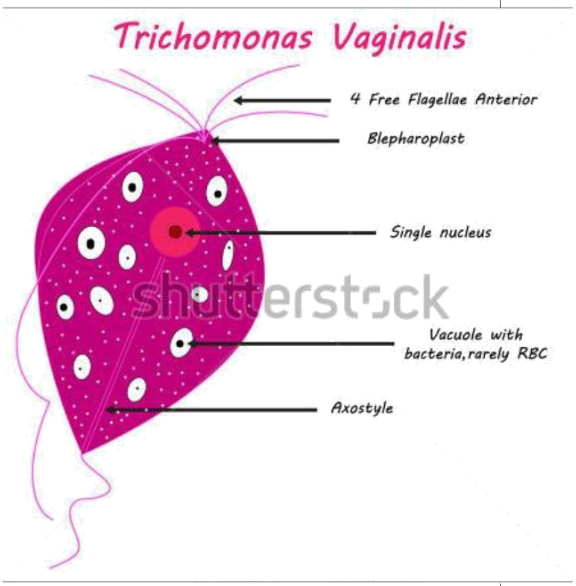


Microscopical examination of discharges from the gums of a patient ill with paradontosis revealed some protozoan pear-shaped organisms 6-13 micrometer long. The parasite has one nucleus and undulating membrane, there are four flagella at the front of its body. What protozoan were found?

A. Trichomonads
B. Leishmania
C. Amoebae
D. Balantidia
E. Lamblia

A smear from frothy and purulent vaginal discharges of a 42 y.o. woman was stained by Romanovsky-Giemsa method. Its analysis revealed some microorganisms of flagellates class. What microorganism were the most probably revealed?

A. Trichomonas vaginalis
B. Leishmania donovani
C. Trypanosoma gambiense
D. Trihomonas hominis
E. Lamblia intestinalis

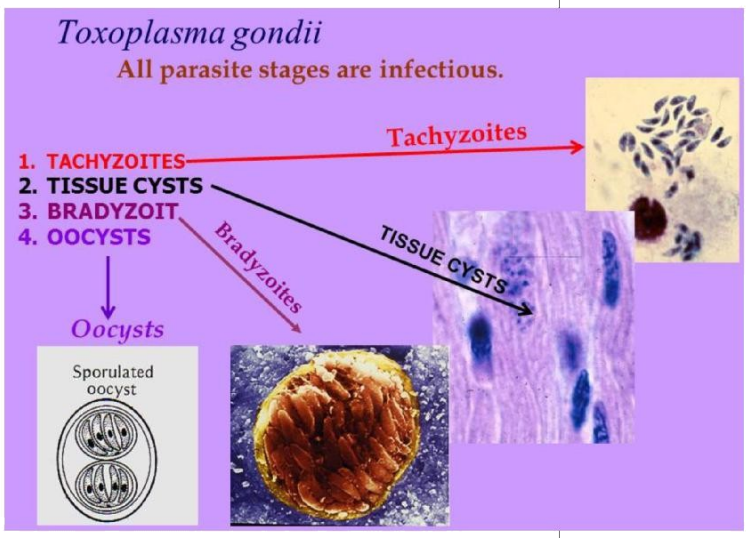


A 42-year-old female has foamy purulent vaginal discharges. The smear stained by Romanovsky-Giemsa's method has been found to include flagellated bacteria. What is the most likely microorganism that has been found by the doctor?

A. Trichomonas vaginalis
B. Trypanosoma gambiense
C. Leishmania donovani
D. Trihomonas hominis
E. Lamblia intestinalis

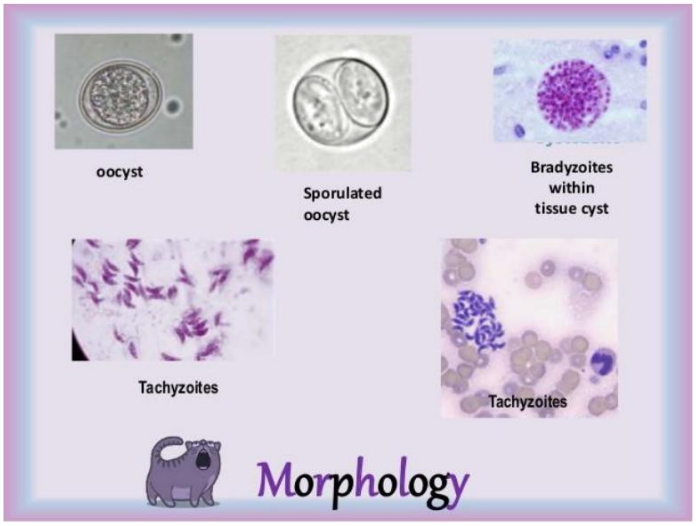
A lymph node punctate of a patient with suspected protozoa disease was examined. Examination of the stained specimen (Romanovsky's stain) revealed some crescent bodies with pointed end, blue cytoplasm and red nucleus. What protozoan were revealed in the smears?

A. Toxoplasmas
B. Malarial plasmodiums
C. Dermotropic leishmania
D. Viscerotropic leishmania
E. Trypanosomes



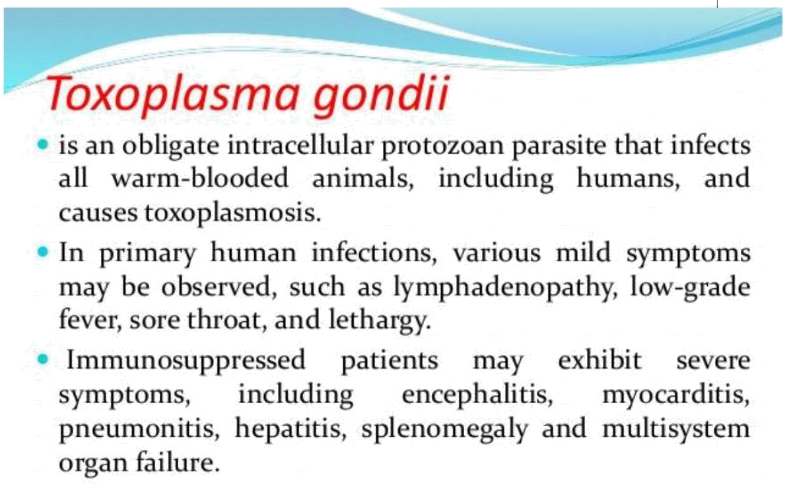
A puncture sample taken from the lymph node of a patient with preliminary diagnosis of protozoan disease has been investigated. The preparation was processed with Giemsa stain and the following was detected: crescent-shaped bodies with pointed tips, blue cytoplasm and red nuclei. What protozoa have been detected in the preparation?

A. Toxoplasma
B. Plasmodium malariae
C. Trypanosoma
D. Viscerotropic Leishmania
E. Dermatotropic Leishmania



Examination of a man revealed a protozoan disease that affected brain and caused vision loss. Blood analysis revealed unicellular half-moon-shaped organisms with pointed end. The causative agent of this disease is:

A. Toxoplasma
B. Leishmania
C. Lamblia
D. Amoeba
E. Trichmonad



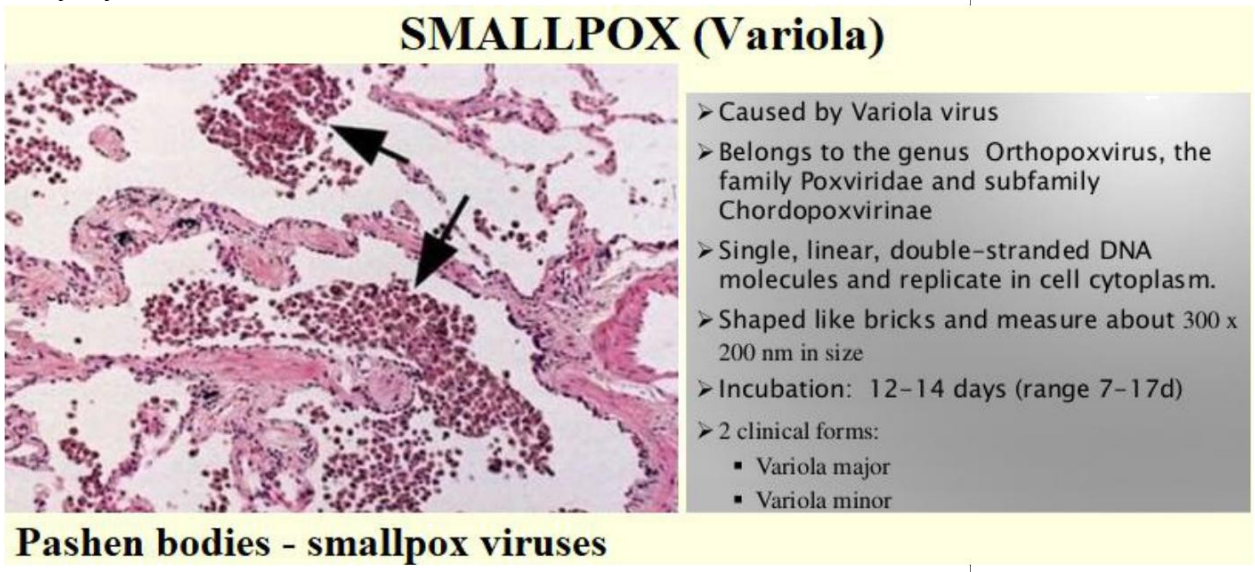
A man is ill with a protozoan disease characterized by cerebral affection and loss of sight. Blood analysis revealed halfmoon-shaped unicellular organisms with pointed ends. This disease is caused by:

A. Toxoplasma
B. Leishmania
C. Lamblia
D. Amoeba
E. Trichomonad

Viruses

The contents of vesicles that appeared on the mucous membrane of a patient with variola were sent to a virological laboratory. Which of the listed changes were revealed during the smear microscopy?

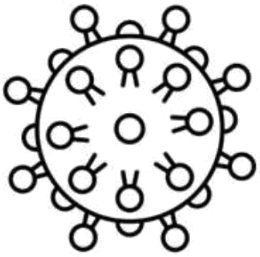
A. Paschen bodies
B. Babes-Negri bodies
C. Guarnieri bodies
D. Babes-Ernst bodies
E. Syncytium



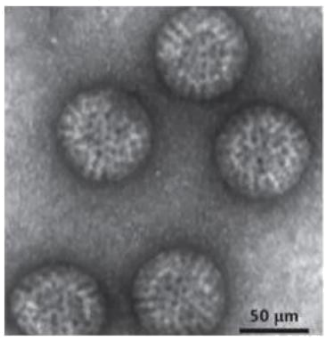
A three-year-old child has had marked diarrhea for three days. Immune electron microscopy of his excrements revealed bilayer pseudocovered capsid viruses that looked like small spoke wheels. What viruses have been revealed?

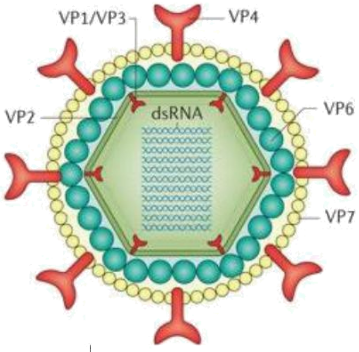
A. Rotaviruses
B. Coxsackie viruses
C. ECHO viruses
D. Coronaviruse
E. Reoviruses

What is rotavirus disease?



- Rotavirus disease is a diarrheal disease caused by a virus called rotavirus
- The name rotavirus comes from the wheel-like appearance of the virus under the microscope
- Rotavirus is a virus that infects the intestines
- Rotavirus is the most common cause of severe diarrheal disease in infants and young children worldwide
- Rotavirus is not the only cause of diarrhea, several other agents may also cause diarrhea





An outbreak of an intestinal infection occurred in a kindergarten on the eve of New Year holidays. Bacteriological examination of patients' feces didn't reveal any pathogenic bacteria. Electron microscopy revealed roundish structures with clear outer edges and a thick core resembling a wheel. Specify the most likely causative agent of this infection:

A. Rotavirus
B. Adenovirus
C. Coxsacki-virus
D. E.coli
E. P.vulgaris

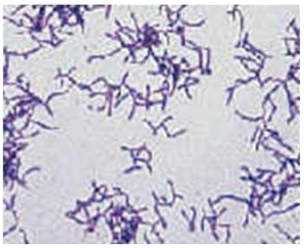
Actinomyces

A 40 year old man noticed a reddening and an edema of skin in the area of his neck that later developed into a small abscess. The incised focus is dense, yellowish-green. The pus contains white granules. Histological examination revealed drusen of a fungus, plasmatic and xanthome cells, macrophages. What type of mycosis is the most probable?

A. Actinomycosis
B. Aspergillosis
C. Candidosis
D. Sporotrichosis
E. Coccidioidomycosis

ACTINOMYCES

Anaerobic, filamentous, gram positive bacillus
– Exhibit true branching
• "Mykes" – Greek for "fungus"



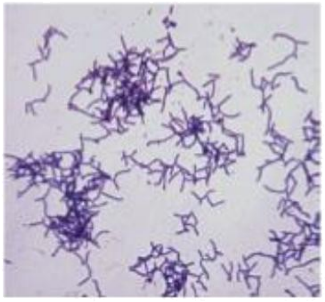
A 40-year-old man developed skin redness and an swelling in the neck area, where eventually a small abscess appeared. The section the focus is dense and yellow-green colored. In the purulent masses there are white granules. Histologically there are fungal druses, plasma and xanthome cells, and macrophages detected. Specify the most correct etiological name of this pathological process?

A. Actinomycosis
B. Furuncle
C. Carbuncle
D. Syphilis
E. Leprosy

ACTINOMYCES

MORPHOLOGY & GROWTH
• Elongated branching Gram-positive bacilli
• Anaerobic or microaerophilic
• Temperature range 35-37°C
• Slow growth on blood agar in 4-7 days

DISEASE: Actinomycosis



Microscopical examination of an infiltrate removed from the submandibular skin area of a 30 y.o. man revealed foci of purulent fluxing surrounded by maturing granulations and mature connective tissue, the pus contains druses consisting of multiple short rod-like elements with one end attached to the homogenous centre. What disease is it?

A. Actinomycosis
B. Tuberculosis
C. Syphilis
D. Candidosis E. –

A 32-year-old patient who lives in the countryside consulted a doctor about a painful swelling and a fistula in the submandibular region. Examination revealed an infiltration with a fistula discharging thick pus and containing white granules. On dissection the infiltration tissues turned out to be dense, yellow-green and had honeycomb structure because of multiple abscesses. What is the most likely diagnosis?

A. Actinomycosis

B. Tuberculosis C.

Lepra

D. Syphilis

E. Submandibular abscess

ACTINOMYCOSIS

Source of infection

- Endogenous

Pathogenesis

- After local trauma, organisms invade tissues
- Due to low oxygen tension, organisms multiply
- Form hard yellow granules (called **sulfur granules**) which are bacterial filaments solidified with tissue exudates
- These granules drain outside through sinuses

Microscopic examination of pus sample taken from mandibular fistula canal and stained by Gram's method has revealed druses with gram-positive coloring in the center and cone-shaped structures with gram-negative coloring. Such morphology is characteristic of the agent of:

A. Fusobacteriosis

B. Actinomycosis

C. Staphylococcal osteomyelitis

D. Anaerobic infection

E. Candidiasis

The sterile Petri dishes and pipettes are necessary to prepare for microbiological tests in bacteriological laboratory. What way of sterilization should be applied in this case?

A. Dry-heat sterilization
B. Tyndallization
C. Pasteurization
D. Boiling
E. Steam sterilization in autoclave

STERILIZATION AND DISINFECTION

Sterilization methods

- **Physical methods**
  - •Moist heat in autoclaves
  - •Dry-heat in ovens
  - •Gamma irradiaton
  - •Filtration
  - •Plasma sterilization
- **Chemical agents**
  - •Ethylene oxide
  - •Glutaraldehye (high concentration)

Disinfection methods

- **Chemical agents**
  - •Alcohols
  - •Aldehydes
  - •Halogens
  - •Phenols
  - •Surfactants
  - •Heavy metals
  - •Dyes
  - •Oxidants
- **Physical methods**
  - **•Boiling and pasteurisation**
  - **•Ultraviolet radiation**

What method should be applied for sterilization of heatproof and moistureproof stomatological instruments in order to ensure total destruction of viruses, vegetative and spore forms of microorganisms?

A. Autoclaving
B. Boiling
C. Pasteurization
D. Tyndallization
E. Burning in the flame of gas burner

Autoclave is a pressurized device designed to heat aqueous solutions above their boiling point at normal atmospheric pressure to achieve sterilization.

Auto ⟹ self

Clavis ⟹ self locking device

Autoclave Machine

- When pressure is increased in a closed vessel the temperature increases proportionately. i.e.for about 15 pounds of pressure per square inch (Psi) the temperature rises to 121°C.
- This pressure and temperature is kept constant for 20 minutes during autoclaving.
- It is sufficient to kill all the vegetative forms and spores of the organism.

Which of the following sterilization methods ensures total death of microorganisms and their spores during onetime thermal processing of an object?

A. Autoclaving
B. Boiling
C. Tyndallization
D. Pasteurization
E. –

Meat peptone broth is prepared for sterilization in bacteriological laboratory. What sterilization method is advisable?

A. Autoclaving
B. Ignition
C. Boiling
D. Filtering
E. Dry heat

In the surgical ward, the dressing material was undergoing sterilization in an autoclave. Through an oversight of a nurse the mode of sterilization was changed and the temperature in the autoclave reached only $100^{o}C$ instead of the due $120^{O}C$.What microorganisms can stay viable under these conditions?

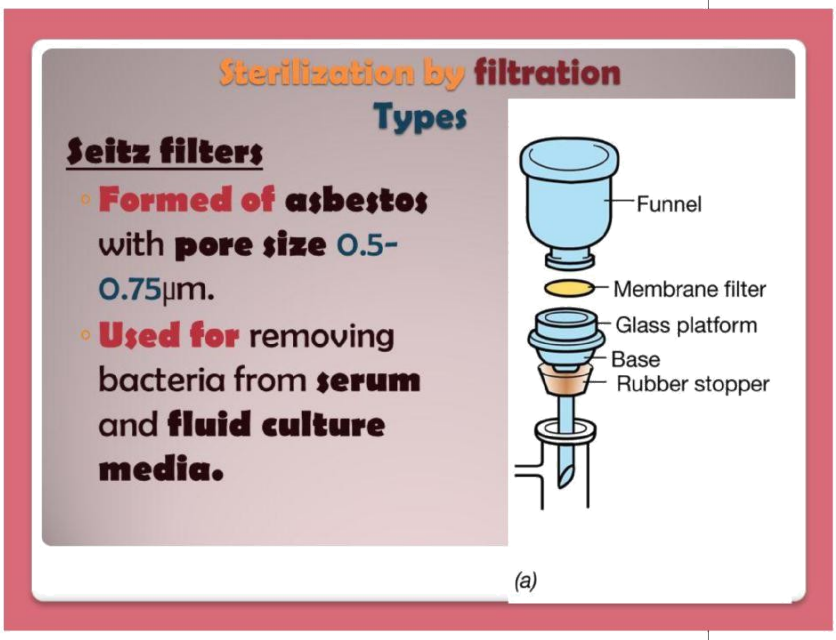
A. Bacilli and clostridia
B. Staphylococci and streptococci
C. Mold and yeast fungi
D. Salmonella and klebsiella
E. Corynebacteria and mycobacteria

Bacteriological laboratory has the task to sterilize nutrient mediums containing substances that convert under the temperature over $100^{0}C$ (urea, carbohydrates). What method of sterilization should be used?

A. Fluid steam sterilization
B. Autoclaving
C. Boiling
D. Tindalization
E. Pasteurization

What method of sterilization should be used during the manufacturing liquid dosage forms containing proteins?

A. Filtering
B. Boiling
C. Gas sterilization
D. Autoclaving
E. Pasteurization

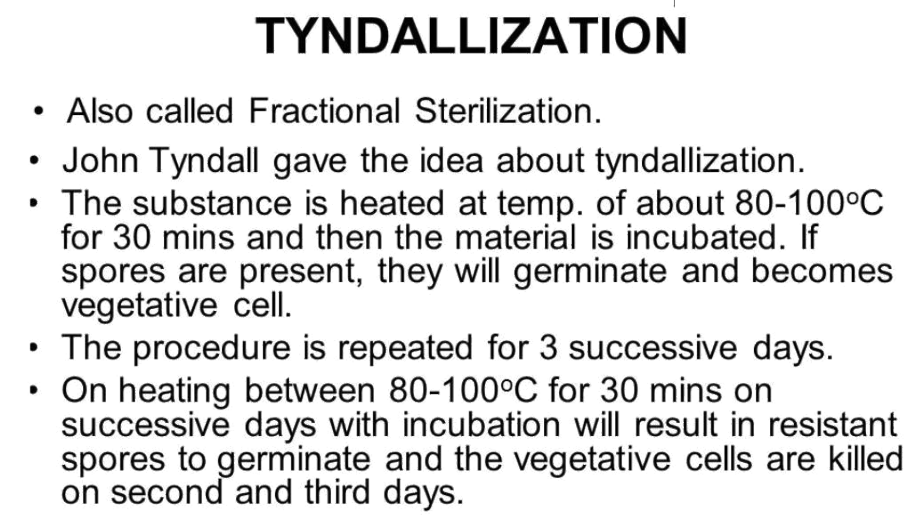


In order to keep vitality and stability of eubiotics microorganisms in frozen state are dried under conditions of high vacuum. What method is it?

A. Lyophilization
B. Pasteurization
C. Tyndallization
D. Inactivation
E. Hybridization

What method ensures reliable sterilization of biological liquids (serums, solutions, enzymes, vitamines etc.) that cannot be exposed to high temperatures?

A. Tyndallization
B. Dry heat
C. Flowing steam
D. Moist steam under pressure
E. Flaming

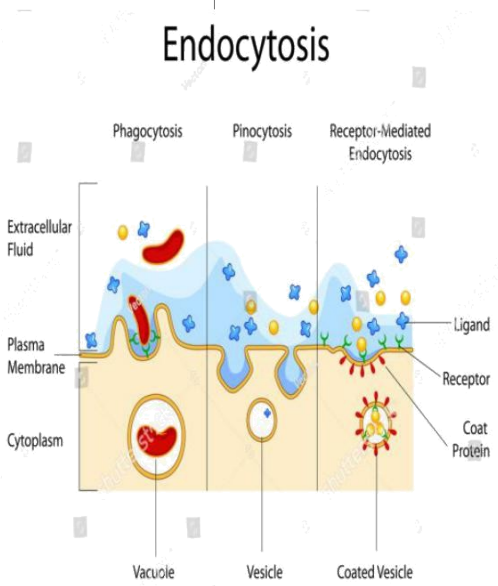


Having completed work in a laboratory, a student must tidy up the workspace, perform disinfection of the workbench and tools. What chemicals should be used for disinfection?

A. Chloramine B. Hydrochloric acid
C. Formalin D. Chloroform E. Ether

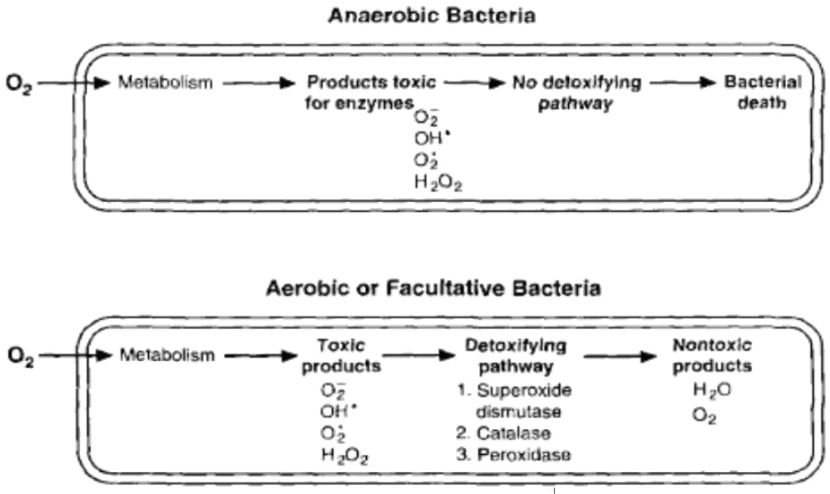
Passive and active transport of substances is realized through the cell membrane. Name the type of active transport by which the membrane changes its structure:

A. Endocytosis
B. Osmosis
C. Filtration
D. Diffusion
E. Facilitated diffusion



Those organisms which in the process of evolution failed to develop protection from H_2O_2 can exist only in anaerobic conditions. Which of the following enzymes can break hydrogen peroxide down?

A. Peroxidase and catalase
B. Oxygenase and hydroxylase C. Cytochrome oxidase, cytochrome B5
D. Oxygenase and catalase E. Flavin-dependent oxidase

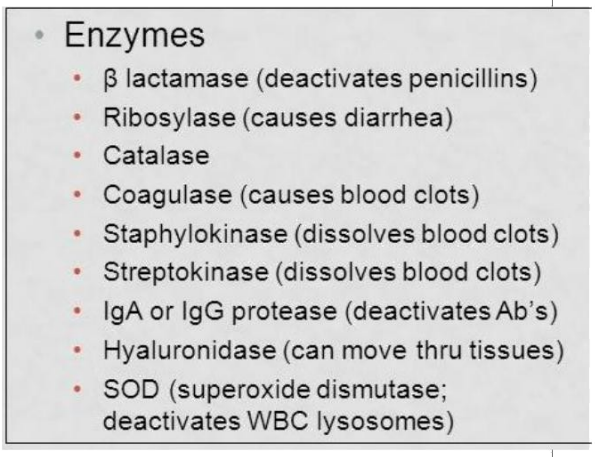


A bacterial cell obtains nutrients by different ways. One of them is the facilitated diffusion that is realized by special membrane carrier proteins. What are these proteins called?

A. Permeases
B. Lyases
C. Oxidoreductases
D. Isomerases
E. Ligases

Pathogenic microorganisms produce various enzymes in order to penetrate body tissues and spread there. Point out these enzymes among those named below.

A. Hyaluronidase, lecithinase
B. Lyase, ligase
C. Transferase, nuclease
D. Oxydase, catalase
E. Esterase, protease



Pathogenic microorganisms are characterized by presence of aggression enzymes that determine their virulence. Select an aggression enzyme:

A. Hyaluronidase
B. Carbohydrase
C. Transferase
D. Oxidase
E.Lyase

Pathological material taken from a patient suffering from pulpitis was inoculated onto Kitt-Tarozzi cultural medium. It is planned to find the following microorganisms:

A. Anaerobic
B. Acid-resistant C. Acidophilic
D. Haemolytic E. Aerobic

A patient was taken to a hospital with acute food poisoning caused by homemade canned mushrooms. The product analysis revealed some microorganisms that develop only in the absence of oxygen. What microorganisms caused the poisoning?

A. Obligate anaerobes
B. Facultative anaerobes
C. Microaerophiles
D. Obligate aerobes
E. Capnophiles

▲ **Obligate anaerobes (Strictly anaerobes) : need an oxygen-free environment to live. They cannot grow in places with oxygen, which can sometimes damage and destroy them.**

▲ **Aerotolerant bacteria (moderate anaerobes) : do not use oxygen to live, but can exist in its presence for a period of time.**

▲ **Facultative anaerobes use fermentation to grow in places without oxygen, but use aerobic respiration in places with oxygen.**

The causative agents of intestinal infections can grow at refrigerator temperatures, which may cause infection in people. What type of temperature optimum do these microorganisms relate to?

A. Psychrophilic
B. Mesophilic
C. Thermophilic
D. Anthropophilic
E. Necrophilic

Psychrophilic

- These grow best at about 20°C but also down to -10°C in unfrozen media.
- Psychrophilic bacteria can cause food spoilage at low temperatures.
- Several of the microorganisms found in the soil and water belong to this group.

For cultivation of Brucella, pure cultures should be incubated in CO2 enriched atmosphere. What type of breathing is typical for Brucella?

A. Capnophilic
B. Facultative anaerobic
C. Obligate anaerobic
D. Obligate aerobic
E. Any

Types of microorganisms

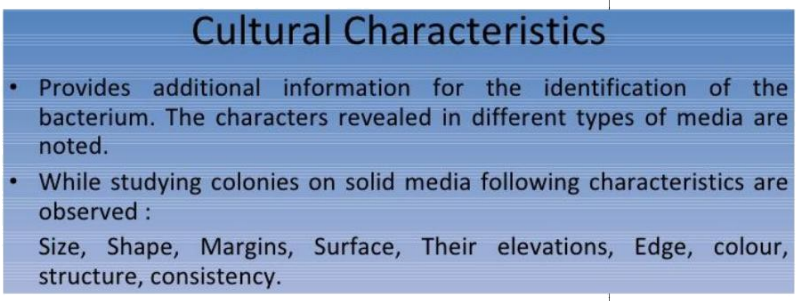
- **Aerotolerant anaerobes**: They are anaerobic parasites that are not killed by exposure to oxygen.
- **Capnophiles**: Capnophilic parasites require increased concentration of carbondioxide (5% to 10%) and approximately 15% oxygen. The examples of capnophilic bacteria includes: *Haemophilus influenzae, Neisseria gonorrhoeae etc.*
- **Microaerophiles:** Microaerophiles are those groups of parasites that can grow under reduced oxygen (5% to 10%) and increased carbondioxide (8% to 10%). Higher oxygen tensions may be inhibitory to them. Examples of Microaerophiles are: *Campylobacter jejuni, Helicobacter pylori* etc.

A patient underwent esophagogastroduodenoscopy. Analysis of the biopsy material enabled doctors to diagnose him with helicobacteriosis. What property of the bacteria found in this patient had to be obligatory taken into account during their cultivation?

A. Microaerophilic ability
B. Presence of urease
C. Colonisation of gastral cells
D. Absence of spores and capsules
E. Presence of six polar flagella

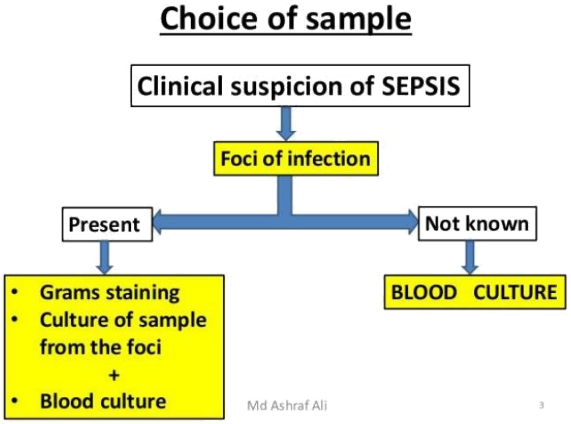
In microbiology class students had been growing pure bacterial culture. Bacterial inoculation of solid medium was performed to obtain separate visible colonies, resulting in two colonies, R-type and S-type, grown in thermostat after one day of incubation. What microorganism properties were described by students?

A. Cultural
B. Tinctorial
C. Biochemical
D. Morphologic
E. Antigenic



A 55-year-old male patient was hospitalized to a surgical clinic for suspected septicemia. What material should be taken for analysis?

A. Blood, sugar broth
B. Liquor, serum agar
C. Urine, beef-extract broth
D. Pus, yolk saline agar
E. Lymph node punctate, cysteine agar

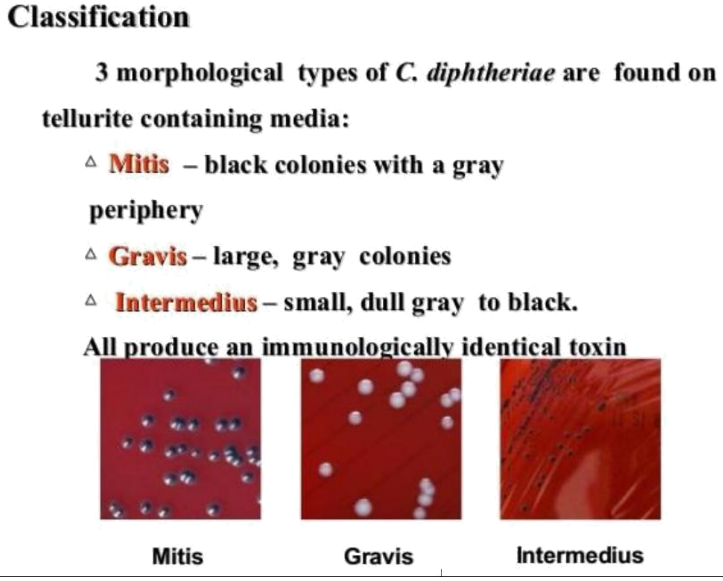


A patient operated for acute paraproctitis undergoes antibacterial and detoxification therapy. According patient state doctor suspected sepsis. What study will confirm the diagnosis?

A. Blood culture for a pathogen
B. X-ray of lungs C. Liver ultrasound
D. Determining the rate of microbial contamination of wound E. Determining the rate of average-weight molecules

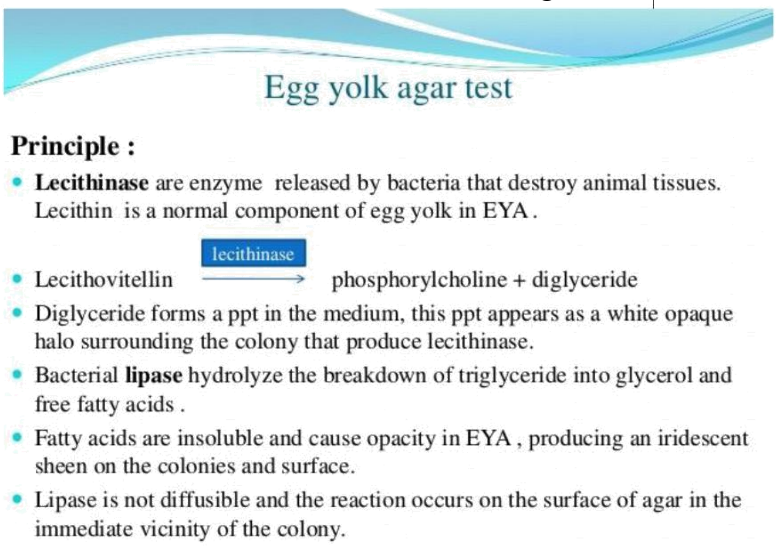
A 4-year-old child presents with general weakness, sore throat and deglutitive problem. After his examination a doctor suspected diphtheria and sent the material to the bacteriological laboratory. In order to determine the diphtheria causative agent the material should be inoculated into the following differential diagnostic medium:

A. Blood tellurite agar B. Endo's agar
C. Ploskyrev's agar
D. Sabouraud's agar
E. Levenshtein-Yessen agar



It is suspected that the workers of a serum drugs plant at a regional hemotransfusion station are carriers of pathogenic staphylococcus aureus. In order to detect staphylococcus carriage, the material from the nasopharynx of the workers should be inoculated into the following medium:

A. Egg-yolk-salt agar
B. Endo agar
C. Meat infusion broth
D. Kessler medium
E. Blood agar



Microbiological studies of air in the pharmacy room revealed the presence of pathogenic staphylococci. Select the medium in which you can detect the lecithinase activity of the isolated microorganism:

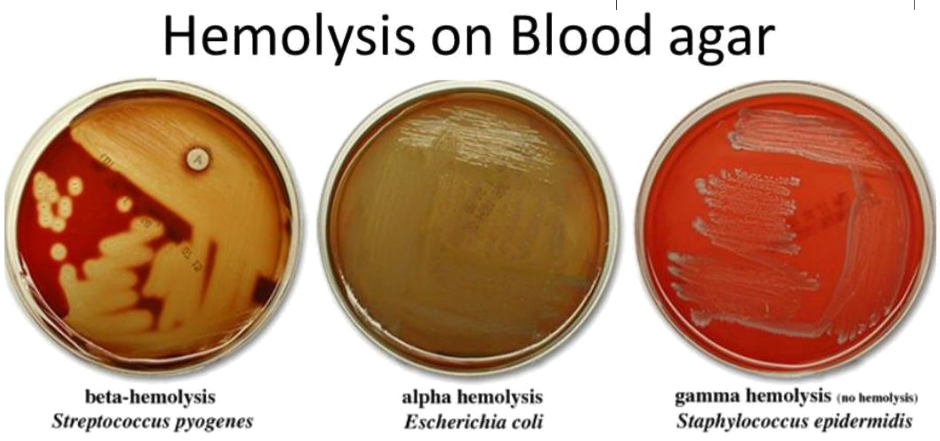
A. Yolk-salt agar
B. Blood agar
C. Bismuth sulfite agar
D. Sugar agar
E. Meat-extract agar

It was suspected that among workers of serum medications factory of regional hemotransfusion station there are carriers of pathogenic cocci. What medium should the material from nasopharynx of workers be inoculated of in order to reveal Staphylococcous carriage?

A. Yolk-salt medium
B. Endo agar
C. Beef-extract broth
D. Ressler's medium
E. Blood agar

Examination of air state in drugstore premises for preparation of injection drugs was done by method of sedimentation. It revealed 5 small roundish colonies with zone of hemolysis around them. Inoculations were made on the following cultural medium:

A. Blood agar
B. Endo agar
C. Meat infusion agar
D. Egg yolk and salt agar E. Lewin's agar



In order to establish the possible contamination of a medication with fungi, a nutrient medium was inoculated, which resulted in growth of large cream-like colonies. What nutrient medium was used in this case?

A. Sabouraud

B. Lowenstein-Jensen

C. Roux

D. Loeffler

E. Finn-2

- **Sabouraud`s dextrose agar** (SDA): the standard media for most fungi. Chloramphenicol added to inhibit bacterial growth.

Crude herbal drugs must be examined for yeast-like fungi. What agar can ensure development of these microorganisms so that associating microflora will grow very slowly or won't grow at all?

A. Sabouraud's peptone agar

B. Endo agar C. Meat infusion agar

D. Milk-salt agar E. Blood agar

A 3 month old infant has got a white deposition on the mucous membrane of his mouth, tongue and lips. The doctor suspected candidosis. What nutrient medium should be used for inoculation of the material under examination in order to confirm this diagnosis?

A. Sabouraud

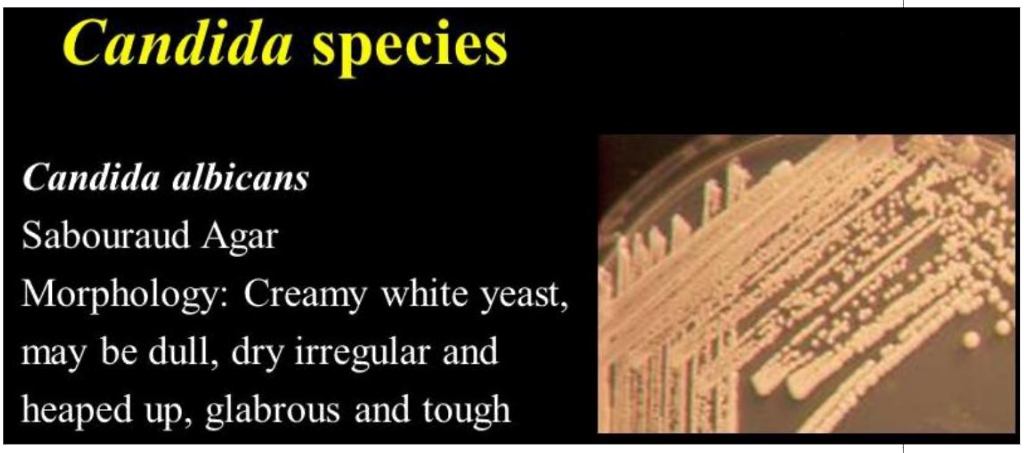
B. Endo C. Loewenstein-Jensen

D. Roux E. Clauberg

A 3 m.o. baby has white film on the mucous membrane of his mouth, tongue and lips. A doctor suspected candidosis. What nutrient medium should be applied for inoculation of the material under examination in order to confirm this diagnosis?

A. Sabouraud's B. Endo C. Jensen's

D. Roux E. Clauberg's



A patient has a necrotizing phlegmon of his lower extremity. A doctor suspects a gas gangrene. Microscopy reveals grampositive bacilli. In order to confirm the diagnosis further bacteriological tests should include inoculation of the material into the following nutrient medium:

A. Kitt-Tarozzi medium

B. Endo agar C. Levine agar

D. Meat-peptone agar E. Milk-salt agar

A lot of pyoinflammatory processes in oral cavity are caused by anaerobes. What nutrient medium can be used for control of wound textile contamination by anaerobes?

A. Kitt-Tarozzi

B. Endo C. Roux

D. Sabouraud's E. Ploskirev's

In 8 days after a surgery the patient develops tetatus. The surgeon suspects this condition to be caused by suture material contaminated by tetanus agent. The material is delivered to a bacteriological laboratory. What nutrient medium is required for primary inoculation of the suture material?

A. Kitt-Tarozzi medium

B. Endo agar C. Hiss medium

D. Sabouraud agar E. Egg-yolk salt agar

A 12-year-old boy has been hospitalized for suspected food poisoning. The fecal samples were inoculated on the Endo agar, which resulted in growth of a large number of colorless colonies. What microorganism is most likely to be EXCLUDED from the list of possible causative agents of the disease?

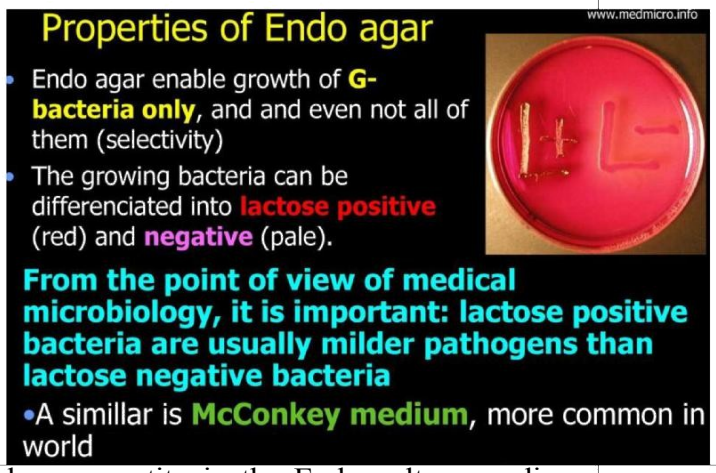
A. Escherichia coli

B. Salmonella enteritidis

C. Proteus vulgaris

D. Pseudomonas aeruginosa

E. Yersinia enterocolitica



Red colonies spread in the large quantity in the Endo culture medium were revealed on bacteriological stool examination of a 4-month-old baby with the symptoms of acute bowel infection. What microorganism can it be?

A. Escherichia

B. Salmonella C. Staphylococcus

D. Streptococcus E. Shigella

On bacteriological examination of the defecation of a 4-months-old baby with the symptoms of acute bowel infection there were revealed red colonies spread in the large quantity in the Endo environment. What microorganism can it be?

A. Staphylococcus

B. Streptococcus

C. Shigella

D. Salmonella

E. Escherichia

During bacteriological examination of solutions prepared in a drug-store there appeared red colonies with metallic shining that grew on Endo agar. What bacteria can they be?

A. Escherichia

B. Shigella C. Staphylococci

D. Streptococci E. Salmonella

During bacteriological analysis of solutions prepared in a pharmacy some red colonies with metallic glitter have grown on Endo agar. What microbes were revealed?

A. Escherichia

B. Shigella C.Staphylococci

D. Streptococci E. Salmonella

Bacteriological examination of a patient with food poisoning required inoculation of a pure culture of bacteria with the following properties: gramnegative movable bacillus that grows in the Endo's medium in form of colourless colonies. A representative of which species caused this disease?

A. Salmonella

B. Shigella

C. Yersinia

D. Esherichia

E. Citrobacter

On bacteriological study of rinsing water of the patient with food poisoning, the pure bacterial culture was inoculated with the following properties: gram-negative motile bacillus in the Endo environment grows like achromic colony. Representative of what genus has caused the illness?

A. Yersinia B. Citrobacter

C. Salmonella

D. Shigella E. Escherichia

A patient was admitted to the infectious department of a hospital. His provisional diagnosis was "acute gastroenteritis". Inoculation of feces on bismuth-sulfite agar induced growth of black colonies with metallic glitter. What microorganisms should you think of?

A. Salmonella

B. Escherichia C. Shigella

D. Yersinia E. Brucella

After inoculation of the material obtained from the pharynx of an angina patient onto the blood-tellurite agar, grey colonies could be observed. They were 4-5 mm in diameter, radially striated (in form of rosettes). Microscopical examination revealed gram-positive bacilli with clavate swollen ends arranged in form of wide-spread fingers. Identify these microorganisms:

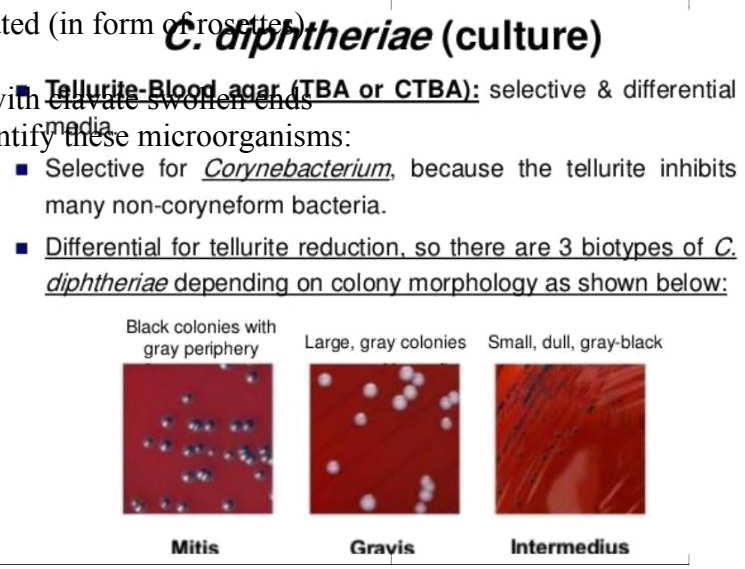
A. Diphtheria corynebacteriae

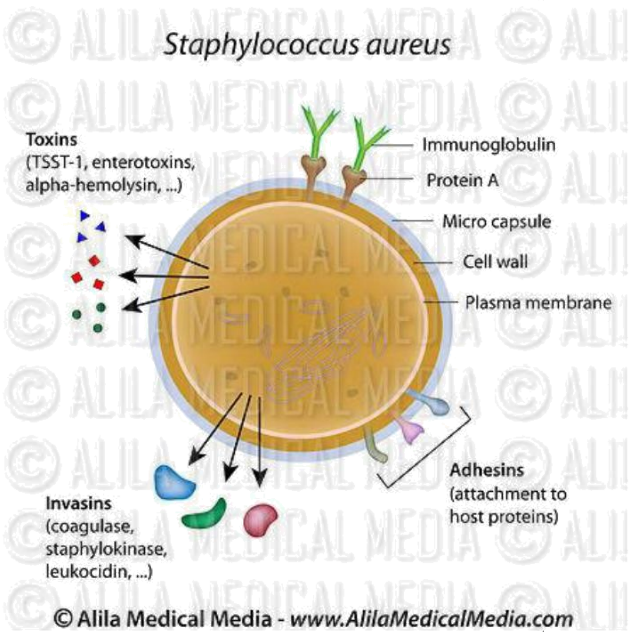
B. Clostridium botulinum

C. Diphtheroids

D. Streptococci

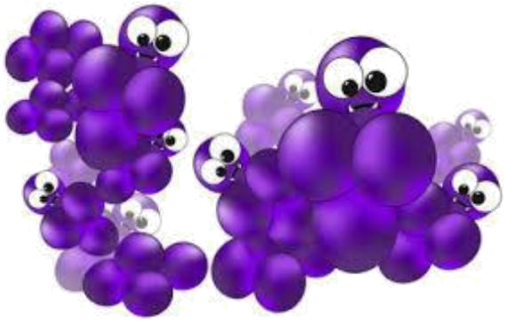
E. Streptobacilli



Inoculum from pharynx of a patient ill with angina was inoculated into bloodtellurite agar. It resulted in growth of grey, radially striated (in form of rosettes) colonies 4-5 mm in diameter. Grampositive bacilli with clublike thickenings on their ends placed in form of spread wide apart fingers are visible by microscope. What microorganisms are these? **A. Diphtheria corynebacteriae** B. Botulism clostridia C. Diphtheroids D. Streptococci E. Streptobacilli	
A sample taken from the pharynx of a patient with angina was inoculated on the blood-tellurite agar. This resulted in growth of grey, radially striated (in form of rosettes) colonies up to 4-5 mm in diameter. Microscopically there can be seen gram-positive rods with club-shaped ends arranged in form of spread fingers. What microorganisms are these? **A. Corynebacteria diphtheriae** B. Clostridium botulinum C. Diphtheroids D. Streptococci E. Streptobacilli	
Examination of a patient with pustular skin lesions allowed to isolate a causative agent that forms in the blood agar roundish yellow middle-sized colonies surrounded by haemolysis zone. Smears from the colonies contain irregular-shaped clusters of gram-positive cocci. The culture is oxidase- and catalasepositive, ferments mannitol and synthesizes plasmocoagulase. What causative agent was isolated? **A. Staphylococcus aureus** B. Streptococcus agalactiae C. Str. pyogenes D. St. epidermidis E. St. saprophyticus	
During inspectation of dental tools for sterility in one case gram-positive cocci were detected. They were situated in clusters and yielded positive plasma coagulation reaction; the cocci were fermenting mannitol in anaerobic conditions and exhibiting lecithinase activity. What microorganism as detected? A. St. saprophiticus B. St. epidermidis C. Corynebacterium xerosis **D. Staph. aureus** E. Str. Pyogenes  	

Microbiological purity of tableted drugs had been tested at factory. Samples cultivation in mannitol salt agar resulted in growth of golden-yellow colonies, microscopic examination of colonies detected grampositive globular bacteria positioned in clusters; microorganisms had plasma coagulation properties. What pure bacterial culture was obtained?

A. Staphylococcus aureus
B. Enterobacteriaceae
C. Staphylococcus epidermidis
D. Staph. saprophyticus
E. Pseudomonas aeruginosa



Bacilli were extracted from investigated sample. The bacilli are curved, extremely mobile, gram-negative, form no spores or capsules, have anaerobic form of respiration. They form transparent smooth colonies in alkaline agar, ferment saccharose and mannose into acid, produce exotoxin, fibrinolysin, collagenase, and hyaluronidase. What agent was extracted?

A. Comma bacillus
B. Proteus
C. Dysentery bacillus
D. Blue pus bacillus
E. Colibacillus

Vibrio sp.

Gram-negative rods
Curves or comma shaped
Non-spore forming
Highly motile-single polar flagella
Associated with salt water
Oxidase positive
Facultative anaerobe
Tolerate alkaline conditions to pH9.0
Readily cultivated, Simple nutritional requirements

Initial inoculation of water in 1% peptone water resulted in growth of a thin film on the medium surface in 6 hours. Such cultural properties are characteristic of causative agent of the following disesase:

A. Cholera
B. Plague
C. Tuberculosis
D. Dysentery
E. Pseudotuberculosis

Alkaline peptone water

- Alkaline Peptone Water is an enrichment medium used for the cultivation of *Vibrio* species from feces and other infected materials.
- Peptones provide nitrogen, vitamins, minerals and amino acids essential for growth.
- Sodium chloride supplies essential electrolytes for transport and osmotic balance and encourages the growth of ***Vibrio cholerae***.

After inoculation of feces sample into the 1% alkaline peptonic water and 8-hour incubation in the thermostat at a temperature of 37^{o}C a culture in form of a tender bluish film has grown. Such cultural properties are typical for the causative agent of the following disease:

A. Cholera
B. Plague
C. Typhoid fever
D. Paratyphoid fever
E. Dysentery

A 4-year-old child presents with general weakness, sore throat and deglutitive problem. After his examination a doctor suspected diphtheria and sent the material to the bacteriological laboratory. In order to determine the diphtheria causative agent the material should be inoculated into the following differential diagnostic medium:

A. Blood tellurite agar
B. Levenshtein-Yessen agar
C. Ploskyrev's agar
D. Sabouraud's agar
E. Endo's agar

LABORATORY DIAGNOSIS : CULTURE

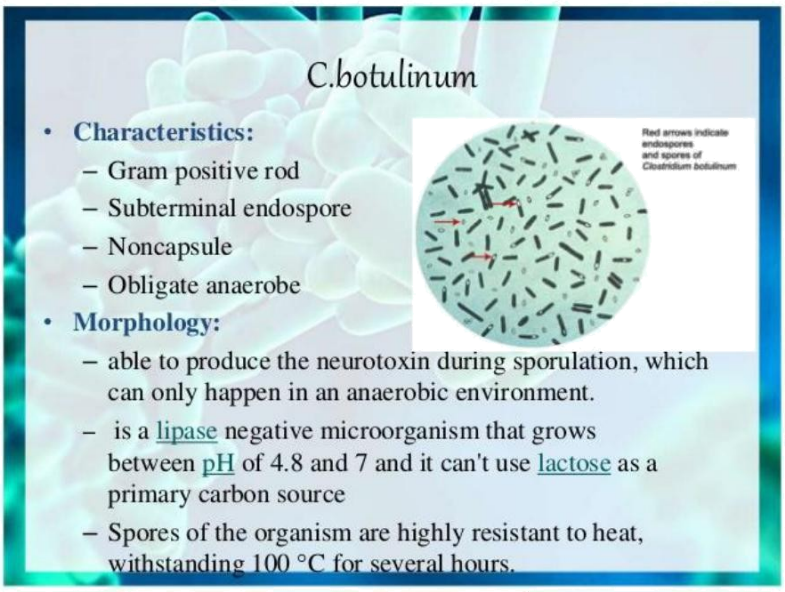
- If the swabs can not be inoculated promptly, they should be kept moistened with serum;
- Inoculate on :
  - **Loeffler's serum slope**
  - **Tellurite blood agar or Tinsdale medium**
  - **Blood agar (for differentiating Staphylococcal or Streptococcal pharyngitis that simulate diphtheria);**
- *Tellurite medium is particulary useful for isolating the organism from – convalescents, contacts or carriers;*

A bacteriological laboratory received a sample of dried fish from an outbreak of food poisoning. Inoculation of the sample on Kitt-Tarozzi medium revealed microorganisms resembling tennis racket. These microorganisms are causative agents of the following disease:

A. Botulism.
B. Diphtheria.
C. Typhoid fever.
D. Salmonellosis.
E. Dysentery
.

A bacteriological laboratory studied the home-made dried fish which had caused a severe food poisoning. Microscopy of the culture grown on the Kitt-Tarozzi medium revealed microorganisms resembling a tennis racket. What is the most likely diagnosis?

A. Botulism
B. Salmonellosis
C. Cholera
D. Dysentery
E. Typhoid fever

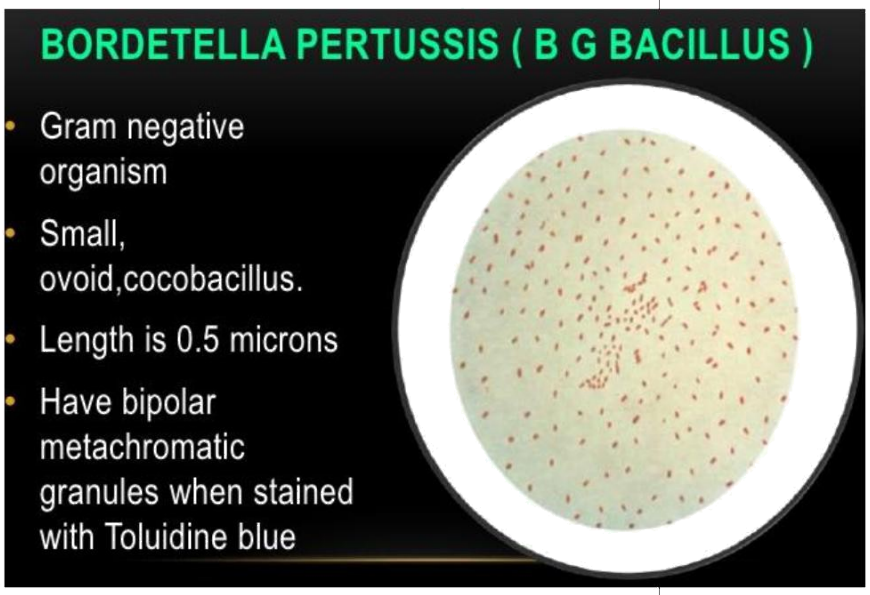


A bacteriological laboratory has been investigating a sample of homemade dried fish that was the cause of severe food poisoning. Microscopy of the culture inoculated in Kitt-Tarozzi medium revealed microorganisms resembling a tennis racket. What diagnosis can be made?

A. Botulism
B. Salmonellosis
C. Cholera
D. Dysentery
E. Typhoid fever

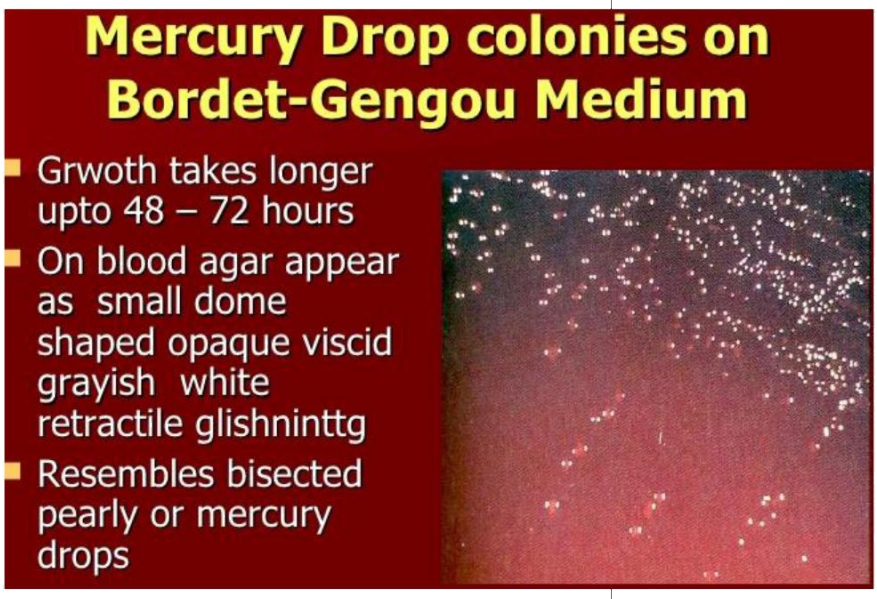
A patient has severe catarrhal symptoms. Material growth on Bordet-Gengou agar showed mercury-drop like colonies. Examination of the blood smears revealed some small ovoid gram-negative bacilli sized 1-3 microns. What microorganisms were isolated?

A. Bordetella
B. Corynebacteria
C. Mycobacteria
D. Meningococcus
E. Brucella



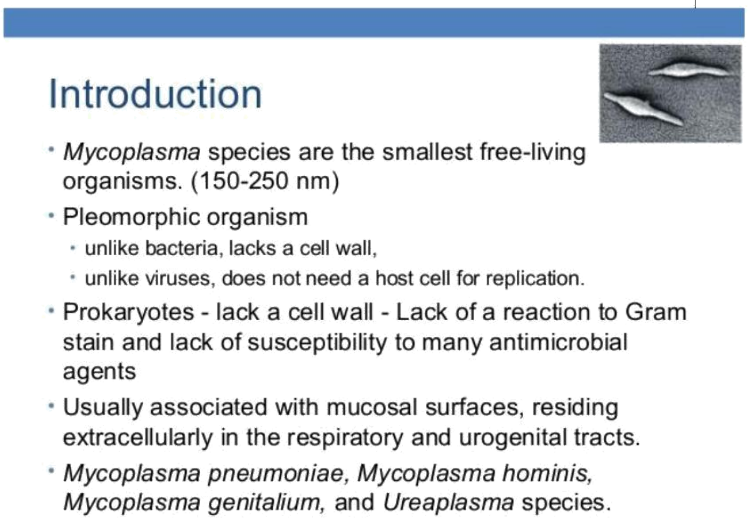
During bacteriological examination of sputum of a child with choking cough and fever there were revealed glossy smooth colonies growing on casein-charcoal agar and reminding of mercury drops. Microscopic examination revealed short Gram-negative bacteria. What microorganism was secured from the sputum?

A. Bordetella pertussis
B. Haemophylus influenzae
C. Corynebacterium dyphtheriae
D.neumoniaa neumonia
E. Streptococcus pyogenes



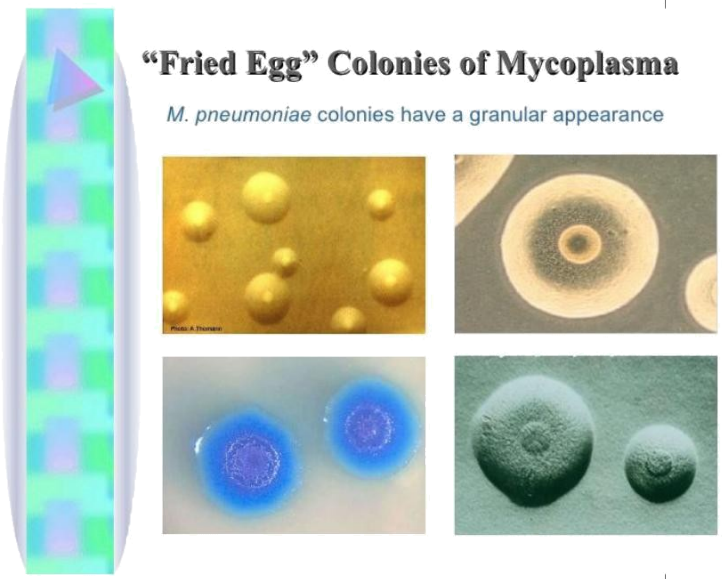
On the base of the clinical data a child was diagnosed with atypical pneumonia resistant to the effects of beta-lactam antibiotics. The patient's sputum was cultured and incubated in a special medium, which resulted in growth of microorganisms forming microscopic colonies with a dense center (looking like fried eggs). What microorganism caused the disease?

A. Mycoplasma pneumoniae
B. Klebsiella pneumoniae
C. Str. pneumoniae
D. L. pneumophila
E. Chlamidia pneumonia



From a medicinal herb a certain phytopathogenic microorganism was secured. In the nutrient medium it forms "fried egg"colonies. What is the most likely agent?

A. Mycoplasma
B. Yeasts
C. Actinomycetes
D. Nocardia
E. Pseudoonas



Bacteriological examination of the urine of the patient with pyelonephritis revealed microorganisms that produced yellow-green pigment and a characteristic odor in meat-peptone agar. What are they called?

A. Pseudomonas

B. Escherichia C. Proteus

D. Klebsiella E. Azotobacter

Many diseases of medicinal plants are caused by bacteria of the Pseudomonas genus. Select the bacteria relating to this genus:

A. Blue pus bacillus

B. Colon bacillus

C. Proteus

D. Mycoplasma

E. Micrococci

Pseudomonas aeruginosa – blue-greenish pus

- Skin graft infected with *Pseudomonas aeruginosa*
- Pyocyanin – blue pigment produced by *Ps.aeruginosa* (pyocyanic bacillus)

Urine examination of a patient with acute cystitis revealed leukocytes and a lot of gram-negative bacilli. Inoculation resulted in growth of colonies of mucous nature that formed green soluble pigment. What microorganism is the most probable cause of the disease?

A. Pseudomonas aeruginosa

B. Klebsiella pneumoniae

C. Escherihia coli

D. Proteus mirabilis

E. Salmonella enteritidis

P. aeruginosa is an opportunistic pathogen

- Extremely broad host spectrum
- Hardly any infections in the normal human host
- Severe immunodeficiencies and medical devices predispose the patients to *P. aeruginosa* infections
- Broad spectrum of clinical symptoms
  - Urinary tract infections
  - Pulmonary infections
  - Soft tissue infections
  - Sepsis
  - Bone and joint infections
  - Endocarditis

A patient of surgical department complains about pain in the small of her back and in the lower part of her belly; painful and frequent urination. Bacteriological examination of urine revealed gram-negative oxidase-positive rod-like bacteria forming greenish mucoid colonies with specific smell. What causative agent can it be?

A. Pseudomonas aeruginosa

B. Mycoplasma pneumonie C. Str.pyogenes

D. E. coli E. Proteus mirabilis

Diagnosis of *P. aeruginosa*

- Isolation and lab identification of the pathogen
- *P. aeruginosa* grows well on most laboratory media
- Identified on the basis of its:
  - Gram morphology,
  - inability to ferment lactose,
  - a positive oxidase reaction,
  - its characteristic odor,
  - its ability to grow at 42° C.
  - Fluorescence is helpful in early identification of P. aeruginosa colonies and may also help identify its presence in wounds.

A patient has wound abscess. Bacteriological examination of the wound content revealed a gram-negative bacillus which forms semi-transparent mucous colonies of blue-green color with a pearlescent appearance on the beef-extract agar. Culture has a specific odor of violets or jasmine. What type of pathogen was isolated from the patient's wound?

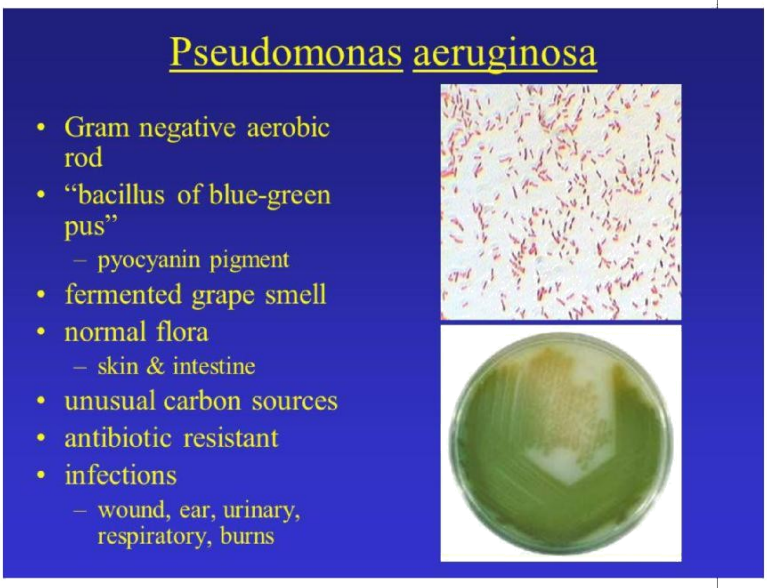
A. P. aeruginosa

B. P.vulgaris

C. S.aureus

D. S.pyogenes

E. S.faecalis



A patient of oral surgery department has developed a purulent complication. Bacteriological analysis of the wound discharge allowed to isolate a culture producing a blue-and-green pigment. Which of the listed microorganisms may be a causative agent of the infection?

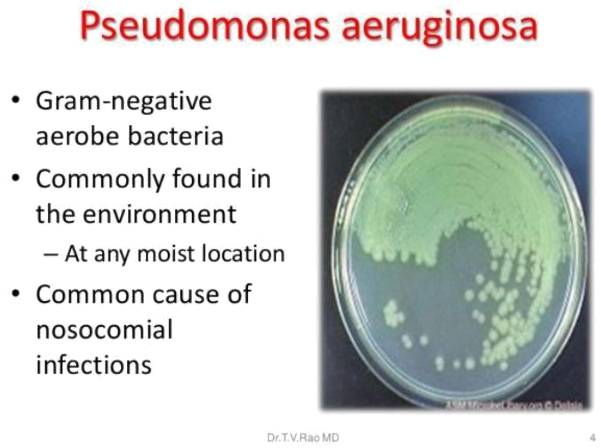
A. Pseudomonas aeruginosa

B. Staph. epidermidis C. B. subtilis

D. Pr. vulgaris E. Klebsiella pneumoniae

A patient in the oral surgery department has got purulent complication. Bacteriological analysis of the wound material found a culture that produces cyan pigment. What microorganism is the most probable causative agent?

A. Pseudomonas aeruginosa
B. Staph. epidermidis
C. B. subtilis
D. Kleb. pneumoniae
E. Pr.vulgaris



A patient being treated in the burns department has suppurative complication. The pus is of bluish-green color that is indicative of infection caused by Pseudomonas aeruginosa. What factor is typical for this causative agent?

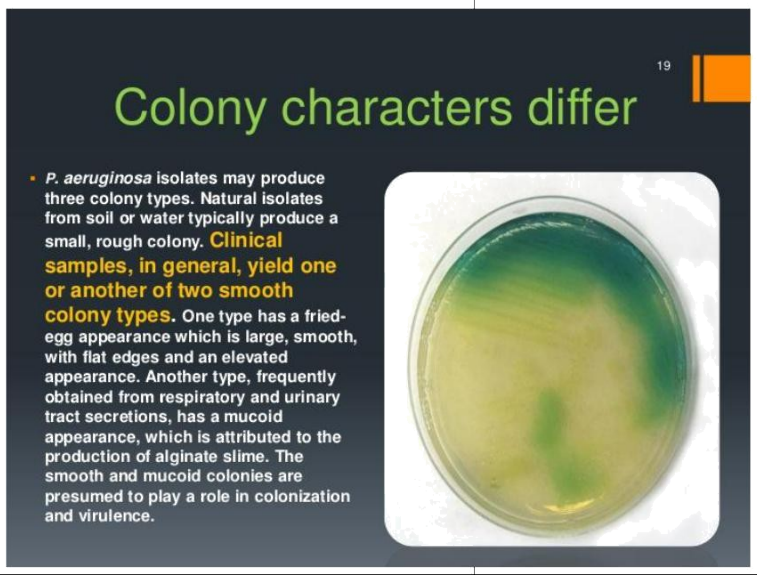
A. Gram-negative stain
B. Presense of spores
C. Coccal form
D. Cell pairing
E. Mycelium formation

Bacteriological inspection of disinfection quality at a pharmacy revealed a microorganism in an utility room (in the sink). The microorganism has the following properties: mobile nonspore-forming gram-negative bacteria that form capsular substance, grow well on ordinary nutrient media, secrete the blue-green pigment. This microorganism is most likely to be of the following genus:

A. Pseudomonas
B. Proteus
C. Clostridium
D. Shigella
E. Vibrio

A sample of a finished dosage form was found to be contaminated with some microorganisms exhibiting the following properties: greenish fluorescent colonies of gram-negative nonsporeforming bacilli that grew on the medium for the detection of pyocyanin. The bacilli release the bluegreen pigment into the medium.
What microorganisms contaminated the finished dosage form?

A. Pseudomonas aeruginosa
B. Enterobacteriaceae
C. Staphylococcus aureus
D. Staphylococcus epidermidis
E. Staph. saprophyticus



During bacteriological examination of the purulent discharge obtained from a postoperative wound an inoculation on meat infusion agar has been performed. The inoculation has resulted in large colorless mucous colonies that in 24 hours with exposure to sunlight developed green-blue pigmentation and smell of honey or jasmine. Bacterioscopy revealed gram-negative lophotrichea. What bacterial culture is contained in purulent discharge?

A. Pseudomonas aeruginosa

B. Klebsiella osaenae C. Streptomyces griseus

D. Proteus vulgaris E. Brucella abortus

Virological laboratory has received patient's nasopharyngeal lavage. What can be used to single out influenza virus from the patient's lavage?

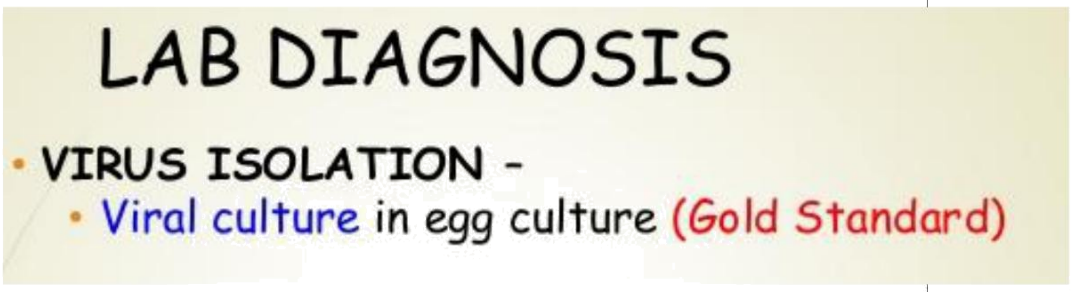
A. Chick embryo

B. Endo's medium

C. Meat infusion agar

D. Meat infusion broth

E. Lowenstein–Jensen medium



Immunity

Examination of a child who frequently suffers from infectious diseases revealed that IgG concentration in blood serum was 10 times less than normal, IgA and IgM concentration was also significantly reduced. Analysis showed also lack of B-lymphocytes and plasmocytes. What disease are these symptoms typical for?

A. Bruton's disease

B. Swiss-type agammaglobulinemia

C. Dysimmunoglobulinemia

D. Louis-Bar syndrome

E. Di George syndrome

Parents of a 5-year-old child report him to have frequent colds that develop into pneumonias, presence of purulent rashes on the skin. Laboratory tests have revealed the following: absence of immunoglobulins of any type; naked cells are absent from the lymph nodes punctate. What kind of immune disorder is it?

A. X-linked hypogammaglobulinemia (Bruton type agammaglobulinemia)

B. Autosomal recessive agammaglobulinaemia (Swiss type)

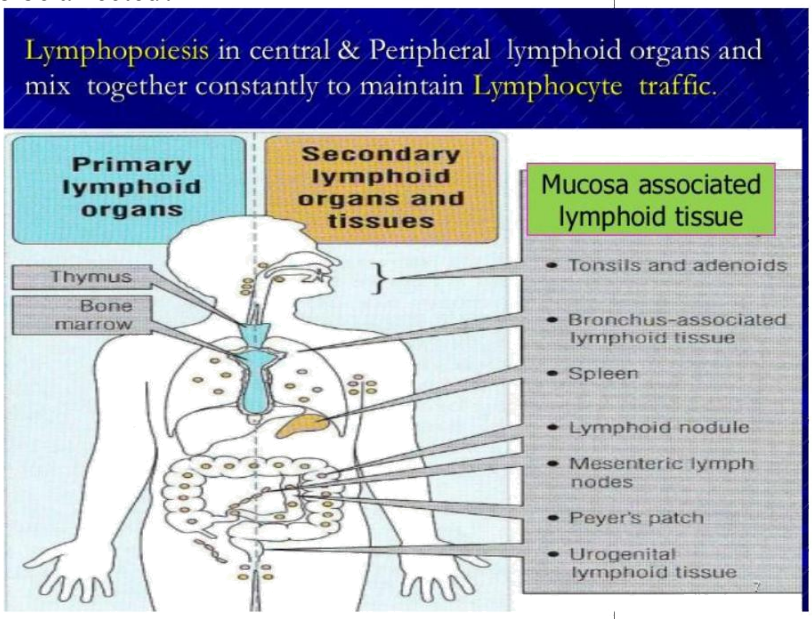
C. Hypoplastic anemia

D. Agranulocytosis

E. Louis-Barr syndrome

A doctor examined a patient, studied the blood analyses, and reached a conclusion, that peripheral immunogenesis organs are affected. What organs are the most likely to be affected?

A. Tonsils
B. Thymus
C. Kidneys
D. Red bone marrow
E. Yellow bone marrow

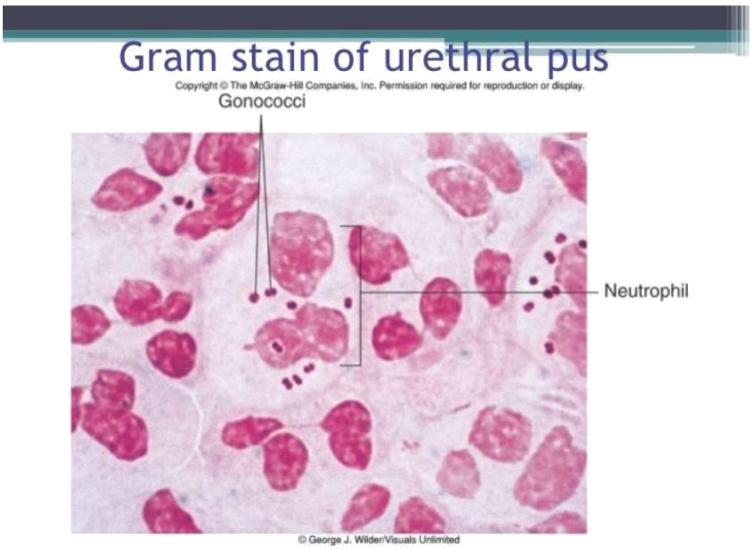


A 32-year-old patient has purulent wound in the lower third of forearm. Smear of purulent wound content has been made. What cells will be generally detected, if it is stained using Romanovsky-Giemsa stain?

A. Neutrophil
B. Eosinophil
C. Lymphocyte
D. Erythrocyte
E. Basocyte

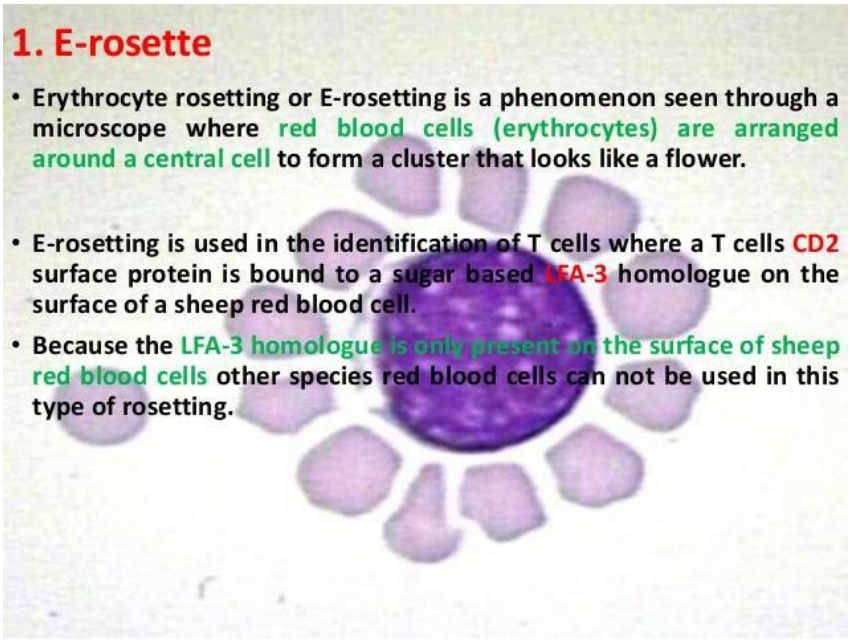
Cellular composition of exudate largely depends on the etiological factor of inflammation. What leukocytes are the first to be involved in the focus of inflammation caused by pyogenic bacteria?

A. Neutrophil granulocytes
B. Monocytes
C. Myelocytes
D. Eosinophilic granulocytes
E. Basophils



A patient with clinical presentations of immunodeficiency has undergone immunological tests. They revealed significant decrease in number of cells that form rosettes with sheep erythrocytes. What conclusion can be done on the ground of the analysis data?

A. Decrease in T-lymphocyte level
B. Decrease in B-lymphocyte level
C. Decrease in natural killer level (NKcells)
D. Decrease in complement system level
E. Lack of effector cells of the humoral immunity

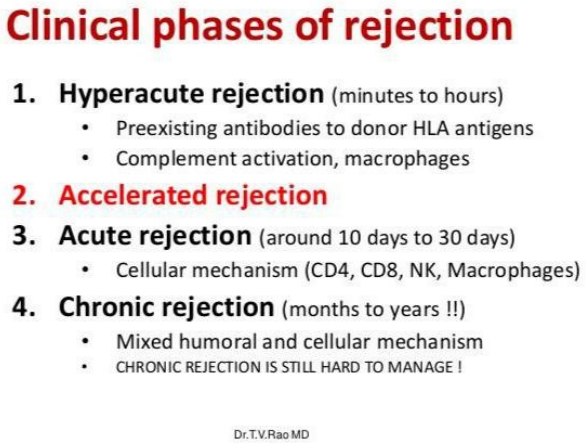


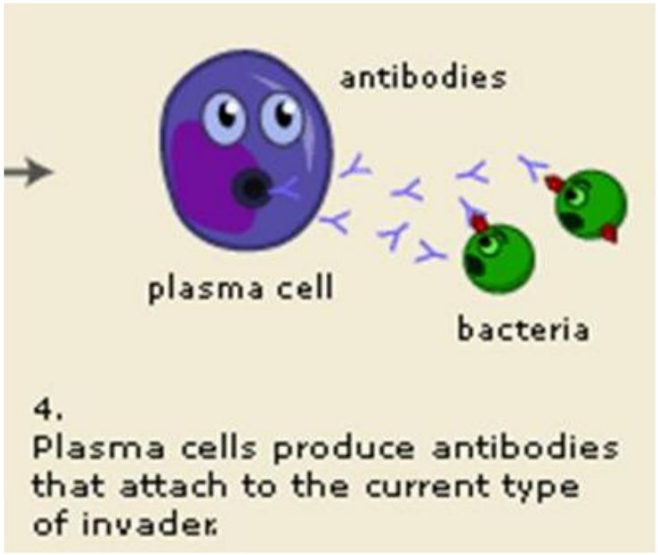
A patient with clinical presentations of immunodeficiency went through immunological examinations. They revealed significant loss of cells that form rosettes with erythrocytes of a ram. What conclusion can be made according to the analysis data?

A. Decrease of T-lymphocytes rate
B. Decrease of B-lymphocytes rate
C. Decrease of natural killer cell rate
D. Decrease of complement system
E. Insufficiency of effector cells of humoral immunity

Donor skin transplantation was performed to a patient with extensive burns. On the 8-th day the graft became swollen and changed colour; on the 11-th day graft rejection started. What cells take part in this process?

A. T-lymphocytes
B. Erythrocytes
C. Basophils
D. Eosinophils
E. B-lymphocytes



A female patient underwent liver transplantation. 1,5 month after it her condition became worse because of reaction of transplant rejection. What factor of immune system plays the leading part in this reaction? **A. T-killers** B. Interleukin-1 C. Natural killers D. B-lymphocytes E. T-helpers	
A patient with skin mycosis has disorder of cellular immunity. The most typical characteristic of it is reduction of the following index: **A. T-lymphocytes** B. Immunoglobulin G C. Immunoglobulin E D. B-lymphocytes E. Plasmocytes	
Recovery from an infectious disease is accompanied by neutralization of antigens by specific antibodies. What cells produce them? **A. Plasmocytes** B. Fibroblasts C. Tissue basophils D. Eosinophils E. T-lymphocytes  	
Throughout a year a 37-year-old woman periodically got infectious diseases of bacterial origin, their course was extremely lingering, remissions were short. Examination revealed low level of major classes of immunoglobulins. The direct cause of this phenomenon may be the following cell dysfunction: **A. Plasmocytes** B. Phagocytes C. Neutrophils D. Macrophages E. Lymphocytes	
Loose fibrous connective tissue of salivary glands contains oval average-sized cells which synthesize antibodies. The cells have round eccentric nucleus and "spoke-wheel" chromatin pattern made by small clumps of chromatin. What are these cells called? **A. Plasma cells** B. Adipocytes C. Neutrophils D. Fibroblasts E. Macrophages	

A 37-year-old woman periodically got infectious diseases of bacterial origin, their course was extremely lingering, remissions were short. Examination revealed low level of major classes of immunoglobulins. The direct cause of this phenomenon may be the following cell dysfunction:

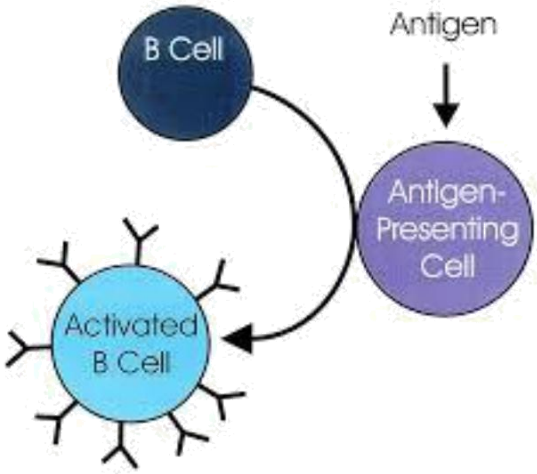
A. Plasmocytes

B. Phagocytes C. Neutrophils D.
Macrophages E. Lymphocytes

Blood analysis of a 16-year-old girl suffering from the autoimmune inflammation of thyroid gland revealed multiple plasmatic cells. Such increase in plasmocyte number is caused by proliferation and differentiation of the following blood cells:

A. B-lymphocytes

B. T-helpers
C. Tissue basophils
D. T-killers
E. T-supressors



Humoral immune response to an antigen results in generation of antibodies produced by plasmacytes. Plasmacytes arise as a result of immunostimulated division from the following cells of immune system:

A. B-lymphocytes

B. Monocytes
C. Granulocytes
D. T-helpers
E. T-killers

In a patient with clinical signs of immunodeficiency the number and functional activity of T and B lymphocytes are not changed. Defect with dysfunction of antigen-presentation to the immunocompetent cells was found during investigation on the molecule level. Defect of what cells is the most probable?

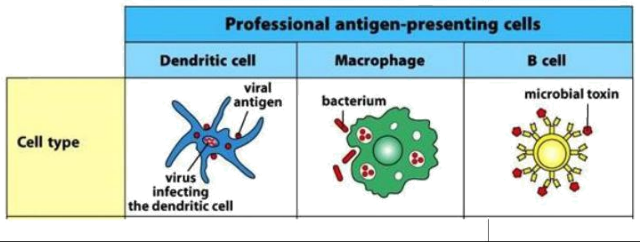
A. T-lymphocytes, B-lymphocytes
B. 0-lymphocytes
C. Fibroblasts, T-lymphocytes, B-lymphocytes
D. NK-cells

E. Macrophages, monocytes

A patient with clinical presentations of primary immunodeficiency displays disturbance of antigen-presenting function by immunocompetent cells. What cells may have structure defect?

A. Macrophages, monocytes

B. T-lymphocytes
C. B-lymphocytes
D. Fibroblasts
E. 0-lymphocytes

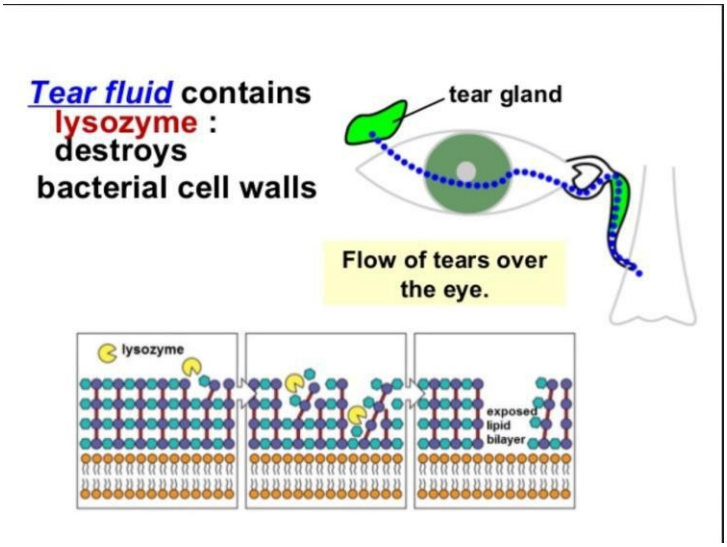


Live vaccine is injected into the human body. Increasing activity of what cells of connective tissue can be expected? A. Fibroblasts and labrocytes

B. Adipocytes and adventitious cells
C. Macrophages and fibroblasts
D. Plasmocytes and lymphocytes
E. Pigmentocytes and pericytes

In order to speed up healing of a wound of oral mucosa a patient was prescribed a drug that is a thermostable protein occurring in tears, saliva, mother's milk as well as in a new-laid hen's egg. It is known that this protein is a factor of natural resistance of an organism. What is it called?

A. Lysozyme
B. Complement
C. Interferon
D. Interleukin
E. Imanine

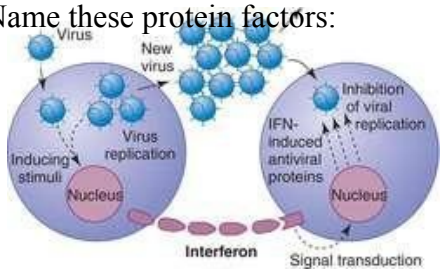


In order to administer general health improving therapy a parodontist intends to study factors of nonspecific resistance of saliva and mucous secretion. Which of the following factors of nonspecific resistance should be studied in the first line?

A. Lysozyme
B. Secretory IgA C. Properdin
D. Interferon E. Complement

Lymphocytes and other cells of our body synthesize universal antiviral agents as a response to viral invasion. Name these protein factors:

A. Interferon
B. Interleukin-2
C. Cytokines
D. Interleukin-4
E. Tumor necrosis factor

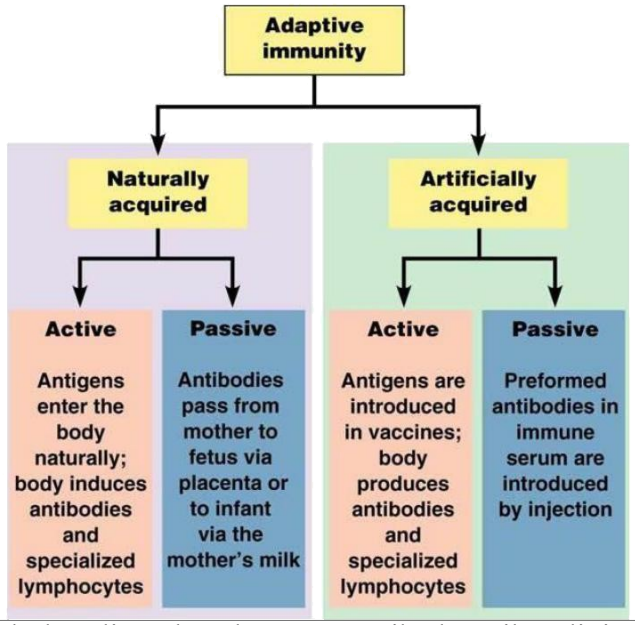


Examination of patients with periodontitis revealed the interdependence between the rate of affection of periodontal tissues and the amount of lysozymes in saliva and gingival liquid. These results can be obtained during studying the following protection system of an organism:

A. Non-specific resistance
B. Humoral immunity
C. Cellular immunity
D. Autoresponsiveness E. Tolerance

Blood serum of a newborn contains antibodies to measles virus. What kind of immunity is this indicative of?

A. Natural passive
B. Natural active C. Artificial passive
D. Artificial active
E. Heredoimmunity



A patient diagnosed with botulism has been prescribed antibotulinic serum for treatment. What immunity will be formed in the given patient?

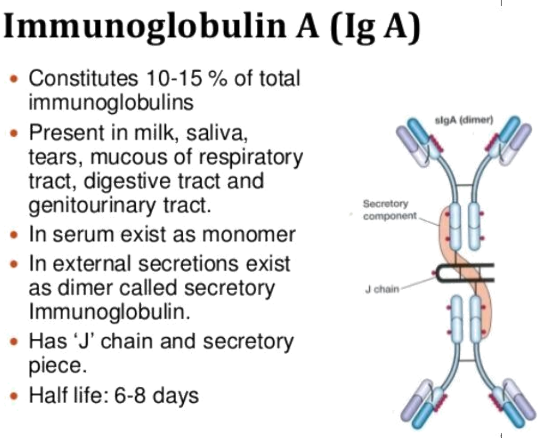
A. Antitoxic passive immunity
B. Infection immunity
C. Antitoxic active immunity
D. Antimicrobic active immunity
E. Antimicrobic passive immunity

For the specific prevention of influenza, the employees of an enterprise were vaccinated with "Influvac". What type of immunity will develop in the body of the vaccinated?

A. Artificial active
B. Innate congenital C. Artificial passive
D. Natural active E. Natural passive

In our country, routine preventive vaccinations against poliomyelitis involve using live vaccine that is administered orally. What immunoglobulins are responsible for the development of local post-vaccination immunity in this case?

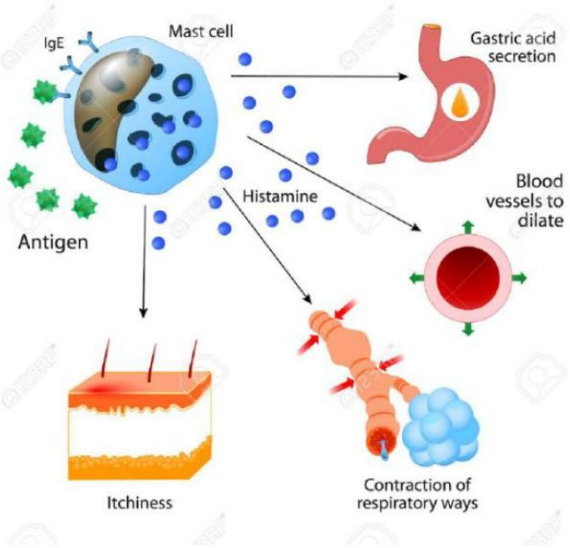
A. Secretory IgA
B. IgM
C. IgG
D. Serum IgA
E. IgE



Various cells of the oral mucous membrane and antimicrobial substances synthesized by these cells play an important part in the local immunity of the oral cavity. Specify the key factors for the local immunity:

A. Secretory IgA
B. B-lymphocytes C. IgG
D. Macrophages E. Eosinophils

A child cut his leg with a piece of glass while playing and was brought to the clinic for the injection of tetanus toxoid. In order to prevent the development of anaphylactic shock the serum was administered by Bezredka method. What mechanism underlies this method of desensitization of the body? **A. Binding of IgE fixed to the mast cells** B. Blocking the mediator synthesis in the mast cells C. Stimulation of immune tolerance to the antigen D. Stimulation of the synthesis of antigenspecific IgG E. Binding of IgE receptors to the mast cells	
A 10-year-old child cut his leg with a piece of glass and was sent to a clinic for an anti-tetanus serum injection. In order to prevent the development of anaphylactic shock, the Besredka desensitization method was applied. What mechanism underlies this method? **A. Binding to IgE fixed to mast cells** B. Inhibited synthesis of mast cells mediators C. Stimulation of the immunological antigen tolerance D. Stimulation of antigen-specific IgG_2 synthesis E. Binding of IgE receptors on mast cells.	



A 10-year-old child cut his leg with a glass shard, when playing, and was delivered to outpatient department to receive anti-tetanus serum. To prevent development of anaphylactic shock the serum was introduced by Bezredka method. This method of organism hyposensitization is based on the following mechanism: A. Stimulation of antigen-specific IgG2 B. Stimulation of the immunological antigen tolerance C. Stabilization of mast cell membranes D. Blocking of mast cell mediators synthesis **E. Binding of mast cell-fixed IgE**	
A 27- year-old woman has dropped penicillin containing eye drops. In few minutes there appeared feeling of itching, burning of the skin, lips and eyelids edema, whistling cough, decreasing of BP. What antibodies take part in the development of this allergic reaction? A. IgA and IgM B. IgM and IgG C. IgM and IgD D. IgG and IgD **E. IgE and IgG**	

Skin samples of a patient with bronchial asthma revealed allergen sensitization of poplar fuzz. What factor of immune system plays the main part in development of this immunopathological state?

A. IgE

B. IgD C. IgM

D. Sensitized T-lymphocytes E. –

A youth, aged 15, from childhood suffers from atopic dermatitis and allergy to the shellfish. In the last 3 months after acquiring aquarium fish, rhinitis, conjunctivitis, itching in the nose developed. What level of immunologic index should be defined in this case?

A. IgE

B. IgG C. IgM

D. IgA E. Circulating immunocomplexes

A 7-year-old child complains of itching, papular erythematous rash, dry skin. Objectively: there is lichenification in the popliteal fossae and antecubital spaces. What immunologic indicator if found in the blood serum will verify the diagnosis (atopic dermatitis)?

A. Total IgE

B. Secretory IgA C. IgM

D. IgG E. IgD

What condition may develop 15-30 minutes after re-administration of the antigen as a result of the increased level of antibodies, mainly IgE, that are adsorbed on the surface of target cells, namely tissue basophils (mast cells) and blood basophils?

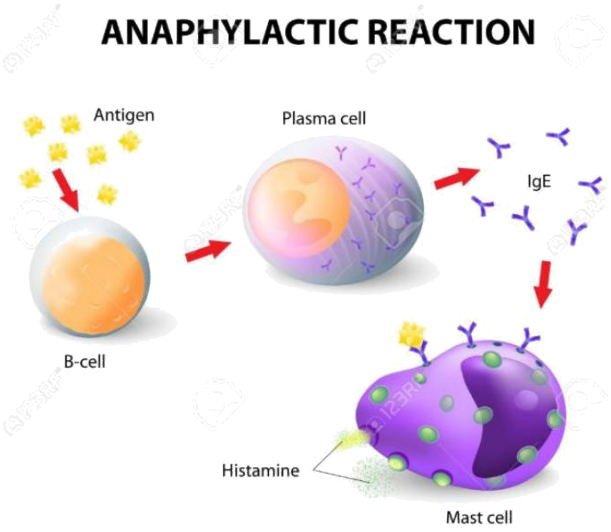
A. Anaphylaxis

B. Antibody-dependent cytotoxicity

C. Delayed-type hypersensitivity

D. Immune complex hyperresponsiveness

E. Serum sickness



A 22-year-old woman ate some seafood. 5 hours later the trunk and the distal parts of limbs got covered with small itchy papules which were partially fused together. After one day, the rash disappeared spontaneously. Specify the hypersensitivity mechanism underlying these changes:

A. Atopy (local anaphylaxis)

B. Systemic anaphylaxis C. Cellular cytotoxicity D. Immune complex hypersensitivity

E. Antibody-dependent cell-mediated cytolysis

A 30-year-old patient has dyspnea fits, mostly at night. He has been diagnosed with bronchial asthma. What type of allergic reaction according to the Gell-Coombs classification is most likely in this case?

A. Anaphylactic

B. Cytotoxic C. Stimulating

D. Immune complex E. Delayed-type hypersensitivity

During surgical manipulations a patient has been given novocaine injection for anesthesia. 10 minutes later the patient developed paleness, dyspnea, hypotension. What type of allergic reaction is it? **A. Anaphylactic immune reaction** B. Cellulotoxic immune reaction C. Aggregate immune reaction D. Stimulating immune reaction E. Cell-mediated immune reaction	
A 50 year old man who was referred to the hospital for treatment of cervical lymphadenitis underwent test for individual sensitivity to penicillin. 30 seconds after he went hot all over, AP dropped down to 0 mm Hg that led to cardiac arrest. What type of hypersensitivity reaction is it? **A. Anaphylactic** B. Delayed-type hypersensitivity C. Complement-mediated cytotoxic D. Immunocomplex-mediated E. –	
A 50-year-old patient has been referred for treatment of neck lymphadenitis. His individual penicillin sensitivity was tested. In 30 seconds fullbody fever raised in the patient and his arterial blood pressure dropped to 0mm Hg followed by cardiac arrest. Resuscitation was unsuccessful. Autopsy revealed acute venous hyperemia of viscera. Histological study revealed mastcells (tissue basocytes) degranulation in the skin (at the area of injections), myocardium and lungs. What kind of hypersensitivity reaction occurred in the patient? **A. Anaphylactic** B. Delayed-type hypersensitivity C. Complement-mediated cytotoxic D. Immune complex-mediated E.–	
Several minutes after a dentist administered novocaine for local anaesthesia of a patient's tooth, the following symptoms sharply developed in the patient: fatigue, skin itching. Objectively the following can be observed: skin hyperemia, tachycardia, BP dropped down to 70/40 mm Hg. What kind of allergic reaction is this pathology? **A. Anaphylactic** B. Cytotoxic C. Stimulating D. Cell-mediated immune reaction E. Immune complex	
A woman complaining of coryza, phonastenia, eyelids redness and lacrymation during spring period came to the doctor. What type of allergic reaction by Gell ano Coombs classification develops in this case? A. Delayed type of hypersensitivity B. Immunocomplex C. Stimulating D. Cytotoxic **E. Anaphylactic**	
A patient who had been suffering for many years from bronchial asthma died from asphyxia. The histological examination of his lungs revealed the following: much mucus with eosinophiles contents in the lumen of bronchioles and small bronci, sclerosis of interalveolar septa, dilation of alveolar lumen. Which of the mechanisms of allergy development is it? A. Immunocomplex B. Cytolysis, caused by lymphocytes C. Cytotoxic **D. Reagin** E. Granulomatosis	

A patient with paroxysmal attacks of asphyxia, which appear after inhalation of different aromatic substances has been made a diagnosis of bronchial asthma. Ig E rate is elevated. What type of reaction is it the most typical for? **A. Anaphylactic** B. Delayed type of hypersensitivity C. Autoimmune D. Cytotoxic E. Immunocomplex	
A patient suffering from periodical attacks caused by inhalation of different flavoring substances was diagnosed with atopic bronchial asthma. IgE level was increased. This is typical for the following type of reactions: **A. Anaphylactic reactions** B. Cytotoxic reactions C. Immunocomplex reactions D. Delayed-type hypersensitivity E. Autoimmune reactions	
During anaesthetization of the oral cavity mucous tunic a patient developed anaphylactic shock (generalized vasodilatation, increase in vascular permeability along with escape of liquid to the tissues). What type of hypersensitivity has the patient developed? **A. I type (anaphylactic)** B. II type (antibody-dependent) C. III type (immune complex) D. IV type (cellular cytotoxicity) E. V type (granulomatosis)	
A teenger had his tooth extracted under novocain anaesthesia. 10 minutes later he presented with skin pallor, dyspnea, hypotension. When this reaction is developed and the allergen achieves tissue basophils, it reacts with: **A. IgE** B. IgA C. IgD D. IgM E. T-lymphocytes	
A surgeon used novocaine as an anaesthetic during surgical manipulations. 10 minutes after it the patient became pale, he got dyspnea and hypotension. What type of allergic reaction is it? **A. Anaphylactic** B. Cytotoxic C. Immune complex D. Stimulating E. Cell-mediated	
During anesthesia of the oral mucosa a 37-year-old patient has had anaphylactic reaction (widespread vasodilation, increased vascular permeability with liquid exiting the blood vessels and penetrating in the tissues). What type of hypersensitivity reaction occurred in the patient? **A. Type I (anaphylactic)** B. Type II C. Type III D. Type IV E. Type V	
After anaesthetic application during tooth extraction the patient developed marked soft tissue edema of the upper and lower jaw, skin rash on the face, reddening, and itching. What pathological process results in such reaction to the anaesthetic? A. Toxic action of drug B. Disturbed lymph drainage **C. Allergy** D. Iflammation E. Circulatory deficiency	

A patient has been administered conduction anesthesia with novocaine in preparation for tooth extraction. After the anesthesia administration the patient developed swelling and hyperemy around the injection site, skin itch, general fatigue, motor agitation. Name the developed complication: **A. Allergy** B.Idiosyncrasy C.Tachyphylaxis D.Drug dependence E.Inflammation	
A man with a long-term history of bronchial asthma died from asphyxia. What mechanism accounts for the development of hypersensitivity reaction? **A. Reagine reaction** B. Cytotoxic reaction C. Immune complex reaction D. Lymphocyte-mediated cytolysis E. Granulomatosis	
A 38 year old patient died during intractable attack of bronchial asthma. Histological examination revealed mucus accumulations in bronchi's lumen, a lot of mast cells (labrocytes) in bronchi's wall, some of these cells are degranulated, there are also many eosinophils. Name pathogenesis of these changes in bronchi: **A. Atopy, anaphylaxis** B. Cytotoxic, cytolytic effect of antibodies C. Immune complex mechanism D. Cell-mediated cytolysis E. Granulematosis	
For the purpose of anaesthetization a patient got injection of local anesthetic. A few minutes later the patient got dyspnea and tachycardia; he lost consciousness. What type of shock is it? **A. Anaphylactic** B. Cardiogenic C. Haemorrhagic D. Traumatic E. Burn	
In order to estimate antibiotic susceptibility of a patient doctors introduced him intracutaneously 0,2 ml of penicillin solution. Ten minutes after introduction there appeared hyperemy and edema. What type does this reaction relate to (according to Coomb's and Gell's classification)? **A. Anaphylactic reaction** B. Cytotoxic reaction C. Tuberculine reaction D. Delayed-type hypersensitivity E.Reaction of Arthus phenomenon type	
A patient with acute bronchitis has been prescribed sulfanilamide drugs for treatment. In an hour after administration the patient developed itching and vesicles filled with light transparent liquid on the face, palms and soles. Name the mechanism of immune response: A. **Reaginic reaction** B. - C. Antibody-mediated cytolysis D. Immune complex-mediated hypersensitivity E. Cell cytotoxicity	
A few minutes afer repeated introduction of penicillin a patient got dyspnea, tongue numbness, hyperemia and then skin pallor. The patient also lost consciousness. What is the cause of such a grave condition? **A. Anaphylactic shock** B. Serum sickness C. Hemolytic anemia D. Acute glomerulonephritis E. Bronchial asthma	

After a 10-year-old child had been bitten by a bee, he was delivered to a hospital. There were lip, face and neck edemata. The patient felt hot and short of breath. Objectively: breathing was laboured and noisy. There were foamy discharges from the mouth, cough. The skin was pale and cold. There was bradypnoea. Heart sounds were muffled and arrhythmic. Thready pulse was present. What diagnosis was made by the expert in resuscitation? **A. Anaphylactic shock** B. Quincke's edema C. Bronchial asthma D. Acute cardiovascular collapse E. Cerebral coma	
Every year during the plant blossoming a female patient develops acute catarrhal inflammation of conjunctiva and nasal mucosa that is the clinical presentation of an allergy. These symptoms relate to the following type of allergic reactions: **A. Anaphylactic** B. Cytotoxic C. Immune complex D. Cell-mediated E. Cellular dysfunction	
After eating strawberries a child presented with itchy red spots on the skin (hives). According to the classification of Coombs and Jell this reaction relates to the following type of allergic reactions: **A. Reagin (anaphylactic)** B. Immunocomplex C. Cytotoxic D. Cell-mediated E. Stimulating	
30 minutes after drinking mango juice a child suddenly developed a local swelling in the area of the soft palate, which impeded swallowing and, eventually, respiration. Mucosa of the swollen area was hyperemic and painless. Blood test revealed moderate eosinophilia. Body temperature was normal. Anamnesis states that the elder sister of the child has been suffering from bronchial asthma attacks. What kind of edema has developed in the child? **A. Allergic** B. Inflammatory C. Cardiac D. Alimentary E. Hepatic	
1 minute after the patient had been administered penicillin the patient's arterial pressure sharply dropped, pulse became thread, cold sweating and clonic convulsions began. Name this condition. **A. Anaphylactic shock** B. Traumatic shock C. Burn shock D. Septic shock E. Cardiogenic shock	
A 35 year old woman consulted a doctor about affection of arm skin and lower third of forearm in form of a large edema, hyperemia, vesiculation and maceration. The disease developed after using a laundry detergent "Lotos". The patient has been using it for a month. She hasn't suffered from dermatological diseases before. What is the most probable diagnosis? **A. Allergic dermatitis** B. Dermatitis simplex C. Toxicoallergic dermatitis D. Microbial eczema E. Localized neurodermatitis	
A 22-year-old girl has been complaining of having itching rash on her face for 2 days. She associates this disease with application of cosmetic face cream. Objectively: apparent reddening and edema of skin in the region of cheeks, chin and forehead; fine papulovesicular rash. What is the most likely diagnosis? **A. Allergic dermatitis** B. Dermatitis simplex C. Eczema D. Erysipelas E. Neurodermatitis	

Hemotransfusion stimulated development of intravascular erythrocyte hemolysis. The patient has the following type of hypersensitivity:

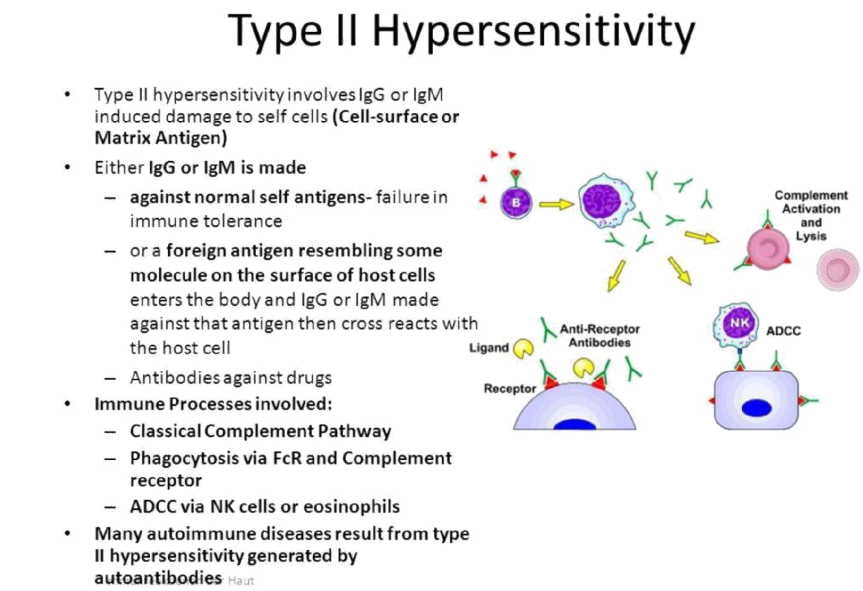
A. II type hypersensitivity (antibodydependent)

B. I type hypersensitivity (anaphylactic)

C. III type hypersensitivity (immune complex)

D. IV type hypersensitivity (cellular cytotoxicity)

E. V type hypersensitivity (granulomatosis)



The patient's condition after blood transfusion has been aggravated by posttransfusion shock. Name the type of allergic reaction causing this pathology.

A. Cytotoxic

B. Anaphylactic

C. Immune complex

D. Delayed-type hypersensitivity

E. Receptor-mediated

During blood transfusion a patient has developed intravascular erythrocyte hemolysis. What kind of hypersensitivity does the patient have?

A. II type (antibody-dependent)

B. I type (anaphylactic)

C. III type (immune complex

D. IV type (cellular cytotoxicity)

E. IV type (granulomatosis)

On the 8th day since the patient was inoculated with antitetanic serum because of dirty wound of his foot he has developed rising temperature up to 38^0C, pains in the joints, rash and itch. The blood tests revealed leukopenia and thrombocytopenia. Allergic reaction of what type has developed in this case?

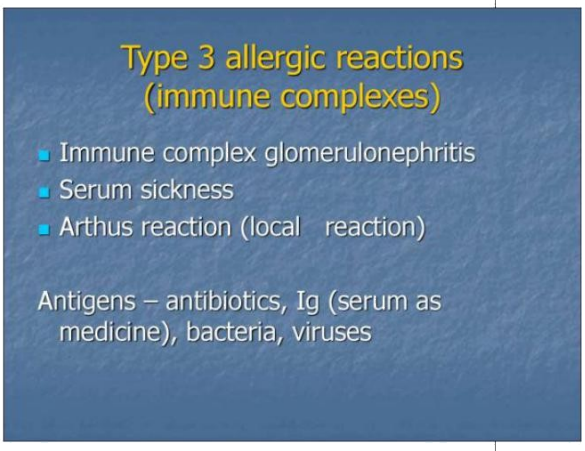
A. Anaphylactic

B. Cytotoxic

C. Delayed type of hypersensitivity

D. Stimulating

E. Immunocomplex



A 16-year-old adolescent was vaccinated with DTP. In eight days there was stiffness and pain in the joints, subfebrile temperature, urticarial skin eruption, enlargement of inguinal, cervical lymph nodes and spleen. What kind of allergic reaction is observed?

A. Immunocomplex

B. Hypersensitivity of immediate type C. Cytoxic

D. Hypersensitivity of delayed type E. –

A patient has been diagnosed with acute glomerulonephritis that developed after he had had streptococcal infection. It is most likely that the affection of basal glomerular membrane is caused by an allergic reaction of the following type:

A. Immune complex

B. Anaphylactic C. Cytotoxic

D. Delayed E. Stimulating

10 days after having quinsy caused by beta-hemolytic streptococcus a 6-year-old child exhibited symptoms of glomerulonephritis. What mechanism of glomerular lesion is most likely in this case?

A. Immunocomplex

B. Cellular cytotoxicity C. Anaphylaxis D. Atopy E. Antibody-dependent cell-mediated cytolysis

A male patient has been diagnosed with acute post-streptococcal glomerulonephritis. It is most likely that the lesion of the basement membrane of renal corpuscles was caused by the following allergic reaction:

A. Immune complex

B. Anaphylactic C. Cytotoxic

D. Delayed E. Stimulating

A 12-year-old child has developed nephritic syndrome (proteinuria, hematuria, cylindruria) 2 weeks after the case of tonsillitis, which is a sign of affected glomerular basement membrane in the kidneys. What mechanism is the most likely to cause the basement membrane damage?

A. Immune complex

B. Granulomatous C. Antibody-mediated

D. Reaginic E. Cytotoxic

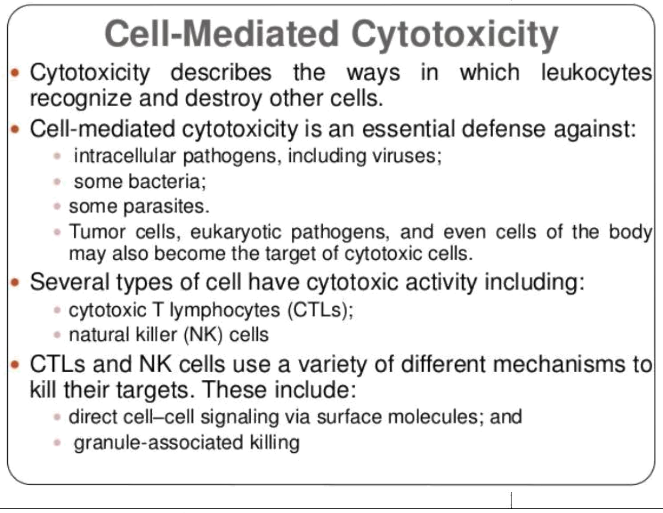
A 30 year old woman has applied a lipstick with a fluorescent substance for a long time. Then she got a limited erythema and slight peeling on her lip border, later there appeared transversal striae and cracks. Special methods of microscopic examination of the affected area helped to reveal sensibilized lymphocytes and macrophages in the connective tissue; cytolysis. What type of immunological hypersensitivity was developed?

A. IV type (cellular cytotoxicity)

B. I type (reaginic)

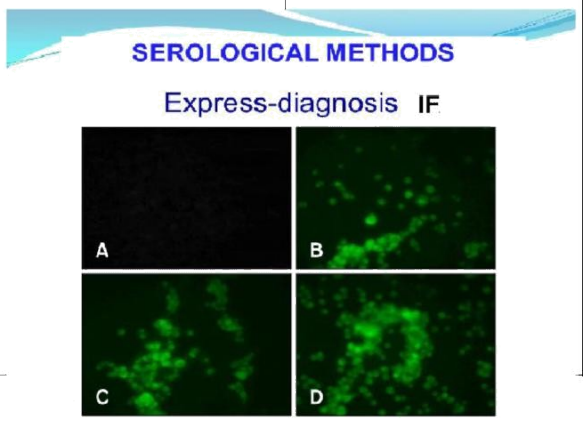
C. II type (antibody cytotoxicity) D. III type (immune complex cytotoxicity)

E. Granulomatosis



A 30 year old woman has been continuously using lipstick with a fluorescent substance that led to development of a limited erythema on the prolabium, slight peeling, and later small transversal sulci and fissures. Microscopic examination of the affected zone revealed in the connective tissue sensibilized lymphocytes and macrophages, effects of cytolysis. What type of immunological hypersensitivity has developed on the lip? **A. IV type (cellular cytotoxicity)** B. I type (reagin type) C. II type (antibody cytotoxicity) D. III type (immune complex cytotoxicity) E. Granulomatosis	
A patient visited a dentist with complaints of redness and edema of his mouth mucous membrane in a month after dental prosthesis. The patient was diagnosed with allergic stomatitis. What type of allergic reaction by Gell and Cumbs underlies this disease? **A. Delayed type hypersensitivity** B. Cytotoxic C. Immunocomplex D. Anaphylactic E. Stimulating	
A woman has been applying a new cosmetic preparation for a week that resulted in eye-lid inflammation accompanied by hyperemia, infiltration and painfulness. What type of allergic reaction was developed? **A. IV** B. I C. II D. III E. V	
Tuberculine was injected intracutaneously to the child for tuberculin test. Marked hyperemia, tissue infiltration developed on the place of injection in 24 hours. What mechanism caused these modifications? **A. Cells cytotoxity** B. Reagin type cytotoxity C. Granuloma formation D. Immunocomplex cytotoxity E. Antibody cytotoxity	
48 hours after performing tuberculin test (Mantoux test) to a child a 10 mm papule appeared on the spot of tuberculin introduction. What hypersensitivity mechanism underlies these changes? **A. Cellular cytotoxicity** B. Anaphylaxis C. Antibody-dependent cytotoxicity D. Immune complex cytotoxicity E. Granulomatosis	
A 10-year-old child had the mantoux tuberculin test administered. 48 hours later a papule up to 8 mm in diameter appeared on the site of the injection. What type of hypersensitivity reaction developed after the tuberculin injection? **A. Type IV hypersensitivity** B. Arthus phenomenon C. Seroreaction D. Atopic reaction E. Type II hypersensitivity reaction	
A 10 year old child was subjected to Mantoux test (with tuberculin). 48 hours later a papule up to 8 mm in diameter appeared on the site of tuberculin injection. What type of hyperesponsiveness reaction has developed after tuberculin injection? **A. Hyperresponsiveness type IV** B. Reaction of Arthus phenomenon type C. Reaction of serum sickness type D. Atopic reaction E. Hyperresponsiveness type II	

A 10 year old child underwent Mantoux test (with tuberculin). 48 hours later there apperaed a papule up to 8 mm in diameter on the site of tuberculin injection. Tuberculin injection caused the following hypersensitivity reaction: **A. IV type hypersensitivity reaction** B. Arthus reaction C. Seroreaction D. Atopic reaction E. II type hypersensitivity reaction	
A 4 year old child had Mantoux test. 60 hours after tuberculin introduction a focal skin hardening and redness 15 mm in diameter appeared. It was regarded as positive test. What type of hypersensitivity reaction is this test based upon? **A. Delayed-type hypersensitivity** B. Immune complex-mediated hypersensitivity C. Complement-mediated cytotoxic hypersensitivity D. Immediate hypersensitivity E. –	
A 45-year-old male died from disseminated tuberculosis. On autopsy the symptoms of tuberculosis were confirmed by both microscopic and histological analyses. What kind of hypersensitivity reaction underlies the process of granuloma development? **A. Delayed** B. Antibody-dependent cytotoxicity C. Anaphylactic D. Complement-dependent cytotoxicity E. Immune complex	
A child with suspected tuberculosis was given Mantoux test. After 24 hours the site of the allergen injection got swollen, hyperemic and painful. What are the main components that determine such response of the body? **A. Mononuclear cells, T-lymphocytes and lymphokines** B. Granulocytes, T-lymphocytes and IgG C. Plasma cells, T-lymphocytes and lymphokines D. B-lymphocytes, IgM E. Macrophages, B-lymphocytes and monocytes	
A child entering the school for the first time was given Mantoux test in order to determine if there was a need for revaccination. The reaction was negative. What is the meaning of this test result? **A. No cell-mediated immunity to tuberculosis** B. Availability of cell-mediated immunity to tuberculosis C. No antibodies to the tuberculosis bacteria D. No anti-toxic immunity to tuberculosis E. Presence of antibodies to the tuberculosis bacteria	
While registering the child to the school Mantoux's test was made to define whether revaccination was needed test result is negative. What does this result of the test mean? **A. Absence of antitoxic immunity to the tuberculosis** B. Presence of antibodies for tubercle bacillus C. Absence of antibodies for tubercle bacillus D. Presence of cell immunity to the tuberculosis E. Absence of cell immunity to the tuberculosis	
A 16 y.o. boy from a countryside entered an educational establishment. Scheduled Manteux test revealed that the boy had negative reaction. What are the most reasonable actions in this case? **A. To perform BCG vaccination** B. To repeat the reaction in a month C. To perform serodiagnostics of tuberculosis D. To isolate the boy temporarily from his mates E. To perform rapid Price diagnostics	

Medical examination of the first-year pupils included Mantoux test. 15 pupils out of 35 had negative reaction. What actions should be taken against children with negative reaction? **A. BCG vaccination** B. Antitoxin vaccination C. Rabies vaccination D. Repeat Mantoux test E. Examination of blood serum	
Planned mass vaccination of all newborn 5-7 day old children against tuberulosis plays an important role in tuberculosis prevention. In this case the following vaccine is applied: **A. BCG** B. Diphteria and tetanus toxoids and pertussis vaccine C. Diphtheria and tetanus anatoxin vaccine D. Adsorbed diphtheria vaccine E. –	
For tuberculosis prevention the newborns got an injection of a vaccine. What vaccine was used? **A. BCG** B. Mantoux C. DTaP vaccine D. Anatoxin E. Oral polio vaccine (Sabin vaccine)	
In a maternity hospital a newborn should receive vaccination against tuberculosis. What vaccine should be chosen? **A. BCG vaccine** B. STI vaccine C. EV vaccine D. DPT vaccine E. Tuberculin	
There is a suspicion of active tuberculosis development in patient. The doctor has appointed Mantoux test to make a diagnosis. What immunobiological agent has to be administered? **A. Tuberculine** B. BCG vaccine C. DPT vaccine D. Tularin test E. DT vaccine	
A 6-year-old child with suspected active tuberculosis process has undergone diagnostic Mantoux test. What immunobiological preparation was injected? **A. Tuberculin** B. BCG vaccine C. DTP vaccine D. Tularinum E. Td vaccine	
The first grade pupils went through a medical examination aimed at selection of children needing tuberculosis revaccination. What test was applied? **A. Mantoux test** B. Schick test C. Cutaneous tularin test D. Burne test E. Anthracene test	
A virological laboratory obtained pathological material (mucous discharges from nasal meatuses) taken from a patient with provisional diagnosis "influenza". What quick test will allow to reveal specific viral antigen in the material under examination? **A. Direct and indirect immunofluorescence test** B. Direct and indirect fluorescence immunoassay C. Hemagglutination inhibition assay D. Radioimmunoassay E. –	

During the breakout of acute respiratory infection in order to diagnose influenza the express-diagnosis, based on revealing of specific viral antigen in the examined material (nasopharyngial lavage), is carried out. Which reaction is used for this?

A. Immunofluorescence

B. Agglutination C. Precipitation

D. Opsonization E. Complement binding

Laboratory of extremely dangerous infections received a sample taken from a patient with assumed cholera. What express-diagnostics method can confirm this diagnosis?

A. Immunofluorescence test

B. Complement binding reaction C. Agglutination test

D. Precipitation reaction E. Hemagglutination reaction

Serological diagnostics of infectious diseases is based upon specific interaction with antigens. Specify the serological reaction that underlies adhesion of microorganisms when they are affected by specific antibodies in presence of an electrolyte:

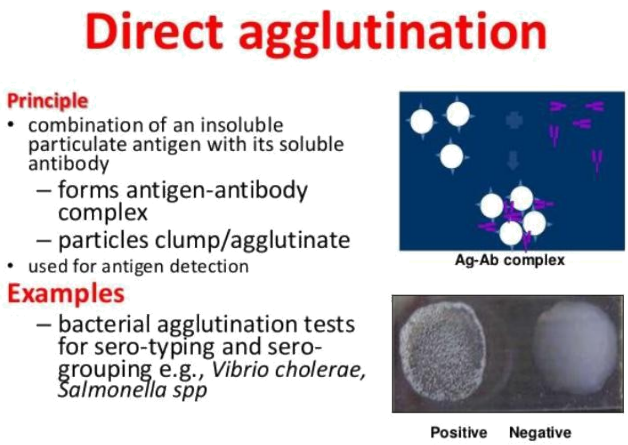
A. Agglutination reaction

B. Precipitation reaction

C. Complement-binding reaction

D. Hemadsorption reaction

E. Neutralization reaction



A physician is planning to diagnose an infectious disease by means of agglutination test. What is required for this reaction apart from the serum of a patient?

A. Diagnosticum

B. Diagnostic serum C. Complement

D. Hemolytic serum E. Anatoxin

To conduct serum diagnostics of typhoid fever a test is carried out, when diagnosticums of three types of microorganisms are being added into different solutions of patient's serum; then agglutinate formation is checked. Name the author of that test.

A. Widal

B.Wassermann C.Ouchterlony

D.Wright E. Sachs-Witebsky

For serological diagnostics of the whooping cough it was made large-scale reaction with parapertussis and pertussis diagnosticums. At the bottom of the test-tubes with diagnosticum of Bordetella parapertussis grain-like sediment formed. What antibodies have this reaction revealed?

A. Bacteriolysins

B. Agglutinins

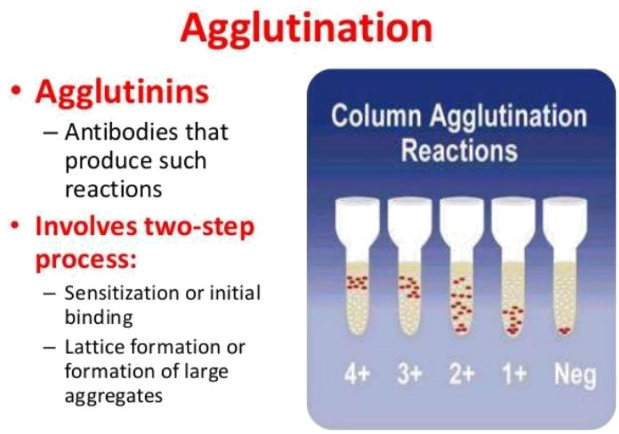
C. Antitoxins

D. Opsonins

E. Precipitins

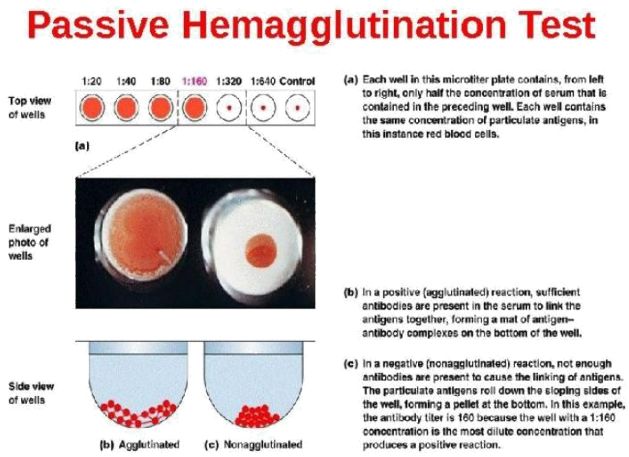
A large-scale reaction with parapertussis and pertussis diagnosticums was made in order to make serological diagnostics of the whooping cough. At the bottom of the test-tubes with diagnosticum of Bordetella parapertussis a granular sediment formed. What antibodies did this reaction reveal?

A. Agglutinins
B.Precipitins
C.Opsonins
D.Bacteriolysins
E.Antitoxins



For the purpose of retrospective diagnostics of recent bacterial dysentery it was decided to perform serological examination of blood serum in order to determine antibody titer towards Shiga bacilli. What of the following reactions should be applied?

A. Passive hemagglutination
B. Bordet-Gengou test
C. Precipitation
D. Hemolysis
E. Bacteriolysis



Retrospective diagnostics of bacterial dysentery involved serological analysis of blood serum intended for determination of Shigella antibody titer. Which of the following reactions should be applied for this purpose?

A. Passive haemagglutination
B. Complement binding
C. Precipitation
D. Haemolysis
E. Bacteriolysis

In order to establish the level of antidiphtheritic immunity in a child it was decided to use a passive hemagglutination test. This task can be completed by the sensibilization of erythrocytes by:

A. Diphtheria anatoxin
B. Diphtheria antitoxin
C. Diphtheria bacillus antigens D. Antidiphtheric serum E. -

At a bacteriological laboratory animal skins are analyzed by means of Ascoli precipitaion test. What is detected if the reaction is positive?

A. Anthrax agent antigens B. Anaerobic infection toxin
C. Brucellosis agent D. Yersinia surface antigen
E. Plague agent

The person was selling "homemade pork" sausages on the market. State sanitary inspector suspected falcification of the sausages. With help of what serological immune reaction can food substance be identified? A. Immunofluorescence test
B. Indirect hemagglutination test
C. Agglutination test
D. Precipitation test
E. Complement- fixation test

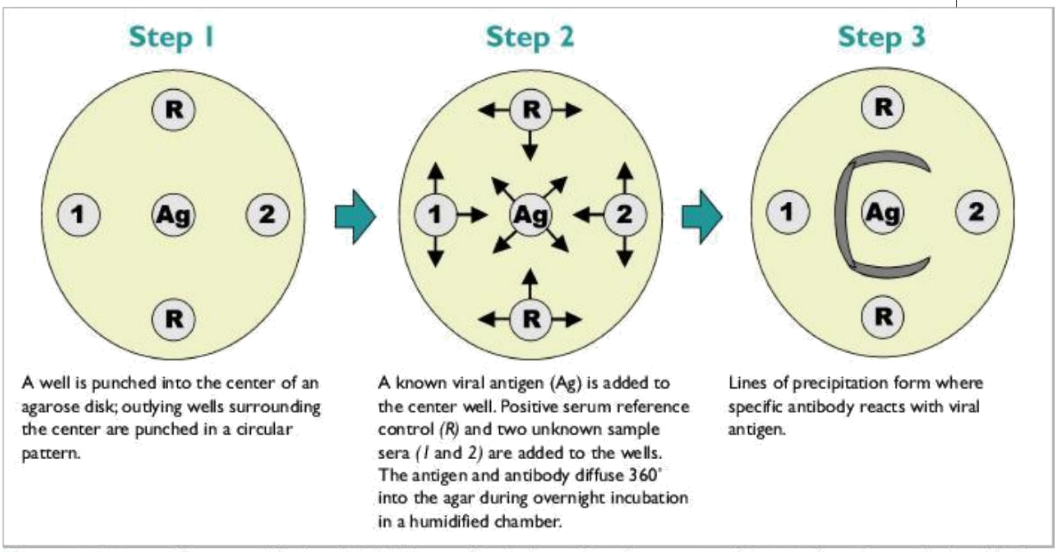
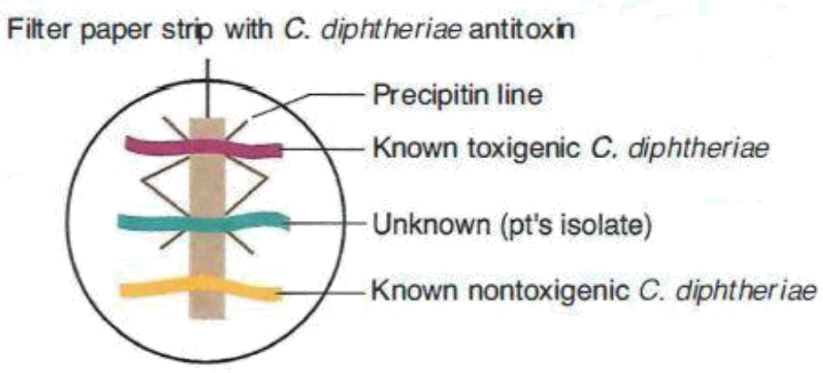


Figure 1. Agar gel immunodiffusion (AGID) for antibody detection. Interpretation: Precipitin lines from wells 1 and R fuse seamlessly in a pattern of "identity." A precipitate has not formed in well 2, indicating that this sample lacks specific antibody to the viral antigen.

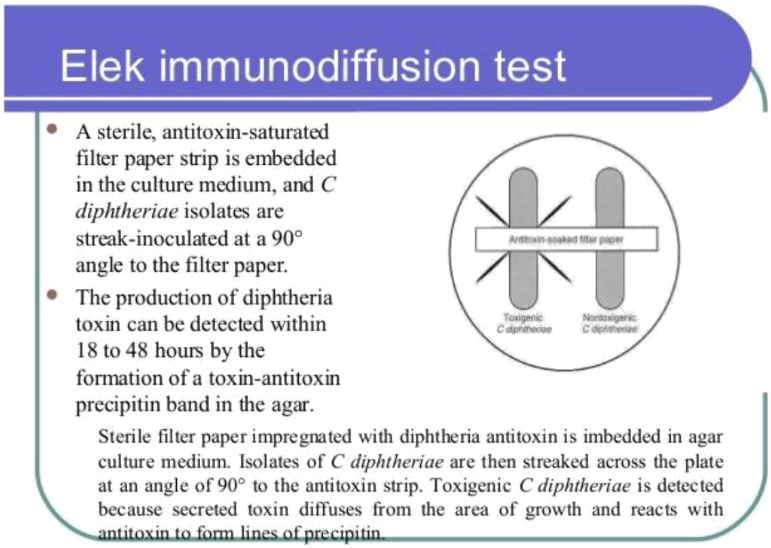
A forensic laboratory received clothes of a citizen, who a day before was reported missing. The clothes were found in a shed, there are red stains identified as blood by an expert. What reaction should be performed to determine whether these red stains are dried human blood? A. Complement binding
B. Enzyme immunoassay
C. Agglutination
D. Flocculation
E. Circular precipitation

In order to determine toxigenicity of diphtheria bacilli a strip of filter paper impregnated with antitoxic diphtheria serum was put on the dense nutrient medium. There were also inoculated a microbial culture under examination and a strain that is known to be toxigenic. If the microbial culture under examination produces exotoxin, this will result in formation of:
A. Precipitin lines
B. Haemolysis zones
C. Zones of diffuse opacification
D. Zones of lecithovitellinous activity
E. Precipitin ring



In order to estimate toxogenicity of diphtheria agents obtained from patients the cultures were inoculated on Petri dish with nutrient agar on either side of a filter paper strip that was put into the center and moistened with antidiphtheric antitoxic serum. After incubation of inoculations in agar the strip-like areas of medium turbidity were found between separate cultures and the strip of filter paper. What immunological reaction was conducted?

A. Precipitation gel reaction
B. Coomb's test
C. Agglutination reaction
D. Rings precipitation reaction
E. Opsonization reaction



A 7 year old girl was taken to an infectious diseases hospital. She had complaints of high temperature, sore throat, general weakness. A doctor assumed diphtheria. What will be crucial proof of diagnosis after defining pure culture of pathogenic organism?

A. Toxigenity test
B. Detection of volutine granules
C. Cystinase test
D. Hemolytic ability of pathogenic orhanism
E. Phagolysability

When examining a child the dentist found the deposit on both tonsils and suspected atypical form of diphtheria. A smear was taken, and after the nutrient media inoculation the toxicity of the isolated pure culture was determined. What reaction was used to determine the toxigenicity of the isolated strain of diphtheria bacillus?

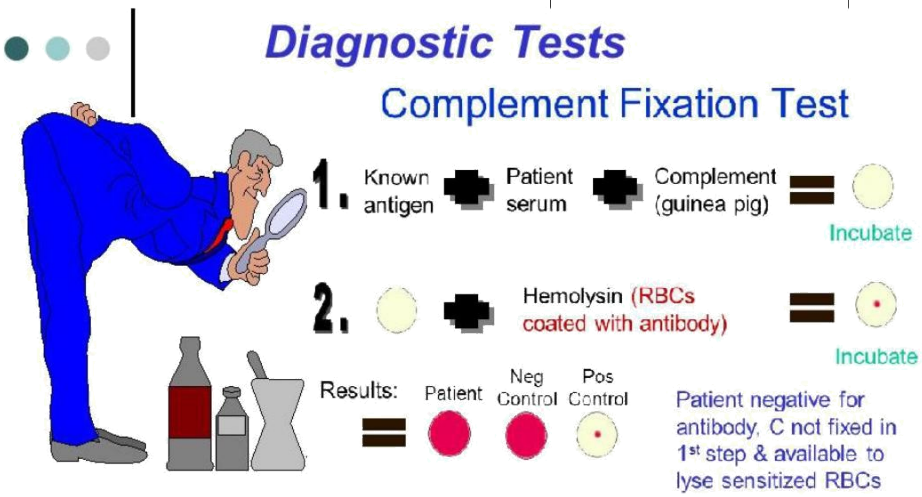
A. Gel precipitation reaction
B. Agglutination reaction on a glass slide
C. Complement binding reaction
D. Hemolysis reaction
E. Ring precipitation reaction

A patient has pure culture of diphtheria corynebacteria. What immunological reaction should be used in order to determine bacteria toxigenity?

A. Precipitation in agar
B. Agglutination
C. Complement binding
D. Inhibition of hemagglutination
E. Indirect hemagglutination

A pregnant woman applied to a doctor with complaints typical for toxoplasmosis. The doctor took a sample of her blood. What serological tests should be performed in this case?

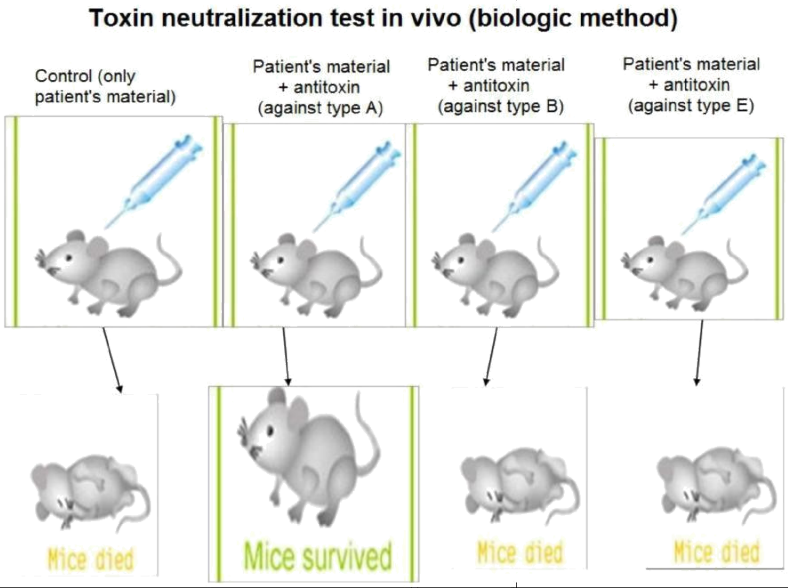
A. Complement binding assay
B. Precipitation test
C. Neutralization test
D. Widal's test
E. Wassermann test



A patient who came to the doctor because of his infertility was administered to make tests for toxoplasmosis and chronic gonorrhoea. Which reaction should be performed to reveal latent toxoplasmosis and chronic gonorrhoea in this patient?
A. RIHA - Reverse indirect hemagglutination
assay B. IFA - Immunofluorescence assay
C. RDHA - Reverse direct hemagglutination assay
D. Immunoblot analysis
E. (R)CFT- Reiter's complement fixation test

Researchers of a bacteriological laboratory examine tinned meat for botulinic toxin. For this purpose a group of mice was injected with an extract of the material under examination and antitoxic antibotulinic serum of A, B, E types. A control group of mice was injected with the same extract but without antibotulinic serum. What serological reaction was applied?

A. Neutralization
B. Precipitation
C. Complement binding
D. Opsonocytophagic
E. Double immune diffusion



Bacteriological laboratory examines canned meat whether it contains botulinum toxin. For this purpose an extract of test specimen and antitoxic antibotulinic serum of A, B, E types were introduced to a group of mice under examination; a control group of mice got the extract without antibotulinic serum. What serological reaction was applied?

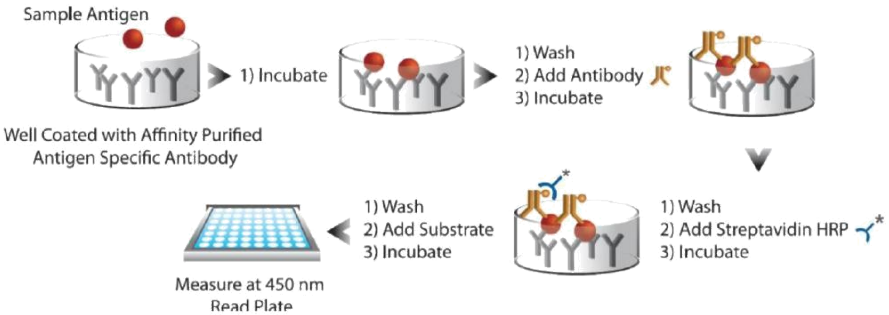
A. Neutralization B. Precipitation C. Complement binding
D. Opsono-phagocytic E. Double immune diffusion

A patient has been hospitalized with provisional diagnosis of botulism. What serological reaction should be used to reveal botulinum toxin?

A. Neutralization reaction B. Agglutination reaction
C. Bordet-Gengou test D. Precipitation reaction E. IF

Antigens of Sonne shigella placed on the objects of outdoor environment and foodstuffs can be revealed by means of a certain test with application of a diagnostic test system that includes a polystyrene tray with adsorbed specific antibodies. What reaction is it?

A. Immune-enzyme assay
B. Immunofluorescence test
C. Passive inverse hemagglutination test
D. Direct hemagglutination test
E. Immunoelectrophoresis test



In case of many infectious diseases patient's blood may contain antigens of causative agents. What reaction should be applied provided that the level of antigenemia is low?

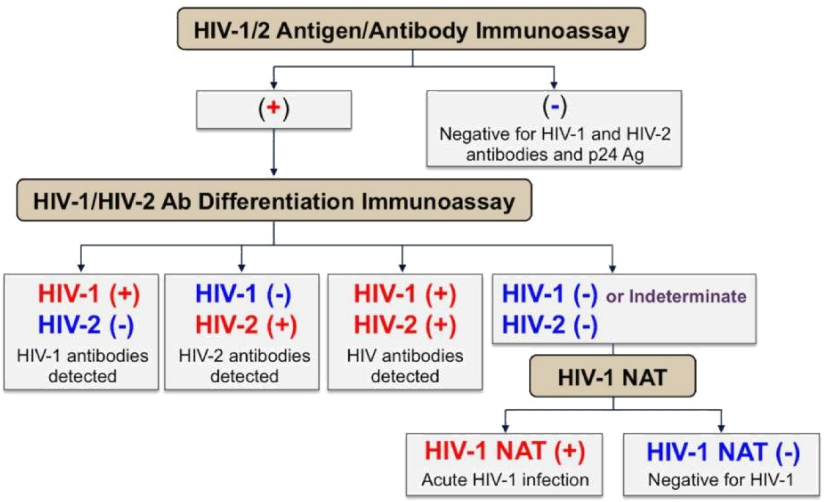
A. Enzyme-linked immunosorbent assay
B. Agglutination test
C. Indirect hemagglutination test
D. Latex agglutination test
E. Immunoelectrophoresis

During many infectious diseases patient's blood may contain antigenes of pathogens. What reaction should be applied provided that antigenemia is at a low level?

A. Enzyme-linked immunosorbent assay
B. Agglutination reaction
C. Indirect hemagglutination
D. Latex-agglutination
E. Immunoelectrophoresis

Mass serological diagnosis of HIV infection is made by means of enzymelinked immunosorbent assay techniques. What standard component of the reaction must be adsorbed on the solid phase of the test system?

A. HIV antigens
B. Monoclonal HIV antibodies
C. Enzyme-marked HIV antibodies
D. Specific immunoglobulins
E. Substrates to determine enzyme

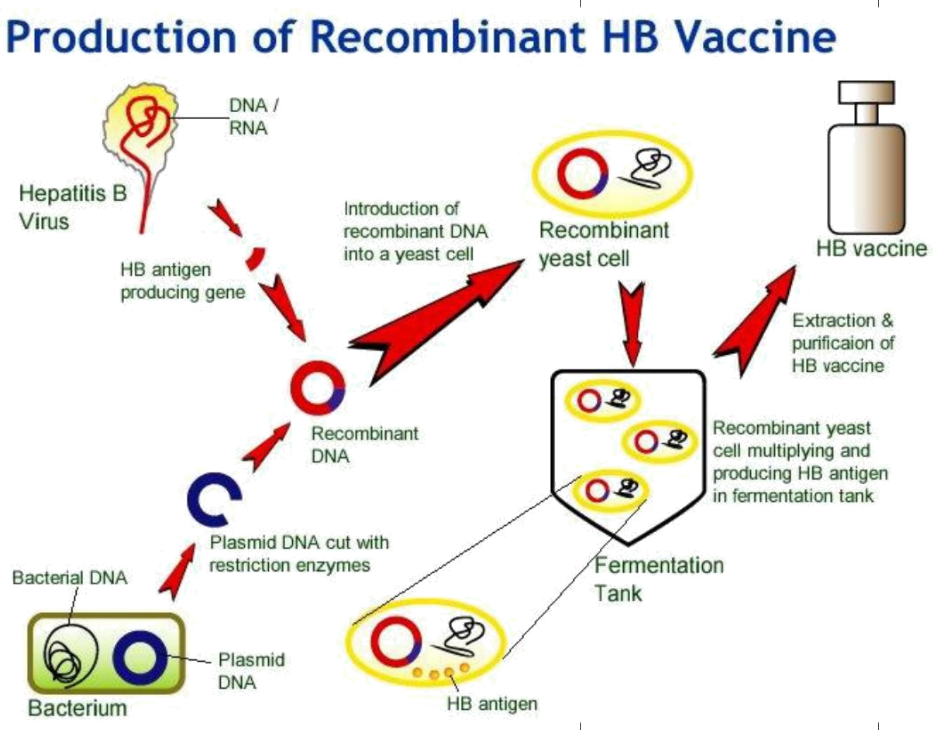


A patient has been hospitalized with provisional diagnosis of virus B hepatitis. Serological reaction based on complementation of antigen with antibody chemically bound to peroxidase or alkaline phosphatase has been used for disease diagnostics. Name this serological reaction:

A. Immune-enzyme analysis
B. Radioimmunoassay technique
C. Immunofluorescence test
D. Bordet-Gengou test
E. Antigen-binding assay

Professional dentists belong to the risk group concerning professional infection with viral hepatitis type B. Name an effective method for active prevention of this disease among the dentists:

A. Vaccination with recombinant vaccine
B. Secure sterilization of medical instruments
C. Working with gum gloves on
D. Introduction of specific immunoglobuline
E. Introduction of interferonogenes



In order to eliminate occupational risks dental workers underwent vaccination. The vaccine should protect them from a viral infection, whose pathogen may be found in blood of dental patients who had had this infection or who are its chronic carriers. What vaccine was used?

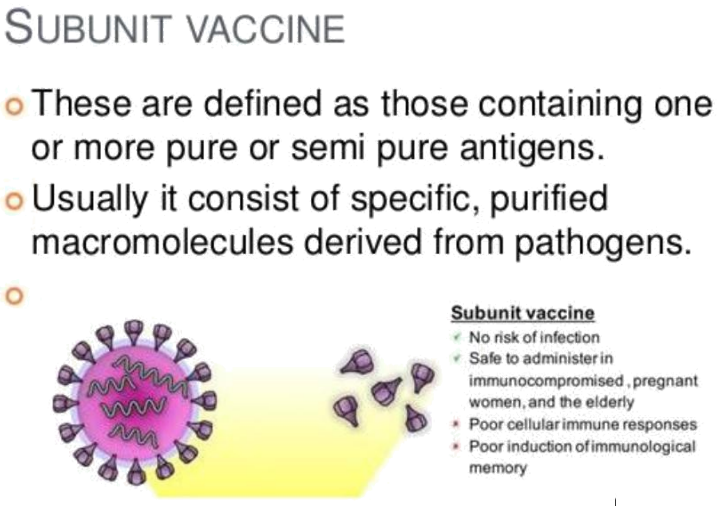
A. Genetically engineered HBs antigen
B. Live measles vaccine
C. Inactivated hepatitis A vaccine
D. Anti-rabies vaccine
E. Subunit influenza vaccine

Specific prophylaxis involved application of a vaccine containing microorganisms and exotoxin detoxicated by formalin. It relates to the following type of vaccine:

A. Combined
B. Genetically engineered
C. Anatoxin
D. Chemical
E. Live

To prevent the seasonal influenza epidemics in the city hospitals, sanitary epidemic station gave orders to immunize health care workers. Which of the following preparations should be used for immunization?

A. Subunit vaccine
B. Interferon
C. Gamma-globulin
D. Rimantadine
E. Amantadine



Bacterioscopic examination of a smear from the pharynx of a diphtheria suspect revealed bacilli with volutine granules. What etiotropic drug should be chosen in this case?

A. Antidiphtheritic antitoxic serum
B. Bacteriophage
C. Diphtheritic anatoxin
D. Eubiotic
E. Interferon

Diphtheria Antitoxin

- **First used in 1891**
- **Produced in horses**
- **Used only for treatment of diphtheria**
- **Neutralizes only unbound toxin**

A patient with suspected diphtheria went through bacterioscopic examination. Examination of throat swab revealed rod-shaped bacteria with volutin granules. What etiotropic preparation should be chosen in this case?

A. Antidiphtheric antitoxic serum
B. Bacteriophage
C. Diphtheria antitoxin
D. Eubiotic
E. Interferon

It is necessary to carry out preventive vaccination of a student group because of an occurrence of diphtheria. Which preparation should be used for the creation of the artificial active immunity?

A. Diphtheria anatoxin
B. Specific immunoglobulin
C. DTP vaccine
D. Inactivated bacteria vaccine
E. Anti-diphtheria serum

Artificial active immunization

- **Antigen:Vaccine or Toxoid**
- **inactivated vaccine (Dead vaccine)**
- **Live-attenuated vaccine**
- **Toxoid**
- **Recombinant Vaccine:HBsAg**

What preventive medications should be injected to a patient with open maxillofacial trauma provided that he has never got prophylactic vaccination before?

A. Antitetanus immunoglobulin and anatoxin

B. Anticonvulsive drugs and anatoxin

C. Antitetanus serum and antibiotics

D. Diphtheria, tetanus toxoids and pertussis vaccine and antibiotics E. Tetanus anatoxin and antibiotics

EO004.06

Tetanus Prophylaxis

History of Tetanus Immunization (Doses)	Clean minor Wounds		All other Wounds	
	Td	TIG	Td	TIG
Uncertain	Yes	No	Yes	Yes
0 - 1	Yes	No	Yes	Yes
2	Yes	No	Yes	No[1]
3 or more	No[2]	No	No[3]	No

1. unless wound is more than 24 hours old
2. unless it has been more than 10 years since last dose
3. unless it has been more than 5 years since last dose

Td: tetanus and diphtheria toxoids for adults (> 7 y.o.)
DPT for children

A laboratory received a food product that had been taken from the focus of food poisoning and presumably contained botulinum toxin. To identify the type of toxin, the neutralization reaction must be performed on white mice. What biological product is used in this reaction?

A. Antitoxic serum

B. Normal serum

C. Antibacterial serum

D. Diagnosticum

E. Allergen

Vaccination is done by means of a toxin that has been neutralized by a formaldehyde (0,4%) at a temperature 37 – 40^0C for four weeks. Ramond was the first to apply this preparation for diphtheria prophylaxis. What preparation is it?

A. Anatoxin

B. Immunoglobulin

C. Antitoxic serum

D. Adjuvant

E. Inactivated vaccine

Diphtheria exotoxin had been treated with 0,3-0,4% formalin and kept in a thermostat for 30 days at a temperature of 40^oC.What preparation was obtained as a result of these manipulations?

A. Anatoxin

B. Antitoxin

C. Diagnosticum

D. Therapeutic serum

E. Diagnostic serum

Biological preparations are subdivided into groups according to their purpose and production principles. What group do the preparations for initiation of active immunity relate to?

A. Vaccines B. Immune sera C. Immunoglobulins

D. Monoclonal antibodies E. Bacteriophages

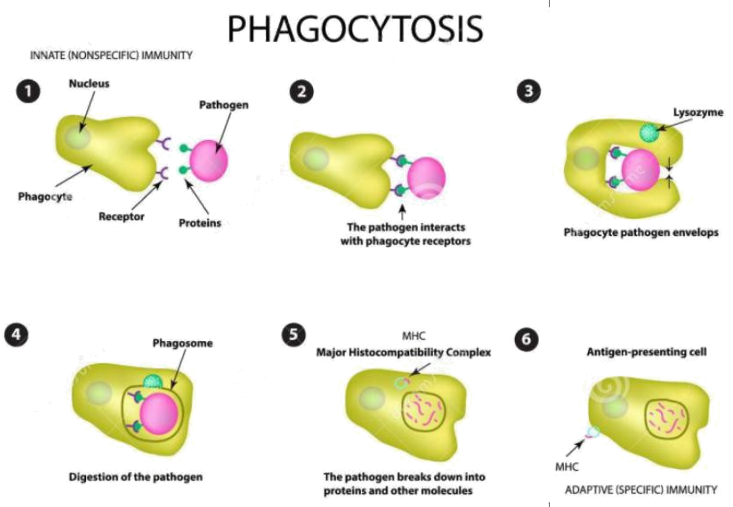
A pharmaceutical company received from a laboratory a delivery order of diagnostic medications used for studying antigenic properties of causative agent. Name these preparations: **A. Diagnostic sera** B. Allergens C. Diagnosticums D. Immunoglobulins E. Bacteriophages	
In an inhabited locality there is an increase of diphtheria during the last 3 years with separate outbursts in families. What measure can effectively influence the epidemic process of diphtheria and reduce the morbidity rate to single cases?	
An 11-year-old girl has been immunized according to her age and in compliance with the calendar dates. What vaccinations should the children receive at this age? **A. Diphtheria and tetanus** B.TB C.Polio D. Hepatitis B E. Pertussis	
One of mass production drugs is produced by inactivation of bacterial exotoxin by formalin. What is this drug for? **A. For active immunization** B. For serodiagnostic assay C. For passive immunization D. For toxinemia treatment E. For immunocorrection	
Anti-tetanus gamma globulin is produced by hyperimmunization of donors with tetanus anatoxin. What class of immunoglobulins prevails in this preparation? **A. IgG** B. IgA C. IgM D. IgE E. IgD	
Vaccines are the artificial or natural preparations produced from bacteria, viruses and other microorganisms, their chemical components and waste products. They are used for the active immunization of humans and animals for the prevention and treatment of infectious diseases. The attenuated vaccines consist of: C. Anatoxin D. Dead microbes and toxoid E. Immunoglobulins	
A person has been in contact with influenza patient. What drug should be administered for specific passive influenza prophylaxis? B. Amizon C. Anaferon D. Vaccine influenza virus inactivated E. Leukocytic interferon	
A patient has been diagnosed with URTI. Blood serum contains immunoglobulin M. What stage of infection is it? **A. Acute** B.Prodromal C.Incubation D.Reconvalescence E.Carriage	

A pregnant woman was detected with IgM to rubella virus. An obstetrician-gynecologist recommended therapeutic abortion due to the high risk of teratogenic affection of the fetus. Detection of IgM was of great importance as it is these specific immunoglobulins that:

A. Indicate recent infection
B. Penetrate placental barrier
C. Have the largest molecular weight
D. Are associated with anaphylactic reactions
E. Are the main factor of antiviral protection

At the laboratory experiment the leukocyte culture was mixed with staphylococci. neutrophile leukocytes engulfed and digested bacterial cells. This process is termed:

A. Phagocytosis
B. Pinocytosis
C. Diffusion
D. Facilitated diffusion
E. Osmosis



During the repeated Widal's agglutination test it was noticed that the ratio of antibody titers and O-antigens S.typhi in the patient's serum had increased from 1:100 to 1:400. How would you interpret these results?

A. The patient has typhoid fever
B. The patient is an acute carrier of typhoid microbes
C. The patient is a chronic carrier of typhoid microbes
D. The patient previously had typhoid fever
E. The patient was previously vaccinated against typhoid fever

Lab Diagnosis: Typhoid Fever

- Widal Test (serology):
  - Antibodies against *Salmonella* Typhi
  - Look for 4-fold rise in titer between acute and convalescent stage (~one month)

A patient was brought into the infectional diseases hospital on the 8th day since the disease onset. The patient complains of headache, malaise, and weakness. A sample of blood was taken for the serological test. Widal agglutination test results with blood sample diluted 1:200 and typhoid fever O-diagnosticum were positive. What diagnosis can be made based on the results of this test?

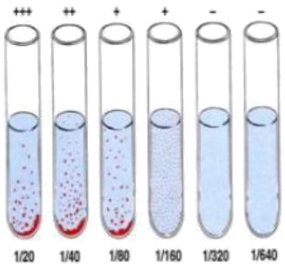
A. Typhoid fever
B. Leptospirosis
C. Tuberculosis
D. Dysentery
E. Cholera

Widal Test

- Single test not diagnostic.
- Paired samples tests
- Diagnostic.
  - O > 1 in 80
  - H > 1in 160

H agglutinins appear first

False positives in Unapparent infection,
Immunization
Previously infected



To conduct serum diagnostics of typhoid fever a test is carried out, when diagnosticums of three types of microorganisms are being added into different solutions of patient's serum; then agglutinate formation is checked. Name the author of that test.

A. Widal
B. Wassermann
C. Ouchterlony
D. Wright
E. Sachs-Witebsky

Serology

- **WIDAL Test** – Tube agglutination test.
- Detects O and H antibodies
- Diagnosis of Typhoid and Paratyphoid
- Testing for H agglutinins in Dryers tubes, a narrow tube floccules at the bottom
- Testing for O agglutinins in Felix tubes, Chalky
- Incubated at 37º c overnight

Dr.T.V.Rao MD 49

A child with diphtheria 10 days after injection of antitoxic antidiphtherial serum has developed skin rash, accompanied by severe itch, rising temperature up to 38^0C and joints pain. What is the cause of these symptoms?

A. Delayed type of hypersensitivity
B. Anaphylacsis
C. Contact allergy
D. Atopia
E. Serum sickness

Serum Sickness

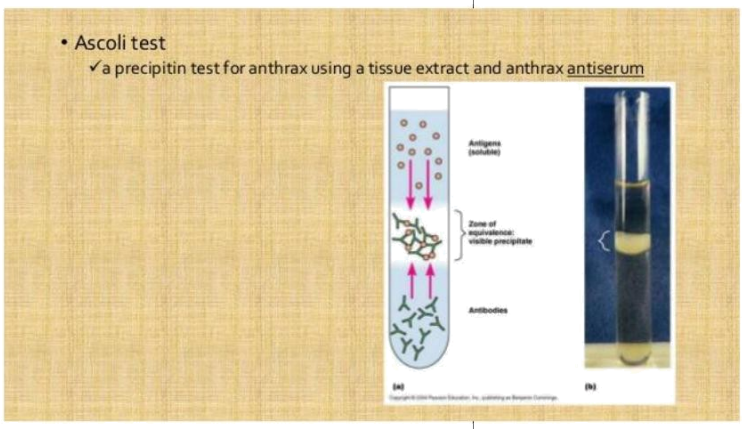
* A systemic immune complex phenomenon
* Injection of large doses of foreign serum
* Antigen is slowly cleared from circulation
* Immune complexes are deposited in various sites

* **10 days after injection** → fever, urticaria, arthralgia, lymphadenopathy, splenomegaly, glomerulonephritis

e.g. treatment with → Antitoxin, Penicillin, Sulphonamides

A toxin neutralized with 0.4% formaldehyde under 37-40°C for 4 weeks is used for vaccination. This preparation was first used by Gaston Ramon for diphtheria prevention. Name this preparation:
A. Immunoglobulin
B. Anatoxin
C. Antitoxic serum
D. Inactivated vaccine
E. Adjuvant

What diagnostic method should be used in industry to test the raw leather for presence of B. antracis?
A. Microscopy with Burry-Gins stain
B. Microscopy with Aujeszky stain
C. Ascoli's thermo precipitation test
D. Bacteriological analysis
E. Serological test

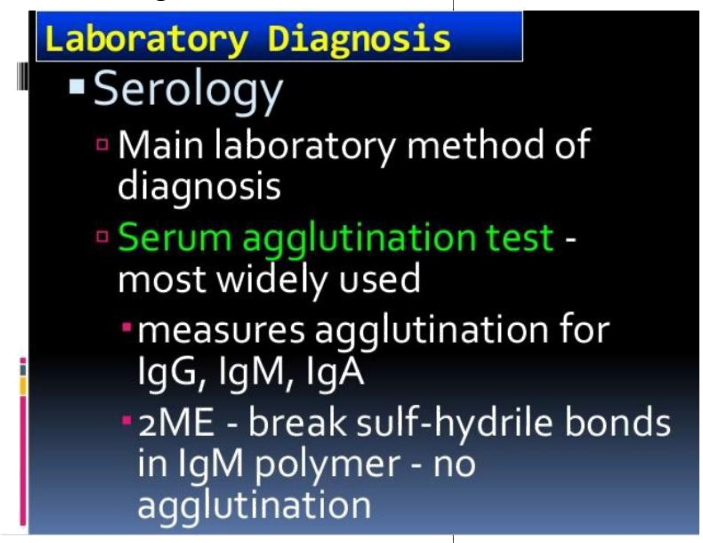


There was a record of some anthrax cases among animals in a countryside. The spread of disease can be prevented by means of immunization. What kind of vaccine should be used?
A. STI live vaccine
B. BCG vaccine
C. Salk vaccine
D. Sabin's vaccine
E. Diphteria and tetanus toxoids and pertussis vaccine

In a village, a case of anthrax had been registered. Medical services began epidemiologically indicated specific prophylaxis of population against anthrax. What preparation was used for this purpose?
A. Live vaccine
B. Inactivated vaccine
C. Chemical vaccine
D. Genetically engineered vaccine
E. Anatoxin

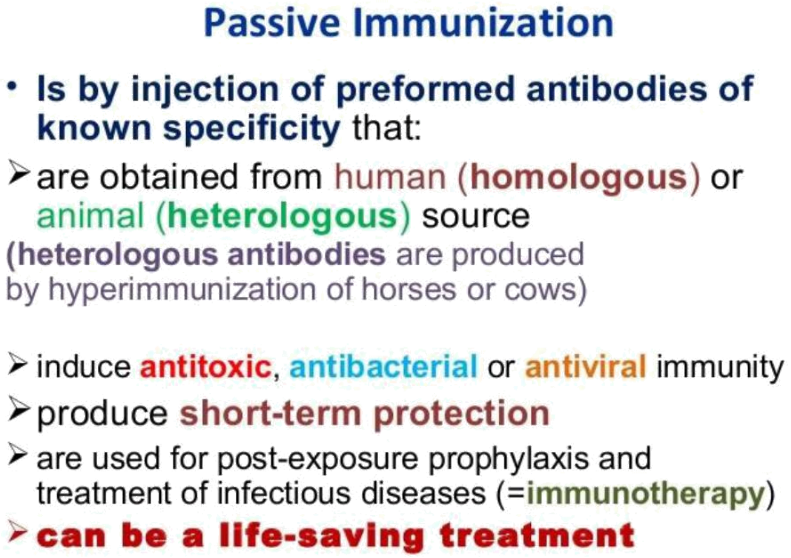
An infectious diseases hospital admitted a veterinarian with assumed brucellosis. What serologic test can confirm this diagnosis?

A. Wright's agglutination reaction B. Widal's agglutination reaction
C. Ascoli's precipitation reaction
D. Weigl's agglutination reaction
E. Wassermann reaction of complement binding



A patient diagnosed with botulism has been prescribed antibotulinic serum for treatment. What immunity will be formed in the given patient?

A. Antitoxic passive immunity
B. Infection immunity
C. Antitoxic active immunity
D. Antimicrobic active immunity
E. Antimicrobic passive immunity



Pathological material (mucosal excretion from the nasal passages) taken obtained from a patient provisionally diagnosed with influenza was delivered to the virological laboratory. What quick test allows detecting specific viral antigen in the investigated material?

A. Direct and indirect immunofluorescence (IF)
B. Reverse indirect haemagglutination (RIHA)
C. Radioimmunoassay (RIA)
D. Direct and indirect enzyme-linked immunosorbent assay (ELISA)
E. Hemagglutination inhibition assay (HAI)

A drugstore received a supply of a drug that is widely used for treatment of many virus diseases since it is not virus specific. What drug is it?

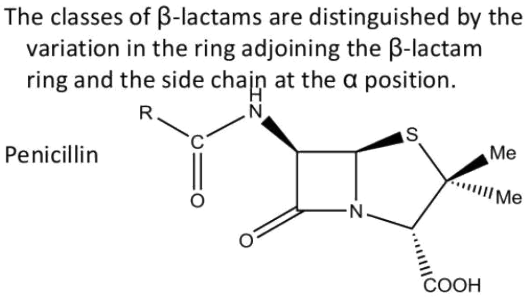
A. Interferon
B. Remantadin
C. Metisazone
D. Immunoglobulin
E. Vaccine

Preventive vaccination against poliomyelitis is made with inactivated vaccine introduced parenterally. What immunoglobulins create the postvaccinal immunity in this case?
A. Serum. IgA, IgM
B. IgE, IgM
C. IgM, secretory IgA
D. IgM, IgG
E. IgG, secretory IgA

Dentists have high risk of contracting viral hepatitis type B in the course of their duties and therefore are subject to mandatory vaccination. What vaccine is used in such cases?
A. **Recombinant vaccine.**
B. Live vaccine. C. Anatoxin.
D. Inactivated vaccine. E. Chemical vaccine.

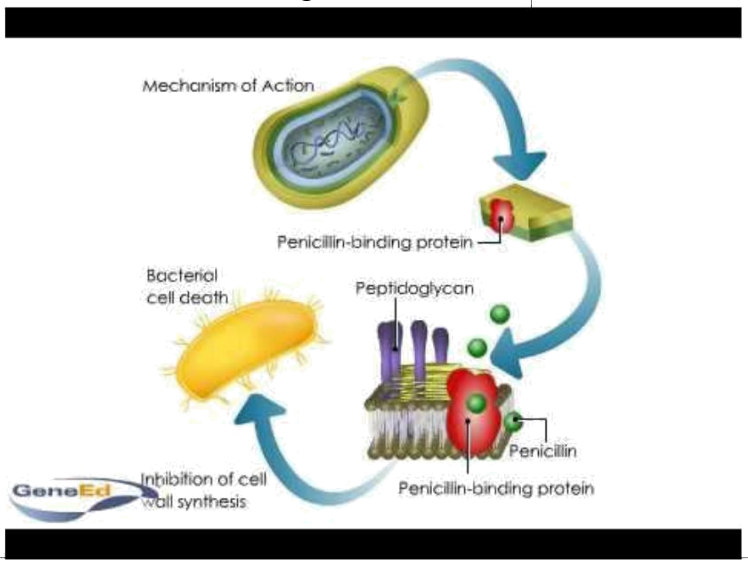
Antimicrobial therapy

A patient with streptococcal infection of gums was prescribed a drug that contained beta-lactam ring in its structure. Which drug relates to this group?
A. Benzylpenicillin
B. Rifampicin
C. Erythromycin
D. Streptomycin sulfate
E. Chloramphenicol



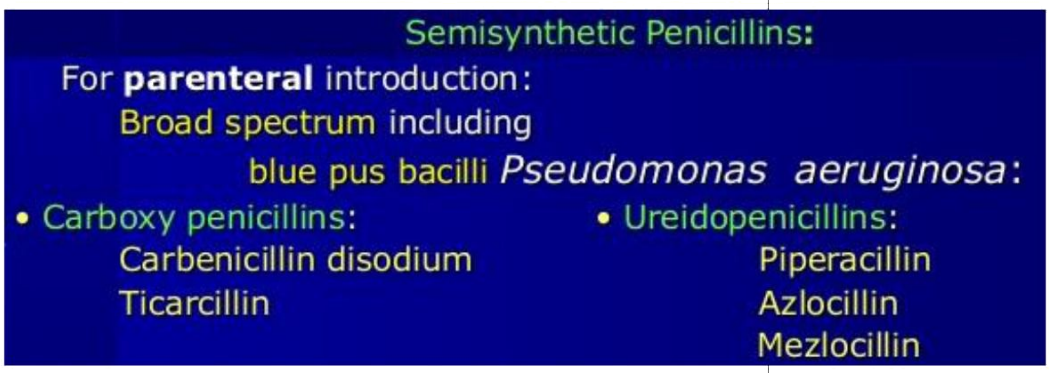
A patient with streptococcal gingival infection was prescribed a medication that contains beta lactam ring in its structure. What preparation belongs to this group?
A. Benzylpenicillin
B. Rifampicin C. Erythromycin
D. Streptomicin sulfate E. Chloramphenicol

A patient suffering from syphilis was prescribed a drug the action of which based upon disturbed generation of murein leading to death of the causative agent. What drug is it?
A. Benzylpenicillin sodium salt
B. Bijochinol
C. Ciprofloxacin
D. Azithromycin
E. Doxycycline

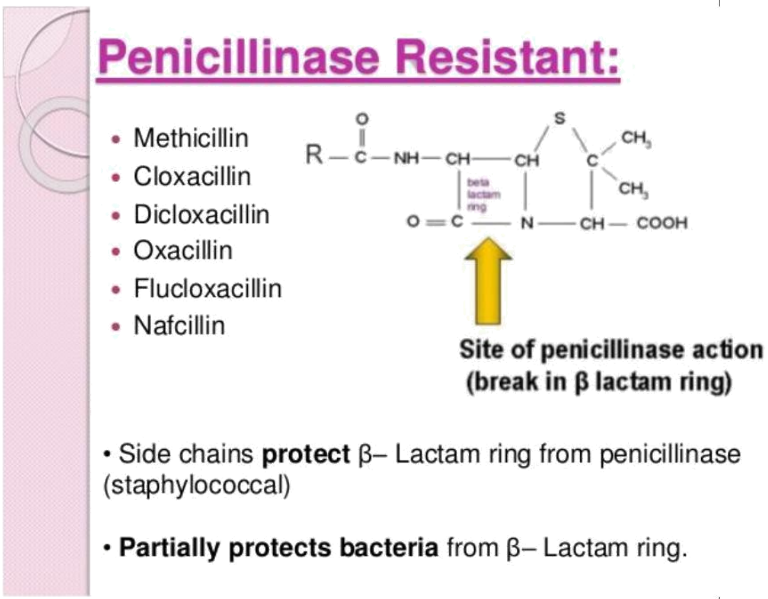


To treat bronchitis the patient was prescribed a beta-lactam antibiotic. Its mechanism of action is based on inhibition of murein production, which results in death of the causative agent. Name this drug:
A. Azithromycin
B. Penicillin G Sodium Salt
C. Ciprofloxacin
D. Streptomycin
E. Bijochinol

A 60-year-old patient was hospitalized to the surgical department because of infection caused by blue pus bacillus (Pseudomonas aeruginosa) which is sensative to penicillin antibiotics. Indicate which of the given penicillins has marked activity to the Pseudomonas aeruginosa?
A. Carbenicillin disodium
B. Benzylpenicillin
C. Phenoxymethylpenicillin
D. Oxacillin
E. Methicillin



A 43-year-old patient is to be administered an antibiotic from the penicillin group which would be resistant to penicillinase. What drug can be recommended?
A. Oxacillin
B. Amoxicillin
C.Carbenicillin
D.Azlocillin
E.Ampicillin



A patient has been diagnosed with bacillary dysentery. What drug of those listed below should be prescribed?
A. Amoxicillin
B. Benzylpenicillin sodium salt
C. Isonicotinic acid hydrazide (Isoniazid)
D. Itraconazole
E. Acyclovir

A patient suffers from a severe life-threatening generalised septic infection. What group of chemotherapeutical drugs should be prescribed in this case?

A. Cephalosporines
B. Tetracyclines
C. Sulfanilamides
D. Chloramphenicol group
E. Macrolides

From urine of a 14-year-old boy with the exacerbation of secondary obstructive pyelonephritis Pseudomonas aeruginosa was isolated with a titer of 1000000 microbes per 1 ml. Which antibiotic is most advisable to be administered in this case?

A. Ciprofloxacin
B. Ampicillin
C. Cefazolinum
D. Azithromycin
E. Chloramphenicol

Fluoroquinolone Antibiotics

Brand Name	Generic Name
Avelox	Moxifloxacin
Cipro	Ciprofloxacin
Factive	Gemifloxacin
Floxin	Ofloxacin
Levaquin	Levofloxacin

A patient has been diagnosed with sepsis. It was decided to treat him with a drug from the fluoroquinolone group. Specify this drug:

A. Ciprofloxacin
B. Cefpirome
C. Metronidazole
D. Ampicillin
E. Cephalexin

Gonorrhoea was revealed in the patient on bacterioscopy of the smear from urethra. Taking into account that medecines for gonorrhoea are fluorquinolones, patient should be prescribed:

A. Ciprofloxacin
B. Fluorouracil C. Cefazoline
D. Urosulfan E. Furazolidone

A patient has been diagnosed with gonorrhea. As fluoroquinolones are the drugs of choice for treatment of gonorrhea the patient should be prescribed:

A. Ciprofloxacin
B. Furazolidone C. Fluorouracil
D. Sulfacarbamide (Urosulfanum) E. Cefazolin

A 54-year-old patient complains of frequent painful urination, chills, fever up to 38^{o}C. Urine test results: protein - 0,33 g/L, WBCs - up to 50-60 in the field of vision, RBCs - 5-8 in the field of vision, gram-negative bacilli. Which of the listed antibiotics should be preferred in this case?

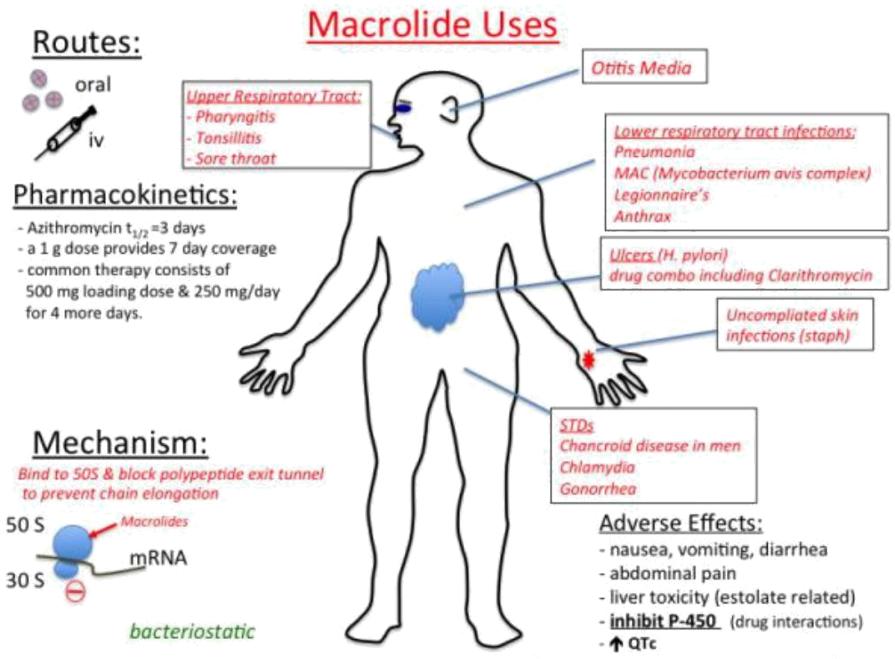
A. Ciprofloxacin
B.OxacillinC.Erythromycin
D.TetracyclineE.Tseporin

Patient with pneumonia has intolerance to antibiotics. Which of the combined sulfanilamide medicines should be prescribed to the patient?

A. Biseptol
B. Streptocid
C. Aethazol
D. Natrium sulfacyl
E. Sulfadimethoxine

A 30-year-old patient with pneumonia has been administered a 3-day course of an antibiotic from the group of azalides that has bactericidal effect, prolonged action, the ability to bind to phagocytic cells and accumulate in the infection foci. What drug has been administered?

A. Azithromycin
B. Erythromycin
C. Isoniazid
D. Benzylpenicillin sodium salt
E. Ciprofloxacin



A 5-year-old child has been diagnosed with acute right distal pneumonia. Sputum inoculation revealed that the causative agent is resistant to penicillin, but it is sensitive to macrolides. What drug should be prescribed?

A. Azithromycin
B. Tetracycline C. Gentamycin D. Streptomycin E. Ampicillin

An infectious patient manifests sensibilization to penicillin. Which of the following antibiotics is the safest to be applied in this case?

A. Erythromycin
B. Bicillin C. Ampicillin
D. Amoxicillin E. Oxacillin

A 1,5 y.o. child fell seriously ill: chill, body temperature rise up to $40,1^0$C, then rapid dropping to 36, 2^0 C, skin is covered with voluminous hemorrhagic rash and purple cyanotic spots. Extremities are cold, face features are sharpened. Diagnosis: meningococcosis, fulminant form, infection-toxic shock. What antibiotic must be used at the pre-admission stage?

A. Soluble Levomycetine succinate
B. Penicillin C. Lincomycin
D. Gentamycin E. Sulfamonometoxin

A 26-year-old female patient with bronchitis has been administered a broad spectrum antibiotic as a causal treatment drug. Specify this drug:

A. Doxycycline

B. Interferon C. BCG vaccine

D. Ambroxol E. Dexamethasone

A patient with mandibular osteomyelitis has been administered an antibiotic from the tetracycline group. Specify this drug:

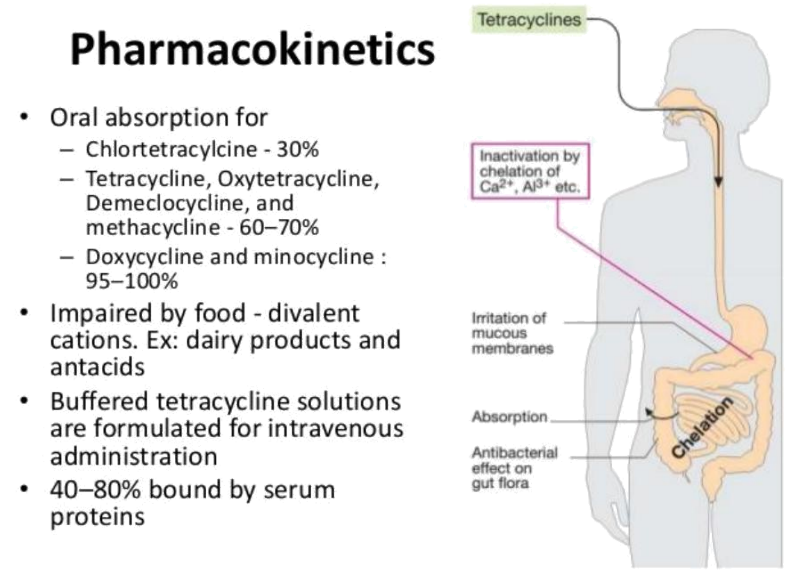
A. Doxycycline hydrochloride

B. Rifampicin

C. Streptomycin

D. Oxacillin

E. Amikacin



A stomatologists examined first-grade pupils and revealed that one of children had yellowish brown teeth, two of them were split. Heretofore the pupil was treated with "some pills" on account of pneumonia. What medication could have such a negative effect upon teeth?

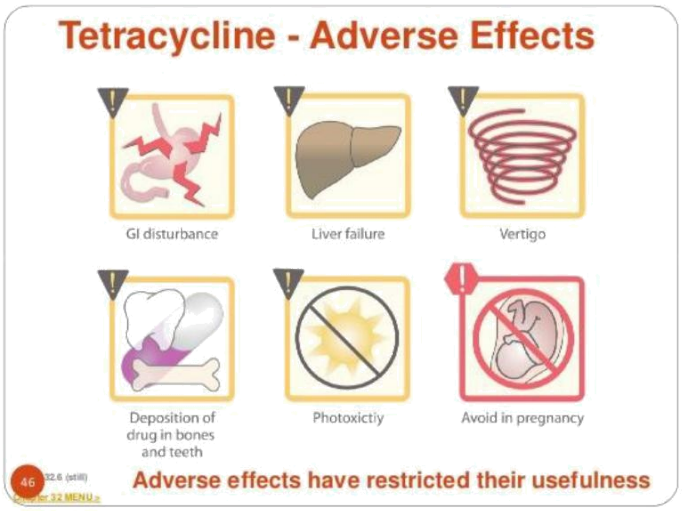
A. Doxycycline

B. Oxacillin

C. Erythromycin

D. Ampicillin

E. Biseptol



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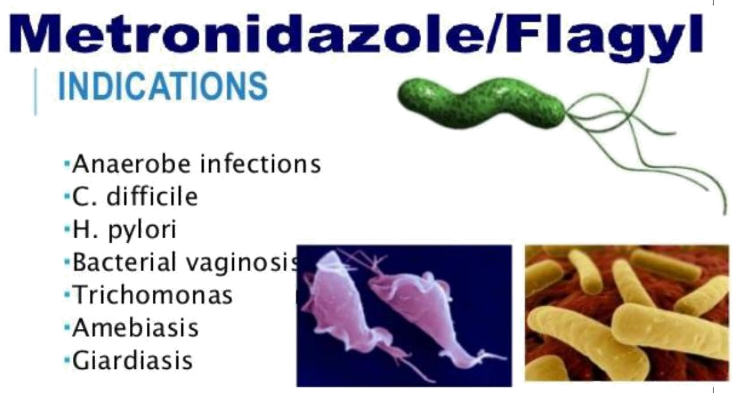
A. Doxycycline

B. Oxacillin C. Erythromycin

D. Ampicillin E. Biseptol

A patient with acne has been prescribed doxycycline hydrochloride. What recommendations should be given to the patient, while he is taking this drug? **A. Avoid long stay in the sun** B. Take with large quantity of liquid, preferably milk C. Take before meal D. Do not take with vitamins E. The course of treatment should not exceed 1 day	
Administration of doxycycline hydrochloride caused an imbalance of the symbiotic intestinal microflora. Specify the kind of imbalance caused by the antibiotic therapy: **A. Dysbacteriosis** B. Sensibilization C. Idiosyncrasy D. Superimposed infection E. Bacteriosis	
The patient with pneumonia was treated with antibiotics for a long period. After treatment patient complains of frequent and watery stool, abdominal pain. What is the reason of intestine function disorder? **A. Intestinal disbacteriosis development** B. Antibiotics toxic influence on the GIT C. Autoimmune reaction D. Bacteria toxins influence E. Hereditary enzyme defect	
As a result of durative antibiotic therapy a 37-year old patient developed intestinal dysbacteriosis. What type of drugs should be used in order to normalize intestinal microflora? **A. Eubiotics** B. Sulfanilamides C. Bacteriophages D. Autovaccines E. Vitamins	
A patient underwent appendectomy. In the postoperative period he has been taking an antibiotic. The patient complains about hearing impairment and vestibular disorders. What group of antibiotics has such by-effects? **A. Aminoglycosides** B. Penicillins C. Tetracyclines D. Macrolides E. Cephalosporins	
Mother of a 2 year old child consulted a stomatologist. In the period of pregnancy she was irregularly taking antibiotics for an infectious disease. Examination of the child revealed incisor destruction, yellow enamel, brown rim around the dental cervix. What drug has apparent teratogenic effect? **A. Doxacycline** B. Furosemide C. Ampiox D. Xantinol nicotinate E. Octadine	
Mother of a two year old child consulted a dentist. In the period of pregnancy she was non-systematically taking antibiotics to treat an infectious disease. The child's examination revealed incisor destruction, yellow enamel, brown limbus of dental cervix. What preparation was mother taking during her pregnancy? **A. Doxycycline** B. Furosemide C. Ampiox D. Xanthinol nicotinate E. Octadine	

A 5 y.o. child's enamel and dentin are striated with yellowish-brown stripes, the child has also dentin exposure, multiple caries. It is known that the child's mother had been taking antibiotics during her pregnancy. What medication might have caused such by-effect? **A.Tetracycline** B.Lincomycin C.Streptocid D.Nystatin E.Ampicillin	
A 7 year old child is ill with bronchitis. It is necessary to administer him an antibacterial drug. What drug of fluoroquinolone group is CONTRAINDICATED at this age? **A. Ciprofloxacin** B. Ampicillin C. Amoxicillin D. Sulfadimethoxine E. Ampiox	
Patient was admitted to the infection unit with diagnosis of bacterial dysentery. On laboratory studies it was revealed that causative element is sensitive to the many antimicrobial medicines, but patient has anemia. What medicine is contra-indicated to the patient? A. Enteroseptol B. Phthalazol **C. Levomycetin** D. Ampicillin E. Furazolidone	
A 50-year-old patient with typhoid fever was treated with Levomycetin, the next day his condition became worse, temperature rised to 39,6^{0}C. What caused worthening? A. Reinfection B. Allergic reaction C. Irresponsiveness of an agent to the levomycetin **D. The effect of endotoxin agent** E. Secondary infection addition	
Purulent endometritis developed in a woman after delivery. Treating with antibiotics inhibitors of murein synthesis was ineffective. Wide spectrum bactericidal antibiotic was administered to her. In 6 hours temperature rapidly increased up to 400C with shiver. Muscle pains have appeared. BP dropped down to 70/40 mmHg. Oliguria has developed. What is the main reason for the development of this condition? **A. Endotoxic shock** B. Toxic effect of preparation C. Internal bleeding D. Anaphylactic shock E. Bacteremia	
In order to prevent wound infection associated with surgical procedures a patient was given a synthetic antiprotozoan drug with a high activity against Helicobacter pylori. Specify this drug: **A. Metronidazole** B. Doxycycline hydrochloride C. Chingamin D. Acyclovir E. Isoniazid	
A 52-year-old patient has the following diagnosis: systemic amebiasis with involvment of intestines, liver, lungs. What drug should be prescribed? **A. Metronidasol** B. Quiniofone C. Tetracycline D. Quingamine E. Enteroseptol	

Systemic amebiasis with involvment of intestines, liver, lungs was diagnosed in a 52-year-old patient. What drug should be prescribed? A. Quiniofone B. Enteroseptol **C. Metronidasol** D. Tetracycline E. Quingamine 	
A patient consulted a doctor about bowels disfunction. The doctor established symptoms of duodenitis and enteritis. Laboratory examination helped to make the following diagnosis: lambliosis. What medication should be administered? **A. Metronidazole** B. Erythromycin C. Monomycin D. Chingamin E. Tetracycline	
A female patient consulted a doctor about a sense of epigastric discomfort, nausea and anorexia. A duodenal content analysis revealed lamblia. What drug should be prescribed? **A.Metronidazole** B.Chingamin C.Rifampicin D.Isoniazid E.Acyclovir	
A patient ill with amebiasis was prescribed a certain drug. The use of alcohol together with this drug is contraindicated because the drug inhibits metabolism of ethyl alcohol. What drug is it? **A. Metronidazole** B. Reserpine C. Clonidine D. Diazepam E. Aminazine	
A 30 y.o. patient is diagnosed with amebic dysentery. This diagnosis was bacteriologically confirmed. Name the preparation for its treatment: **A. Metronidazole** B. Mebendazole C. Itrakonazole D. Furacillin E. Acyclovir	
A 30-year-old patient complains about having abdominal pain and diarrhea for five days; body temperature rise up to 37, 5^{o}C along with chills. The day before a patient had been in a forest and drunk from an open water reservoir. Laboratory analyses enabled to make the following diagnosis: amebic dysentery. What is the drug of choice for its treatment? **A. Metronidazole** B. Furazolidonum C. Levomycetin D. Phthalazol E. Emetine hydrochloride	
A 30 year old patient consulted a doctor about having diarrhea and stomach aches for 5 days, temperature rise up to $37,5^{0}$C with chills. The day before the patient was in a forest and drank some water from an open pond. He was diagnosed with amebic dysentery that was bacteriologically confirmed. Name the medication for treatment of this disease: **A. Metronidazole** B. Furasolidone C. Chloramphenicol D. Phthalazole E. Emethine hydrochloride	

A patient consulted a stomatologist about purulent inflammation of his gums. What drug will be the most effective if it is suspected that a causative agent is an anaerobe?

A. Metronidazole

B. Gentamicin C. Oxacillin sodium

D. Co-trimoxazole E. Nitroxoline

A patient consulted a dentist about itching and burning in the oral cavity; high temperature. The patient was diagnosed with trichomonal gingivostomatitis. What drug should be chosen for his treatment?

A. Metronidazole

B. Doxycycline hydrochloride

C. Ampicillin

D. Gentamicin sulfate

E. Nystatin

A dentist has detected symptoms of parodontosis in a patient. What antiprotozoal drug should be prescribed?

A. Metronidazole

B. Levamisole C. Griseofulvin

D. Mykoseptin E. Furazolidone

A healthy man is in a region with high risk of catching malaria. What drug should be administered for individual chemoprophylaxis of malaria?

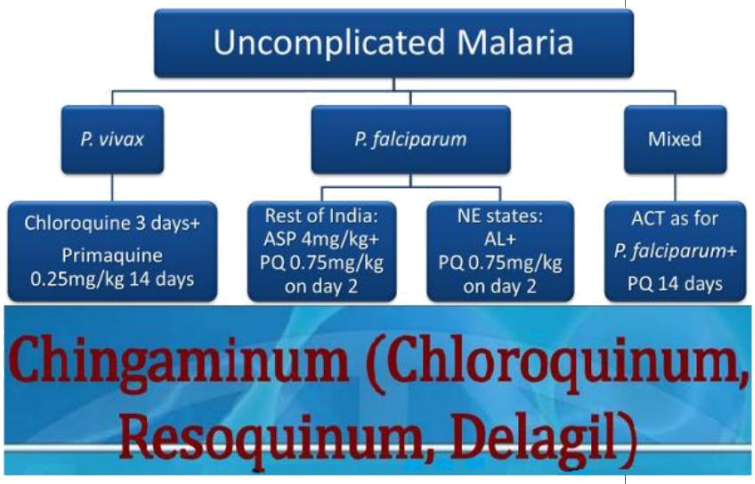
A. Chingamin

B. Sulfalen

C. Tetracycline

D. Metronidazole

E. Biseptol



This drug has a destructive effect on erythrocytic forms of malarial plasmodia and dysenteric amoebae. It is used for treatment and prevention of such diseases as malaria, amebiasis and interstitial disease. What drug is it?

A. Chingamin

B. Emetine hydrochloride

C. Tetracycline

D. Erythromycin

E. Quinine

UN volunteers have arrived in Nigeria to assist the locals in aftermath of earthquakes. What drug should they prescribe for individual chemoprophylaxis of malaria?

A. Chingamin

B. Pyrantel

C. Pyrimethamine (Chloridinum)

D. Primaquine

E. Interferon (Laferon)

After the second abortion a 23 year old woman has been diagnosed with toxoplasmosis. Which drug should be used for toxoplasmosis treatment? **A. Co-trimoxazole** B. Itraconazole C. Mebendazole D. Azidothimidine E. Acyclovir	
A patient was diagnosed with active focal pulmonary tuberculosis. What drug should be prescribed in the first place? **A. Isoniazid** B. Sulfalen C. Cyclocerine D. Ethionamide E. Ethoxide	

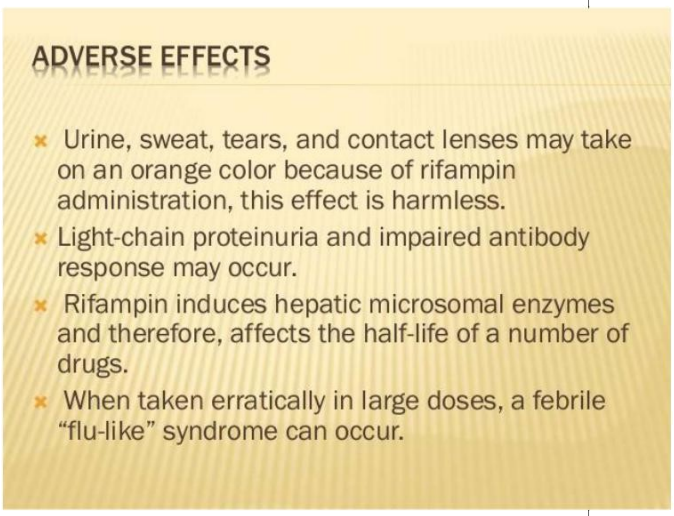
Isoniazid

- Isoniazid-induced hepatitis-most common major toxic effect
- Peripheral neuropathy
- CNS toxicity-memory loss, psychosis,seizures
- Fever and skin rashes
- Drug-induced SLE
- Hematologic abnormalities
- Provocation of pyridoxine deficiency anemia
- Tinnitus
- Gastrointestinal discomfort

A patient suffers from pulmonary tuberculosis. During treatment neuritis of visual nerve arose. What drug has caused this by-effect? **A. Isoniazid** B. Ethambutol C. Kanamycin D. Rifampicin E. Streptomycin	
After 4 months of treatment for tuberculosis the patient began complaining of toes and fingers numbness, sensation of creeps. He was diagnosed with polyneuritis. What antituberculous drug might have caused these complications? **A. Isoniazid** B. Rifampicin C. Ciprofloxacin D. Sodium salt of benzylpenicillin E. Iodine solution	
A patient suffering form tuberculosis was treated with rifampicin, which caused drug resistance of tuberculosis mycobacteria. In order to reduce mycobacteria resistance, rifampicin should be combined with the following drug: **A. Isoniazid** B. Acyclovir C. Intraconazole D. Metronidazole E. Amoxicillin	
Following treatment with a highly efficient anti-tuberculosis drug a 48-yearold female developed optic nerve neuritis, memory impairment, cramps. Which of these anti-TB drugs had the patient taken? **A. Isoniazid** B.PASA C.Rifampicin D.Ethambutol E.Kanamycin sulfate	
A patient with pulmonary tuberculosis is prescribed the most effective antituberculosis antibiotic. Name this drug: A. Tetracycline B. Furasolidone **C. Rifampicin** D. Bactrim (Co-trimoxazole) E. Streptocide	

Tuberculosis can be treated by means of combined chemotherapy that includes substances with different mechanisms of action. What antituberculous medication inhibits transcription of RNA into DNA in mycobacteria?

A. Rifampicin
B. Isoniazid
C. Streptomycin
D. Ethionamide
E. Para-aminosalicylic acid



After starting treatment for pulmonary tuberculosis a patient complained about red tears and urine. What drug could cause such changes?

A. Rifampicin
B. Benzylpenicillin sodium salt
C. Benzylpenicillin potassium salt
D. Biseptol-480
E. Cefazolin

A patient being treated for tuberculosis is suffering from hearing deterioration. What drug causes this complication?

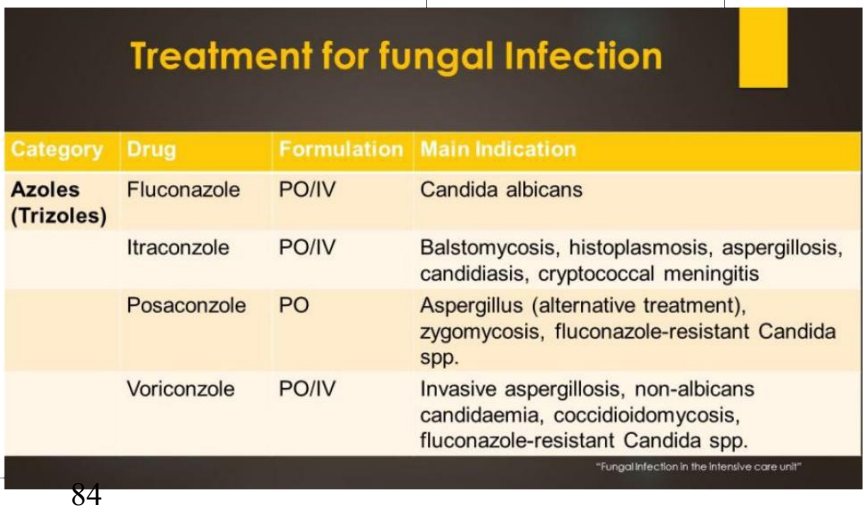
A. Streptomycin
B. Isonicotinic acid hydrazide (Isoniazid)
C. Rifampicin
D. Ethionamide
E. Kanamycin sulphate

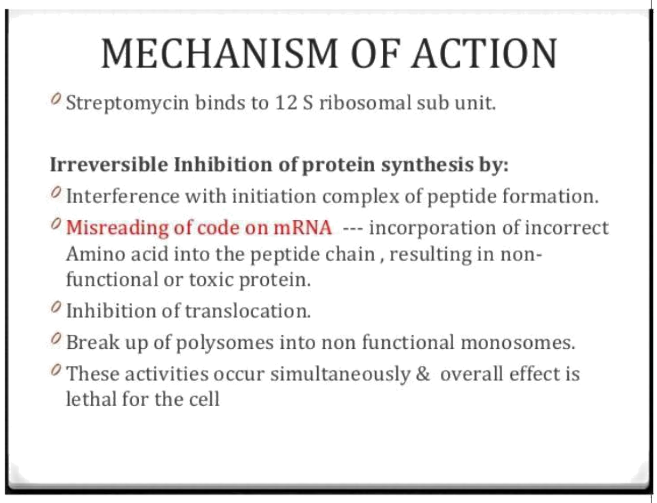
A patient who has been taking tetracycline for a long time has developed candidosis of mucous membranes. What drug should administered for its treatment?

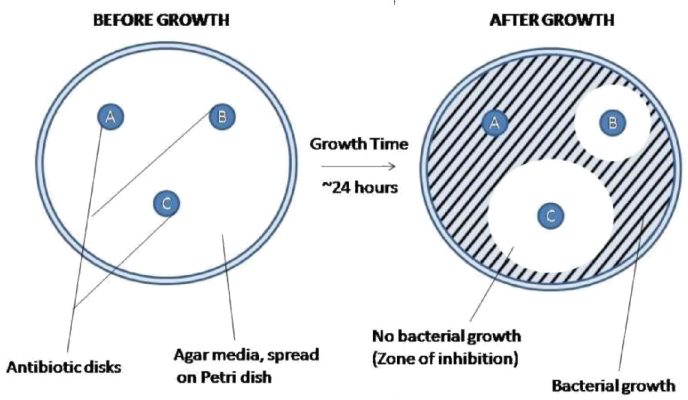
A. Itraconazole
B. Griseofulvin C. Nitrofungin
D. Amphotericin E. Nitrofurantoin

A female who had been continuously taking antibiotics for an intestinal infection developed a complication manifested by inflammation of the oral mucosa and white deposit. Bacteriological study of the deposit samples revealed yeast fungi Candida albicans. Which of the following medications is indicated for the treatment of this complication?

A. Fluconazole
B. Biseptol
C. Tetracycline
D. Furazolidone
E. Polymyxin

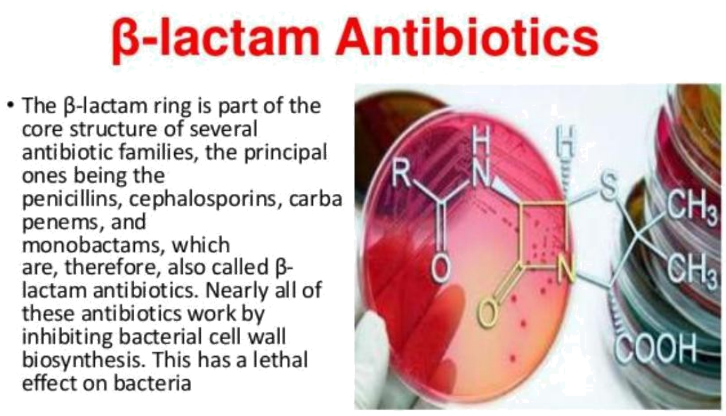


Infectious diseases are treated with antibiotics (streptomycin, erythromycin, chloramphenicol). They inhibit the following stage of protein synthesis: **A. Translation** B. Transcription C. Replication D. Processing E. Splicing 	
Streptomycin and other aminoglycosides prevent the joining of formyl-methionyl-tRNA by bonding with 30S ribosomal subunit. This effect leads to disruption of the following process: A. Translation initiation in eucaryotes **B. Translation initiation in procaryotes** C. Replication initiation in procaryotes D. Transcription initiation in eucaryotes E. Transcription initiation in procaryotes	
A patient with bacterial pneumonia was prescribed benzylpenicillin. What is the mechanism of its antibacterial effect? **A. Inhibition of synthesis of microorganism wall** B. Inhibition of intracellular protein synthesis C. Abnormal permeability of cytoplasmic membrane D. Inhibition of SH-groups of microorganism enzymes E. Antagonism with p-amino-benzoic acid	
A 19 year old woman suffers from primary syphilis. Doctor administered her complex therapy that includes benzylpenicillin sodium salt. What is the mechanism of action of this drug? **A. It blocks synthesis of peptidoglycan of microbial membrane** B. It blocks synthesis of cytoplasm proteins C. It blocks thiol enzymes D. It blocks RNA synthesis E. It blocks DNA synthesis	
A doctor prescribed a cephalosporin antibiotic to the patient after appendectomy for infection prevention. Antimicrobial activity of this group of antibiotics is based upon the disturbance of the following process: **A. Microbial wall formation** B. Nucleic acid synthesis C. Ribosome protein synthesis D. Energy metabolism E. Choline esterase block	
For infection prevention a patient who underwent appendectomy was prescribed a cephalosporin antibiotic. Antimicrobial activity of these antibiotics is called forth by the disturbance of the following process: **A. Microbial wall formation** B. Nucleic acid synthesis C. Ribosomal protein synthesis D. Energy metabolism E. Cholinesterase block	

Certain infections caused by bacteria are treated with sulphanilamides that block the synthesis of bacterial growth factor. What is the mechanism of these drugs action? **A. They are antivitamins of paminobenzoic acid** B. They inhibit the folic acid absorption C. They are allosteric enzyme inhibitors D. They are involved in redox processes E. They are allosteric enzymes	
A patient with herpetic stomatitis was prescribed acyclovir for topical application. What is its mechanism of action? **A. It inhibits synthesis of nucleic acids of viruses** B. It inhibits virus penetration into cells C. It inhibits virus maturation D. It increases the resistance of macroorganism cells to the viruses E. It inhibits virion assembly	
A patient is ill with herpetic stomatitis provoked by immunosuppression. What preparation introduced intravenously, internally and locally can provide antiviral and immunopotentiating effect? **A. Acyclovir** B. Remantadinum C. Levamisole D. Methisazonum E. Amoxicillin	
On the 5-th day of the respiratory disease a 24 y.o. man has developed progressive headaches systemic dizziness, feeling of seeing double, paresis of mimic muscles on the right, choking while swallowing. Acute viral encephalitis has been diagnosed. What is the main direction of urgent therapy? **A. Zovirax** B. Glucocorticoids C. Ceftriaxon D. Lasix E. Hemodesis	
What preparations are used for prevention of fungal infection? **A. Fluconozol, Orungal, Nisoral** B. Rubomycin,Bleomycin,Mytomycin C. Cytosar,Cormyctin,Lomycitin D. Captopril, Enalapril E. Isoniazid, Ftibazid, Pyrazinamid	
Name the halogen-containing antiseptic with fungicidal properties, which is used to treat dermatomycosis: **A. Iodine solution** B. Formalin solution C. Methylene blue D. Brilliant green E. Boric acid solution	
Pathogenic staphylococcus was obtained from the purulent wound of the patient. Its antibiotic sensitivity was determined to be as follows: penicillin growth inhibition zone - 8 mm; oxacillin - 9 mm, ampicillin - 10 mm, gentamicin - 22 mm, lincomycin - 11 mm. What antibiotic should be chosen for treatment in this case? A. **Gentamicin** B. Penicillin C. Ampicillin D. Oxacillin E. Lincomycin	

A patient with streptococcal gingival infection was prescribed a medication that contains beta lactam ring in its structure. What preparation belongs to this group?

A. Benzylpenicillin
B. Rifampicin
C. Erythromycin
D. Streptomicin sulfate
E. Chloramphenicol

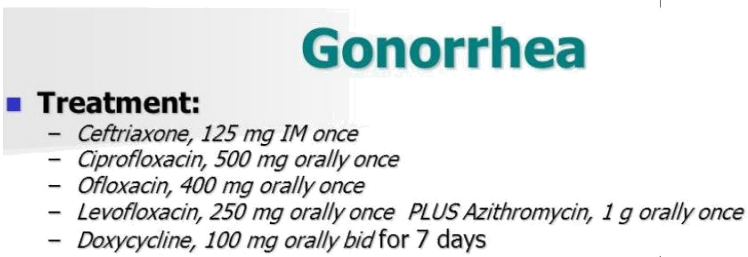


A patient with streptococcal infection of gums was prescribed a drug that contained beta-lactam ring in its structure. Which drug relates to this group?

A. Benzylpenicillin
B. Rifampicin C. Erythromycin
D. Streptomycin sulfate E. Chloramphenicol

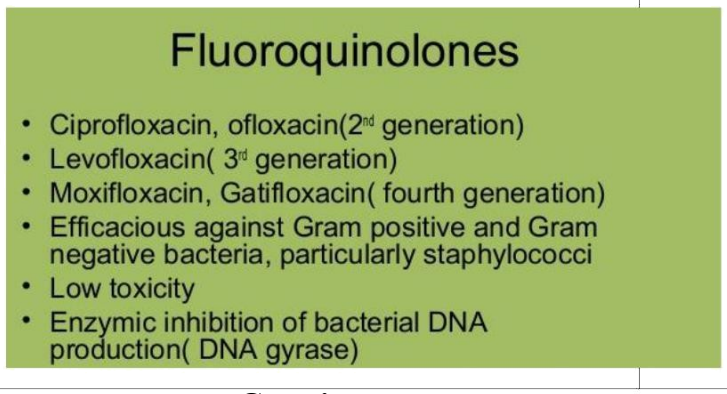
Gonorrhoea was revealed in the patient on bacterioscopy of the smear from urethra. Taking into account that medecines for gonorrhoea are fluorquinolones, patient should be prescribed:

A. Ciprofloxacin
B. Fluorouracil
C. Cefazoline
D. Urosulfan
E. Furazolidone



A patient has been diagnosed with gonorrhea. As fluoroquinolones are the drugs of choice for treatment of gonorrhea the patient should be prescribed:

A. Ciprofloxacin
B. Furazolidone
C. Fluorouracil
D. Sulfacarbamide (Urosulfanum)
E. Cefazolin



Genetics

Ability to divide is characteristic of prokaryotic and eukaryotic cells. Prokaryotic cell division is different from that of eukaryotic, but there is one molecular process that is the basis of both types of division. Name this process.

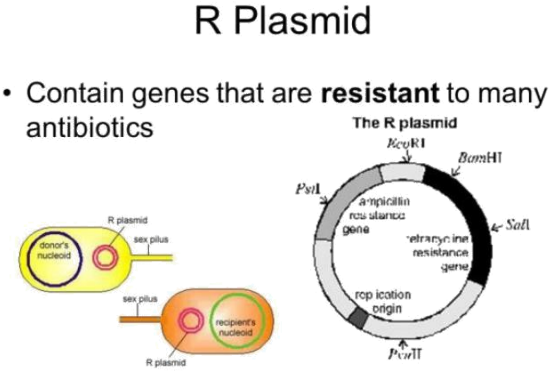
A. DNA replication B. Transcription
C. Reparation D. Translation E. Gene amplification

From the nasopharynx of a 5-year-old child it was excreted a microorganism which is identical to Corynebacterium diphtheriae dose according to morphological and biochemical signs. Microorganism does not produce exotoxin. As a result of what process can this microorganism become toxigenic?
A. Cultivation in the telluric environment
B. Chromosome mutation
C. Passing through the organism of the sensative animals
D. Phage conversion
E. Growing with antitoxic serum

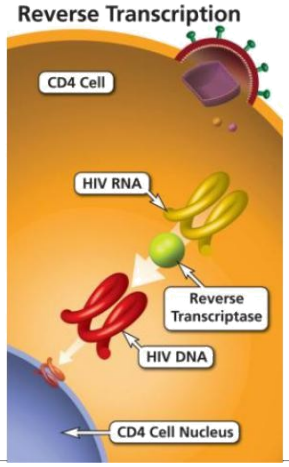
Because of suspected intrahospital infection in the neonatal department of the maternity home the inspection was carried out. In some children and on some general things Staphylococcus aureus was revealed. What properties of these cultures allow to establish their origin from one source?
A. Antibioticogramma
B. Antigenic structure
C. Biochemical activity
D. Phagotype
E. Chromogenesis

From the fecal sample of a patient Shigella sonne were isolated. What additional studies are required to identify the source of infection?
A. Phage-typing of the isolated pure culture
B. Antibiogram C. Precipitation reaction D. Complement-fixation reaction E. Neutralization reaction

In the surgical department of a dental clinic cases of hospital-acquired staphylococcal infection were registered which was caused by strains with multiple drug resistance. Such feature can be identified by presence of:
A. **R-plasmids**
B.F-plasmids
C.Exotoxins
D.T-phages
E. Virulent phages



RNA that contains AIDS virus penetrated into a leukocyte and by means of reverse transcriptase forced a cell to synthesize a viral DNA. This process is based upon:
A. Reverse transcription
B. Operon repression
C. Reverse translation
D. Operon depression
E. Convariant replication



During reproduction of some RNA-containing viruses that cause tumors in animals, genetic information can be transmitted in the opposite direction from the RNA to the DNA via a specific enzyme. The enzyme of reverse transcription is called: **A. Reverse transcriptase** B. DNA polymerase C. Ligase D. Primase E. Topoisomerase	
It was revealed that T-lymphocytes were affected by HIV. Virus enzyme - reverse transcriptase (RNA-dependent DNA polymerase) - catalyzes the synthesis of: **A. DNA on the matrix of virus mRNA** B. Virus informational RNA on the matrix of DNA C. DNA on virus ribosomal RNA D. Viral DNA on DNA matrix E. mRNA on the matrix of virus protein	
A doctor was addressed by a 30-year old man. There is a probability of the patient being HIV-positive. To clarify the diagnosis the doctor proposed to perform polymerase chain reaction. The basic process in this kind of investigation is: **A. Gene amplification** B. Transcription C. Genetic recombination D. Genomic mutation E. Chromosome mutation	
In the course of evolution there developed molecular mechanisms for correction of damaged DNA molecules. This process is called: **A. Reparation** B. Transcription C. Translation D. Replication E. Processing	
Genetic information is stored in DNA but does not participate directly in protein synthesis within DNA cells. What process ensures transfer of genetic information into polypeptide chain? **A. Translation** B. Formation of rRNA C. Formation of tRNA D. Formation of iRNA E. Replication	
5. A man is a carrier of HIV that is an RNA virus. The cells of this patient synthesize viral DNA. This process is based on: A. Transcription B. Repair C. Replication **D. Reverse transcription** E. Translation	
Infection	
A doctor made the diagnosis of gonorrhoea. It was known from the anamnesis that a patient had had gonorrhoea before and he had been treated completely. What type of infection can this new disease be attributed to? A. Superinfection **B. Reinfection** C. Relapse D. Secondary infection E. Autoinfection	

A patient who suffered form syphilis took a course of antibiotic therapy and fully recovered. Some time later he was infected again with Treponema pallidum. What form of infection is it?

A. Reinfection
B. Recurrence
C. Superinfection
D. Relapse
E. Complication

Reinfection: Subsequent infection by same organism in a host (after recovery).

A patient who suffered from syphilis took a course of antibiotic therapy and fully recovered. Some time later he was infected again with Treponema pallidum. What form of infection is it?

A. Reinfection
B. Recurrence
C. Secondary infection
D. Superinfection
E. Complication

Material obtained from a patient contains several types of microorganisms (staphylococci and streptococci) causative of the patient's disease. Name this type of infection:

A. Mixed infection
B. Superinfection
C. Reinfection
D. Consecutive infection
E. Coinfection

Mixed infection – several microbes grow simultaneously at the infection site – **polymicrobial**

2 weeks since the blood transfusion a recipient has developed fever. What protozoal disease can it be?

A. Trypanosomiasis
B. Malaria
C. Amebiasis
D. Toxoplasmosis
E. Leishmaniasis

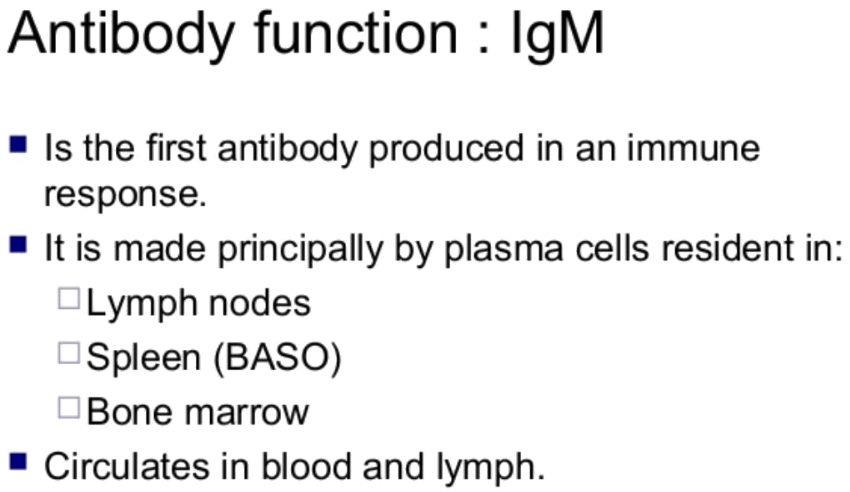
- Malaria can be transmitted by blood transfusion, needle-stick injury, sharing of needles by infected injection drug users, or organ transplantation. The incubation period in these settings is often short because there is no pre erythrocytic stage of development.
- The clinical features and management of these cases are the same as for naturally acquired infections.

Two weeks after hemotransfusion a patient developed fever. What protozoal disease can be suspected?

A. Malaria
B. Toxoplasmosis
C. Leishmaniasis
D. Amebiasis
E. Trypanosomiasis

A pregnant woman was registered in an antenatal clinic and underwent complex examination for a number of infections. Blood serum contained IgM to the rubella virus. What is this result indicative of?

A. Of primary infection
B. Of a chronic process
C. The woman is healthy
D. Of exacerbation of disease
E. Of recurring infection with rubella virus



A pregnant woman was detected with IgM to rubella virus. An obstetrician-gynecologist recommended therapeutic abortion due to the high risk of teratogenic affection of the fetus. Detection of IgM was of great importance as it is these specific immunoglobulins that:

A. Indicate recent infection
B. Penetrate placental barrier
C. Have the largest molecular weight
D. Are associated with anaphylactic reactions
E. Are the main factor of antiviral protection

A patient has been diagnosed with ARVI. Blood serum contains immunoglobulin M. What is the stage of infection in this case?

A. Acute
B.Prodromal
C.Incubation
D.Reconvalescence
E.Carriage

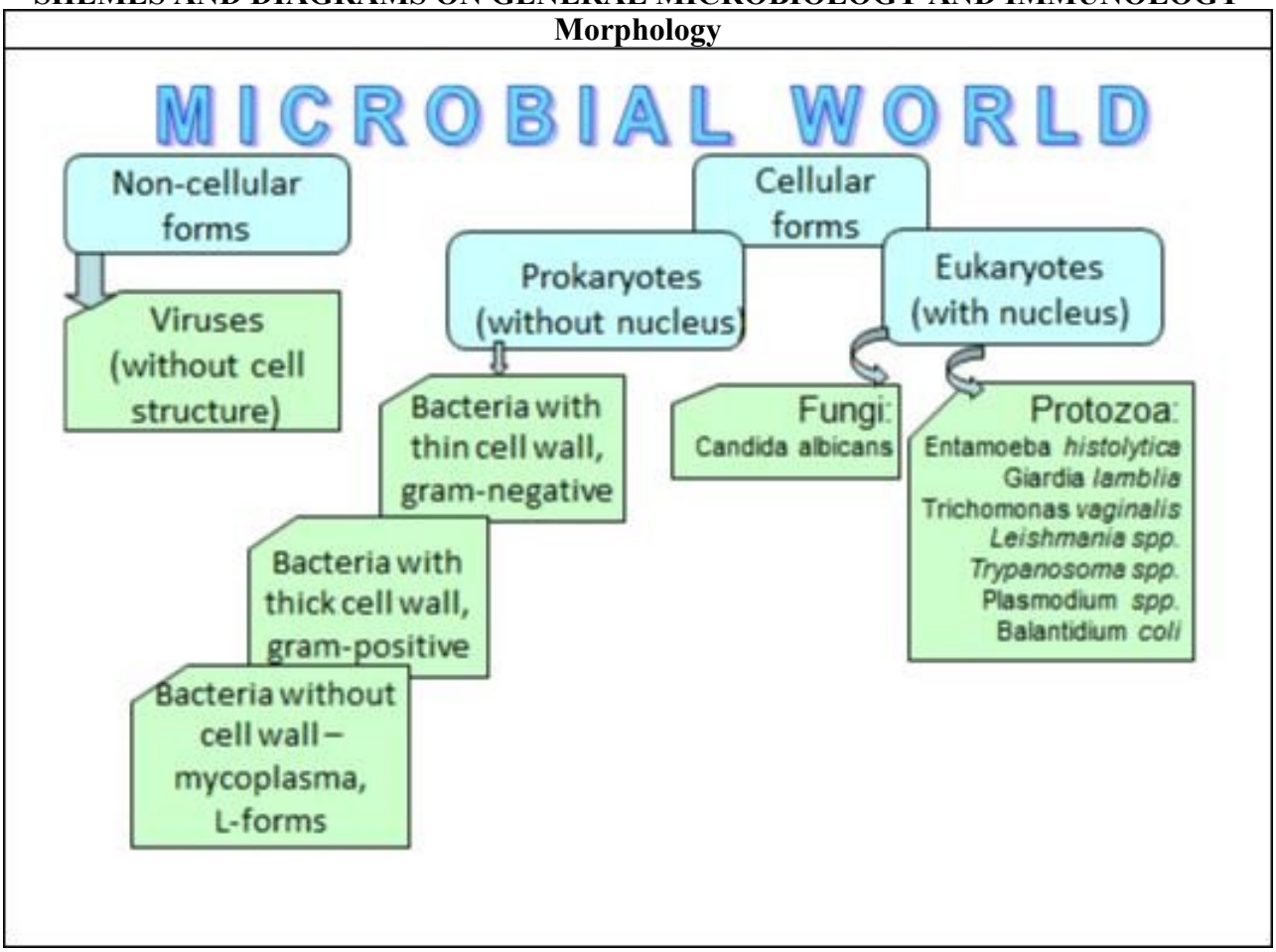
As an example of specific human parasites one can name Plasmodium falciparum, human pinworm and some others. The source of parasite invasion is always a human. Such specific human parasites cause the diseases that are called:

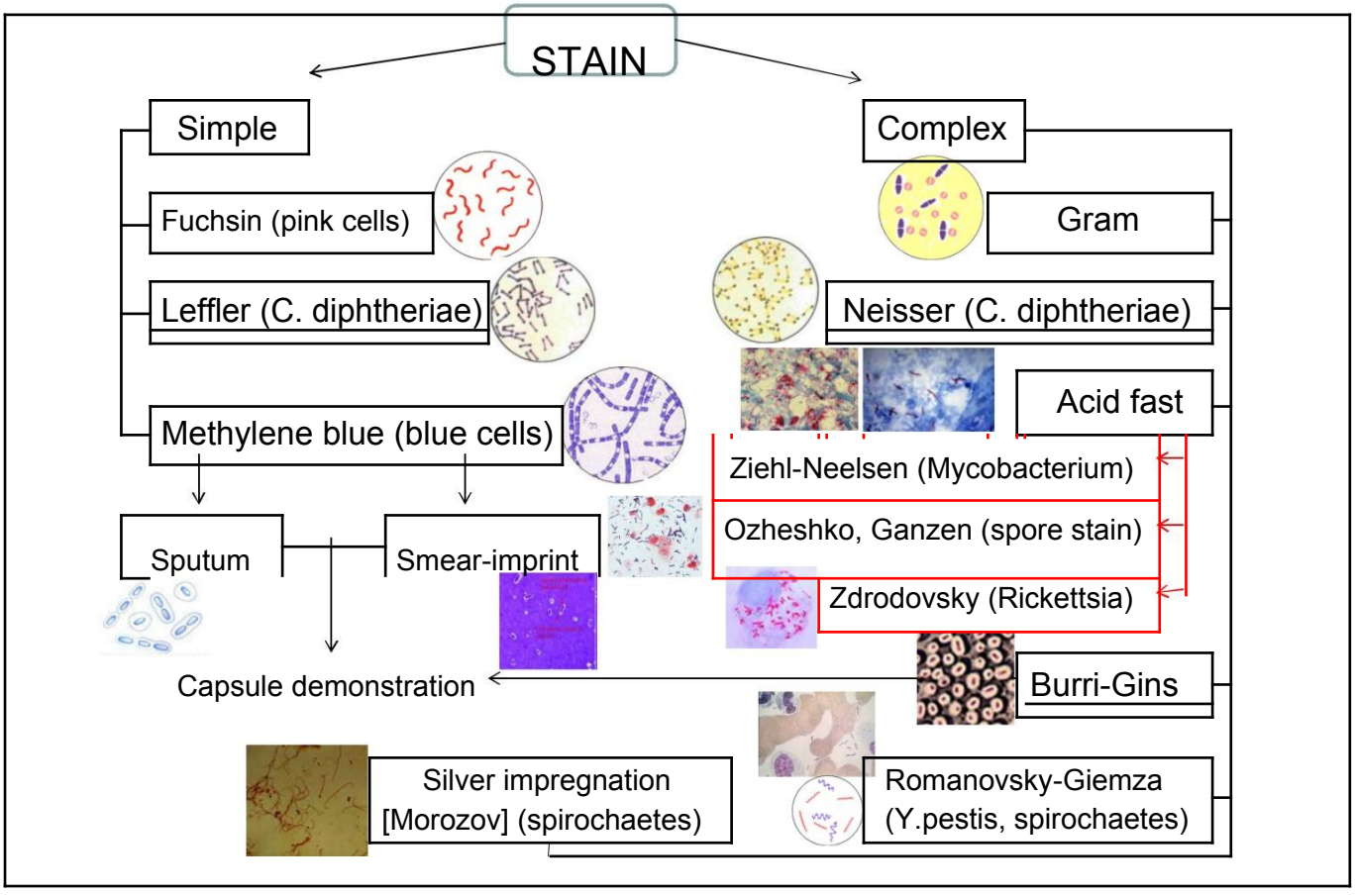
A. Anthroponoses
B. Anthropozoonoses
C. Zoonoses
D. Multifactorial diseases
E. Infections

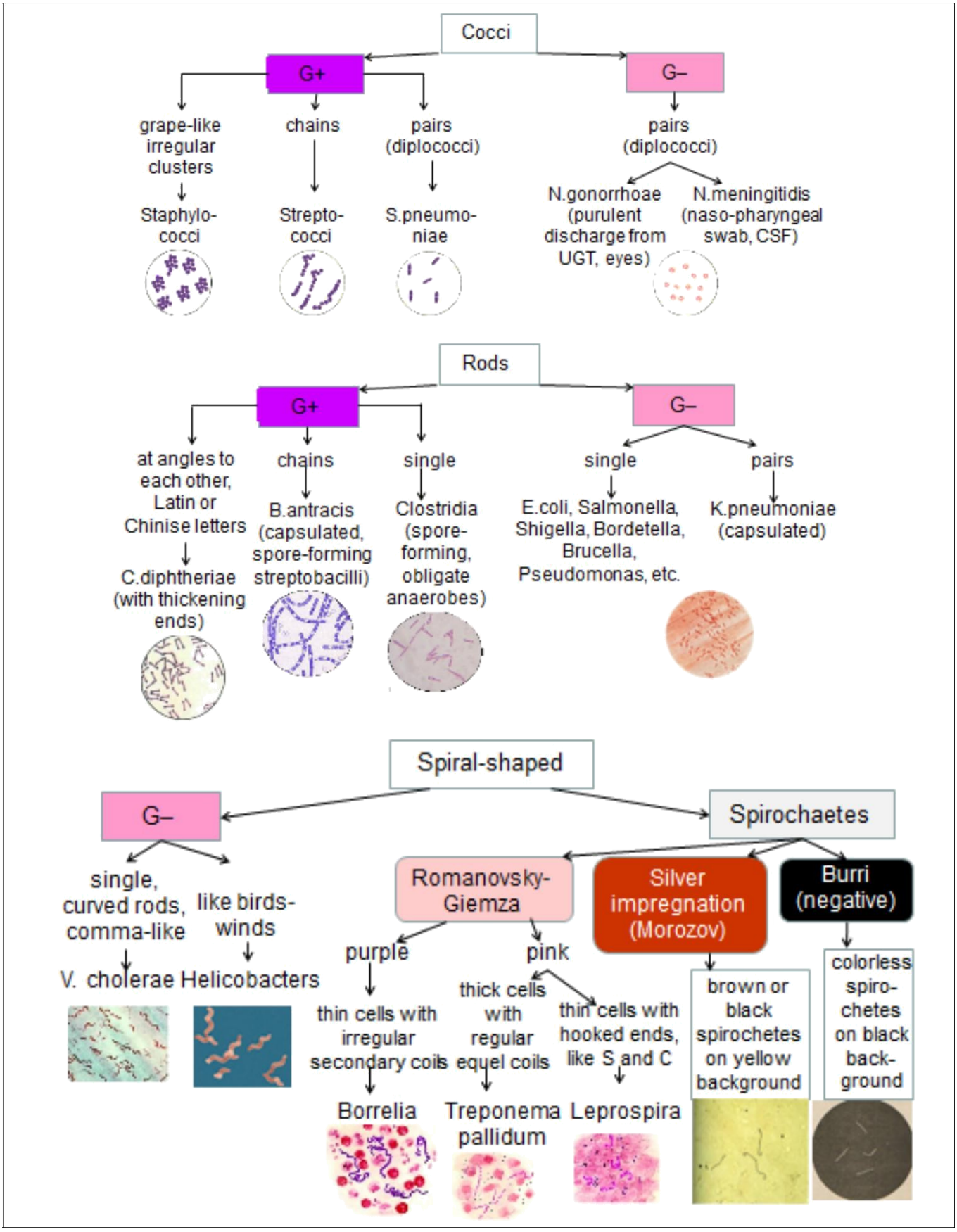
Anthroponoses = infections transmisible among human beings only (typhoid fever, shigelloses, venereal infections etc.)

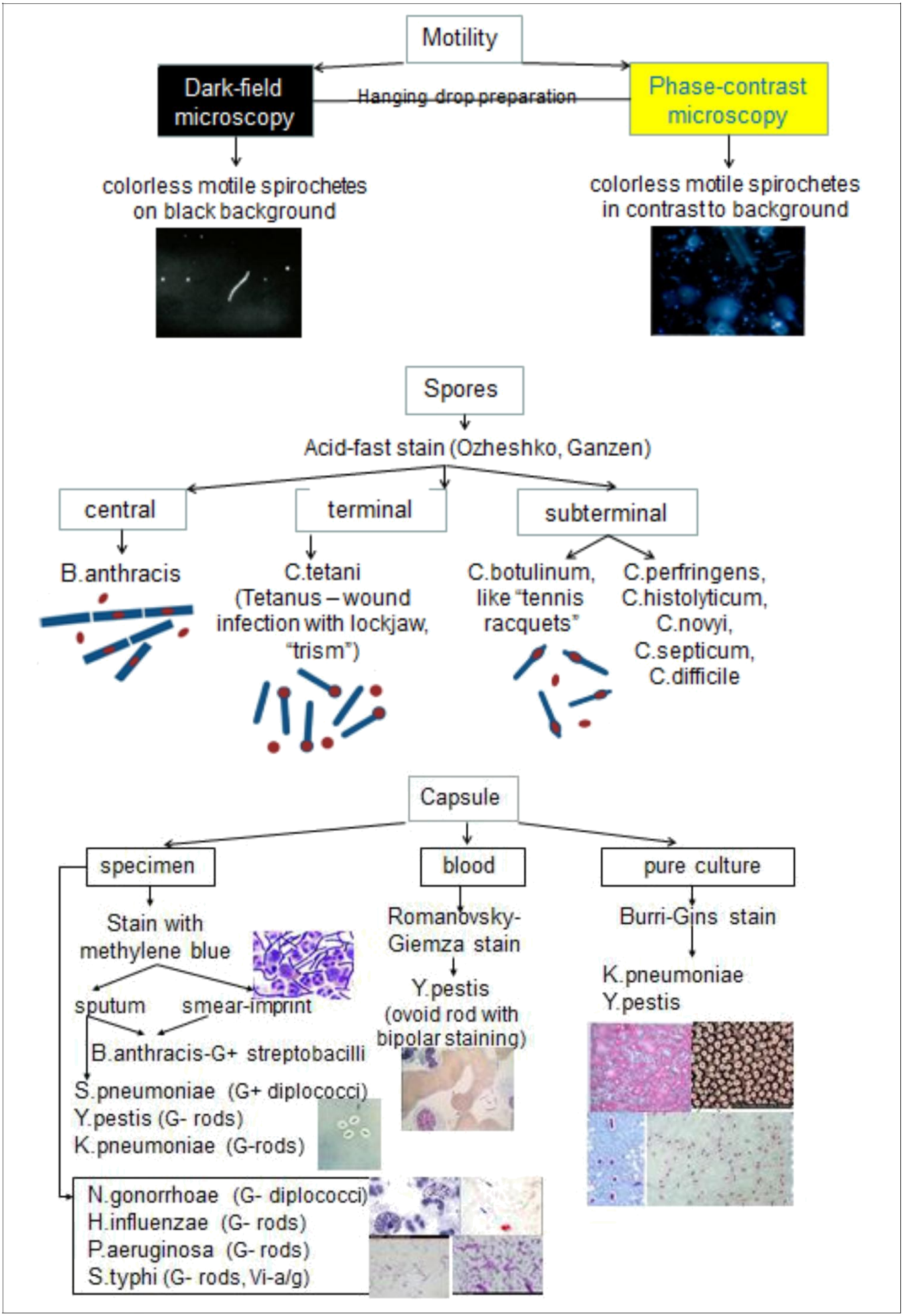
Examples of human-specific parasites are malaria plasmodium, enterobius vermicularis and some other. The source of invasion of such parasites is always a human. Such human-specific parasites cause diseases that are called: **A. Anthroponotic** B. Zoonotic C. Anthropozoonotic D. Infectious E. Multifactorial	
A pregnant woman complains of vaginal mucosa irritation, itching and genital tracts secretion. Bacterioscopy of vaginal smears revealed large gram-positive oval oblong cells that form pseudomicelium. What is the most probable channel of infection? **A. Endogenous infection** B. Sexual transmission C. Contact infection D. Vector-borne transmission E. Wound infection	
A patient developed pyoinflammatory process of periodontal tissue caused by activation of the microorganisms inherent in the body, which are the part of oral mucosal microflora. What type of infection is it? A. Relapse **B. Autoinfection** C. Reinfection D. Exogenous infection E. Superinfection	
Typical signs of food poisoning caused by C. botulinum include diplopia, swallowing and respiration disorders. These signs develop due to: A. Enterotoxic shock development B. Enterotoxin action C. Adenylate cyclase activation D. Adhesion of the agent to enterocyte receptors **E. Exotoxin action**	
A laboratory has been investigating virulence of a diphtheria agent. In the process of the experiment the infection was introduced intraperitoneally into test animals. The dosage of bacteria resulting in 95% mortality of test animals was found. What unit of virulence measurement was determined? **A. DLM** B. DCL C. LD50 D. ID E. LD5	
A patient with signs of intestinal infection (vomiting, diarrhea, abdominal pain) has been presenting with increasing symptoms of intoxication for three days. Papular rash appeared on the uncovered skin areas and spread to the torso. A doctor suspected pseudotuberculosis. What laboratory test allows confirming this diagnosis within the first week from the onset of disease? **A. Bacteriological** B. Microscopic C. Serological D. Allergic E. Biological	

Morphology

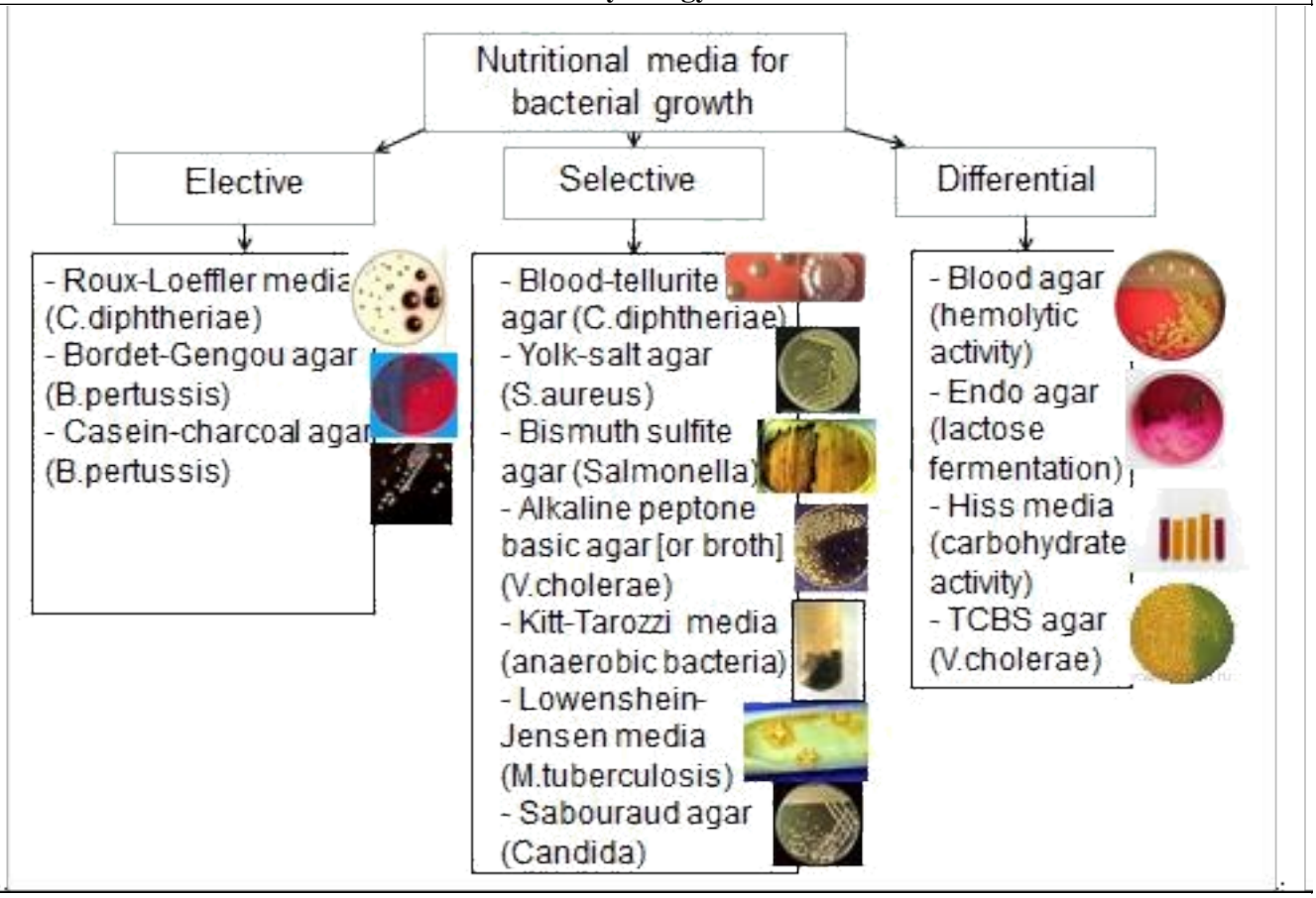

MICROBIAL WORLD
Non-cellular forms
Viruses (without cell structure)
Cellular forms
Prokaryotes (without nucleus)
Eukaryotes (with nucleus)
Bacteria with thin cell wall, gram-negative
Bacteria with thick cell wall, gram-positive
Bacteria without cell wall – mycoplasma, L-forms
Fungi: Candida albicans
Protozoa: Entamoeba histolytica Giardia lamblia Trichomonas vaginalis Leishmania spp. Trypanosoma spp. Plasmodium spp. Balantidium coli

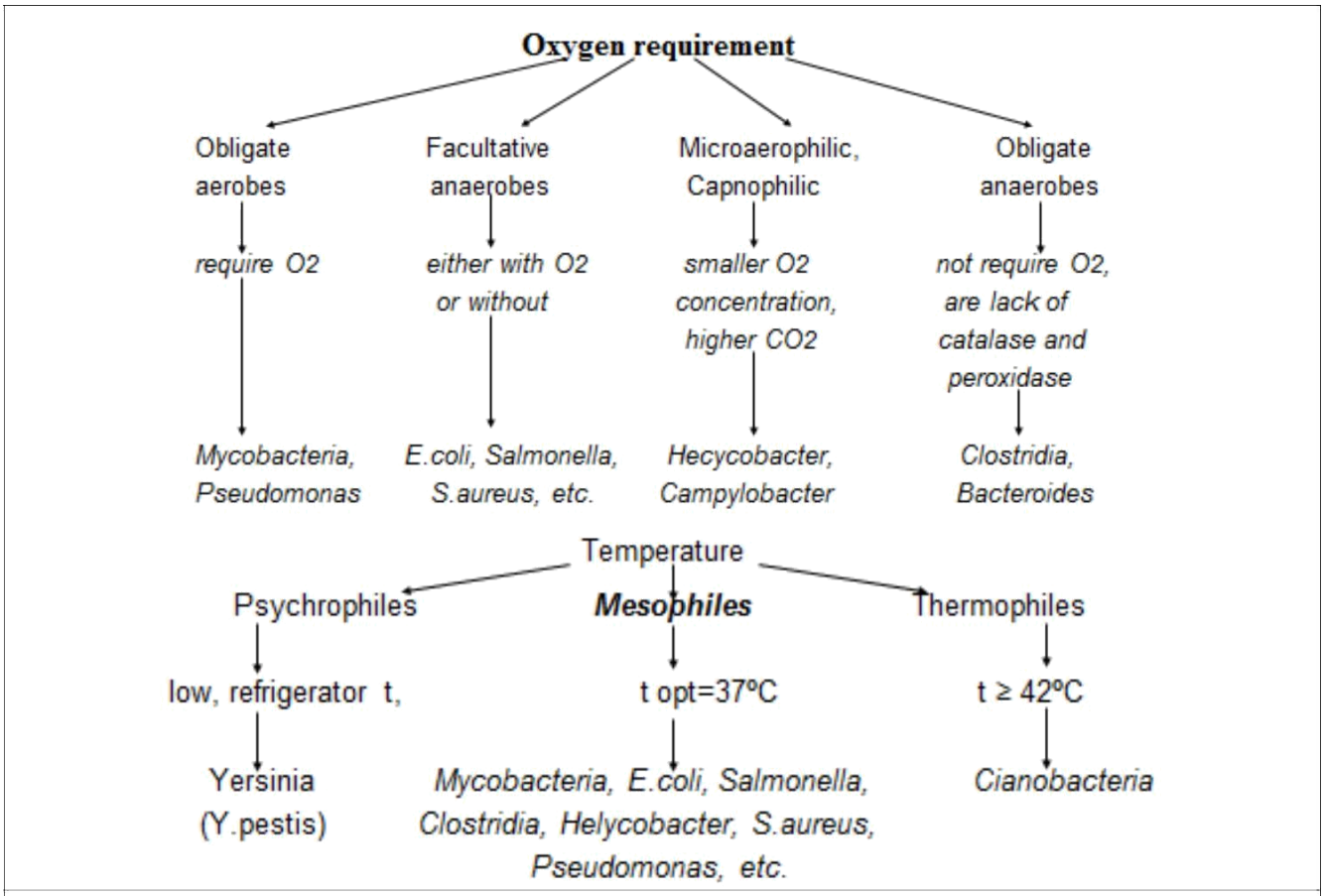

STAIN
Simple
Fuchsin (pink cells)
Leffler (C. diphtheriae)
Methylene blue (blue cells)
Sputum
Smear-imprint
Capsule demonstration
Silver impregnation [Morozov] (spirochaetes)
Complex
Gram
Neisser (C. diphtheriae)
Acid fast
Ziehl-Neelsen (Mycobacterium)
Ozheshko, Ganzen (spore stain)
Zdrodovsky (Rickettsia)
Burri-Gins
Romanovsky-Giemza (Y.pestis, spirochaetes)

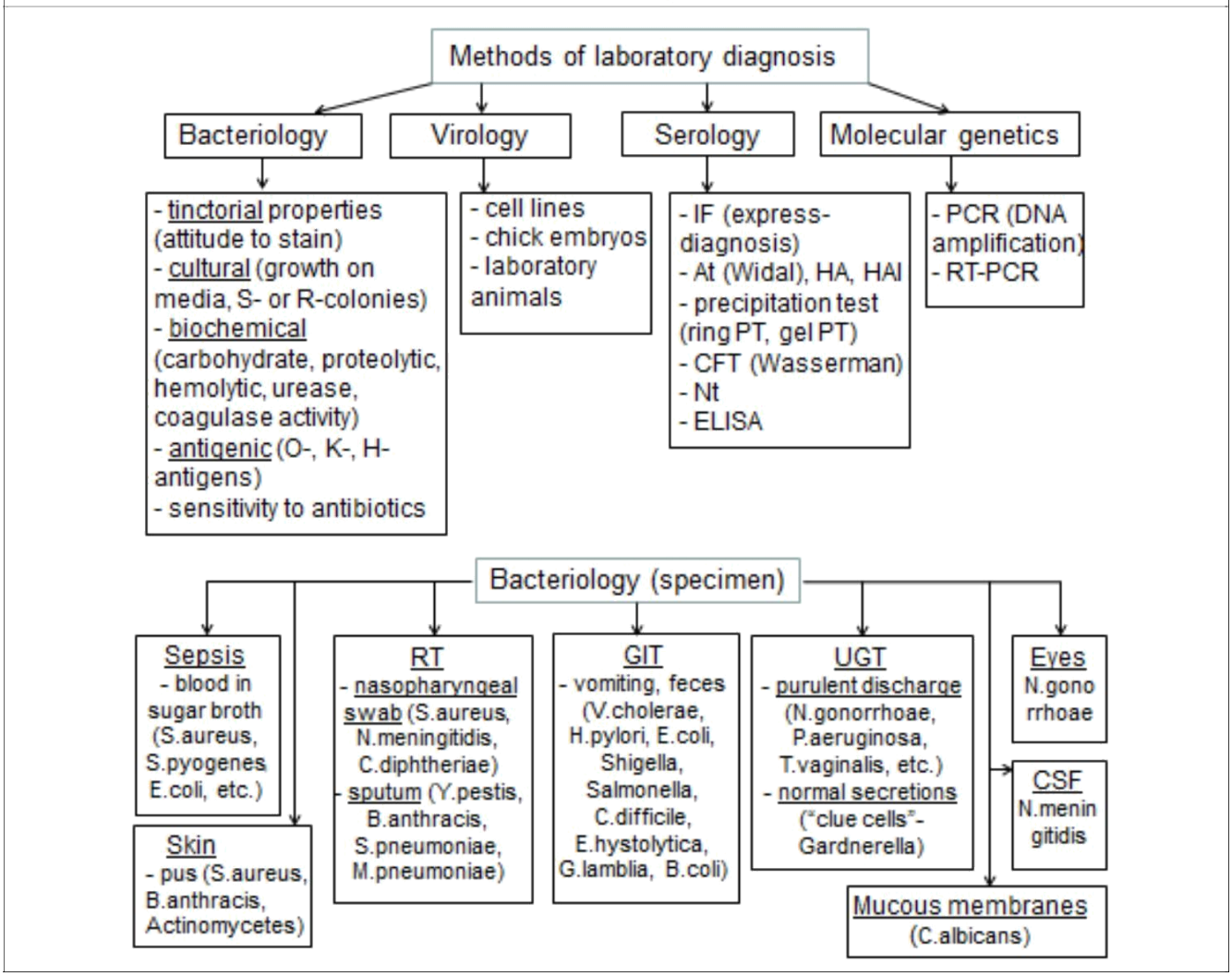

Cocci
G+
G–
grape-like irregular clusters
chains
pairs (diplococci)
pairs (diplococci)
Staphylo-cocci
Strepto-cocci
S.pneumo-niae
N.gonorrhoae (purulent discharge from UGT, eyes)
N.meningitidis (naso-pharyngeal swab, CSF)
Rods
G+
G–
at angles to each other, Latin or Chinise letters
chains
single
single
pairs
C.diphtheriae (with thickening ends)
B.antracis (capsulated, spore-forming streptobacilli)
Clostridia (spore-forming, obligate anaerobes)
E.coli, Salmonella, Shigella, Bordetella, Brucella, Pseudomonas, etc.
K.pneumoniae (capsulated)
Spiral-shaped
G–
Spirochaetes
single, curved rods, comma-like
like birds-winds
Romanovsky-Giemza
Silver impregnation (Morozov)
Burri (negative)
V. cholerae
Helicobacters
purple
pink
brown or black spirochetes on yellow background
colorless spiro-chetes on black back-ground
thin cells with irregular secondary coils
thick cells with regular equel coils
thin cells with hooked ends, like S and C
Borrelia
Treponema pallidum
Leprospira

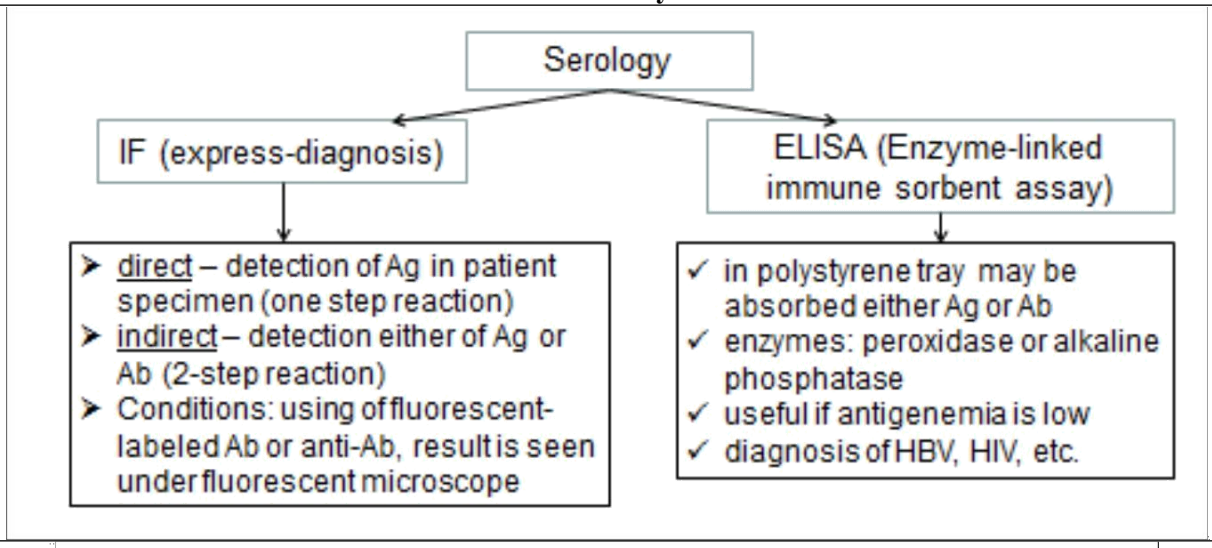

Motility
Dark-field microscopy
Hanging drop preparation
Phase-contrast microscopy
colorless motile spirochetes on black background
colorless motile spirochetes in contrast to background
Spores
Acid-fast stain (Ozheshko, Ganzen)
central
terminal
subterminal
B.anthracis
C.tetani (Tetanus – wound infection with lockjaw, "trism")
C.botulinum, like "tennis racquets"
C.perfringens, C.histolyticum, C.novyi, C.septicum, C.difficile
Capsule
specimen
blood
pure culture
Stain with methylene blue
sputum
smear-imprint
B.anthracis-G+ streptobacilli
S.pneumoniae (G+ diplococci)
Y.pestis (G- rods)
K.pneumoniae (G-rods)
Romanovsky-Giemza stain
Y.pestis (ovoid rod with bipolar staining)
Burri-Gins stain
K.pneumoniae
Y.pestis
N.gonorrhoae (G- diplococci)
H.influenzae (G- rods)
P.aeruginosa (G- rods)
S.typhi (G- rods, Vi-a/g)

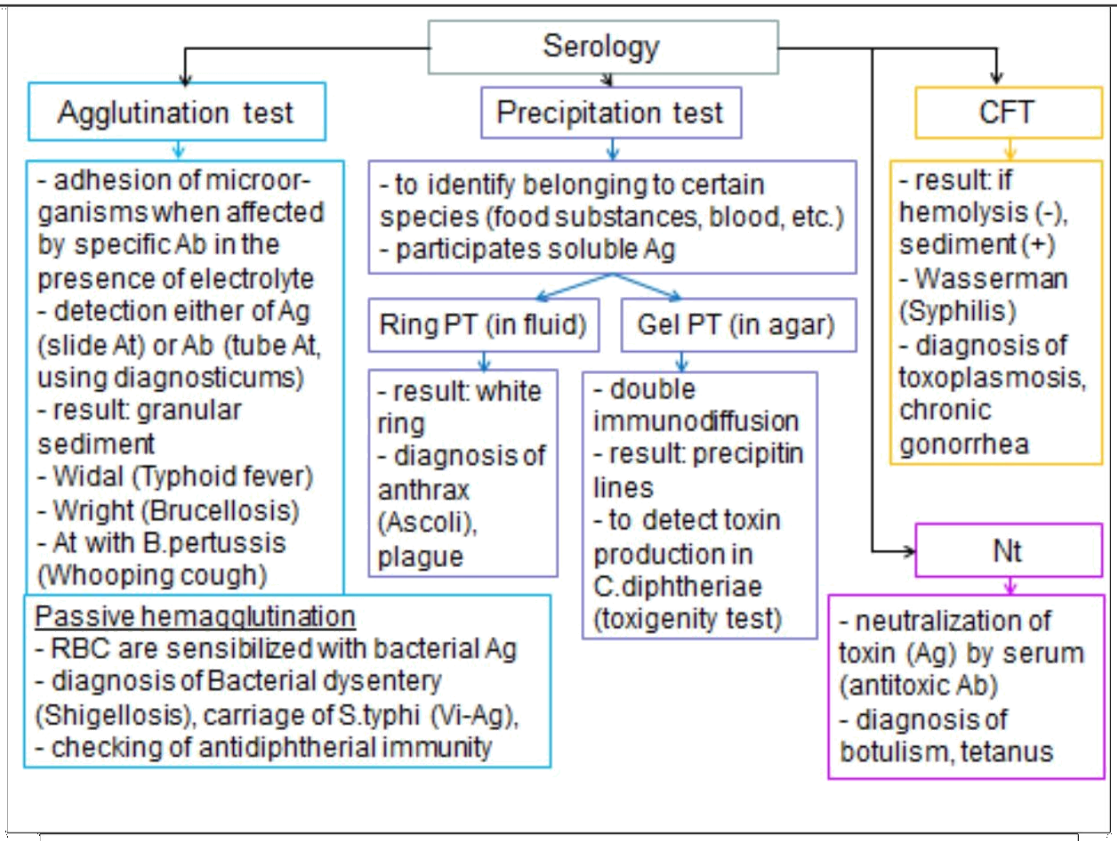
Physiology

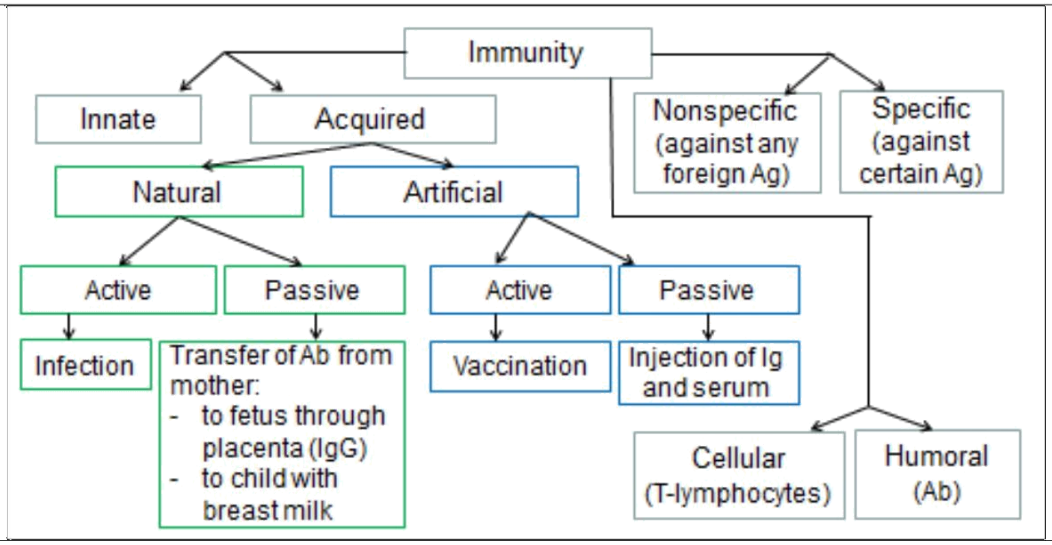

Nutritional media for bacterial growth
Elective
Selective
Differential
- Roux-Loeffler media (C.diphtheriae)
- Bordet-Gengou agar (B.pertussis)
- Casein-charcoal agar (B.pertussis)
- Blood-tellurite agar (C.diphtheriae)
- Yolk-salt agar (S.aureus)
- Bismuth sulfite agar (Salmonella)
- Alkaline peptone basic agar [or broth] (V.cholerae)
- Kitt-Tarozzi media (anaerobic bacteria)
- Lowenshein-Jensen media (M.tuberculosis)
- Sabouraud agar (Candida)
- Blood agar (hemolytic activity)
- Endo agar (lactose fermentation)
- Hiss media (carbohydrate activity)
- TCBS agar (V.cholerae)

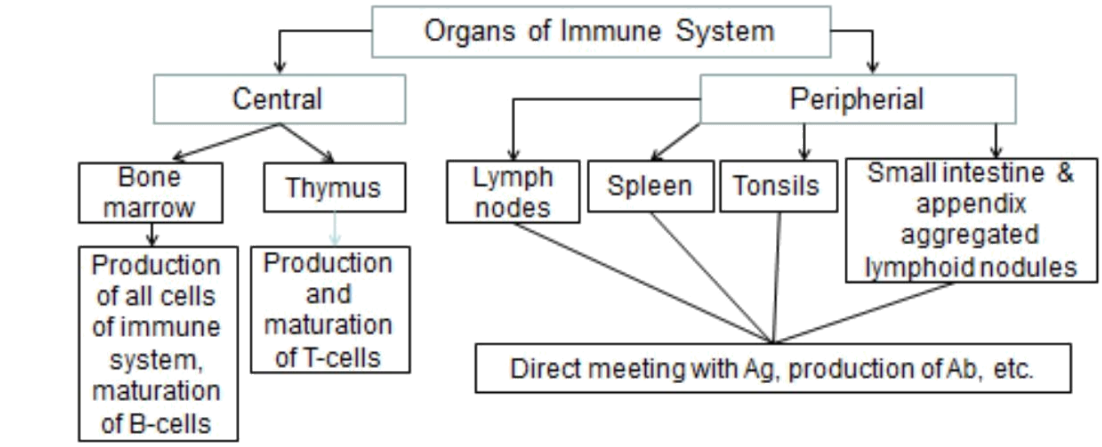

Oxygen requirement
Obligate aerobes
Facultative anaerobes
Microaerophilic, Capnophilic
Obligate anaerobes
require O2
either with O2 or without
smaller O2 concentration, higher CO2
not require O2, are lack of catalase and peroxidase
Mycobacteria, Pseudomonas
E.coli, Salmonella, S.aureus, etc.
Hecycobacter, Campylobacter
Clostridia, Bacteroides
Temperature
Psychrophiles
Mesophiles
Thermophiles
low, refrigerator t,
t opt=37ºC
t ≥ 42ºC
Yersinia (Y.pestis)
Mycobacteria, E.coli, Salmonella, Clostridia, Helycobacter, S.aureus, Pseudomonas, etc.
Cianobacteria

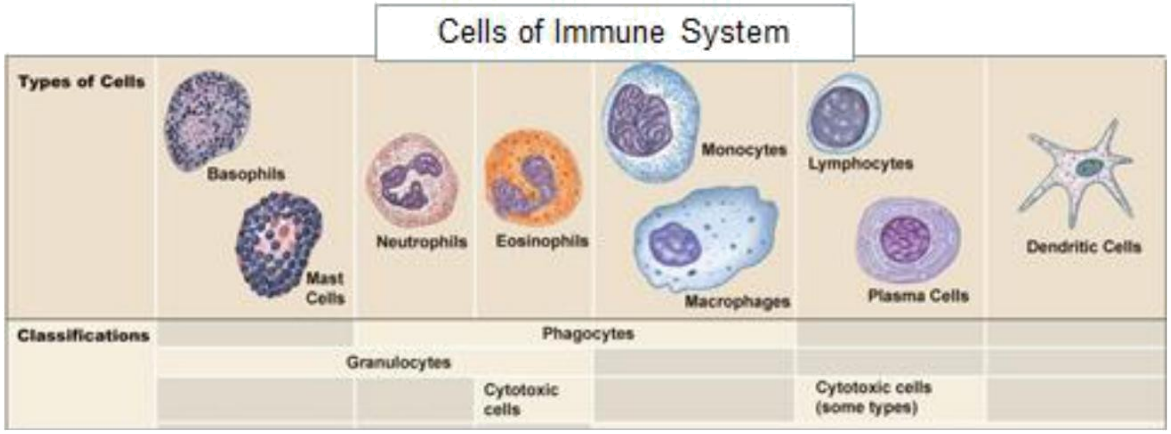

Methods of laboratory diagnosis
Bacteriology
Virology
Serology
Molecular genetics
- tinctorial properties (attitude to stain)
- cultural (growth on media, S- or R-colonies)
- biochemical (carbohydrate, proteolytic, hemolytic, urease, coagulase activity)
- antigenic (O-, K-, H-antigens)
- sensitivity to antibiotics
- cell lines
- chick embryos
- laboratory animals
- IF (express-diagnosis)
- At (Widal), HA, HAI
- precipitation test (ring PT, gel PT)
- CFT (Wasserman)
- Nt
- ELISA
- PCR (DNA amplification)
- RT-PCR
Bacteriology (specimen)
Sepsis
- blood in sugar broth (S.aureus, S.pyogenes E.coli, etc.)
Skin
- pus (S.aureus, B.anthracis, Actinomycetes)
RT
- nasopharyngeal swab (S.aureus, N.meningitidis, C.diphtheriae)
- sputum (Y.pestis, B.anthracis, S.pneumoniae, M.pneumoniae)
GIT
- vomiting, feces (V.cholerae, H.pylori, E.coli, Shigella, Salmonella, C.difficile, E.hystolytica, G.lamblia, B.coli)
UGT
- purulent discharge (N.gonorrhoae, P.aeruginosa, T.vaginalis, etc.)
- normal secretions ("clue cells"- Gardnerella)
Eyes
N.gonorrhoae
CSF
N.meningitidis
Mucous membranes
(C.albicans)

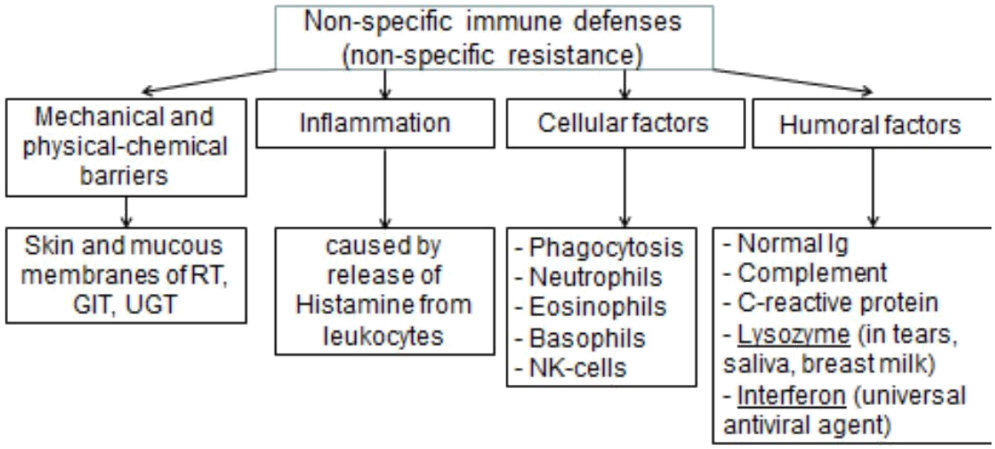

Serology
IF (express-diagnosis)
ELISA (Enzyme-linked immune sorbent assay)
direct – detection of Ag in patient specimen (one step reaction)
indirect – detection either of Ag or Ab (2-step reaction)
Conditions: using of fluorescent-labeled Ab or anti-Ab, result is seen under fluorescent microscope
in polystyrene tray may be absorbed either Ag or Ab
enzymes: peroxidase or alkaline phosphatase
useful if antigenemia is low
diagnosis of HBV, HIV, etc.


Serology
Agglutination test
Precipitation test
CFT
- adhesion of microorganisms when affected by specific Ab in the presence of electrolyte
- detection either of Ag (slide At) or Ab (tube At, using diagnosticums)
- result: granular sediment
- Widal (Typhoid fever)
- Wright (Brucellosis)
- At with B.pertussis (Whooping cough)
- to identify belonging to certain species (food substances, blood, etc.)
- participates soluble Ag
Ring PT (in fluid)
Gel PT (in agar)
- result: white ring
- diagnosis of anthrax (Ascoli), plague
- double immunodiffusion
- result: precipitin lines
- to detect toxin production in C.diphtheriae (toxigenity test)
- result: if hemolysis (-), sediment (+)
- Wasserman (Syphilis)
- diagnosis of toxoplasmosis, chronic gonorrhea
Nt
- neutralization of toxin (Ag) by serum (antitoxic Ab)
- diagnosis of botulism, tetanus
Passive hemagglutination
- RBC are sensibilized with bacterial Ag
- diagnosis of Bacterial dysentery (Shigellosis), carriage of S.typhi (Vi-Ag),
- checking of antidiphtherial immunity


Immunity
Innate
Acquired
Nonspecific (against any foreign Ag)
Specific (against certain Ag)
Natural
Artificial
Active
Passive
Active
Passive
Infection
Transfer of Ab from mother:
- to fetus through placenta (IgG)
- to child with breast milk
Vaccination
Injection of Ig and serum
Cellular (T-lymphocytes)
Humoral (Ab)


Organs of Immune System
Central
Peripherial
Bone marrow
Thymus
Lymph nodes
Spleen
Tonsils
Small intestine & appendix aggregated lymphoid nodules
Production of all cells of immune system, maturation of B-cells
Production and maturation of T-cells
Direct meeting with Ag, production of Ab, etc.


Cells of Immune System
Types of Cells
Basophils
Mast Cells
Neutrophils
Eosinophils
Monocytes
Macrophages
Lymphocytes
Plasma Cells
Dendritic Cells
Classifications
Phagocytes
Granulocytes
Cytotoxic cells
Cytotoxic cells (some types)


Non-specific immune defenses (non-specific resistance)
Mechanical and physical-chemical barriers
Inflammation
Cellular factors
Humoral factors
Skin and mucous membranes of RT, GIT, UGT
caused by release of Histamine from leukocytes
- Phagocytosis
- Neutrophils
- Eosinophils
- Basophils
- NK-cells
- Normal Ig
- Complement
- C-reactive protein
- Lysozyme (in tears, saliva, breast milk)
- Interferon (universal antiviral agent)

Antibodies (immunoglobulins [Ig], gamma-globulins)

Ig M
- pentamer
- first produced in response to Ag
- marker of acute, recent infection
- present in blood and tissue fluid
- participate in agglutination

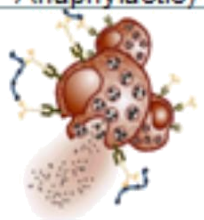
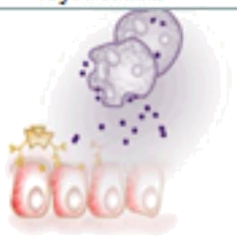
Ig G
- monomer
- produced later
- cross placenta
- responsible for secondary immunity
- present in blood and tissue fluid
- participate in agglutination
- increase macrophage activity
- is an antitoxin

Ig E
- monomer
- reagine molecule
- marker of allergy
- reacts with allergen on the surface of basophil
- present in tissues

Ig A
- mono- or dimer
- responsible for local immunity
- present in secretions
- stop bacteria adhering to host cells
- prevents bacterial colonization on mucous membranes

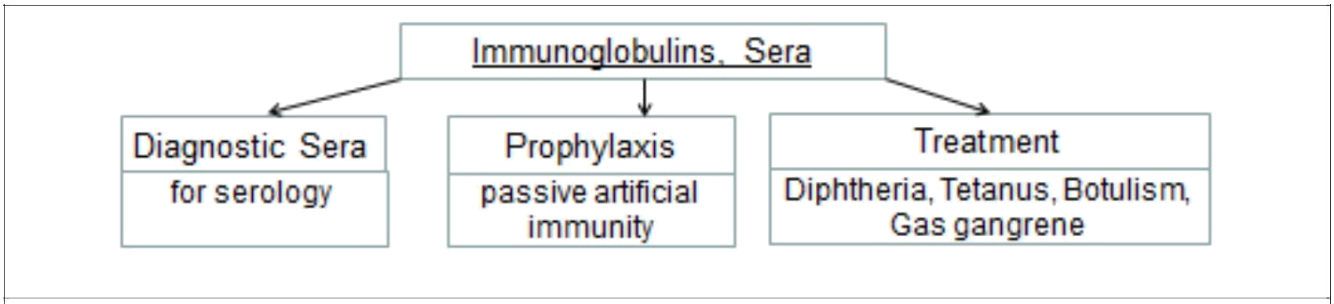
Ig D
- receptor of B-cells

Hypersensitivity reactions (Gell and Coombs classification)

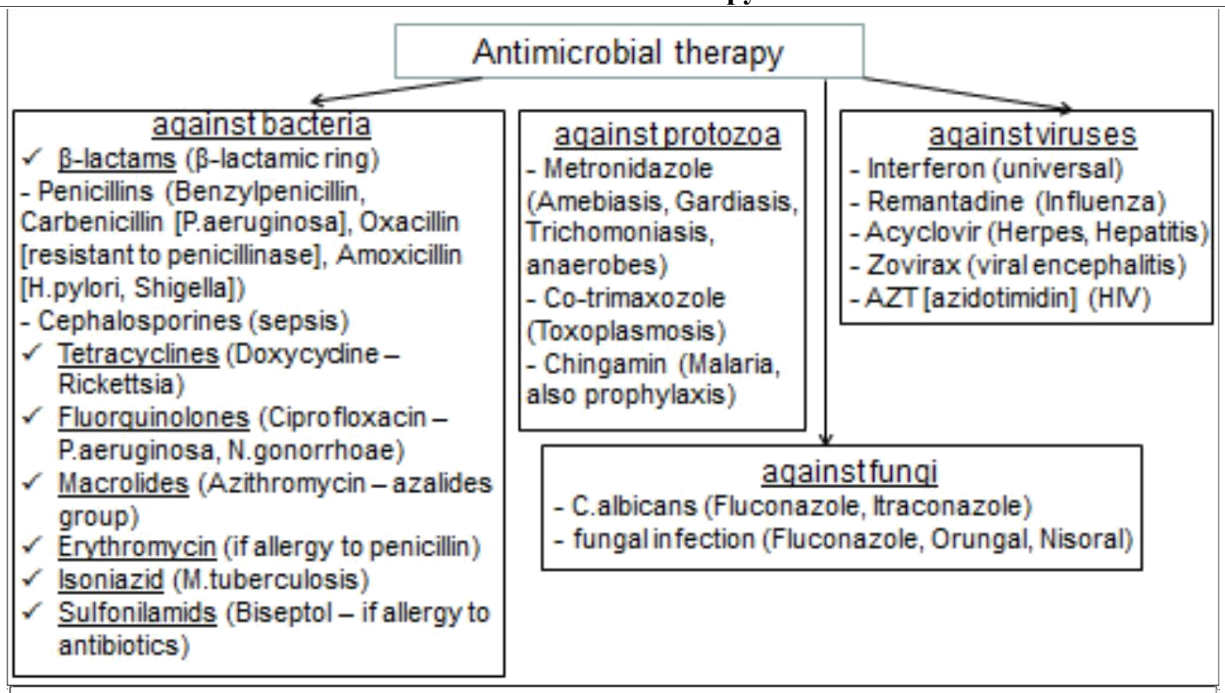
I type – Immediate, IgE-dependent, Reagine, Anaphylactic)	II type – Antibody-dependent, Cytotoxic	III type – Immune complex	IV type – Delayed, T-cell-dependent, cell-dependent
			
* Minutes – 2 hours after second contact with Ag * Result of: injection (anesthetics, penicillin, bee bite, etc.); inhalation (pollen, perfumes, etc.); eating (shellfish, nuts, chocolate, strawberries); contact with skin (soap, gel, cream, washing substances, etc.) * Skin rash, rhinitis, conjunctivitis, allergic dermatitis, pollinosis, bronchial asthma, Quincke edema, anaphylactic shock	* in 5 – 12 hours appear clinical symptoms * IgG and IgM directed against cell surface Ag mediates cell destruction via complement activation or Ab-dependent cell cytotoxicity * Blood transfusion reactions, hemolytic anemia of newborn, erythroblastosis gravis	* in 3-8 hours * Immune complex formation and deposition in tissues leading to local or systemic inflammatory reactions * Arthus reaction, serum sickness (on 7th-10th day), rheumatoid arthritis, necrotizing vasculitis, glomerulonephritis, systemic lupus erythematous	* 48 – 72 hours * Induced by infection, skin contact or injection of Ag inside skin or with adjuvants *Sensitized Th1-cells activated to release cytokines upon binding to Ag, resulting in macrophage and cytotoxic T-cell accumulation * Skin allergic test (tuberculin [Mantoux], brucelin [Burne], lepramin [Mitsuda], leishmanin [Montenegro]); Contact dermatitis, Transplant rejection, Crohn's disease

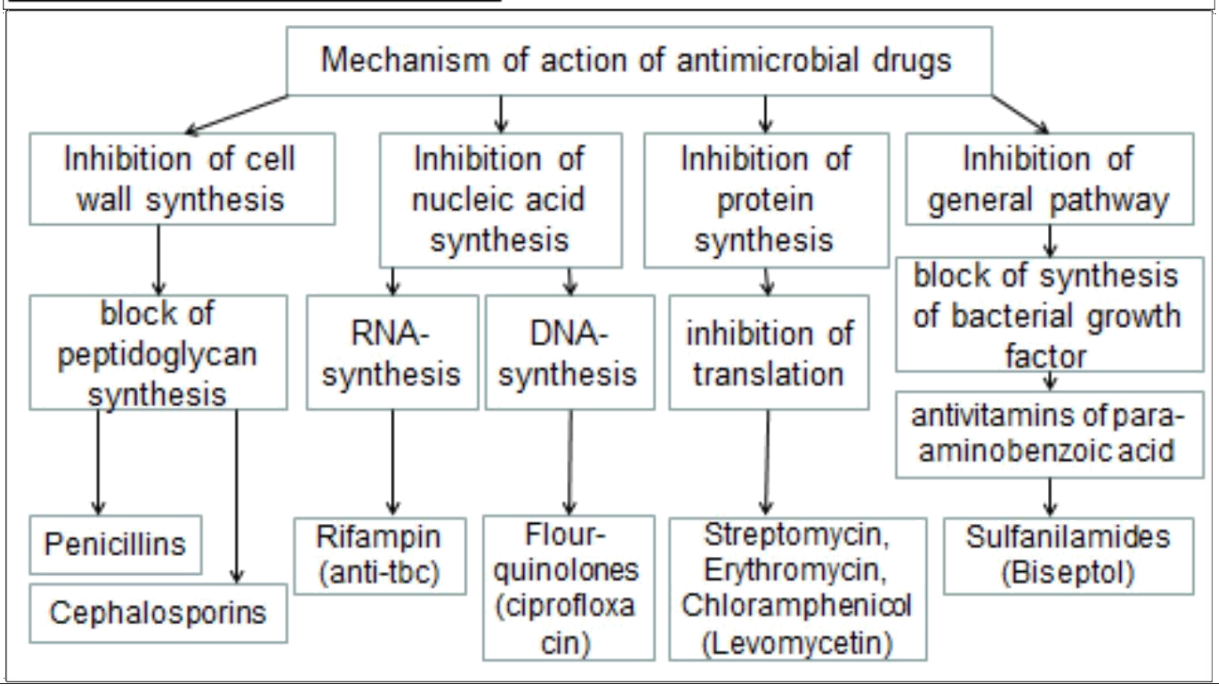
<u>Vaccines</u> – for creation of acquired active artificial immunity

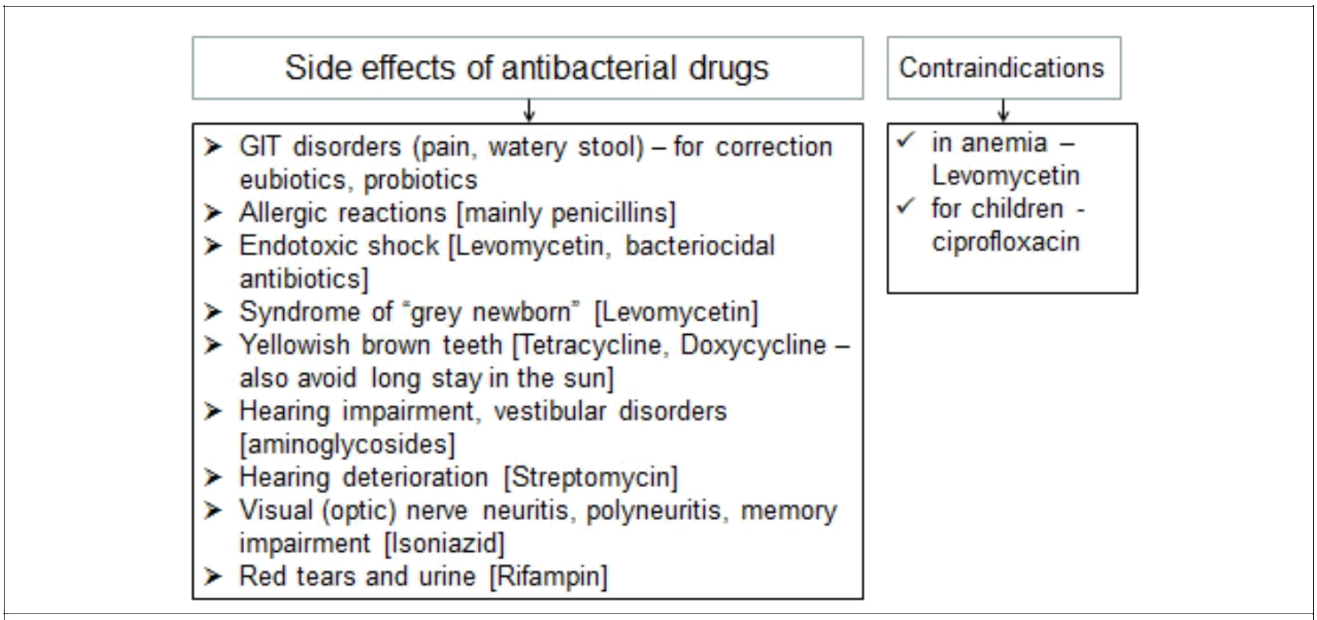
Live attenuated	Inactivated (killed)	Toxoid [Anatoxin]	Recombinant (gene-engineering)	Subunit
Tuberculosis (BCG), Anthrax (STI), Poliomyelitis (OPV), Chickenpox (VZV), Measles-mumps-rubella (MMR)	Poliomyelitis (IPV), Rabies	exotoxin treated with formalin Diphtheria, Tetanus	Hepatitis B	Influenza



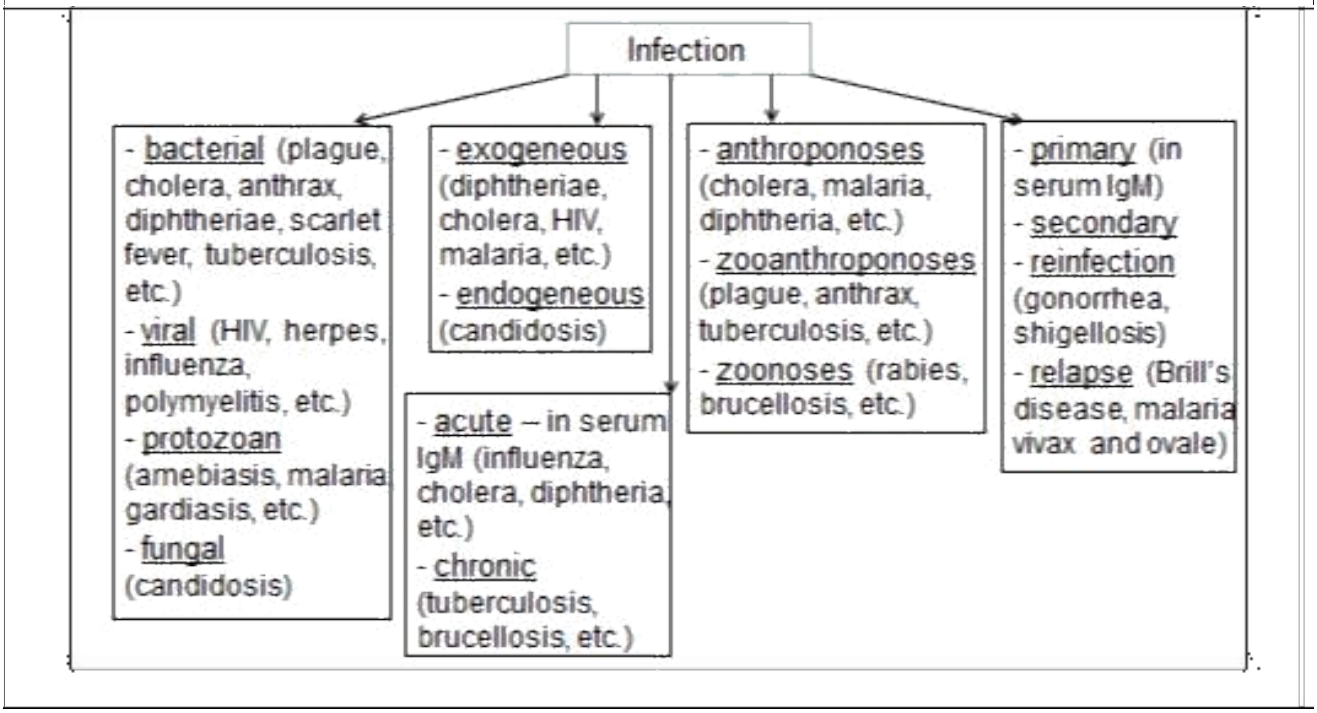
Antimicrobial therapy






Side effects of antibacterial drugs
Contraindications
GIT disorders (pain, watery stool) – for correction eubiotics, probiotics
Allergic reactions [mainly penicillins]
Endotoxic shock [Levomycetin, bacteriocidal antibiotics]
Syndrome of "grey newborn" [Levomycetin]
Yellowish brown teeth [Tetracycline, Doxycycline – also avoid long stay in the sun]
Hearing impairment, vestibular disorders [aminoglycosides]
Hearing deterioration [Streptomycin]
Visual (optic) nerve neuritis, polyneuritis, memory impairment [Isoniazid]
Red tears and urine [Rifampin]
in anemia – Levomycetin
for children - ciprofloxacin

Infection


Infection
- bacterial (plague, cholera, anthrax, diphtheriae, scarlet fever, tuberculosis, etc.)
- viral (HIV, herpes, influenza, polymyelitis, etc.)
- protozoan (amebiasis, malaria, gardiasis, etc.)
- fungal (candidosis)
- exogeneous (diphtheriae, cholera, HIV, malaria, etc.)
- endogeneous (candidosis)
- acute – in serum IgM (influenza, cholera, diphtheria, etc.)
- chronic (tuberculosis, brucellosis, etc.)
- anthroponoses (cholera, malaria, diphtheria, etc.)
- zooanthroponoses (plague, anthrax, tuberculosis, etc.)
- zoonoses (rabies, brucellosis, etc.)
- primary (in serum IgM)
- secondary
- reinfection (gonorrhea, shigellosis)
- relapse (Brill's disease, malaria vivax and ovale)

FOR NOTES

References:

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7. www.who.int
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