

## Topical medication: Drug for Skin

- Numerous topical anti-infective products are available to your patients over-the-counter (OTC) or by prescription in the form of ointment or cream.
- Antifungal: Ketoconazole, clotrimazole, miconazole, Terbinafine, nystatin
- Antiviral: Acyclovir
- Antibacterial: neomycin, polymyxin, silver sulphadiazine, mupirocin, bacitracin, polymyxin, gentamycin
- Antiseptic: hydrogen peroxide, povidine iodine
- Antiinflammatory
- glucocorticoids- Betamethasone, dexamethasone, triamcinolone, clobetasone
- NSAIDs- diclofenac

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## Eye medication

- Most Eye Medications are in the form of an eye drop or an ointment to treat eye disorders (such as glaucoma, conjunctivitis, and injuries)
- Eye drops are more common, but ointments may last longer, provide more lubrication, or be easier to administer in some cases.
- Ocular drugs are almost always used for their local effects.

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## TYPES OF EYE MEDICATIONS

- **Antibiotics-** gentamicin, tobramycin, ofloxacin, chloramphenicol, ciprofloxacin
- **Antivirals-** acyclovir
- **anti-inflammatory-** NSAIDs (Flurbiprofen), Corticosteroid (dexamethosone, Beclomethasone)
- **anti-allergy medications-** antihistamines (Azelastine), mast cell stabilizer (cromolyn)
- **Artificial tear and lubricant** (hydroxy ethylcellulose)
- **glaucoma medications**

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## Glaucoma Treatment

- Glaucoma is a condition that causes intraocular pressure (IOP) to increase and can lead to permanent blindness.
- Most treatments for glaucoma are designed to lower and/or control intraocular pressure which can damage the optic nerve that transmits visual information to the brain.
- These lower pressure by *decreasing the amount of fluid produced in the eye, by increasing the amount of fluid exiting through the eye's natural drain, or by providing additional pathways for fluid to leave the eye*

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## Medical Management of Glaucoma

1. Beta-adrenergic Antagonists (Beta Blockers): Timolol, Betaxolol
2. Parasympathomimetics (miotic agent): pilocarpine, carbachol
3. Carbonic Anhydrase Inhibitors (CAI): Dorzolamide, Acetazolamide
4.  $\alpha_2$  Adrenergic Agonists: Brimonide
5. Prostaglandin Analogues: Latanoprost, Bimatoprost
6. Combined Medications (Timolol + Brimonidine)
7. Hyperosmotic Agents
  - a) Oral: glycerin and isosorbide
  - b) iv: mannitol and urea

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## According to MOA

- Increase outflow- PG analogue, miotic
- Reduce production- beta blocker, carbonic anhydrase inhibitors,
- Both- alpha 2 agonist

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## Drugs for ear

- **Ear drops** are a form of medicine used to treat or prevent ear infections, especially infections of the outer ear and ear canal
- The common ear problems are inflammation of the ear, infection, impacted cerumen and ear pain.

### Types of ear medication

- ✓ Anti-inflammatory medication
- ✓ Anti-infective medication
- ✓ Cerumenolytic medications
- ✓ Anesthetic medication

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## **Anti-inflammatory medication**

- These are the medication used to reduce inflammation of the ear by reducing edema and deposition of fibrin in the external ear.
- Clinical use: to decrease external ear inflammation.
- Commonly used drugs : hydrocortisone acetate, dexamethasone sodium phosphate

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## Anti-infective medication

- These are the drugs to clear gram-negative and gram-positive infection, and fungal infections of the ear.
- Use: to treat infections of the external auditory canal and middle ear infection.
- Drugs used:
  - ✓ **chloramphenicol and Neosporin** otic drops for bacterial infection,
  - ✓ **miconazole, clotrimazole and fluconazole** otic drops for fungal infection.

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## Cerumenolytic medications

- Cerumen is the soft brownish-yellow wax secreted by glands in the auditory canal of the external ear.
- Nontechnical name **earwax**
- These drugs prevent cerumen accumulation and emulsify hardened, impacted cerumen.
- Use: to prevent cerumen accumulation and remove impacted cerumen in the external auditory canal.
- Drugs used: **triethanolamine polypeptide oleate and carbamide peroxide**

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### **Anesthetic medication**

- These medications block nerve conduction.
- Use: to temporarily relieve ear pain.
- Common drug: **benzocaine** eardrops.

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### **Drug used in Leprosy**

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## Leprosy

- is a chronic granulomatous infection caused by mycobacterium leprae, which is a slow growing intracellular bacillus that infiltrates the skin, the peripheral nerves, the nasal and other mucosa and the eyes.
- M leprae was discovered by Dr. Hansen in 1873 in Norway. Hence also called Hansen's disease.
- Transmission through nasal mucosa or minor skin abrasion.
- Clinical Feature: variety of skin lesions and peripheral nerve trunk damage which lead to anaesthesia and paralysis

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## classification

S. No.	Characteristic	PB (Pauci bacillary)	MB (Multi bacillary)
1	Skin lesions	1 – 5 lesions	6 and above
2	Peripheral nerve involvement	No nerve / only one nerve with or without 1 to 5 lesions	More than one nerve irrespective of number of skin lesions
3	Skin smear	Negative at all sites	Positive at any site

**Note:** If skin smear is positive irrespective of number of skin and nerve lesions, the disease is classified as MB leprosy but if skin smear is negative it is classified on the basis of the number of skin and nerve lesions.

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## Antileprotic Drugs

- Sulfone: Dapsone
- Phenazine derivative: Clofazimine
- Antitubercular: Rifampicin
- Other antibiotics: Ofloxacin, Minocycline, clarithromycin

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## Dapsone [diamino diphenyl sulfone (DDS)]

- Oldest, cheapest and most effective
- Dapsone was first studied as an antibiotic in 1937.
- Its use for leprosy began in 1945.
- is an antibiotic commonly used in combination with rifampicin and clofazimine for the treatment of leprosy.
- **MOA:** Chemical related to sulfonamides- inhibits folate synthetase thus prevents the formation of tetrahydrofolate from PABA.
- against *M leprae* at lower doses.
- Resistance may develop if used as monotherapy and first noted in 1964.

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## Therapeutic Uses

- Leprosy
- Chloroquine resistant malaria (in combination with Pyrimethamine)
- Other bacteria's who are sensitive to sulfonamides.

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## Adverse effects

- Mild haemolytic anemia
- Nausea
- Anorexia
- Headache
- Fever
- Mental symptoms
- Allergic rashes
- Photo toxicity
- Hepatitis

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## Contraindications

- Hypersensitivity
- Sever anemia (less than 7 Hb)
- G6PD

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## Clofazimine

- It is a dye with leprostatic and anti-inflammatory properties.
- **MOA:** works by binding to the guanine bases of bacterial DNA, thereby blocking the template function of the DNA and inhibiting bacterial proliferation.
- It also increases activity of bacterial phospholipase A2, leading to release and accumulation of lysophospholipids, which are toxic and inhibit bacterial proliferation.
- Antiinflammatory effects: due to inhibition of macrophages, T cells , neutrophils. Because of it is **anti-inflammatory property**, it is valuable in lepra reactions.
- used together with rifampicin and dapsone to treat leprosy. It is specifically used for **multi bacillary leprosy**.

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## Adverse Effects

- Reddish black discoloration of skin.
- Discoloration of hair
- Dryness and itching of skin
- Acne
- Photo toxicity
- Conjunctival pigmentation
- Loose stool
- Nausea
- Abdominal pain
- Anorexia
- Weight loss

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## Caution

- Clofazimine is to be avoided during early pregnancy and in patients with liver or kidney damage.

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## Rifampin

- It is important antitubercular drug and bactericidal to *M. Leprae*.
- Upto 99.999% *M. Leprae* are killed in 3-7 days, however it is not satisfactory if used alone, some bacilli persist even after prolonged treatment- resistance develops.
- It has been included in the multi drug therapy of leprosy.

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### MOA

- Rifampicin binds strongly to the  $\beta$ -subunit of *DNA-dependent RNA polymerase* and thereby inhibits RNA synthesis from DNA and kill the bacteria.

### Adverse effect

- Hepatitis; jaundice
- Nausea, vomiting abdominal pain
- Flu- syndrome: fever, headaches, malaise
- *Urine and secretion may be orange-red color* → harmless

It should not be given to patients with **hepatic** or renal **dysfunction**.

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## Other Antibiotics

- Ofloxacin
- Gatifloxacin
- Sparfloxacin
- Minocycline
- Clarithromycin

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## Ofloxacin

- Many trials have evaluated ofloxacin as a component of MDT and found it to hasten the bacteriological and clinical response.
- Over 99.9% bacilli were found to be killed by 22 daily doses of ofloxacin monotherapy.
- It is used in case of **rifampin** cannot be used or to shorten the duration of treatment.
- Dose: 400mg per day.

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## Minocycline

- is a broad spectrum tetracycline antibiotic .
- Minocycline has high lipophilicity and active against *M. Leprae*.
- Its antibacterial activity is less than the rifampin.
- Used intolerance to **clofazimine**.
- It is included multiple Drug Therapy.

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## Multiple drug therapy of leprosy (MDT)

- MDT is a key element for cure.
- MDT is provided in convenient-to-use blister calendar packs (BCPs) with medicine for four weeks or 28 days, which is loosely referred to as one month.
- BCPs for PB leprosy contain two medicines (Rifampicin and dapsone) and that for MB leprosy contain three medicines (Dapsone, Clofazimine and Rifampicin).

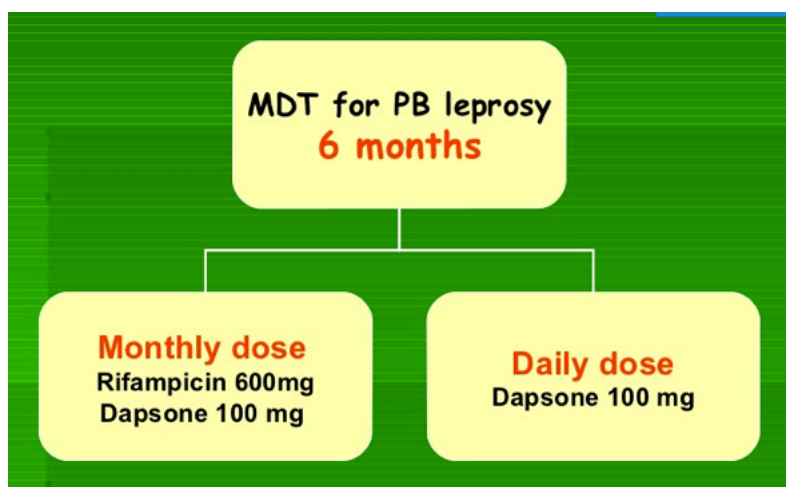
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## Advantages of MDT

- Effective in cases with primary dapsone resistance
- Prevent emergence of resistance
- Quick symptomatic relief
- Reduces total duration of therapy
- Highly effective with reduced relapse and good patient compliance.
- Available in blister pack; easy to dispense, store and take.

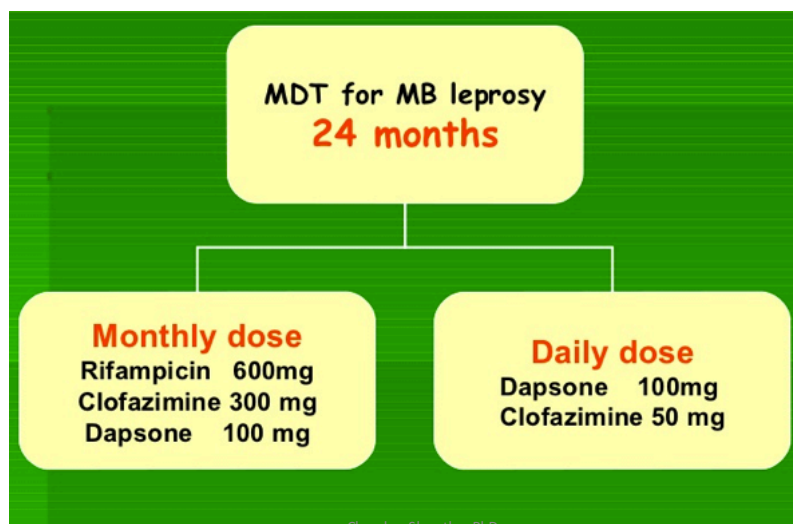
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## MDT for PB leprosy



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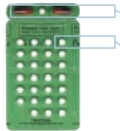
## MDT for MB leprosy



## MDT Regimens

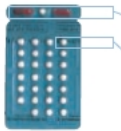
Each blister pack contains treatment for 4 weeks.

It is crucial that patients understand which drugs they have to take once a month and which every day.



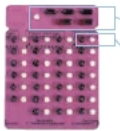
**PB adult treatment:**  
Once a month: Day 1  
– 2 capsules of rifampicin (300 mg X 2)  
– 1 tablet of dapsone (100 mg)  
Once a day: Days 2–28  
– 1 tablet of dapsone (100 mg)  
Full course: 6 blister packs

**PB adult blister pack**



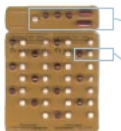
**PB child treatment (10–14 years):**  
Once a month: Day 1  
– 2 capsules of rifampicin (300 mg+150 mg)  
– 1 tablet of dapsone (50 mg)  
Once a day: Days 2–28  
– 1 tablet of dapsone (50 mg)  
Full course: 6 blister packs  
For children younger than 10, the dose must be adjusted according to body weight.

**PB child blister pack**



**MB adult treatment:**  
Once a month: Day 1  
– 2 capsules of rifampicin (300 mg X 2)  
– 3 capsules of clofazimine (100mg X 3)  
– 1 tablet of dapsone (100 mg)  
Once a day: Days 2–28  
– 1 capsule of clofazimine (50 mg)  
– 1 tablet of dapsone (100 mg)  
Full course: 12 blister packs

**MB adult blister pack**



**MB child treatment (10–14 years):**  
Once a month: Day 1  
– 2 capsules of rifampicin (300 mg+150 mg)  
– 3 capsules of clofazimine (50 mg X 3)  
– 1 tablet of dapsone (50 mg)  
Once a day: Days 2–28  
– 1 capsule of clofazimine every other day (50 mg)  
– 1 tablet of dapsone (50 mg)  
Full course: 12 blister packs  
For children younger than 10, the dose must be adjusted according to body weight.

**MB child blister pack**

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## Lepra Reaction

- Reactions occur due to abrupt change in immunological response of the body against *M. leprae*.
- occur in up to 25% of patients with PB leprosy and as much as 40% in MB leprosy.
- Clinical indications of a reaction are nerve pain, loss of sensation and loss of function— may rapidly cause severe and irreversible nerve damage.
- Lepra reaction can develop at anytime, at
  - ✓ Onset of the disease / before starting the treatment
  - ✓ During treatment
  - ✓ After completion of the treatment

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Signs	Type 1	Type 2
<b>Type of reaction</b>	Cell mediated Delayed Hypersensitivity	Antigen antibody (Immune complex), reaction
<b>Inflammation of the skin</b>	Skin lesions suddenly becomes reddish, swollen, warm, painful/ tender but the rest of the skin is normal, “fresh” lesions may be noticed	Red, painful, tender, cutaneous/subcutaneous nodules appear (not associated with leprosy patches). ENL may appear commonly on face, extensor surfaces of arms and legs.
<b>Nerve involvement</b>	Nerves close to skin may be enlarged, tender and painful (neuritis) with loss of nerve function (loss of sensation and muscle weakness) and may appear suddenly / rapidly	Nerves may be affected
<b>General condition (Constitutional symptoms)</b>	Good, with little or no fever or other constitutional symptoms	Poor, with prominent fever and general malaise
<b>Eye involvement</b>	Weakness of eyelid muscles leading to incomplete closure may occur (nerve involved)	Internal eye disease (iritis, iridocyclitis) occurs, lepromatous nodules are seen.
<b>Other Organs/Tissues</b>	Not affected	May be affected

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## Treatment of Lepra reaction

### Type I

- They are delayed hypersensitivity reactions and may occur in both PB leprosy and MB leprosy.
- Mild, no evidence of neuritis (pain, loss of sensation or function)- analgesics (Paracetamol)
- Involvement of nerve: analgesics and corticosteroids.

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## Treatment of Lepra reaction

### Type II

- They are an antibody response or immune complex response to *M. leprae* occur only in multibacillary leprosy.
- Therapy for type 2 reactions may include analgesics, such as acetylsalicylic acid or paracetamol, and corticosteroids, such as oral prednisolone.
- In patients with severe type 2 reactions, who do not respond to corticosteroids or in whom corticosteroids are contraindicated, **clofazimine** at high doses or thalidomide may be used under close medical supervision.

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## ROM therapy

- Include 3 drugs- **R**: Rifampicin (600mg), **O**: Ofloxacin (400mg) and **M**: Minocycline (100mg).
- A combination of rifampicin, ofloxacin and minocycline is one of the newer recommendations for treatment of leprosy.