



MEDICINE
KING SAUD UNIVERSITY

Microbiology

team 436



Lecture :

mycetoma and other Subcutaneous Mycoses

■ important

■ Extra notes

■ Doctors notes

"لا حول ولا قوة إلا بالله العلي العظيم" وتقال هذه الجملة إذا دهم الإنسان أمر عظيم لا يستطيعه ، أو يصعب عليه القيام به .

Objectives:

1. Acquire the basic knowledge about mycetoma and the clinical features of the disease
 2. Acquire the basic knowledge about other common subcutaneous mycosis and their clinical features.
 3. Know the main fungi that affect subcutaneous tissues, muscles and bones.
 4. Identify the clinical settings of such infections
 5. Know the laboratory diagnosis, and treatment of these infections.
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Subcutaneous Mycoses :

- Definition : **Fungal infections** involving the dermis, subcutaneous tissues, muscle and may extend to bone.
 - They are **initiated by trauma** to the skin.
 - Are **difficult to treat** and **surgical intervention** (تدخل جراحي) is frequently employed.
 - Diseases in healthy host, however, more **severe disease in immunocompromised host**.
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Subcutaneous Mycoses

1. Mycetoma
2. Subcutaneous zygomycosis
3. Sporotrichosis
4. Pheohyphomycosis
5. Rhinosporidiosis
6. Lobomycosis
7. Chromoblastomycosis

1-4 will explained in detail in the next slides **BUT** 5,6 and 7 are in the schedule slide ()

Mycetoma: Definition and characteristic \ Etiology \ Diagnosis \ Treatment

- **Mycetoma is a chronic**, granulomatous disease of the skin and subcutaneous tissue, which sometimes involves muscle, and bones. (in the beginning localized and painless)
 - It is characterized by **Swelling** , **abscess formation**, and **multiple draining sinuses** that exude characteristic grains of clumped organisms .
 - It typically affects the lower extremities, but also other areas of the body e.g. hand, back and neck.
 - The disease was first described in the Madura district of India in 1842, (**Madura foot**). (don't memorize the date)
 - **Mycetoma is endemic in tropical, subtropical, and temperate regions**. Sudan, Senegal, Somalia, India, Pakistan, Mexico, Venezuela
 - Is **more common in men** than in women (ratio is 3:1). Because this infection is done by trauma usually , and the men usually work as a farmer so they most likely to get trauma than women.
 - Commonly in people who work in rural areas, framers
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Mycetoma: Definition and characteristic \ Etiology \ Diagnosis \ Treatment

- Mycetoma is acquired via **trauma of the skin**

Trauma

painless subcutaneous firm **nodule** is observed

massive swelling with skin rupture, and **sinus tract formation**

old sinuses close and new ones open, draining exudates **with grains** (granules)

Grains may sometimes be seen with the naked eye.



Mycetoma: Definition and characteristic \ **Etiology** \ Diagnosis \ Treatment

Classified as :

1-Eumycetoma:

Caused by a several mould (filaments) fungi

The most common are :

- Madurella mycetomatis
- Madurella grisea
- Pseudallescheria boydii

The color of grains is black or white

2-Actinomycetoma :

Caused by aerobic filamentous bacteria (Actinomycetes)
gram positive

The most common are:

- Actinomadura madurae
- Streptomyces somaliensis
- Nocardia brasiliensis

Color of grains **yellow, white, yellowish-brown, pinkish – red.**

There is no black

Mycetoma: Definition and characteristic \ Etiology \ **Diagnosis** \ Treatment

-Clinical samples:

| **Biopsy tissue** (Superficial samples of the draining sinuses are inadequate) , (deep biopsy is more accurate*)

| **Pus with grains**

| **Blood** (for serology only i.e antibody and antigen)

1-Direct microscopic examination

-Histological sections: Hematoxylin-Eosin,

-Smears:

1-fungi: Stain with Giemsa , Gomori methenamine silver

2-Actinomycetes: Stain with Gram (**Actinomycetes**)

-Grains :

(Observing the size of the filaments , the color of the grain)

e.g.

- **White-to-yellow grains** indicate *P. boydii*, *Nocardia* species, or *A. madurae* infection.
- **Black grains** indicate, *Madurella* species infection.

2-Culture

▪ Media such as Sabouraud dextrose agar (SDA) to **isolate fungi**

-**Fungi** are identified based on the macroscopic and microscopic features.

▪ Blood agar to **isolate bacteria**.

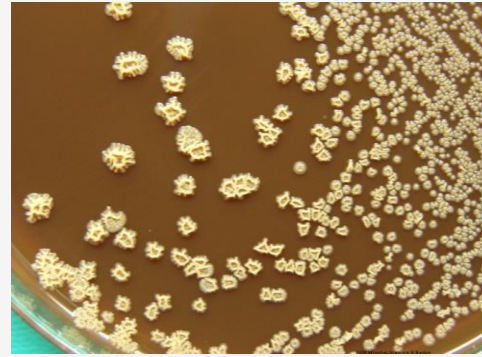
-**For Actinomycetes** biochemical and other tests are used for identification

*Because the superficial layer of the skin may contain mixed microbe at least the normal flora.

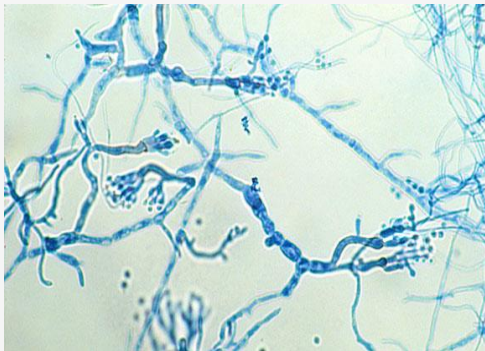
Mycetoma:



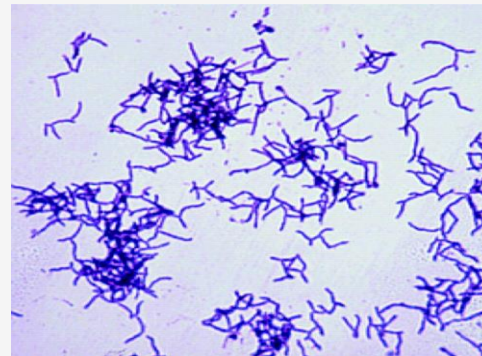
- SDA
- Brownish - wrinkled - seems to be dry - with orange pigmentation around it



- Dry – wrinkled – small



- Septated hyphae with conidia=spores



- After we stained it by gram stain
- Gram+ branching filaments bacteria

Mycetoma

Definition and characteristic \ Etiology \ Diagnosis \ **Treatment**

- **Therapy** is suggested for several months or years (1-2 years or more)
- **Actinomycetoma** generally **respond better** to treatment than **eumycetoma**
- **Radiologic tests** (bone radiographs) if bone involvement is suspected
- **Surgical Care:** In eumycetoma, surgical treatment (debridement or amputation) in patient not responding to medical treatment alone and if bone is involved

1-Eumycetoma :

- **Itraconazole**

2-Actinomycetoma:

- **Trimethoprim-sulfamethoxazole**

With either **Dapsone** Or **Streptomycin** **Dapsone is Common than Streptomycin, which required to be given IV**

- **Combination** of 2 drugs is used
-

Subcutaneous zygomycosis: Definition and characteristic \ Etiology \ Diagnosis \ Treatment

- **Chronic localized** firm Subcutaneous masses. (they are usually Localized – nodule – painless)
- **facial area** or other like hand, arm, leg, thigh. There is no sinus formation and abscesses unlike Mycetoma, the most characteristic feature here is the necrosis.
- Firm **swelling** of site with intact skin-Distortion. with **NO abscess or sinuses** (differentiate with Mycetoma).
- Direct spread to adjacent bone and tissue.
- Acquired via **traumatic implantation of spores**, needle-stick, tattooing, contaminated surgical dressings, burn wound

Etiology:

-Mould fungi of the Zygomycetes:

- Mainly caused by entomophthorales

- it's more in male.

- It present according to the etiology:

If its conidiobolus we will find it in the face

If its basidiobolus we will find it in the limb

GI or **abdominal mass**

→ 1-Entomophthorales (chronic) :

Conidiobolus coronatus, Basidiobolus ranarum,

→ 2- mucorales (acute). Rhizopus, Mucos

(Black necrosis)

Mostly caused by mucorales → cause it mostly affected blood vessels

هذا يعني انها تسوي → invasion necrosis and infarction which lead to black necrosis..



Subcutaneous zygomycosis: Definition and characteristic \ Etiology \ **Diagnosis** \ **Treatment**

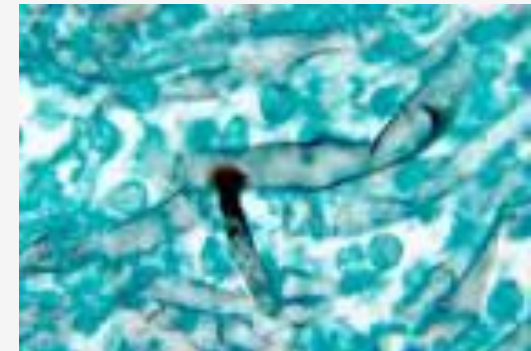
Laboratory Diagnosis:

Specimen: **Biopsy tissue** In most disease we take biopsy or pus because its subcutaneous sample

1-Direct microscopy:	2-Culture:
stained sections or smears: broad non-septate hyphae	Culture on SDA

Treatment:

- Oral Potassium iodide (KI)
- **Amphotericin B**
- Posaconazole



Phaeohyphomycosis: Definition and characteristic \ Etiology \ Diagnosis \ Treatment

- Is a group of fungal infections **caused by dematiaceous** (darkly pigmented) fungi widely distributed in the environment
- Subcutaneous or **brain Abscess** (ranging from **simple nodule** to **systemic or brain abscess**)
- Presents as nodules or erythematous plaques with **no systemic involvement**
- **Affected site**: Thigh, legs, feet, arms **Affected normal host**

Etiology:

- Dematiaceous mold fungi.

common:

- Cladosporium,
- Exophiala,
- Wangiella,
- Cladophialophora,
- Bipolaris

Diagnosis:

- Specimens: **Pus, biopsy tissue**

1-Direct Microscopy:

KoH and smears will show ***brown septate fungal hyphae**

2-Culture: On SDA

Treatment:

- The treatment of choice is **Surgical excision of the lesion**
- Antifungal:
Itraconazole, Posaconazole

*Shows as brown septate fungal hyphae because is caused by dematiaceous which are darkly pigmented fungi.

Sporotrichosis: Definition and characteristic \ Etiology \ Diagnosis \ Treatment

- Subcutaneous , deep cutaneous or **systemic** fungal infection
- Inoculation (embedded) into the **skin**
- Can present as:
 - plaque (subcutaneous nodules)
 - Lymphanginitic** : which spread along the line of lymphatic drainage
 - Dissiminated** it means spread to other area by hematogenitics

Etiology:

Sporothrix schenckii its a ***Dimorphic** fungus

Laboratory Diagnosis:

Specimen: **Biopsy tissue**, pus

1-Direct Microscopy: smear will show **Finger-like yeast cells or Cigar shaped**

2-Culture: On SDA at room temperature and at 37°C

Because they already had taken from someone's body so they will be in yeast form .

Treatment




Itraconazole, KI (potassium iodide)

- 1- yeast which is grow at body temperature or
- 2- mold/hyphal/filamentous which is grow at room temperature



Remember : *dimorphic : have 2 forms (mold and yeast) depending on changing in the environmental factor (temperture)

Other subcutaneous fungal infections

	Sporotrichosis	Phaeohyphomycosis	Chromoblastomycosis	Rhinosporidiosis	Lobomycosis
Clinical features	Subcutaneous or systemic infection Nodular subcutaneous lesions, verrucous plaques or Lymphatic	Subcutaneous or brain Abscess Nodules and erythematous plaques	Subcutaneous Verrucous plaques, cauliflower aspect, hyperkeratotic, Ulcerative	Granulomatous, mucocutaneous polyps	Subcutaneous Nodular lesions, keloids
 Etiology	Dimorphic fungus <i>Sporothrix schenckii</i>	Dematiaceous (darkly pigmented) mould fungi	Dematiaceous mould fungi	Obligatory parasitic fungus <i>Rhinosporidium seeberi</i>	Obligatory parasitic fungus <i>Lacazia loboi</i>
 Clinical sample	Biopsy tissue	Biopsy tissue	Biopsy tissue	Biopsy tissue	Biopsy tissue
 Direct Microscopy	Elongated yeast cells	Brown septate hyphae	Muriform cells (sclerotic bodies)	Spherules with endospores	Chains of yeast cells
Treatment	Potassium iodide Itraconazole	Surgery (Antifungal therapy)	Surgery (Antifungal therapy)	Surgery	Surgery

Bone and joint infections:

- They are **uncommon** and not as isolated clinical problem
- **Result from:**
 - **Hematogenous dissemination**
 - Presence of foreign body
 - Direct inoculation of organism (trauma, surgery , etc) **Direct inoculation from closely related site Or due to the presence of foreign body**
 - Spread through direct extension of infection to the bone

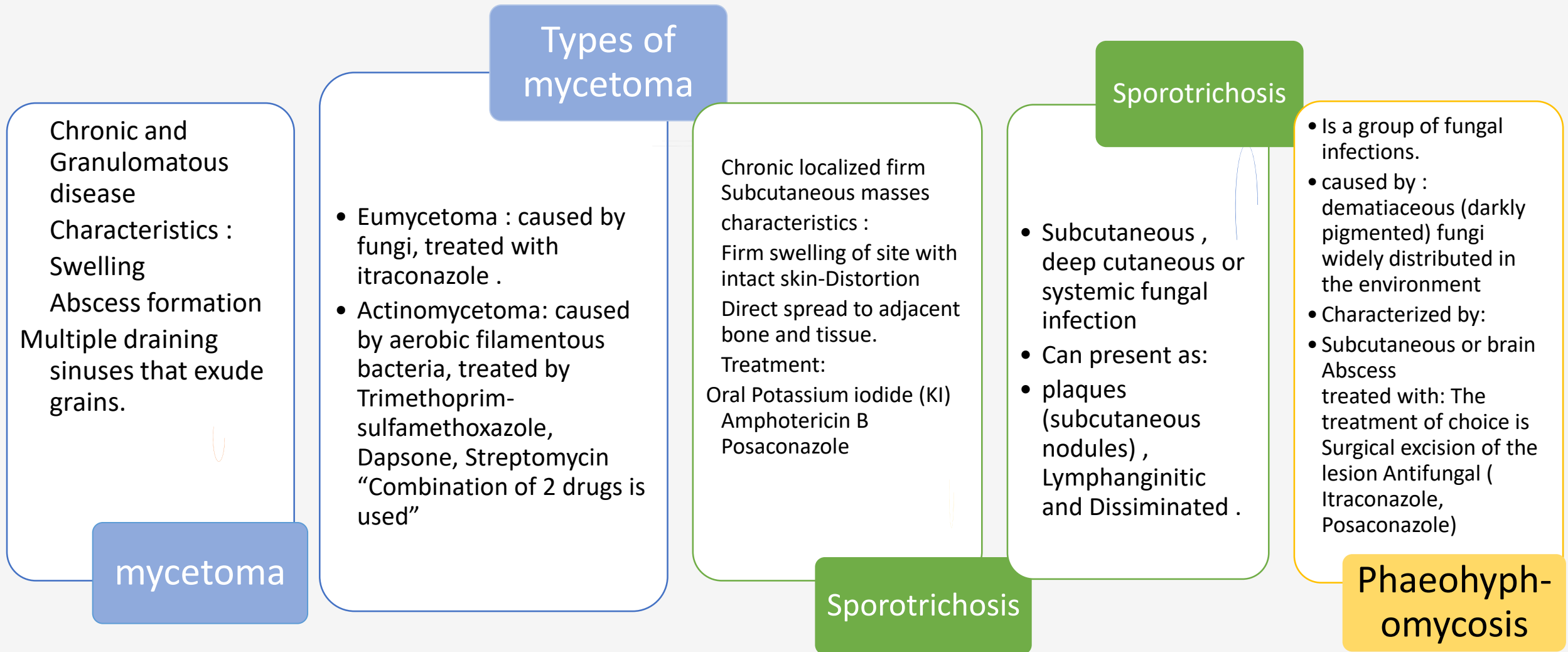
e.g.

- Rhinocerebral zygomycosis
- Aspergillosis
- mycetoma
- **Osteomyelitis**
- **Joint infections**

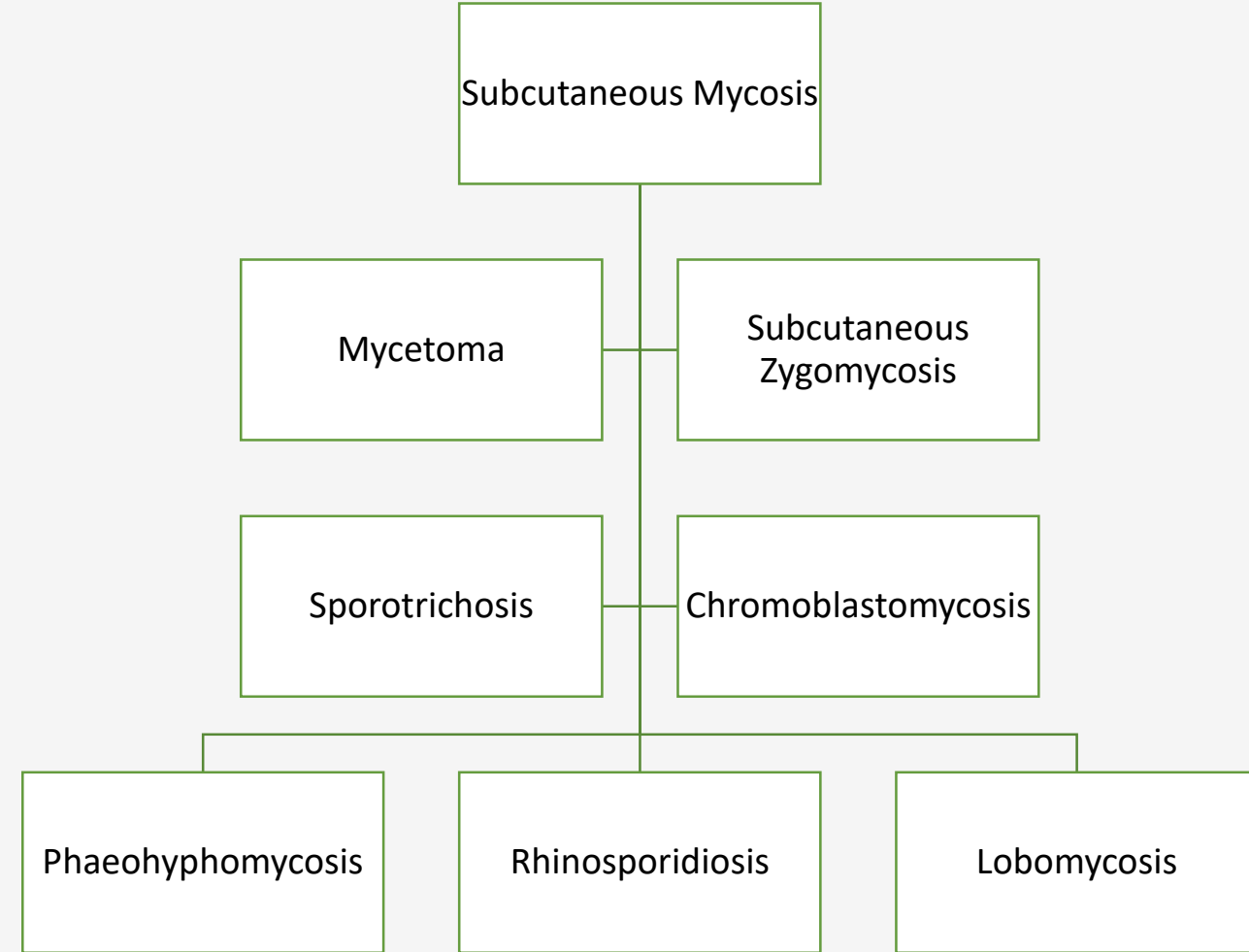
Etiology:

- **Candida species**
 - **Aspergillus species and mould fungi**
 - Blastomyces dermatitidis
 - Coccidioides immitis
 - Histoplasma capsulatum
 - Paracoccidioides brasiliensis
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Summary:

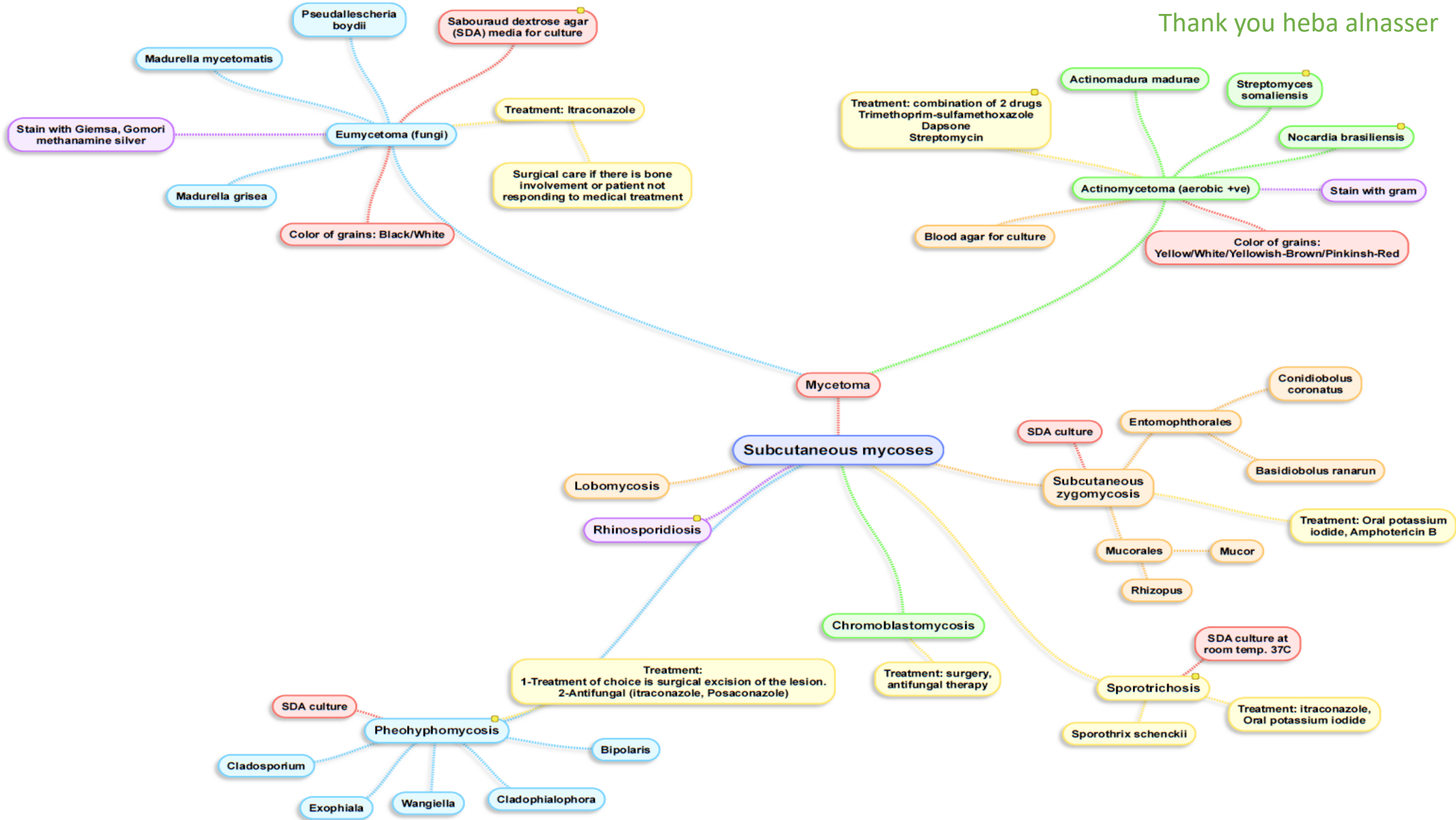


Summary:



Drugs:

- **Itraconazole** for **treatment** of (Eumycetoma, phaeohyphomycosis, Sporotrichosis)
- **Posaconazole** for **treatment** of (Zygomycosis and phaeohyphomycosis)
- **Oral Potassium iodide (KI)** for **treatment** of (Zygomycosis and Sporotrichosis)
- **Amphotericin B** for **treatment** of (Zygomycosis)
- **Trimethoprim-sulfamethoxazole** for **treatment** of (Actinomycetoma).
- **Surgical excision of the lesion** for **treatment** of Most of them (Phaeohyphomycosis, chromoblastomycosis, rhinosporidiosis and lobomycosis, Mycetoma)



GOOD LUCK!

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