

Topical Antifungal medications

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What is Fungal infection?

- **Fungal infections** are caused by molds or yeasts. It is also known as mycosis. Many types of fungal germs live harmlessly in the soil, on food, on our skin and in other places in the environment. However, some types of fungi can thrive and multiply on the surface of the body, to cause infection of the skin, nails, mouth or vagina.
- Fungal infection is usually not serious and can not normally be spread easily from person to person, but if an infection deeper within the body may be more serious.
- Fungal infections of the skin was the **4th** most common disease in 2010 affecting 984 million people.



Fungal infections can affect toenails and fingernails.

Classification of fungal infections

- Fungi reproduce by releasing spores that can be picked up by direct contact or even inhaled. That's why fungal infections often affect the lungs, skin, or nails. Fungi can also penetrate the skin to affect your organs and cause a whole body systemic infection. So fungal infections are classified into 3 groups:
- **1. Systemic mycosis**
 - Systemic mycoses due to primary pathogens originate primarily in the lung and may spread to many organ systems.
 - Systemic mycoses due to opportunistic pathogens are infections of patients with immune deficiencies who would otherwise not be infected.
 - (Important fungi: Coccidioidomycosis; Histoplasmosis; Blastomycosis; Paracoccidioidomycosis; Candidiasis; Cryptococcosis and Aspergillosis).
- **2. superficial or mucocutaneous mycoses**
 - Superficial mycoses are limited to the outermost layers of the skin and hair.
 - (*Candida* and *Malassezia* species.)
 - Mucocutaneous mycoses are inflammation occurs in response to cell wall glycopeptides. (*Candida* species)
- **3. subcutaneous mycoses**
 - Subcutaneous mycoses involve the dermis, subcutaneous tissues, muscle and fascia. These infections are chronic and can be initiated by piercing trauma to the skin which allows the fungi to enter.

subcutaneous mycoses, chromomycosis



http://itg.content-eu/Generated/pubx/173/mm_files/do_3538/co_69067/CD_1001_057c.jpg

Systemic mycosis, Paracoccidioidomycosis



Mucocutaneous *Candida* a infections



<http://image.slidesharecdn.com/systemicmycosis-110210200523-phpapp02/95/systemic-mycosis-dimorphic-fungus-39-728.jpg?cb=1297389987>

Superficial mycoses



<https://www.inkling.com/read/dermatology-bolognia-jorizzo-schaffer-3rd/chapter-77/superficial-mycoses>

http://classconnection.s3.amazonaws.com/699/flashcards/1860699/jpg/candidiasis_chronic_mucocutaneous141359146682428.jpg

Topical antifungal medication



<http://www.schuylersproducts.com/images/HexaChlor-K%20Spray%208oz.jpg>

https://edc2.healthtap.com/ht-staging/user_answer/reference_image/9603/large/Antifungal_cream.jpeg?1386669723



<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3076938/figure/F1/>

- Topical antifungal drugs are medicines applied to the skin, on the nail, onto mucus membranes or vaginally, to treat the infections caused by fungus.
- Different types of topical antifungal medications may contain different active ingredients, and many of them are available without a prescription. These types of antifungal are considered to be quite safe, and there are typically very few reported side effects.
- Topical antifungal medications can come in many forms (ex: cream, spray, gel, tablet, troches, oral suspension). A cream antifungal is one of the most common.
- Using a topical antifungal is quite simple. It is rubbed onto the affected area, and the area surrounding the infection.
- To prevent the infection from spreading to other areas of the body, special care should be taken when applying an antifungal cream. Such as, wearing the glove when applying the cream or washing hand afterwards. Also, the tip of the container should never touch the infected area.

Mechanism of action

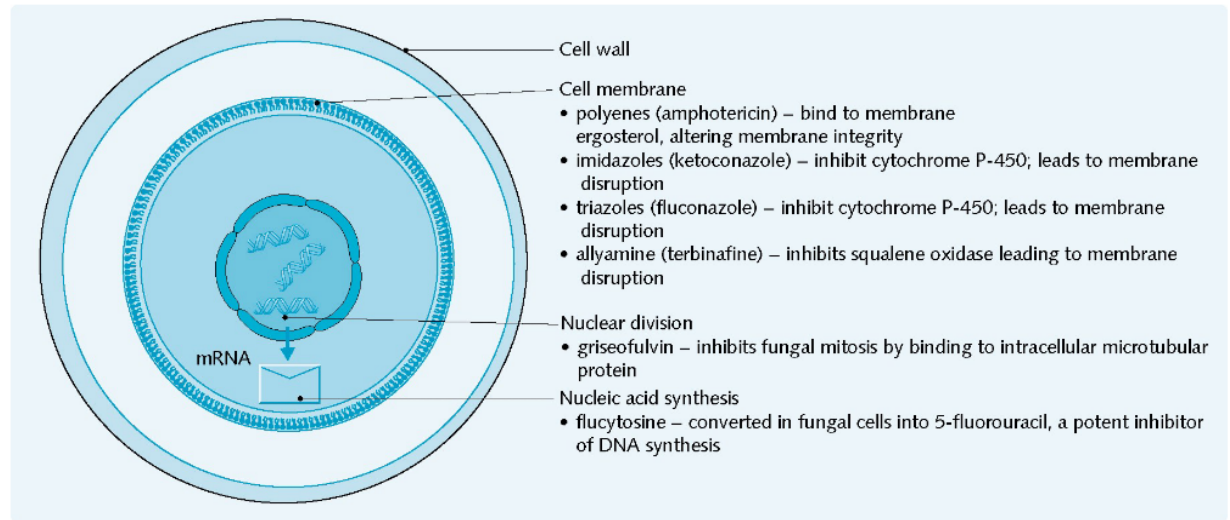


FIG. 11.10 Sites of action of antifungal drugs.

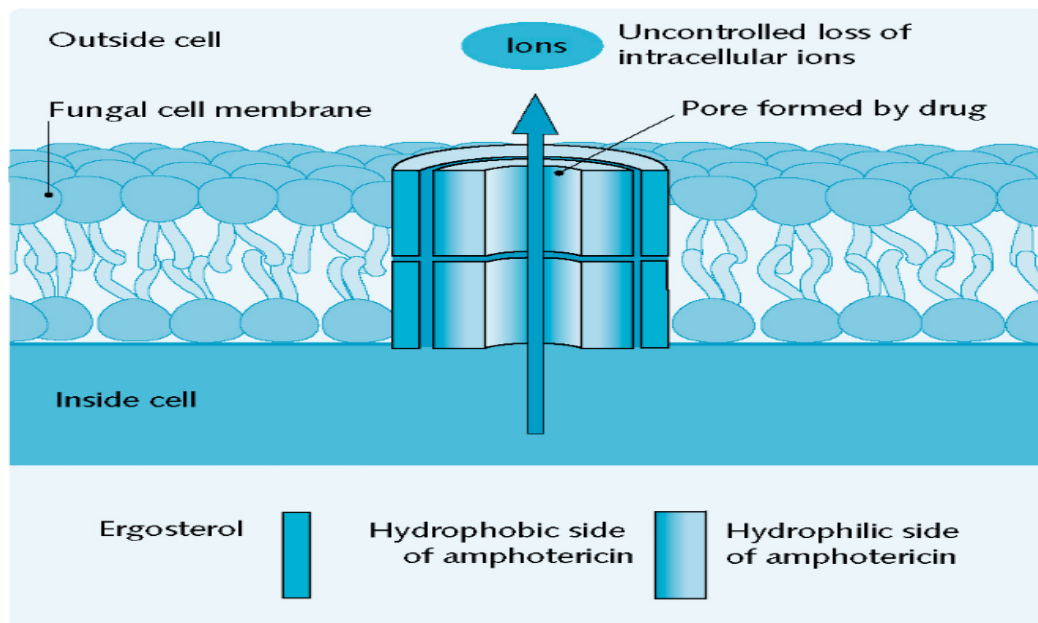


Figure 11.11: Mechanism of action of polyene antifungal agents.

● **Imidazoles (Clotrimazole, Miconazole and Ketoconazole) and Terbinafine** : They inhibit the synthesis of the primary cell sterol of fungi, known as ergosterol, located in fungal cell membrane. Imidazoles interfere with 14- α demethylase, a cytochrome P-450 enzyme, which is necessary in conversion of lanosterol to ergosterol. The inhibition of ergosterol biosynthesis results cell permeability to increase and leakage of cellular contents

● **Polyene macrolides (Nystatin)**: They result in fatal damage of cells by binding to ergosterol. This binding action cause spore formations in the cell membrane and leads to leakage of cellular constituents and cell death.

Most common opportunistic fungal infections

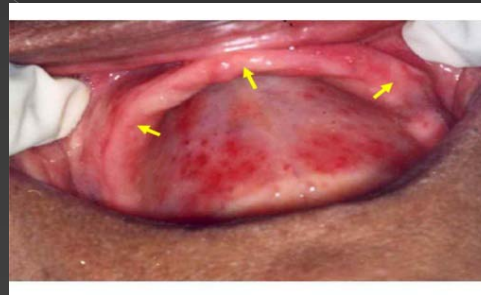
Oral Candidiasis

Acute pseudomembranous candidiasis (Thrush)

White plaque appears on oral mucous membranes



http://hardinmd.lib.uiowa.edu/pictures22/dermnet/tinea_ym04-01.jpg



<http://screening.iarc.fr/picoral/H4000013a.jpg>



<http://recommendpills.com/wp-content/uploads/2012/11/angular-cheilitis.jpg>

Chronic atrophic candidiasis (Denture sore mouth)

Palatal tissue appears localized red spots (not painful)

Angular cheilosis

Inflammation of corners of mouth

Common Topical Medication for Oral Candidiasis

Agent	Duration	Interval	Advers effects
<u>Clotrimazole</u> (Mycelex) 2% Troches	14 days	5 times daily (every 3 hours)	<u>Nause/vomitting</u> Rash, <u>stining</u> , unpleasant sensation in the mouth may occur
<u>Miconazole</u> (Monistat) Tablet	1-2 weeks	Once daily	Burning Increase incidence of caries
<u>Nystain</u> (Mycostatin) Suspension	Follow your doctor's orders	directions on the label	Diarrhea Stomach upset Nausea

Patient with a **high caries** or long term **xerostomia** should not be given troches or nystein oral suspension because of their high sugar content.

Many fungal infection tend to recur after discontinuing drug treatment, antifungal medications should be use for about 2 days after oral lesions disappear. Duration of treatment depends on the severity of infection and patient-specific factor such as age & immune status.

Fungal infections of the skin



http://hardinmd.lib.uiowa.edu/pictures22/dermnet/seborrheic_dermatitis_232.jpg

Seborrheic dermatitis

- is a chronic inflammatory skin disorder affecting primarily the skin of the scalp, face, chest, and intertriginous areas, causing scaling and redness of the skin.
- one to three in 100 people have seborrheic dermatitis
- more common in men than in women

Treatment

- Topical steroid : Hydrocortisone(Cortate) and Betamethasone(Del-Beta)
- Topical Calcineurin inhibitor : Tacrolimus(Protopic) and Pimecrolimus(Elidel)
- Ketoconazole(Ketodem)
- Do not wash the areas where you applied this medicine for at least 3 hours after you apply it.
- This medicine is flammable. Do not use it near heat, an open flame, or while smoking. Do not puncture, break, or burn the foam can.

The most common side - effects were burning, itching, erythema, and dryness in all treatment groups.

Tinea Pedis- Athlete's Foot Infection

Definition

- It is a fungal infection of the feet that is easily spread and difficult to get rid of.

Clinical features

- Dermatitis
- Peeling
- Maceration
- Fissuring



<http://medicalpicturesinfo.com/wpcontent/uploads/2011/10/Tinea-Pedis-2.jpg>
<http://www.dartmouth.edu/~thabif/weeklyClinic082701/Images/13TineaPedisAcute.jpg>

Treatment

• Terbinafine (Lamisil)

- treat infections caused by a fungus. It works by killing the fungus or preventing its growth.
- high fungicidal potency of the drug
- ability to form a depot in the upper skin layer
- apply once daily (1 week)
- Can cause Itching, rash, swelling, blisters, or redness

About 15% of the world population have fungal infections of the feet between the toes and on the soles, heels, and sides of the foot

The infection can spread to other sites including the nails



Role of Dental Hygienists



- ◉ Fungal infections are commonly presented in oral mucous membranes but also infects other parts of body. However, we are the dental health providers who need to pay more attention to oral disease.
- ◉ When cleaning interproximal area, for example by using a dental floss, it is important to avoid injuring the mucous membrane lining of the mouth. It is because food deposits and remaining particles allow inflammation to develop or fungus to grow.
- ◉ If patient wears denture, different factors may influence the likelihood of a fungal infection, for example: poor fit, unsmooth surfaces, food deposits. This means it is important to clean and adjust the dentures regularly, for example with a toothbrush and a special cleaning solution.
- ◉ It is important to teach patients to keep their mouth hydrated by drinking water regularly, especially to the patients whom eat and drink very little, in order to prevent inflammations from developing and fungus from growing.

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