

Skin Pharmacology

Dr. Alia Shatanawi

Done By : Raneem M AL-Snaid

Dermatologic Pharmacology

Variables affecting Pharmacologic Response:

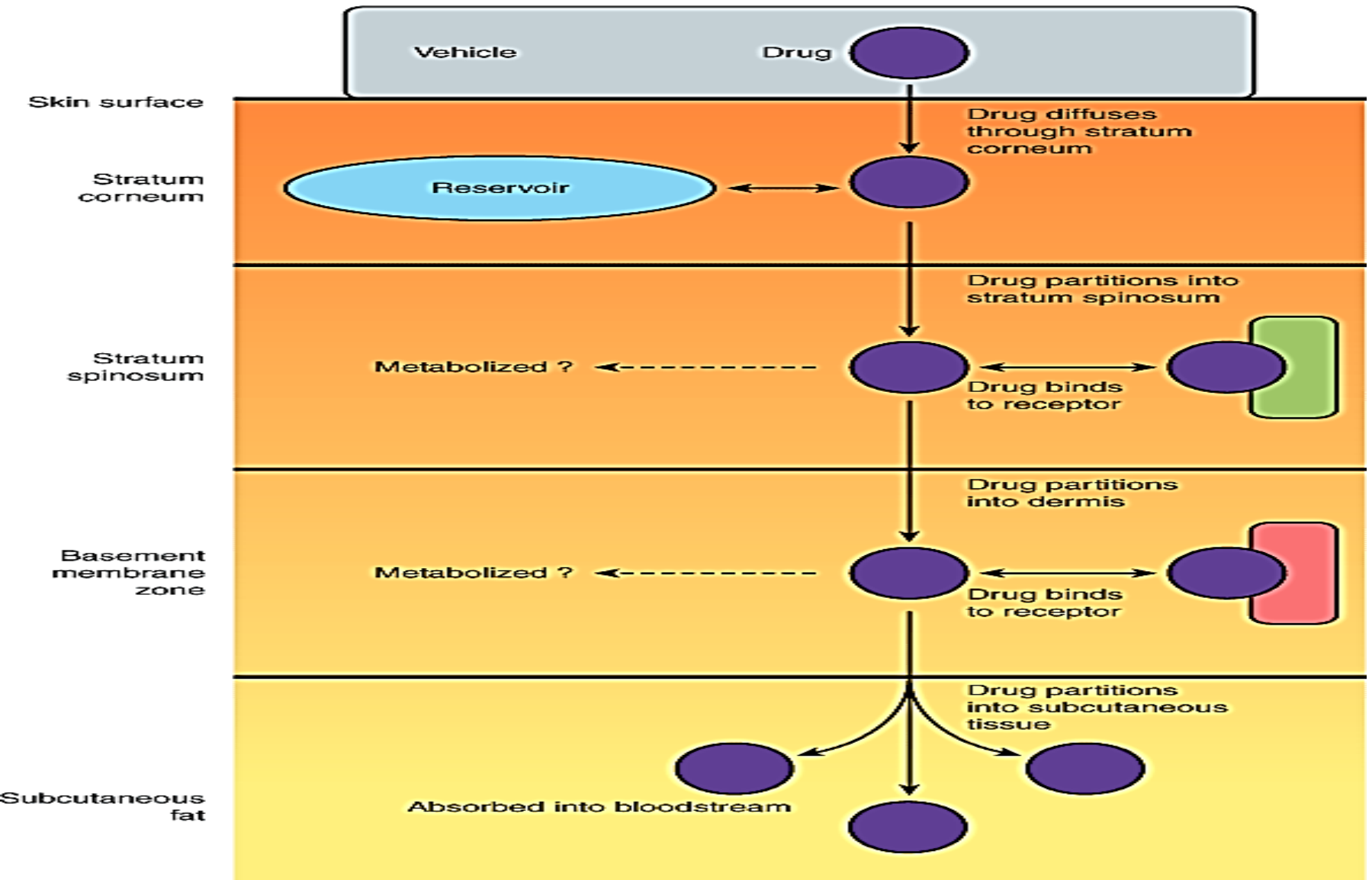
Regional variation in drug penetration.

Concentration gradient.

Dosing schedule.

Vehicles and occlusion.

Percutaneous Absorption.



Dermatologic Formulations

- **Tinctures.**
- **Wet dressings.**
- **Lotions.**
- **Gels.**
- **Powders.**
- **Pastes.**
- **Creams.**
- **Ointments.**

Adverse Effects of Dermatologic Preparations

- **Burning or stinging sensation.**
- **Drying and irritation**
- **Pruritus.**
- **Erythema.**
- **Sensitization.**
- **Staining**
- **Superficial erosion.**

TABLE 61-1

Local cutaneous reactions to topical medications.

Reaction type	Mechanism	Comment
Irritation	Non-allergic	Most common local reaction
Photoirritation	Non-allergic	Phototoxicity; usually requires UVA exposure
Allergic contact dermatitis	Allergic	Type IV delayed hypersensitivity
Photoallergic contact dermatitis	Allergic	Type IV delayed hypersensitivity; usually requires UVA exposure
Immunologic contact urticaria	Allergic	IgE-mediated type I immediate hypersensitivity; may result in anaphylaxis
Non-immunologic contact urticaria	Non-allergic	Most common contact urticaria; occurs without prior sensitization

Topical Antibacterial Agents

- Gram-positive bacteria

- Bacitracin
- Gramicidin

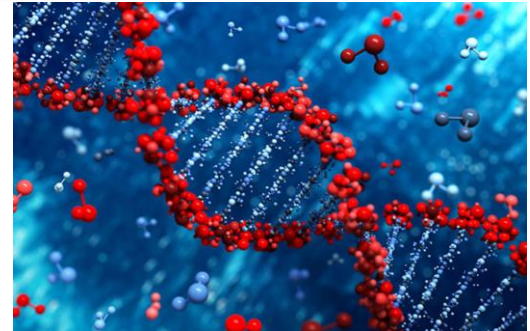


بقر
وحليب البقر مفيد في كثير من الصناعات
لذا يُعتبر **POSTIVE**

- Gram-negative bacteria

- Polymyxin B Sulfate
- Neomycin
- Genatamicin

جين متعدد جديد
حدوث طفرة بالجين رح ينعكس
سلبا لذا يُعتبر **NEGATIVE**



BACITRACIN

- Active against streptococci, pneumococci, and staphylococci
- Also , most anaerobic cocci, neisseriae, tetanus bacilli, and diphtheria bacilli are sensitive.
- MOA???

- Side effects: Toxicity ???

Allergic contact dermatitis occurs frequently, and immunologic allergic contact urticaria rarely. Bacitracin is poorly absorbed through the skin, so systemic toxicity is rare.





- Frequently used in combination with other agents (polymyxin B and neomycin)
- Form: creams, ointments, and aerosol preparations
- Usually Antiinflammatory agents added
 - (Hydrocortisone)

GRAMICIDIN

- **Only for topical use, in combination with other antibiotics such as neomycin, polymyxin, bacitracin, and nystatin**
- **MOA??**
- **Hemolysis**

POLYMYXIN B SULFATE

Kb + 2E(Entero + Escher..)

- gram-negative : **Pseudomonas aeruginosa**, **Escherichia coli**, **enterobacter**, and **klebsiella**.
- **Proteus** and **serratia** are resistant, as are all gram-positive organisms.

• احذر عدوك مرة واحذر صديقك الف مرة (بروتوس وسارة)

• يعني **PROTEUS & SERRATIA** عندهم مقاومة لهذا الدواء وبدايتهم نفس أول حرف من كل مقطع باسم الدواء (المقاومة من نفس أحرف الدواء)

- Side effects: total daily dose applied to denuded skin or open wounds should not exceed 200 mg in order to reduce the likelihood of toxicity “neurotoxicity and nephrotoxicity”
 - Allergic contact dermatitis NOT common.

NEOMYCIN & GENTAMICIN

Neomycin

- Aminoglycoside antibiotics
- gram-negative :E coli, proteus, klebsiella, and enterobacter.
- SE: allergic contact dermatitis

- **G**entamicin generally shows **greater activity** against **P** aeruginosa than neomycin.
- Gentamicin **more active** against **staphylococci** and **group A** β -hemolytic streptococci.
- **Be careful with systemic toxicity :**
esp in renal failure
- **Hospital acquired resistant**

أول حرف **G** GREAT = **G**
يعني إله نشاط كبير ضد هاي الانواع من
البكتيريا



Topical Antibacterials in Acne

- **Clindamycin.**
- **Erythromycin.**
- **Metronidazole: rosacea**
- **Sodium sulfacetamide.**
- **Dapsone**

Clindamycin

- **10% absorbed, so, possibility of *Pseudomembranous colitis***
- The hydroalcoholic vehicle and foam formulation (Evoclin)may cause drying and irritation of the skin, with complaints of burning and stinging.
- The water-based gel and lotion formulations..... well tolerated and less likely to cause irritation. *Allergic contact dermatitis is uncommon.*
- Clindamycin is also available in fixed-combination topical gels with benzoyl peroxide (Acanya, BenzaClin, Duac), and with tretinoin (Ziana).

Metronidazole

- Effective in the treatment of rosacea.
- The mechanism of action is unknown, but it may relate to the inhibitory effects of metronidazole on *Demodex brevis*; This drug may act as an anti-inflammatory agent by direct effect on neutrophil cellular function
- Adverse local effects include dryness, burning, and stinging.
- Less drying formulations may be better tolerated (MetroCream, MetroLotion, and Noritate cream).
- Caution should be exercised when applying metronidazole near the eyes to avoid excessive tearing.

Erythromycin

- In topical preparations, erythromycin base rather than a salt is used to facilitate penetration
- One of the possible complications of topical therapy is the development of antibiotic-resistant strains of organisms, including staphylococci
- Adverse local reactions to erythromycin solution may include a burning sensation at the time of application and drying and irritation of the skin
- Erythromycin is also available in a fixed combination preparation with benzoyl peroxide (Benzamycin) for topical treatment of acne vulgaris.

Topical Antifungal Agents

- **Azole Derivatives:**

- Clotrimazole

- Econazole.

- Ketoconazole.

- Miconazole.

- Oxiconazole.

- Sulconazole.

- Activity against dermatophytes (*epidermophyton*, *microsporum*, and *trichophyton*) and yeasts, including *Candida albicans* and *Pityrosporum orbiculare*.

Topical Antifungal Agents

- Ciclopirox **Olamine**. أغنية دق الماني
- Naftifine and **Terbinafine**. نפט في التراب
- Tolnaftate. طولنا فتفوتة 

مرة ثنين طلعو رحلة في البكم ومشغلين أغنية دق الماني ، ووقفوا شوي عالطريق عشان يشربو مي (Ampho) ولقوا نפט بالتراب فطولوا لما روحوا . نعتبر أنه جو الرحلة استوائى **TROPICAL** اذن هذه الادوية **TOPICAL**



Topical Antifungal Agents

الماء يُعتبر أمفوتيري وبالتالي احتمالية أنه يكون حمض أو قاعدة 50% (نص = NYS)

50%



- **Nystatin and Amphotericin B:**
 - Only for *Candida albicans*.
 - Available as topical preparations, oral suspension, or vaginal tablets

Tinea Versicolor



Oral Antifungal Agents

- **Azole Derivatives:**
 - **Fluconazole.**
 - **Itraconazole.**
 - **Ketoconazole.**
 - **Affect the permeability of fungal cell membrane through alteration of sterol synthesis.**
 - **Effective in systemic mycosis, mucocutaneous candidiasis, and other cutaneous infections.**
 - **Might have systemic side effects: hepatitis and liver enzyme elevations, and interactions.**

Oral Antifungal Agents



- Azole Derivatives.
 - **Griseofulvin:**
 - Effective against *epidermophyton, microsporum, and trichophyton*.
 - Requires prolonged treatment:
 - 4-6 weeks for the scalp.
 - 6 months for fingernails.
 - 8-18 months for toenails.
 - Has many side effects.
- ORAL الغرس (نبات) في التراب ونأكل الثمار بالفم إذن
- **Terbinafine:**
 - Recommended for *onchomycosis*.
 - 6 weeks for fingernails.
 - 12 weeks for toenails.

NYSTATIN & AMPHOTERICIN B

- **Topical therapy of C albicans infections but ineffective against dermatophytes.**
- **Cutaneous and mucosal candida infections**
- **Amphotericin B : broader antifungal**
intravenously in the treatment of many systemic mycoses and to a lesser extent in the treatment of cutaneous candida infections.
- **Toxicity with systemic administration**

Topical Antiviral Agents

- Acyclovir.
- Valacyclovir.
- Penciclovir.
- Famciclovir.
 - Synthetic **guanine** analogs with inhibitory activity against herpes viruses.
 - Ointments and creams are useful for recurrent orolabial herpes simplex infection

Immunomodulators

- **Imiquimod:** للحفاظ نفس بداية العنوان
- Stimulates peripheral mononuclear cells to release interferon- α and to stimulate macrophages to produce interleukins-1,-6, and -8 and tumor necrosis factor- α .
- Uses:
 - For external genital and perianal warts.
 - Actinic keratosis on the face and scalp.
 - Primary basal cell carcinoma.
- **Tacrolimus.**
- **Pimecrolimus.**
 - Useful for atopic dermatitis.
 - Inhibit T-lymphocyte activation and prevent release of inflammatory cytokines and mast cell mediators
 - (**Black box warning**)

β

لحفظ آخر دوائين :
تذكر كلمة بيتا والبيت يكون شكله مثل ال BOX
اذن هذه الادوية يكون عليها تحذير (BLACK BOX)



Ectoparasiticides

- **Permethrin:**
 - Toxic to *Pediculus humanus*, *Pthirus pubis*, and *Sarcoptes scabiei*
 - Pediculosis: cream applied for **10 minutes** and then rinsed off with warm water.
 - Scabies: cream applied for the whole body for **8-14 hours**.
- **Lindane (Hexachlorocyclohexane):**
 - 10% absorbed and concentrated in fatty tissues.
 - Can cause neurotoxicity and hematoxicity

- **Crotamiton.**

- **Sulfur.**

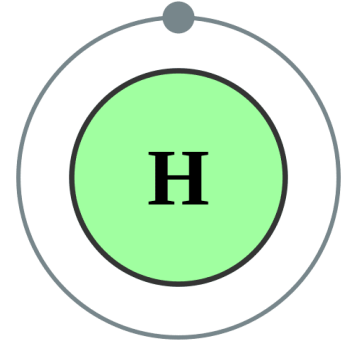
- **Malathion.**

ليندا مريضة مصابة بأحد الطفيليات اذن هذه الادوية ل Ectoparasiticides
ما لازم Malathion
تسافر (تقريبا نفس لفظ SULFUR = سفر)
وما أخذت كرت جمعها كروت (CROT)
إذن (PERMETION) بالسفر (الفيزا)
كرت الاذن (الفيزا)

Agents affecting Pigmentation

- **Hydroquinone.**

تحتوي ذرة الهيدروجين (HYDRO)
على بروتون واحد (MONO)



- **Monobenzene.**

- Monobenzene may be toxic to melanocytes resulting in permanent depigmentation.

- **Mequinol**

- Reduce hyperpigmentation of skin by inhibiting the enzyme tyrosinase which will interfere with biosynthesis of melanin.

Agents affecting Pigmentation

- **Trioxsalen.**
- **Methoxsalen.**

المريض الذي يكون عنده نقص بالصبغة سيكون زعلان (SALEN)
اذن هذه الادوية تنتهي بهذا المقطع
فنعطيه ميثان (Meth) ثلاثي (Tri) عشان نرجع الصبغة
اذن الميثان الثلاثي يرجع الصبغة (REPEGMENTATION)

- Are psoralens used for the repigmentation of depigmented macules of vitiligo.
- Must be photoactivated by long-wave-length ultraviolet light (320-400nm) to produce a beneficial effect.
- They intercalate with DNA.
- Can cause cataract and skin cancer.

Sunscreens and Sunshades

قعدة بالربيع تحت الشمس فيها بابا (PAPA)
واخواته (SISTERS=ESTERS)

لما تقعد تحت المظلة (مصنوعة من معدن
التيتانيوم) ما رح تتعرض لأشعة الشمس

- Sunscreens **absorb** UV light.
 - Examples are para amino benzoic acid (PABA) and its **esters**.
- Sunshades are opaque materials that **reflect light, like titanium** dioxide.
- Useful in polymorphous light eruption, lupus erythematosus, and drug –induced photosensitivity.