\* mycoses are eukaryotes that grow in two basic forms, a yeasts and molds.

\* Growth in the mold form occurs by production of multicellular filamentous colonies. These colonies consist of branching tubules called hyphae

 The mass of intertwined hyphae that accumulates during active growth is a mycelium.

\*reproductive phase, fungi may undergo either asexual or sexual reproduction. Asexual reproduction involves the generation of spores; sexual . R eproduction requires specific cellular structures that are used for taxonomic differentiation.

\* fruiting body is the part above the soil . Superficial (limited to the outer layers of the skin and hair)

\* infections (generally originating in the lungs and other organs). Cutaneous (deeper in the epidermis, hair and nails)

 Site of the infection Subcutaneous (dermis, subcutaneous tissues and muscle)

 Endogenous (normal flora , previous infection)

\*clinical nomenclatures used for the mycoses are based on Route of acquisition of the pathogen Exogenous (include airborne, cutaneous)

 Type of virulence exhibited by the fungus Primary pathogens (normal host)

 Opportunistic pathogens(compromised)

\* Many pathogenic fungi are dimorphic, forming hyphae at ambient temperatures (25)but yeasts at body temperature(37).

 Skin superficial : ( invade most superficial layers cause no inflammation / produce keratinase > metabolize and live on .

 human keratin (hair, nail, skin) / tropic > need heat and humidity –ideal growth / transmitted by direct contact )

\*types of mycosis causes (1- Pityriasis versicolor – caused by  *Malassezia furfur >* hypopigmentation or hyperpigmentation of skin

 2- Tinea nigra – caused by Phaeoannellomyces werneckii > brown-black silver nitrate-like stain

 3- Black piedra – caused by *Piedraia hortae >* small black nodule involving the hair shaft

 4- White piedra – caused by *Trichosporon beigelii >* *soft, friable, nodule of* *distal ends of hair shafts*

 Cutaneous (Dermatophytes) : (in the , on-living tissues of skin, hair, or nails above where the protein keratin is deposited.

 have the ability to degrade keratin and grow as non-invasive saprotrophs on skin and its appendages­ keratinase

 causes irritation and inflammation >allergic reaction/Contagious-direct or indirect contact (infected hair or cells)

 Microsporum (hair , skin only)-spindle , Trichophyton (hair ,skin ,nails)-cylinder, Epidermophyton (skin ,nails only) -club

 Obligate Parasitic Fungi / Grow only on humans /

 Soil fungi: thermal dimorphic, adaptations to human body / Opportunistic saprobes: (compromised)

 Cause common tinea (ringworm), rash is circular, with a ring-like appearance

 Reservoir not in soil or animals ,,, Reservoir in carpets and upholstery for up to two years

 Calssified as (1- Dermatophytoses – caused by (*Epidermophyton, Microsporum,* and *Trichophyton)*

 2- Dermatomycoses – such as (*Candida* spp.)

 Tinea (1- faciei >face / 2-barbae > beard / 2-corporis >ringworm of arm,leg,trunk / 4-cruris >groin,upper legs “jock itch” /

 5- pedis > foot “athletes foor / 6- mannum >hand / 7-versocolour > back,chest,shoulders / 8- capitis > scalp / ringworm

 All body

 Subcutaneous (caused by traumatic inoculation into the subcutaneous tissue.)

 (three types 1- Chromoblastomycosis -*Fonsecaea (pedrosoi*, *compacta)*, *Cladosporium carionii*>Verrucoid lesions of skin

 2- Mycetoma - Eumycotic Mycetoma(fungi 40%) and Actinomycotic Mycetoma (bacteria, Actinomycetes).

 > Suppurative and Granulomatous, destructive of contiguous bone, tendon, and skeletal mus

 3- Sporotrichosis - *Sporothrix schenckii >* *spreads along cutaneous lymphatic channels*

 Primary (able to infect normal host / access via respiratory tract(inhalation) / include 1- *Coccidioides immitis*

 (Coccidioidomycosis ) /2-*Histoplasma capsulatum* (*cave disease)/3-Blastomyces dermatitidis (Blastomycosis)*

 Systemic(deep) Originate in lungs > phagocytosed by macrophages >spread to organs /

 Response > formation of fibrous tissue, granulomas and calcified lesions.

 \*Histoplasmosis (Cave disease or Ohio valley disease) - Histoplasma capsulatum( microconidia transform into

 budding yeast cells)

 \* Blastomycosis - *Blastomyces dermatitidis (flu-like illness or chronic illness or lung cancer)*

 \* Coccidioidomycosis (Valley fever) - *Coccidioides immitis (*spherule *form in the host)*

 Opportunistic (generally have a low potential for virulence)

 Include (1- *Candida* spp. (Candidiasis) / 2- *Aspergillus* spp. (Aspergillosis) / 3- Zygomycetes (Zygomycosis)

 4- *Cryptococcus neoformans / 5- Penicillium marneffei / 6- Trichosporon beigelii.*

 *predisposing factors (1- Age* /2- stress /3-other pathologic conditions)

 C. albicans ( normal flora / broad spectrum antibiotics, mucosal injury, introduction of catheters ,intravascular

 Devices > permit *candida* to enter the bloodstream. > oral and vaginal thrush

 \* Vaginal Candidiasis (vaginal thrush) > normal saliva reduces adhesion // pH and glucose concentration

 effect the occurrence / lactoferrin > antimicrobial activity(protective)

 risk factors(Post-operative status/Cytotoxic cancer/Chemotherapy/Antibiotic therapy/ Burns

 drug abuse /GIT gamage)

Mycotoxins > toxic to the host // virulence factors(LPS-like endotoxins/ Hemolysins / Steroid-like toxins(affects nerves)) // Aspergillus> Aflatoxin> liver cancer

Aflatoxin: (b1 is the most toxic / contaminated food is processed>Aflatoxins enter / animals fed with contaminated food can pass it to eggs, milk, and meat

 Carcinogenic )

 Nonspecific defenses ( skin / internal factors(mucus,macrophages) / blood components / tempreture /genetic /hormonal factors )

Host defense Specific defenses (1-Humoral Immunity – antibodies /2-Cell-mediated Immunity - T-cell mediated ,

Epidimology (*Dermatophytes* *from person to person(towels,combs….) // candidiasis is often associated with diabetes//candida normal vaginal flora)*

 Occupation is important (*Sporothrix* is normally found in woody plants / *Histoplasma* is often found in bird or bat excret)

Diagnosis (Clinical / Samples include(scrapings of scale, hair, brushings,nail clippings, skin scraped, skin biopsy, moist swab) / Laboratory( skin scrapings>

 10% potassium hydroxide >reveal hyphae or spores , Sabouraud's dextrose agar > grow fungi) .

 Skin testing for delayed hypersensitivity response for epidemiologic purposes but often not for diagnosis.

 Germ tube test > to differentiate *candida albicans* from other yeast (candida is grown in human or sheep serum 37c for(3-4) h they form germ tube

Control (1- Sanitary- difficult,communicable disease reduced / 2- Immunological – no vaccines available / 3- Chemotherapeutic - very toxic

Topical powders and creams often contain azole derivatives (miconazole, clotrimazole, econazole)> against superficial dermatophytes

Sporotrichosis >treated using potassium iodide

Systemic infections > treated by miconazole, Fluconazole or ketoconazole.