SUBCUTANEOUS MYCOSES

- Mycetoma
- Chromoblastomycosis
- Phaeohyphomycosis
- Sporotrichosis
- Lobomycosis
- Rhinosporidiosis
MYCETOMA
(= Maduromycosis = Madura foot)

• Madura foot referring to the first case seen in Madura region of India.

• Mycetoma - clinical syndrome of localized, deforming, swollen lesions and sinuses, involving cutaneous and subcutaneous tissues, face, and bone; usually occurring on the foot or hand) - etiologic agent may be fungi or actinomycetes.

• Mycetoma is a chronic granulomatous infection
Mycetoma

- Localized swollen lesions that develop **multiple draining sinuses** are usually found on the limbs,
- infections occur on other parts of the body.
- There is often a long period between the initial infection and formation of the characteristic lesions;
- spread from the site of origin is unusual but may occur, particularly from the foot up the long bones of the leg.
• Mycetoma caused by actinomycetes is termed **actinomycetoma**, and mycetoma caused by true fungi is called **eumycetoma** or **mycotic mycetoma**.

• Fungi associated with fungal mycetoma are **opportunistic**.

• the disease occurs most frequently in agricultural workers, in whom minor penetrating skin injuries are common.
• Infection is acquired following trauma to the skin by plant materials from trees or vegetation debris, thus more seen in rural areas (in farmers, Sheppard's, walking bare-foot in agricultural land or city parks).

• The disease is most prevalent in tropical and subtropical regions of Africa, Asia, and Central and South America.

• One potential causal agent can be Pseudallescheria boydii, a soil/water inhabiting fungus with worldwide distribution. However other fungi can be involved.

**MYCETOMA**

(=Maduromycosis=Madura foot)

• mycotic mycetoma - usually more common in men (3:1 to 5:1) than in women

• usually results from trauma or puncture wounds to feet, legs, arms and hands (usually on the feet)

• starts out as tumor-like subcutaneous swelling ruptures near the surface; infects deeper tissues including subcutaneous tissues and ligaments (tendons, muscles and bone are usually spared)
MYCETOMA

- Posttraumatic chronic inf. of subcutaneous tissue

- A large number of organisms have been implicated. Within host tissues, the organisms develop to form **compacted colonies (grains)** **0.5–2 mm in diameter**, the colour of which depends on the organism responsible;

- for example, in unstained preparations *Madurella* grains are **black** and *Actinomadura pelletieri* grains are **red**
• The common **etiological agent in Saudi Arabia** and neighboring countries are: *Madurella mycetomatis* causes the majority of the cases with the black grains.

• It is an **imperfect dematiaceous** mold with brown colonies and diffused honey-colored pigment.

\[Image\]

*Madurella grisea*: another species of *madurella* similar to *mycetomatis* but with grey colonies

\[Image\]

Grains of *Madurella grisea* (tissue microcolonies) are black, round to lobed, soft to firm, up to 1.0 mm, with two distinctive zones, a hyaline to weakly pigmented central zone and a deeply pigmented periphery.
Microscopical appearance of *Madurella grisea* in a stained mycetoma grain.

*Pseudallescheria boydii*: causes white grain mycetoma. It is Ascomycetes mold forming cleistothecia and ascospores. The imperfect of it’s the moniliaceous mold: *Scedosporium apiospermum* which forms annelloconidia from annellids.
**Actinomycetes** (*Actinobacteria*)

- Gram-positive bacteria with branching filaments that sometimes develop into mycelia are included in the rather loosely defined order Actinomycetales.
- Although mostly soil saprophytes,
- Grow on brain–heart infusion agar or blood agar but soil saprophytes grow on starch nitrate agar or Actinomycetes media.

**Laboratory diagnosis of Mycetoma**

- The presence of grains in pus collected from draining sinuses or in biopsy material is diagnostic.
- The grains are visible to the naked eye and their colour may help to identify the causal agent.
- Grains should be crushed in potassium hydroxide and examined microscopically to differentiate between actinomycetoma and eumycetoma;
- material from actinomycetoma grains may be Gram stained to demonstrate the Gram positive filaments.
- Samples should also be cultured, at both 25–30°C and 37°C, on brain–heart infusion agar or blood agar for actinomycetes and on Sabouraud agar (*without cycloheximide*) for fungi.
- The fungi that cause eumycetoma are all septate moulds that appear in culture within 1–4 weeks, but their identification requires expert knowledge.
EUMYCETOMA

Treatment

- **Surgery**
- **Antifungal therapy**
  - Amphotericin B
  - Flucytosine
  - Topical nystatin
  - Topical potassium iodide
  - (choice of treatment varies according to the infecting fungus)

CHROMOBLASTOMYCOSIS

(CHROMOMYCOSIS OR VERRUOUS DERMATITIS)

Geographical distribution of chromoblastomycosis based on CDC
Chromoblastomycosis

• Is a disease, also known as chromomycosis
• is a chronic, localized infection of the skin and subcutaneous tissues, characterized by slow-growing verrucous lesions usually involving the limbs.
• The disease is encountered mainly in the tropics or subtropics, in Central and South America, and Madagascar.
• characterized by the development in tissue of dematiaceous (brown-pigmented), hyperplasia, rounded sclerotic bodies.
• Like mycetoma, Infections are caused by the traumatic implantation of fungal elements into the skin and are chronic and is seen most often among those with outdoor occupations.

Chromoblastomycosis

• slowly progressive and localized. Tissue proliferation usually occurs around the area of inoculation producing crusted, verrucose (rough), wart-like lesions,
• cutaneous nodules, which may be raised 1-3 cm above the skin surface. The roughened, irregular vegetations often resembles the florets of cauliflower
• This disease is caused by Fonsecaea pedrosoi, F. Compacta, Cladophialophora carrionii and Phialophora verrucosa (identical to Cladophora americana which causes bluing of lumber), both of which are dematiaceous fungi (darkly pigmented)
Chromoblastomycosis - chromomycosis or verrucous dermatitis

- occurs rarely in animals (such as, horses, cats, dogs, and frogs)
- soil-inhabiting fungi
- susceptibility enhanced by going barefoot or wearing sandals
- found almost exclusively in laborers
- enters hand or feet after trauma
• Chronic verrucose chromoblastomycosis of the foot due to *Phialophora verrucosa*.
• Note tissue hyperplasia characterized by the formation of verrucoid, warty cutaneous nodules raised 1 to 3 cm above the skin surface.

• Chronic verrucous chromoblastomycosis of the hand due to *Cladophialophora carrionii*.
• Note tissue hyperplasia forming a white verrucoid cutaneous lesion.
• In Australia, chromoblastomycosis due to *C. carrionii* occurs mostly on the hands and arms of cattle workers in humid tropical forests.

Skin scrapings from a patient with chromoblastomycosis mounted in 10% KOH and Parker ink solution showing characteristic brown pigmented, rounded *sclerotic bodies*.
Haematoxylin and eosin (H&E) stained sections showing characteristic dark brown sclerotic cells, which divide by binary fission and not by budding. Note all agents of chromoblastomycosis form these sclerotic bodies in tissue.

**Cladophialophora carrionii** on Sabouraud's dextrose agar. Colonies are slow growing, reaching 3-4 cm in diameter after 1 month
**Fonsecaea spp.**

*Cotton Blue Lactophenol staining*  

*Fonsecaea pedrosoi* colony on SGA medium after 14 days of incubation

Conidiophores of *Fonsecaea pedrosoi*  
Cotton Blue Lactophenol staining
Phialophora spp.

*Phialophora* varrucosa
Fungus (Black Mould) **Growth** usually maturing in about 7 – 12 Days.

Photomicrograph of a *Phialophora* varrucosa fungal organism from a slide culture.
Chromoblastomycosis - chromomycosis or verrucous dermatitis

• red or violet color on skin may resemble a ringworm lesion
• develops into a verrucous lesion
• pruritus (itchiness) and papules may develop
• fungus gets under the skin (produces bumps)
• bumps may block lymphatic system and cause elephantiasis

Chromoblastomycosis - chromomycosis or verrucous dermatitis

• sometimes bacterial infection may enter and cause a secondary infection
• rarely this fungus spreads to other areas of the subcutaneous tissue.
• potentially may spread to brain (life-threatening in that case)
Chromoblastomycosis

**Laboratory diagnosis**

- After biopsy tissue - look at the skin for fungus
- hematoxylin stain - look for fungal cells scattered among skin cells
- attempt to culture fungus from biopsy tissue must always take place to identify the etiological or causal agent
- The characteristic clusters of brown-pigmented, thickwalled fungal cells are relatively easy to see on microscopical examination of skin scrapings, crusts and pus.
- Culture on Sabouraud agar at 25–30°C yields
- slow-growing, greenish grey to black (dark or blackish colonies), compact, folded colonies. Cultures should be incubated for 4–6 weeks.
- Specific identification of these closely related fungi is usually left to a reference laboratory.

**Chromoblastomycosis - chromomycosis or verrucous dermatitis**

- Two species implicated in this mycosis - each may produce several spore types
  
  • *Fonsecaea pedrosoi* - Cladosporium type and Rhinocladiella type of conidiation
  
  • *Phialalophora verrucosa* - Phialophora type (flowers in the vase conidiation)
- fungi found growing on plant debris, wood, soil.
Chromoblastomycosis - chromomycosis or verrucous dermatitis

- **Treatment**
  - There is no ideal treatment for this disease,
  - but promising results have been obtained with [terbinafine](https://example.com) and [itraconazole](https://example.com), both of which can be combined with [flucytosine](https://example.com) in difficult cases.
  - [thiabendazole](https://example.com) - shows promise (given orally and on skin mixed with dimethyl sulfoxide [DMSO](https://example.com) - to deliver drug) - experimental drug
  - surgical excision, are useful in early stages of disease
  - application of heat to infected sites has been reported to effect a cure of the disease after six months of treatment
Phaeohyphomycosis

- amalgam of clinical diseases caused by a wide variety of dematiaceous fungi characterized by the presence of **brown pigmented fungal elements** in host tissue
- etiologic agent varies, and can be represented by a number of different fungal species
- infections may vary from being superficial and contained in the *stratum corneum* of the skin, to cutaneous and subcutaneous.

Phaeohyphomycosis

- A mycotic infection caused by a number of *dematiaceous* (brown-pigmented) fungi where the *tissue morphology* of the causative organism is **mycelial**. This separates it from other clinical types of disease involving **brown-pigmented fungi** where the tissue morphology of the organism is a grain (mycotic mycetoma) or sclerotic body (chromoblastomycosis).
Phaeohyphomycosis

**Distribution:** World-wide.

**Aetiological Agents:** Various dematiaceous hyphomycetes especially *Cladophialophora bantiana, Curvularia* sp., *Wangiella dermatitidis, Bipolaris* sp., *Alternaria* sp., and *Exophiala jeanselmei.*

Phaeohyphomycosis - Periodic Acid-Schiff (PAS) stained smear of pus from a subcutaneous abscess of the toe showing septate hyphal elements of *Exophiala moniliae*
Phaeohyphomycosis

- in rare instances infections may become invasive systemic (invading various organs) and/or brain

- in diagnosis, materials from cysts, nodules, abscesses and other infected tissues may be examined under the microscope directly with 10% KOH. The fungi are usually **pigmented dark brown**.

- treatment usually involves surgical excision of fungus and treatment with antifungal drugs (amphotericin B, 5-fluorocytosine, ketoconazole, or another imidazole).

Cutaneous phaeohyphomycosis of the face caused by *Wangiella dermatitidis*.

Cutaneous phaeohyphomycosis of the forearm caused by *Exophiala jeanselmei*. 
Exophiala jeanselmei on Sabouraud's dextrose agar showing black mucoid, yeast-like streaked colonies. Reverse is olivaceous-black.

Microscopic morphology of *Exophiala jeanselmei*. Numerous ellipsoidal, yeast-like, budding cells are usually present, especially in young cultures. Scattered amongst these yeast-like cells are larger, subglobose to broadly ellipsoidal cells (germinating cells) which give rise to short hyphae that gradually change into unswollen hyphae.