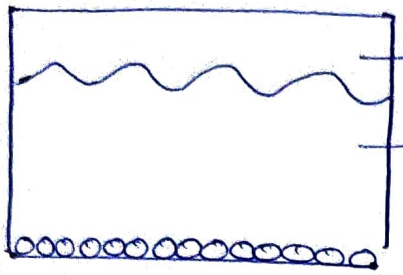
Anatomy of skin

Skin has three layers i) Epidermis : made up of stratified squamous epithelium

ii) Dermis : contain collagen / elastin fibers

iii) Subcutaneous layer / Hypodermis : made up of Fat cells.



Function : Barrier function

* Prevent the entry of pathogen / allergen or irritants
* Prevent Heatloss
* Prevent trans dermal water loss

- Largest organ
- 1.7 - 2 m^2, 4-5 kg - weight Surface area

Epidermis

Made up of cells - known as Keratinocytes

Stratum Corneum

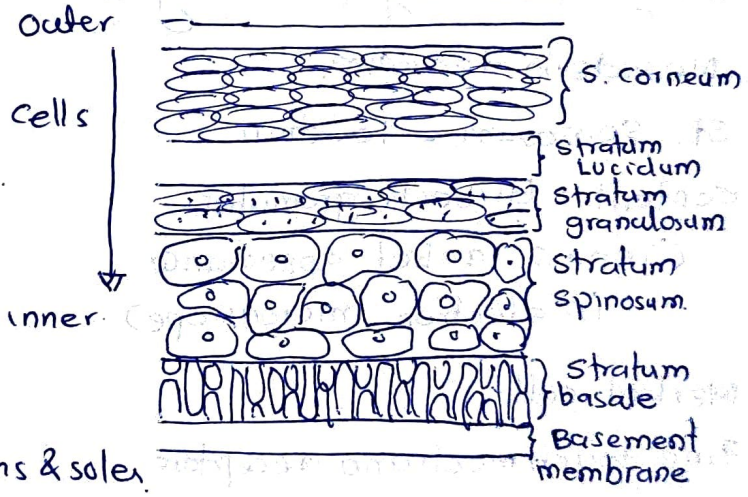
- Flattened, Anucleated cells
- a.k.a horney cell layer.
- Act as barrier

Stratum lucidum

- clear cell layer.
- mainly found in palms & soles

stratum Granulosum

- Granular cell layer.



Come Lets Get Sun Burn

Types

Keratohyaline granules

- Responsible for forming Pro Filaggrin.
- pro Filaggrin Form Filaggrin. (It's a Filament aggregating protein).

Lipid coating Granules / Lamellar granules

- Lipid ~~coat~~
- Odland bodies.

Stratum Spinosum

- ~~Prick~~ Prickle cell layers
- Desmosomes present - intra epithelial intracellular connections
  - Lies b/w epidermis
- Thickest layer of epidermis

Stratum Basale

- Most mitotically active layer.
- a.k.a. Stratum germinativum.

Cells : cells

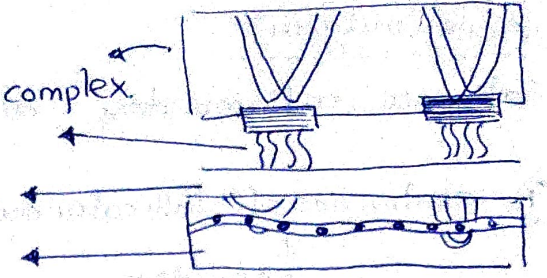
↓ Keratinocytes (90%)
- Derived from ectoderm.

↓ Non Keratinocytes
- Langerhans cells
- Melanocyte
- Merkel cell

- Langer hans cell.
  - antigen ~~producing~~ presenting cell.
  - Mesoderm derivative.
  - St. Spinosum. - location.
  - content : Birbeck granules. (Tennis racket appearance in electron micronscope)
- Merkel cell
  - Fine touch mechano receptors
  - Ectoderm
  - stratum basale - location
  - content : Neurosecretory granules
- Melanocyte :
  - Melanin (pigment producing cell)
  - Neural crest
  - St. Basale
  - content : Melanosomes

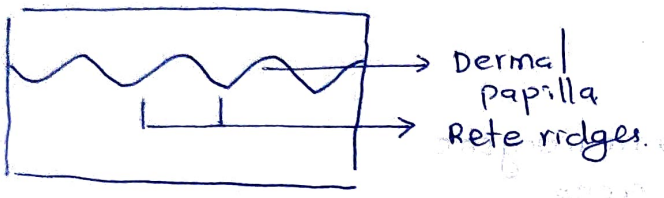
Dermo epidermal junction :

layers : 1. Hemidesmosome - KIF complex
2. Lamina lucida.
3. Lamina densa.
4. sublamina densa.



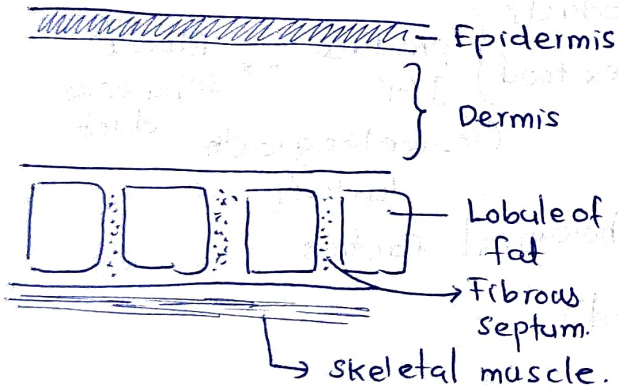
Dermis

Made up of - superficial - papillary dermis - $\frac{1}{10}^{th}$ of dermis - mainly cellular layer
- deep - Reticular dermis - $\frac{9}{10}$th of dermis - mainly contain elastin and collagen. (most abountant is type I)



Hypodermis / subcutaneous tissue

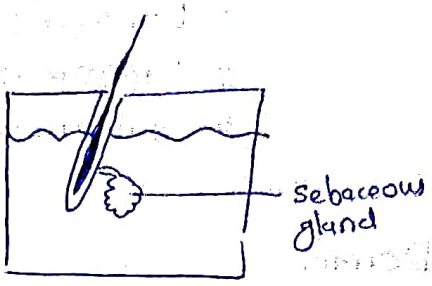
- Adipocytes or Fat cells



Papillary dermis - Upper most layer dermis, just below epidermis
- Rich in small blood vessels and contains a number of sensory receptors, including Meissners corpuscles.
↓
sensitivity to light touch.

Acne vulgaris

chronic inflammatory disease of pilosebaceous unit.



1) obstruction of follicular outflow
↓
comedone

2) Proliferation of propionibacterium acne.
↓
papule

3) Recruitment of inflammatory cells
↓
pustule

4) Rupture of hair follicle → Neurocystic acne.

Factors modifying acne:

1. climate
2. Diet : - milk and milk products
   - High glycemic index food
   } produce IGF (Insulin like growth factor) → Blocks sebaceous duct.
3. Emotional stress and psychological factors
4. Facial cosmetics (oil based)
5. Genetic predisposition
6. Hormonal factors.

Grades of Acne (PILSBURG)

1. Grade I : comedones, occasional papules
   - open → oxidation and sebum → Black comedones
   - closed → No oxidation → white comedones
2. Grade II : mainly papules
3. Grade III : mainly pustules, ~~comedones~~, ~~few pustules~~ (predominantly)
4. Grade IV : Mainly cysts, abscess, scars

Treatment

General measures
- ✓ cleansers
- ✓ water based cosemetics
- ✓ Diet.

℞. Grade I: Topical retinoids:
- Adapaline
- Tretinoin

Grade II: Topical retinoids +
Topical anthbiotics: clindamycin, Benzyl peroxide

Grade III: Topical retinoids +
Oral antibiotics: azithromycin, Doxycycline/ minocycline

Grade IV: oral retinoids: Isotretinoin
+ oral antibiotics

Fungal infection : Divided into 2 types

1. Superficial Fungal infection.
   a) Dermatophytic infection
   b) P. versicolor
   c) candrasis

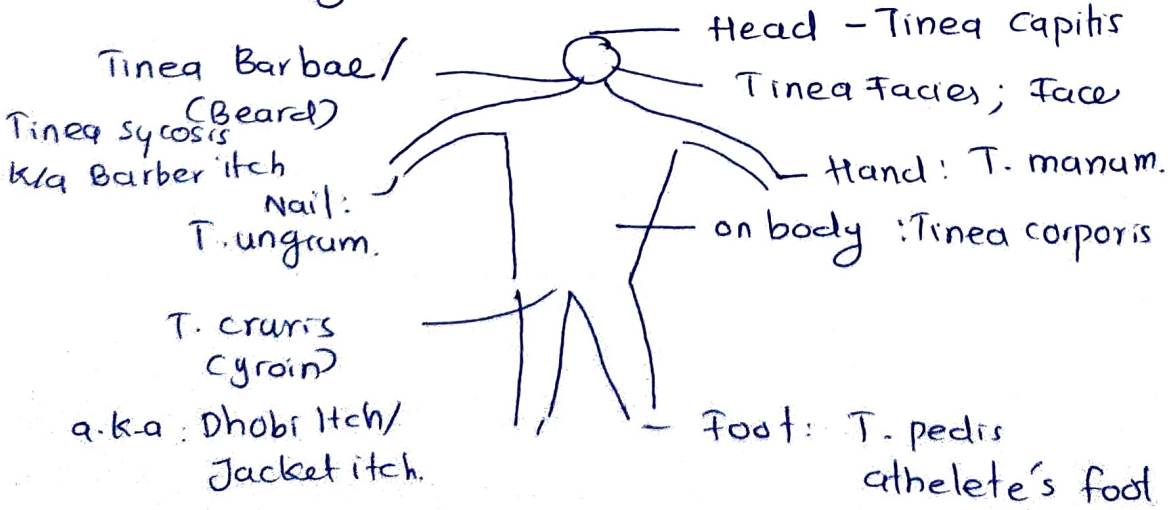
2. Deep Subcutaneous infection.
   a) Mycetoma.
   b) Sporotrichosis
   c) chromoblastomycosis

Dermatophytic : keratophilic fungus.
superficial fungal infection that involve keratinized tissue

	Skin (epidermis)	Hair	Nails
① Trichophyton	✓	✓	✓
② Microsporum	✓	✓	x
③ Epidermophyton.	✓	x	✓

Depending upon their macro conidia

1. Microsporum — Fusiform shaped macroconidia
2. ~~Trichophyton~~ Epidermophyton - club shaped macroconidia
3. Trichophyton - Pencil like



Pityriasis Versicolor

Scale — variable colour.

- caused by (Yeast) Malassezia furfur / Malassezia Globosa

- Hypo / Hyper pigmented macules with fine scaling → scratch sign / Besnier's sign.
  ↳ stimulation of melanosomes.

- Azaelic acid (hypopigmentation)

Clinical features

Multiple well defined discrete to confluent Hypo / Hyper pigmented

- KOH mount

Spaghatti and meat ball appearance or Banana & grape appearance.

- Wood's lamp
  - yellow colour flaurescence

(Malassezia sp. release pteridine molecule?

T.O.C

imidazole and selenium sulphide
↳ ketoconazole, clotrimazole.

candida infection - candidal intertrigo.

- intertriginous area
- clinical features
  - ✓ Red scaly plaque, white maceration.
  - ✓ satellite lesion - small discrete lesion.

Mucocutaneous candiasis

Etrological agent: Candida albicans.

Oral candiasis: white plaque and red plaque.

Scabies

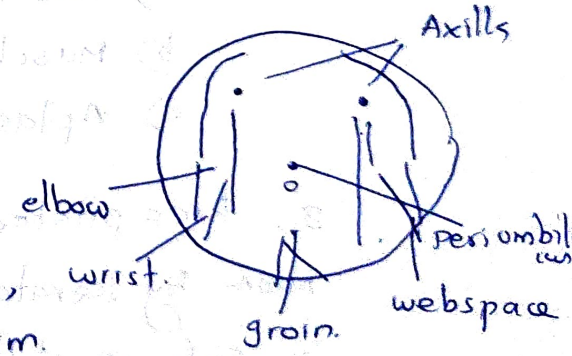
- Parasitic infection.
- a.k.a water washed disease
- caused by Sarcoptes scabie.
- Predisposing factors :
    a) Poor hygiene
    b) Low socio-economic status
    c) over-crowding.

clinical features

- Incubation period 2-4 weeks.
- Symptoms :
    a) Itching - worse at night · Nocturnal itching
    b) Family history positive

On examination.

- Burrow - Pathognomic lesion
    ✓ It is the path of parasite in St. corneum.
- Papules & vesicles
- Pustules due to secondary infection
- Nodules (penile shaft / scrotum)



Site:

- Adult · Finger web, Axilla, umbilicus, genitals, Ulnar aspect of forearm.
- face, Palm and soles are spared in adults. (Sebaceous activity → sebum have anti scabitic property.)
- In infants all the areas are involved.

Treatment

Principles:

- All family members & sexual contacts are treated → regardless of symptoms.
- cloths used in past 5 days should be washed.

Drugs:

1. Permethrin 5%
   - D.O.C
   - M.O.A - Inhibit sodium influx in parasite causing paralysis and death
     Indicated in children, adults, Pregnant, lactating female, in HIV patients.

2. Gamma Benzene - hexa chloride – Topical Lindane.
   - cholinesterase inhibitor.
   - CNS stimulant causes seizures & death of scabies.

   Side effect: systemic
   a) CNS toxicity
   b) Muscle spasm
   c) Aplastic anemia

   C/I: children, pregnant, Lactating female

3. Precipitated Sulfur (5-10%)

   M.OA- By keratolysis
   - Safe in children <2 months
     (permethrin & lindane should be avoided in infants <2 months)

4. Oral Ivermectin: Dose 200 µg/kg.
   - Inhibits GABA gated chloride channels of PNS of inveitebrates
   - Side effect: should be avoided in children <5yr or body wt <15kg as they have poor BBB.

Psoriasis

- It is non infectious chronic papulo squamous, T cell mediated skin disorder

Drug - "PLAB"

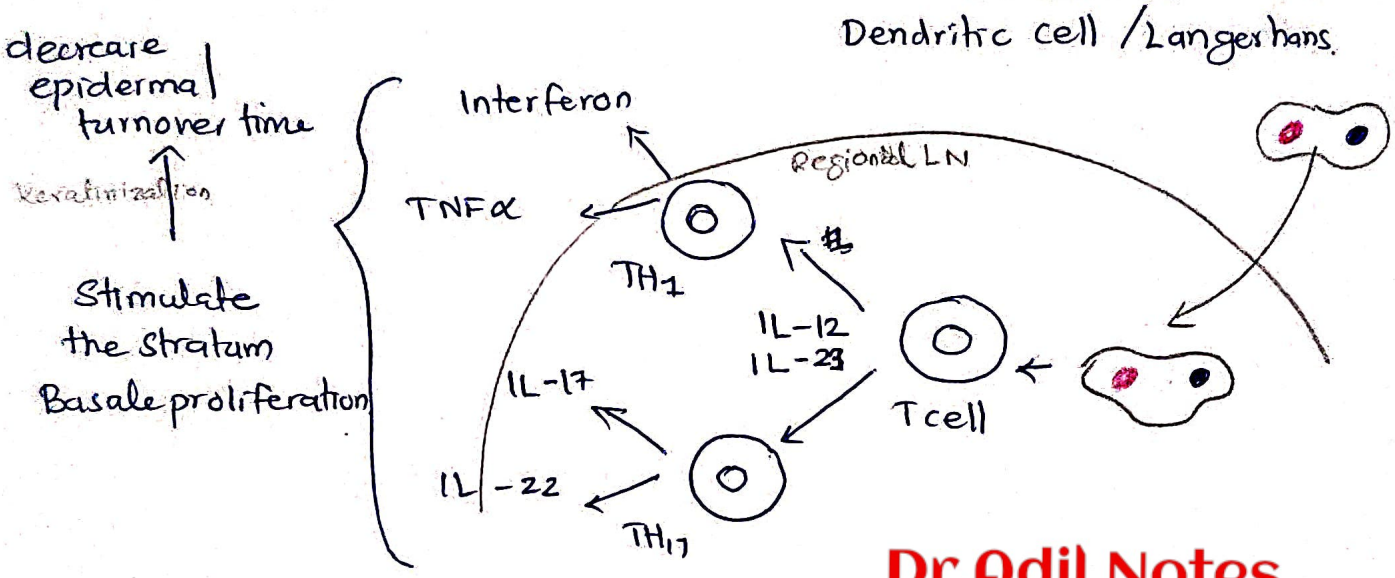
Pathogenesis
- T cell mediated chronic infection.

Trigger: Genetic Background (PSORS1 gene, HLA CW6, HLA B27)
Drugs (Painkiller NSAID, Lithium, Antimicrobial, Ace inhibitor, β blockers)
Environment (stress, ~~Chronic~~ trauma, alcohol, smoking)
Infection. (Group A β-hemolytic Streptococci - Guttate psoriasis)

} Alters cellular DNA

↓

Activation of Dendritic cell / Langerhans



clinical features:

Well defined, Erythomatous / ~~red color~~ salmon pink coloured papule, plaque a/w
- ✓ silvery micaceous scale.
- white. Hypopigmented ~~area~~ halo
- ✓ woronoff ring: surrounded the psoriatic plaque.
- ✓ mainly present on extensors (site: lower back, Palm, sole, scalp)

Types:

1) chronic plaque Psoriasis / Psoriasis Vulgaris
   C/f - well defined erythrymatous papule/pustule associated with silvery white scale.
   Location - Extensors.

2) Guttate Psoriasis

clinical feature: small sized ~~coin~~ rain droplike coin shaped lesion.

- mainly seen at Trunk >>> Extensor
- History of sorethroat → Precipitated by Group A β hemolytic streptococci
- commonly seen children > adult
- genetic factor : HLA Cw6
- Treatment : Antibiotics

3) Erythrodermic ~~e~~ Psoriasis

c/f Ill defined universally red skin with skin exfoliation.

- Precipitated by withdrawal of steroids

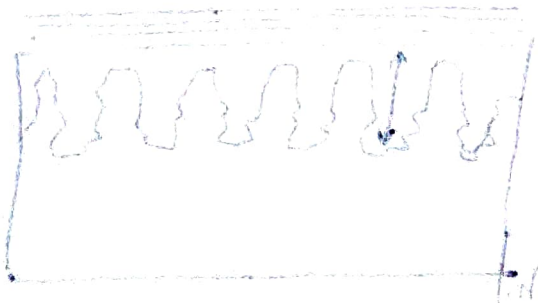
4) Pustular Psoriasis

c/f multiple discrete to confluent sterile pustules.

- precipitated by withdrawal steroids

Extrapoint:
Generalised pustular psoriasis with systemic upset (like pyrexia, Arthalgia, high PMNL)
→ known as Von Zumbush.

unstable psoriasis ~~with~~
Inpregant female →
Impetigo ~~to~~ herpetiformis



Change in nail due matrix damage

- Thimble pitting - irregular / non uniform - Most common
- Leuconychia - whitish discoluration nailplate.
- Red spot in lunula
- Nail plate crumpling
- subungal hyperkeratosis
- oil drop sign - salmon patch - most specific Pathognomic sign.
- Onycholysis - seperation of nail plate from Nailbed
- Subungal hemorrhage.

Psoriatic arthritis - HLA B27

- Moll and Wright Diagnostic criteria for PsA

① Inflammatory arthritis

② Presence of psoriasis

③ absence of serological tests for Rheumatoid factor

- Dip joint m/c involved.
- Inflammation of digit - Daclihr - sausage finger appearance.
- X-ray - Pencil in cup deformity

Histopathology

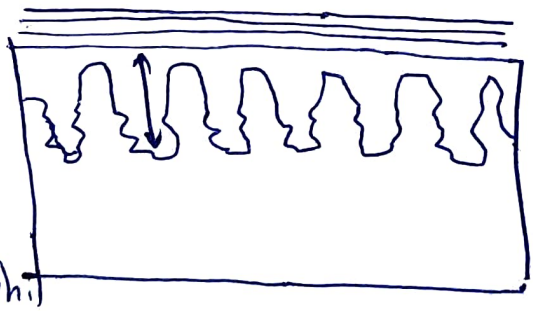
St. corneum : Hyperkeratosis (increased thinkness)
Para keratosis - Retension of nucleus.

Micro munrd abscess : collection of neutrophil

st. granulosum : Agranulosis : ~~Absent~~.

st spinosum : ~~Acanthosis~~ Acanthosis : increased thickness
Suprapapillary thinning
(Proliferation of Rete ridges / Elongation of dermal papilla)

- Dilated tortus blood vessel in dermis



- Kogoj micropustule
Collection in Neutrophil
In stratum spinosum.
- Camel foot appearance.

Auspitz sign / Grattage test -> negative in Inverse pustular Erythrodermic.

Step I: Rub the scaly plaque with a glass slide
- Exacerbation of the scale - candle wax sign

Step II : Remove the scale
- Bulkely membrane seen

Step III : Remove membrane
Pin Point bleeding spot
Auspitz sign.

Treatment of psoriasis - Autoimmune + -lymphocyte - immunosuppressive.

BSA <20% → Local - Topical.

1. Tar preparation.
2. calcipotriol (vitamine D3 analogues)
3. Anthralin.
4. Topical steroids.
5. Tazarotene (topical retinoids)

BSA >20% → Add systemic

1. PUVA.
2. retinoids (Acitretin).
3. Methotrexate.

PUVA

- Psoralene
- source of UV A

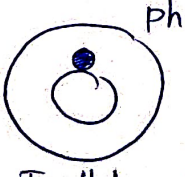
Phototherapy.

M.OA → psoralene / oral (2hr)
\ topical (30 minutes)

Narrowband

1. PUVA / NBUVB (311± 2nm)
2. Psoralen plus UVA

- side effects:
  - skin cancer
  - cataract
  - premature ageing.



Photoadducts

T cell ↓
UV light causes lysis of photoadducts
↓
T cell destroys

Lichen planus

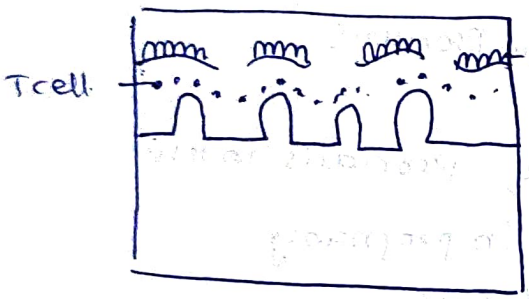
Lichen planus is a pruritic inflammatory dermatosis that is commonly assosiated with mucosal involvement.

Pathogenesis:

Autoimmune T-lymphocyte mediated disease

Triggers:
- Genetic
- Drugs (Gold, antimalarials, thaiazide, phenothiazine, NSAID, pencillamine,)
- infection (Hepatitis C)
- Heavy metals (mercury (Dental amalgam))

Inflammation in epidermis
↓
Up regulation of ICAM / VCAM
↓
collection of Tcell at D-E Junction.



- Increased proliferation of Stratum Basale → plain topped, polygonal, papule.
- Melanocyte in dermis → purple colour
- Merkel cell Stimulation → Pruritis

Initiating factor / Event (Exogenous / endogenous)
↓
Focal release of regulatory cytokines (Langherhans cells & dendritic cells)
↓
Upregulation of vascular adhesion molecule by endothelium (ICAM / VCAM)
↓
Recruitment and retention of T lymphocytes
↓
cytotoxicity & apoptosis of basal keratinocytes (Mediated by Tcell)
↓
Hyper keratosis
↓
Lichen planus.

clinical features:

- womens more effected than men
- Skin lesions: Atypical rash of lichen planus well described as 'sp.
  Plain (Flat) topped, Pruritic, polygonal, purple, papular
- Site involved: Flexor surface especially wrist, ankle, flankes, nails, scalpe, oral mucosa.
- Fine lacey white pattern on surface of lesion - Wickham's striae
- Mucosal lesions - seen in 30-70%
  site: retromolar buccal mucosa > gingiva > tongue
  - oral lesions > genital lesions
  - Reticular type (MC)

Variants of Lichen planus

- Annular LP - Annular / ring like arrangement
- Actinic LP - sunexposed
- Hypertrophic LP - due to excessive itching
- Bullous LP
- Follicular LP - Lichen planopilaris
- Linear LP

Nail changes (10) . Dorsal pterygium - Proximal nail fold extending & fusing with Nail plate

1. Pterygium (diagnostic) - most specific
2. Tenting of Nail plate - Pup tent sign
3. Onychorrhexia - longitudinal ridges with rough nail
4. Thinning - most common
5. Anychia - Absent nail plate
6. Rough Nail - Trachyonychia

Histopathology

- Hyper keratosis with out Parakeratosis - Orthokeratosis
- Irregular / wedge shaped Hypergranulosis
- Saw toothening of rete ridges

Band ~~like~~ shape collection of Tcell at D-E Junction- ~~inf~~ interface dermatitis

Apoptotic keratinocyte — colloid / cytoid / civatte bodies
Max Jospeh space
Melanophages (~~melanocyte~~ macrophage with melanin)

} 40X

Treatment of chorea

T. corticosteroids

second line - systemic steroids
retinoids & PUVA

Note:
Basal epidermal cell degeneration seen in
- Lichen planus
- Graft vs host Disease (GVHD)
- Erythema multiforme
- Discoid Lupus erythematosus

Vitiligo

- It is an autoimmune T-lymphocyte mediated damge to melanocyte
- vitiligo is an aquired disorder of skin and mucous membrane that characterized by well circumscribed / depigmented macules.
- Lesional skin biopsy show loss of melanocytes
- Approx. half of patient present before the age of 20yr.

Pathogenesis

- Auto immune hypothesis is the most widely accepted theory. & vitiligo antigen : vit 40, vit 75, vit 90
- Others: Neuro-humoral → more accepted for segmental type of vitiligo, auto-cytotoxic, oxidative stress, melanocytorrhagy.
- convergence theory: multiple factors contribute to the pathogenesis of vitiligo

clinical Features

- milky white macule
- Round-oval shape
- Scalloped margin
- Overlying hair may be depigmented (leukotrichia)

Cutaneous association in vitiligo →
- Premature grey hair
- Halo nevi
- Alopecia areata

Vitiligo
- Localized
  1. mucosal vitiligo
  2. Acral vitiligo
  3. segmental vitiligo
  4. Focal vitiligo
- Generalised
  Multiple b/l symmetrical patches >90% BSA

Classification of Vitiligo
- Segmental
- Non-segmental

- Koebner's phenomenon / Isomorphic phenomena - Present
  Trauma induced lesions
  [True Koebner's - vitiligo, Lichen planus, Psoriasis
  Pseudo - Viral wart, molluscum contagiosum,
  Auto inoculation]

Poor prognostic factor

1. Early onset (child)
2. Generalized vitiligo
3. Patches on trauma prone area (Head & neck)
4. a/w Leukotrichia
5. a/w other autoimmune conditon

Systemic association in vitiligo

- Thyroid disease
- Diabetes
- Addisons disease
- Pernicious anemia
- multiple endocrinopathy syndrome

Differential diagnosis

- Piebaldism
- Pityriasis alba
- Hansens disease
- Morphea
- Pityriasis versicolor.

Treatment

T.o.C – Topical corticosteroids

Non surgical - Topical & systemic medications, phototherapy and photo therapy, lasers

- surgical : Tissue grafts, cultured and non cultured cellular translants

- Supportive : Camouflage, psychotherapy

Treatment options for repigmentation

- Topical steroids – All types of vitiligo
- Topical PUVA – Focal/segmental
- Systemic PUVA – segmental/ generalised

Pigmentary Disorders

Hypopigmentary

Melanocyte count decreased.
- Piebaldism
- Waardenberg syndrome
- Vitiligo.

Melanocyte count normal
- Production & distribution decrease.
- Albinism
- Griscelli syndrome.

Hyperpigmentary

Melanocyte count ↑↑
- Epidermal melanin disease
  - Brown
    - Becker's Nevus
    - Lentigen.
  - Blue
    - Nevus of OTA
    - Nevus of ITO
    - Mongolian spot
- Dermal melanin disease.

Melanocyte count (N). Production ↑
- Melasma
- Freckle.

Nevus of OTA - Bluish discolouration, unilateraly distributon of trigeminal nerve.

Nevus of Ito - Bluish discolouration on the scapular region.

Mongolian spot - Bluish discolouration of the Lumbo sacral area.

Lentigen: Brown coloured macules on sunexposed area → Face.

Becker's Nevus - A brown colour patch on trunk
- a/w puberty
- a/w hypertrichosis

Melasma - Melanocyte count → normal
melanin production - increased.

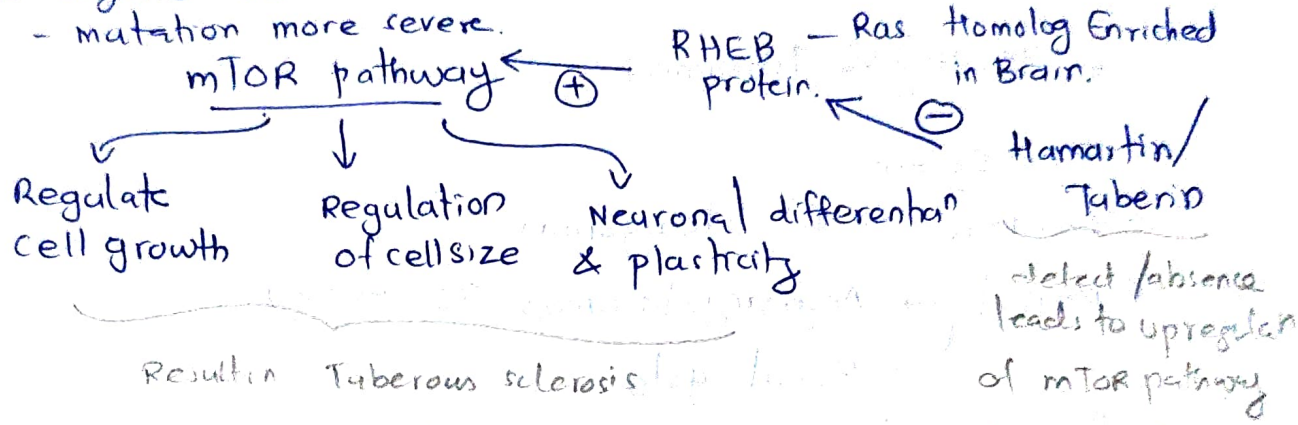
causes: Hormonal, Sun exposure, pregnancy, Hypothyroidism, certain medications

c/f: Hyperpigmented.

Types:
1. Malar
2. Mandibular
3. Centrofacial.

Tuberous sclerosis

- A.k.a Bourneville disease
- Prevalence 1 in 6000 to 1 in 10,000 live births
- Inheritance : Autosomal dominant
- Genes
  1. TSC-1 gene – on 9th chromosome – code for Hamartin. } Tumour suppressor of mTOR pathway
  2. TSC-2 gene – 16th chromo – code for tuberin
     - mutation more severe.



Clinical features

A. CNS involvement – Hallmark

Lesions → cortical tubers – Hamartomas in brain
→ subependymal lesion/Nodules
- Near lateral ventricle

- Calcify → Candle-dripping appearance
- 15-20% → SEGA (subependymal grant cell astrocytoma) → locally invasive

Neuro manifestation of TSC

- Some – Asymptomatic.
- Epilepsy – early infantile spasm
  – Focal clonic sz or Gene. myclonic epilepsy
- TAND – Tsc associated Neuropsychatric dysfunction.
  - 50% – Autistic spectrum disorder.
  - 40% – Intellectual disability – low IQ
  - Other – ADHD, Specific learning disabilities
    Depression

B: Skin involvement

- Ash-leaf Macules → woods UV lamp.
  ✓ Hypopigmented, Trunk.
- Adenoma Sebaceum – Acne like lesion

shagreen patch
Raised, rough, scaly - Lumbosacral region
"orange peel -consistency"
Confetti skin lesion - Numerous hypopigmented macules scattered over arms & legs

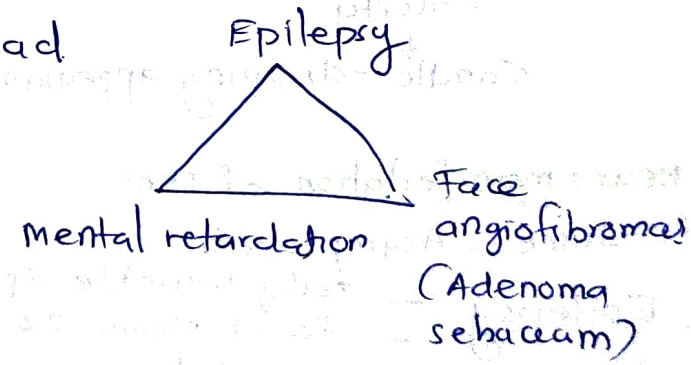
other skin lesions
- Fore head fibrous plaques : usually unilateral, raised yellow brown coloured or flesh coloured
- periungal fibromas

c. other systems
- cardiac → Rhabdomyomas
- Renal → Angiomyolipomas (75%-80%)
  → Renal cysts
- Palmonary lesion - Lymphangio leiomyomatosis.

Retinal lesions
* Hamartomas: elevated mulberry lesion or plaque like lesion.
* white pigmented patches (Retinal acromic patch)

Triad → Vogt's triad

EPILOA.



Management.
- management of SEGA - Surgery.
  surgery not possible or Asymptomatic → mTOR inhibitor - Everolimus
- mx of infantile spasm in TSC - Vigabatrin

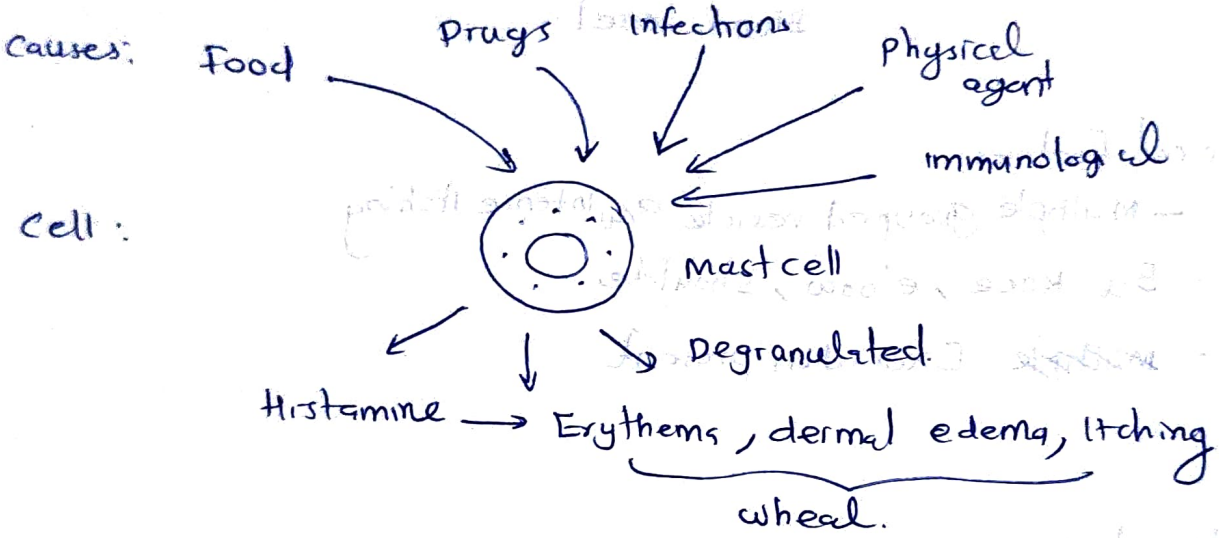
Urticaria

Urticaria is derived from Latin word uttica meaning stinging nettle.

- It's a ~~ea~~ cutaneous reaction pattern consisting of transient dermal swelling in form of wheals or angioedema.

- individual wheals are pruritic, pink or pale swelling of superficial dermis that have red flare around them, and usually subside within 24 hours

Pathogenesis



Food, Drugs, Infection, Physical agent, immunological

↓

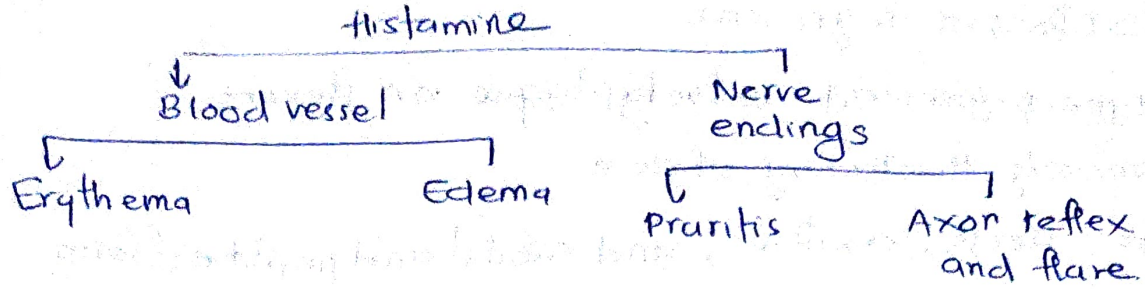
~~eee~~ causes degranulation of mastcell

↓ Histamine (mediator)

wheal.

Treatment
- Removal of triggering factors
D.O.C - antihistamines

- For ~~th~~ urticaria/ angioedema to happen, vaso dilation and plasma leakages required.
  - Most commonly this brought about by histamine (usualy mastcells)
  - But many other chemicals like sorbic acid, benzoic acid and bradykinin can also cause.



[Lewis triple response - erythema, flare, wheal]

classification and causes of ~~ut~~ Urticaria.

Acute urticaria

- duration less than 6 week.
  - infections (40%)
  - Drugs (9%)
  - Food items (1%)
  - idiopathic (50%)
    ↓
    immunological

chronic ~~ut~~ urticaria

Daily or almost daily for more than 6 weeks

- chronic spontaneous urticaria (autoimmune, pseudoallergic, infection & idiopathic)
- physical / inducible urticaria.
- Urticarial vasculitis

Treatment

general

- Rule out anaphylaxis
- Discontinue offending drugs, food, or behavior.
- offere reassurance.

modern second generation H_1 antihistamines in std dosage → 1-2 weeks

4 fold increased dosage of same antihistamine. → 2-4 weeks

add omalizumab, cyclosporin, montelukast

↓

Dapsone, methotrexate, colchicine

[Indication of steroid when respiratory is effected]

Acanthosis nigricans.

- Hyperpigmented velvety plaque on flexors.
- velvety thickening of skin.

site: Neck, axillae, and cubital and popliteal fossa.

Acanthosis nigricans

↓ Benign

↓ young patient

associated with metabolic syndrome

PCOD

DM

Hyperlipedemia

Obese

Malignant

↓ Elderly

a/w gastric carcinoma.

intraabdominal adenocarcinoma

(Acanthosis nigricans is paraneoplastic dermatosis in elderly patients)