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**Written by: Zaid Jebreen**
**Corrected by:Mays abu afifeh**

**opportunistic pathogens** :

Widely distributed in nature as spores for small segments of filaments and these contaminate our respiratory tract by inhalation.
Normally inhaled, some might reside in nose or less in the oral cavity but later it might be associated with just allergic certain allergic reaction in certain patients, rarely disseminated from respiratory tract or oral cavity to cause systemic mycosis(organism reach blood stream or certain tissues in the body which produce a type of infection).
In general human's body resist opportunistic pathogens in normal cases(healthy conditions), resistance decrease in immunocompromised patients and in cases of using antimicrobial drugs.
Keep in mind that these opp. pathogens are mainly found in soil not as true saprophytes(not true pathogens).

Aspergillosis : opportunistic pathogen, composed of many species which contaminate our food
It has three important species: 1)A. niger, it called niger in relation to its color which is black.
2) A. fumigatus, its called fumigatus in relation to the color of the sky
3) A.Flavus : Flavus in Latin means yellow, and its the only type of aspergillus that gives mycotoxin.
Mycotoxin is known as aflatoxins which is a very dangerous toxin that a nano-milligram of it can cause liver cirrhosis and kidney failure.
Spores of these species are widely distributed and we can get easily contaminated with them during inhalation or contamination with soil or with certain food...etc
If there is any damage in the lung such as cavities or TB, when these spores of aspergillus enters by inhalation, they might reside inside the cavities to produce nets of filaments (like a ball inside the cavity) and produce damage to the lungs.
The cavity infected by aspergillus is called Aspergilloma(nets of filaments), aspergillus rarely spread from the cavity to other parts of the body, and rarely rarely reaches blood stream, it might reach sinuses and meninges and the eye(also rarely).
Within short period of time(about 72 hours), one spore of aspergillus can produce vegetative and areal mycelium (rapid growing organism), these spores are very thin and can be easily spread in air and inhaled.
The color and arrangement of spores can help us in classifying different types of aspergillus. Keep in mind that spores increase in number as they are exposed to atmospheric air.
\*Alternaria(filamentous fungi) can be seen in homes, it is white cotton like structure. It is not like aspergillu pathogenicity and it is rarely associated with infection but can be associated with few cases of local infection.
\*\*Majority of aspergillus causes pulmonary infections (lung infections).

**Cryptococcus** :

Capsulated yeast, true pathogens not considered as saprophytes, Should be isolated from the respiratory tract.
-It is the only type of yeast that is surrounded by a large capsule composed of polysaccharide which we can demonstrate the presence of this capsule by India ink.
-Cryptococcus neoformans are the most important species.
-C. Neoformans : Found in feces of birds especially pigeons(excreted from their feces) since they grow in higher temperature than human's body temperature.
-Infection with pigeons is fatal due to the fact that this organism slowly produce damage in the lung which later might reach the blood and then the brain producing brain abscess and meningitis.
-It is not easily recognized, you might have few cells in infected patients (with meningitis for example).
-most cases die without proper diagnosis, and the detection of the organism occur after death if they take a biopsy.
-Mostly infection is asymptomatic with certain especially in patients in immuno-suppression and it rarely occurs in healthy individuals.

**Histoplasmosis and blastomycosis :**

Histoplasmosis : caused by organism called histoplasma capsulatum, it is a dimorphic fungi, and dimorphic means it has two forms of growth, filamented growth in vitro and capsulated growth in vivo, in vivo it is similar/related to capsulated yeast(capsulated cryptococcus) but in fact it is not a true capsule. To understand more, if you culture them in vitro you don’t recognize capsules but we recognize filaments and spores which grow on the surface of the media.

Blastomycosis : caused by blastomyces dermatitidis, infection starts in nose and respiratory tract NOT in skin (even though its name is dermatitidis).
\*These two organisms (Histoplasma and blastomyces) are excreted from large birds because 1)the optimum temperature for these organisms is about 41 degrees C, 2)their spores are widely distributed and easily inhaled in healthy patients, but their spores cause only allergy and cough and a change in eosinophils number not more.
-There is skin test for the previous two organisms, you may acquire the infection without clinical infection, which means you got in contact with the organism without clinical infection.
-Infection with these two organisms in immunocompromised patients result in more active inflammation and in more active growth in the lung and might spread and reach to any part of the body and result in ulceration in the oral cavity, or it might also spread to internal body parts such as the liver, kidney, intestines..... etc.
-they are highly contagious especially in immunocompromised patients , so there are special laboratories to work with these organisms, in addition they might produce chronic form of pulmonary conditions which is not easily recognized, because of the absence of antibodies (no immuno response) only you can recognize cell mediated by skin test which is not enough.
-They might later reach the bone and cause cell damage , but remember primarily manifested as growth in the lung and oral ulcers, so it is not easy to treat patients with systemic histoplasmosis or blastomycosis. So usually infection in immunocompromised patients lead to death!
-There are no vaccines available.

**Sporotrichosis** :

Disease caused by sporothrix schencki which is a filamentous fungi, and this type of disease is very common in our country.
\*Majority if infected people with this organism don’t know they are infected due to the fact that tis organism produce very mild infection in the skin especially in fingers, which might be cured without treatment, but in cases of severe infection it requires treatment.
-Spines of flowers contain spores of sporotrichosis, so any contamination with flowers might result in production of small vesicles which might result in mild to chronic form of sporotrichosis so it is very common in farmers and its not dangerous, only in few cases spores can spread to lymph system to produce lymphadenitis, in such cases patient must be treated with anti-fungal drugs.
-If there is any injury or small cuts or abrasions or parts of the body especially our legs, it might be contaminated with two types of organisms, the first one belong to filamentous fungi called madurella species, once these madurella filaments are established in subcutaneous tissues they start producing granulomatous disease and this is associated with developing sinus tract which will release pus and part of the organism and is called mycetoma which might result in severe damage in the infected area.

**Actinomyces-Nocardia species** :

Widely distributed in soil.
-Actinomyces can be found as part of the oral cavity flora
-Actinomyces israelii found in 20% in the oral cavity of all the population in the world .
-They are anaerobic.
-If there is damage during oral manipulation(dental manipulation for example), infection might be established which later produce slow progressive inflammation associated later with sinus tract producing channels releasing infected organism and pus cells and are usually yellow in color called sulfur granules but has no relation to sulfur compound(it only produce pus cells and infected organism), their treatment require Surgical treatment + anti-fungal agents.
-They rarely reach the lung to produce infection similar exactly to TB(but RARELY!), this is recognized in patients treated with cytotoxic drugs especially during transplantation of an organ.
-Aspergillus more commonly is related to oral cavity than actinomyces-nocardia species.