

- **Hyperkeratosis**-increase in thickness of st, cornium occur in two forms
- **Orthokeratotic** hyperkeratosis(cells are anuclear)
- **Parakeratotic** hyperkeratosis(cells have nuclei)
- Hyperkeratosis is a feature of primary cornification.
- **Hyperplasia**-increase in the cells within epidermis most often within the st, spinosum and referred to as acanthosis.
- **Dyskeratosis**- refer to the premature keratinization of cells in the viable layer of epidermis.(cells shrunken, separated from adjacent cells, pyknotic nucleus, eosinophilic cytoplasm due to accumulation of keratin filaments-zinc responsive dermatosis, premalignant change in the development of sq cell carcinoma.

- **Acantholysis**- refer to the loss of cohesion between keratinocytes, due to breakdown of intercellular bridges via immune destruction such as pemphigus (type II cytotoxic hypersensitivity or due to neutrophilic enzymatic destruction in superficial pyoderma).

Diseases of epidermis

- **Pustular disease**-impetigo, pemphigus foliaceus, superficial bacterial infection
- **Bullas and vesicular disease**-pemphigus vulgaris, lupus erythromatosis, bullas pemphigoid, epidermalysis bullosa, viral diseases.
- **Necrotizing disease**- burns, superficial necrolytic dermatopathy, erythema multiforme, toxic epidermal necrolysis.
- **Exudative and ulcerative disease**
- **Hyperkeratotic diseases**

Dermis

- **Perivascular disease**-hypersensitivity reaction, parasitic dermatosis
- **Vascular diseases**-immune mediated vasculitis, septic vasculitis.

- **Lichenoid and interface disease**-mucocutaneous pyoderma, lupus erythromatosis, lupoid onychodystrophy, epitheliotropic lymphoma.
- Infectious nodular and diffuse disease- blastomycosis, habronemiasis

Cutaneous parasitic infections

| | |
|-----------------|---|
| Mites | Demodex, Sarcoptes, Notoedres, Otodectes, Psoroptes Chorioptes |
| Ticks | Argasid (Soft), Ixodid (Hard) |
| Lices | Mallophaga (Biting), Anoplura (Blood sucking) |
| Flies | Horn fly, Stable fly, Horse fly |
| Helminth larvae | Hookworms, Habronema, strongyloid, gnathostoma |
| Filarial | Onchocerca, parafilaria, Dirofilaria sp |
| Protozoa | Leishmania sp |

Scabies

Sarcoptes scabiei (Highly contagious mite)

- ☐ Common in dogs rare in cattle, sheep and goat.
- ☐ Mite burrow in tunnels in st.cornium and cause intense pruritis due principally to hypersensitivity reaction and from secretion
- ☐ Lesion begin on external ear, head, neck and can become generalized.
- ☐ Early lesion consist of erythematosis macules, papules, crust and excoriation (superfial perivascular dermatitis with eosinophil, mast cells and lymphocytes, Mild focal spongiosis and Small parakeratotic crusts.

Chronic

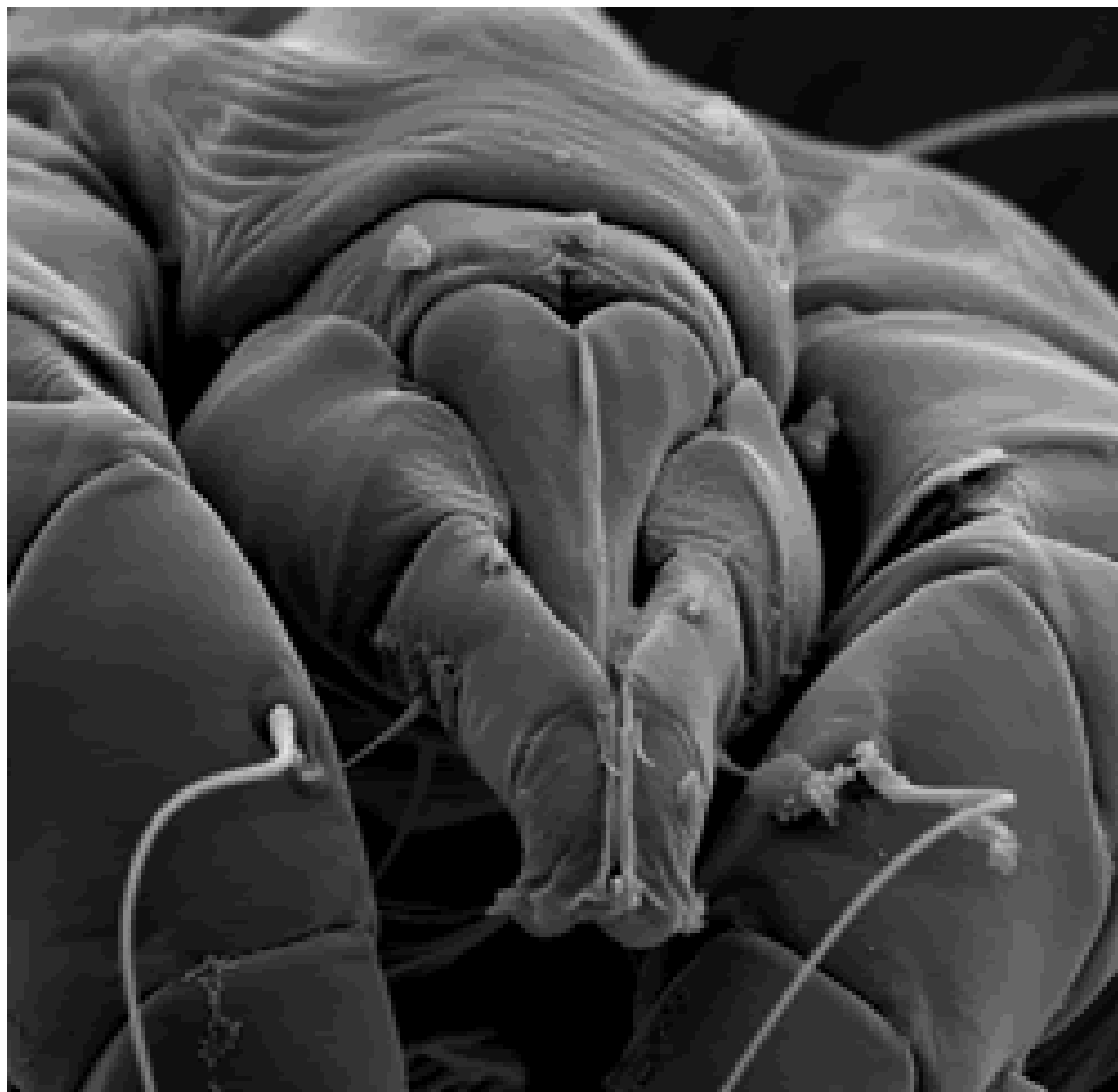
- ▶ Scaly, lichenifies and hairless
- ▶ Epidermal acanthosis with marked rete ridge formation
- ▶ Compact hyperkeratosis/parakeratosis/crusting
- ▶ Perivascular dermatitis with eosinophils
- ▶ Dermal scaring
- ▶ Mite eggs, mite or feces may be found into the st. cornium



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Photographed by the late Prof. Israel Yeruham









Cutaneous fungal infection

Superficial (limited to hair or st. cornium (*Trichosporum beigellii*

Cutaneous (limited to hair and st. cornium

Dermatophytes (*Mircosporum canis*, *M. gypseum*, *Trichophyton mentagrophytes*).

Subcutaneous (usually limited to cutaneous and subcutaneous tissue some time lymphatics

Eumycotic mycetoma (*Curvularia geniculata*, *madurella* sp., Dermatophyte pseudomycetoma, Sporotrichosis, Oomycosis (Pythiosis and Lagenidiosis)

Systemic (Usually pulmonary, portal of entry can affect dermis and subcutis (Blastomycosis, Coccidioidomycosis, Cryptococcosis, Histoplasmosis)

Dermatophytosis

- Fungal infection of skin, hair and claws of animals caused by Dermatophytes.
 - Pathogenic genera (Epidermophyton, Microsporum, Trichophyton)
 - Occur worldwide
 - Most important cutaneous superficial mycosis
 - Acquired by contact with infected animals
 - More contagious than other fungal infection
 - Common in hot, humid environment
 - Young animal are more susceptible than adult
- Increased incidence in overcrowded, dirty or damp area .

- Dermatophytes invade cornified tissue (St. cornium, hair shafts, claws) producing proteolytic enzymes thus enhances penetration.
- Fungal hyphae invade cornified tissue and break in to chain of arthrospores.
- Dermal irritation and damage to epidermis.
- Fungal products and cytokine released by damaged keratinocytes
- Epidermal hyperplasia, hyperkeratosis, acanthosis
- Intracorneal microabscesses and folliculitis.



- ▶ Circular or irregularly shape, scaly to crusty patches of alopecia coaleas to involve large portion of body.
- ▶ Fungi tend to die in area of inflammation (center of lesion) but viable at the periphery thus giving rise to the peripheral red ring and the term **ring worm**.
- ▶ Hair loss due to breakage of hair shafts and loss of hair shaft from inflamed follicle.
- ▶ Follicular papules and pustules can be present.
- ▶ Inflammation can extend in to the deep dermis and sub cutis leading to draining tracts.
- ▶ Perifolliculitis, epidermal hyperplasia with intra corneal micro abscesses.
- ▶ Septate hyphae or spores are present in hair shafts and to st. cornium of the epidermis or follicles.











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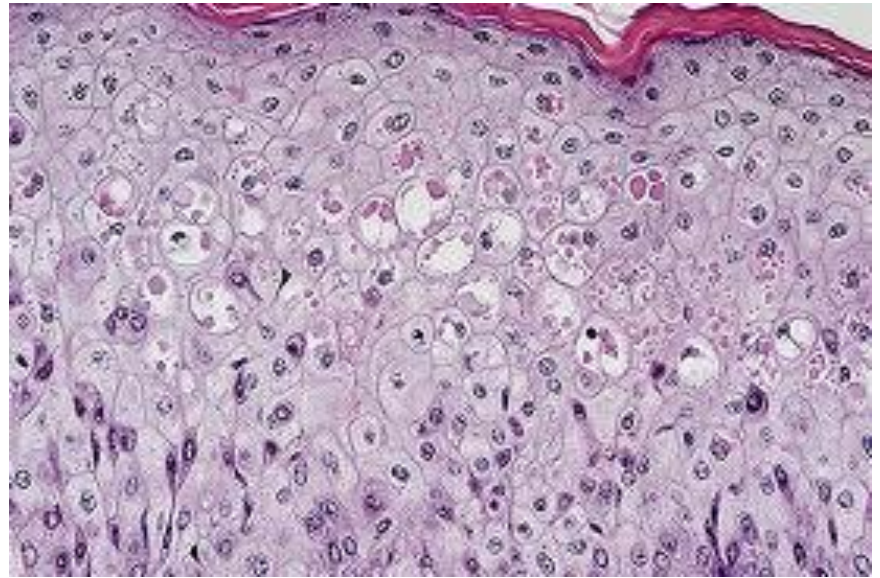
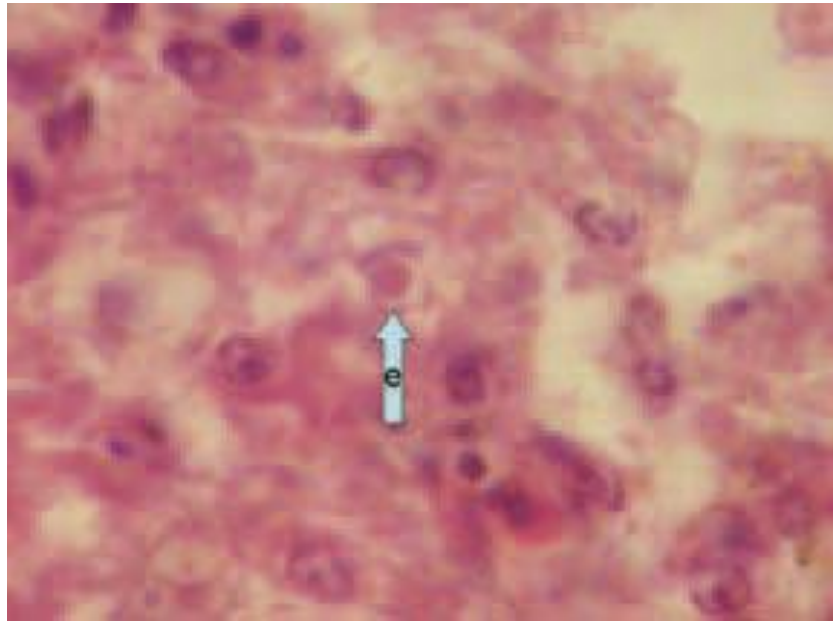
Contagious ecthyma/Contageous pustular dermatitis/Orf/Sore mouth

- Common localized infection of sheep and goat
- Para pox virus with world wide distribution
- Mortality is usually low approach 15% in lamb
- Lesion begin at commissors of mouth and spread to the lips, oral mucosa, eyelid and feet
- Lamb can transfer the virus to teats of ewes and can spread to the skin of the udder.
- CE is of economic importance due to weight loss in lamb that are reluctant to eat because the pain associate with oral and perioral lesion
- Vesicle stage is very brief-ulcer and crust stage persist and clinically prominent.
- Epidermis is markedly hyperplastic
- Inclusion bodies are only briefly detectable Histologically at the vesicular stage.



photograph by Maria L. Browning







Contagious Ecthyma (Sore Mouth)

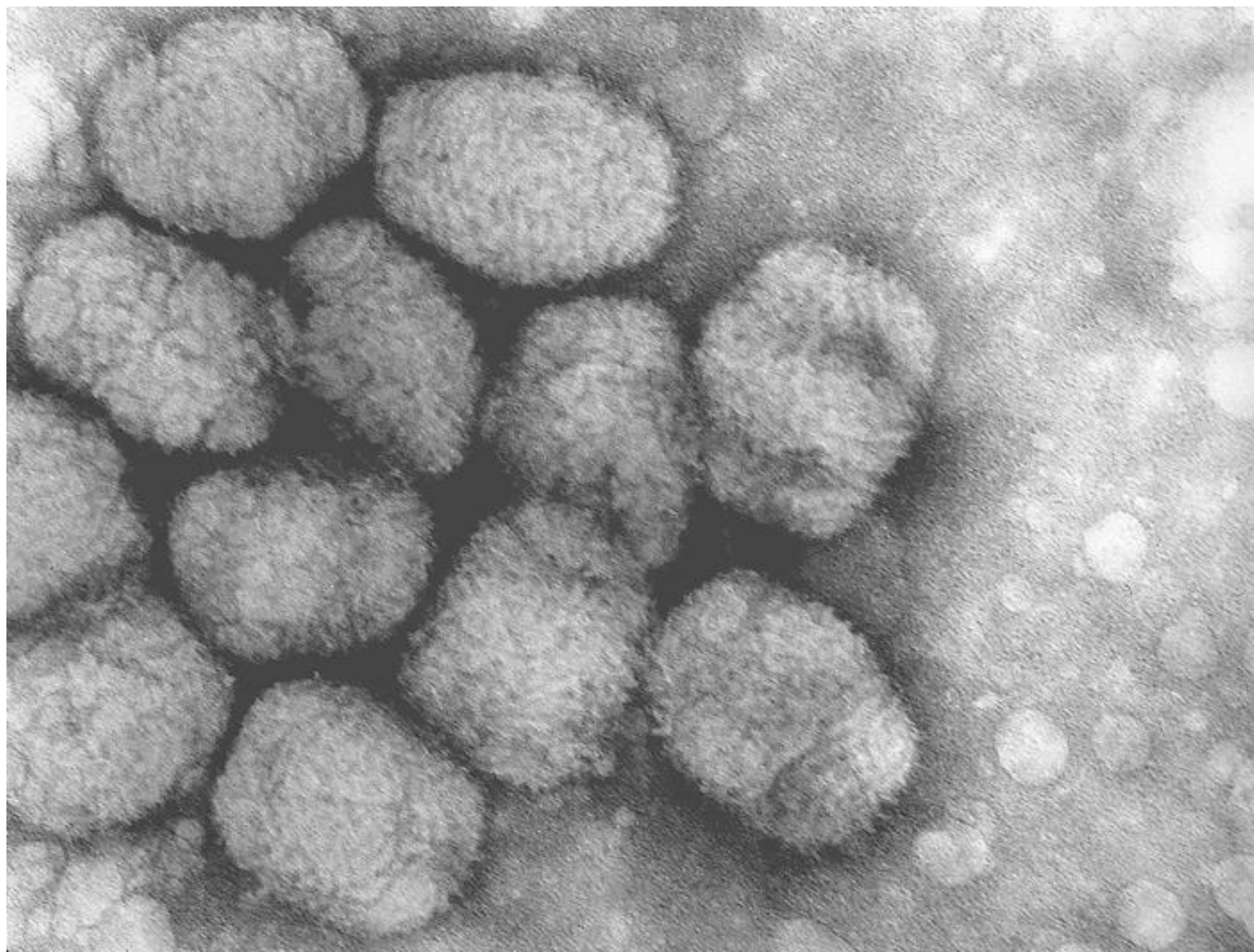
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Cow pox

- DNA epitheliotropic Virus infection, affect domestic, wild and bird and occur rarely in cattle
- Cutaneous infection in cattle usually develop on the teats and udder of cows and on muzzle of suckling calves.
- Lesions- on face, fore legs consist of ulcerated or crusted macule
- May develop in to deep ulcer that heal with granulation tissue or less commonly develop into micro abscesses or cellulitis.
- Lesion sharply demarcated, deep ulcers covered by fibrinonecrotic exudates
- Intra cytoplasmic inclusion bodies in keratinocytes or follicular or sebaceous glandular epithelium







Nottingham Vet School









Cutaneous Tumors

Squamous
cell
carcinoma

Productive (papillary growth of varying size/cauliflower like, surface tend to ulcerate)

Erosive (shallow, crusted ulcer)

- Irregular masses cords of epidermal cells that proliferate downwards and invade the dermis and sub cutis.
- Formation of keratin horns pearls/cancer pearls are present (concentric layers of squamous cells showing gradually, increasing keratinization toward the centers).
- Cells are large raised, has glassy , deeply eosinophilic cytoplasm and pyknotic nuclei.
- Presence of intercellular bridges
- Mitotic figures are atypical in appearance.

Papillomatosis/Varuca Vulgaris/Papilloma/Comon Warts







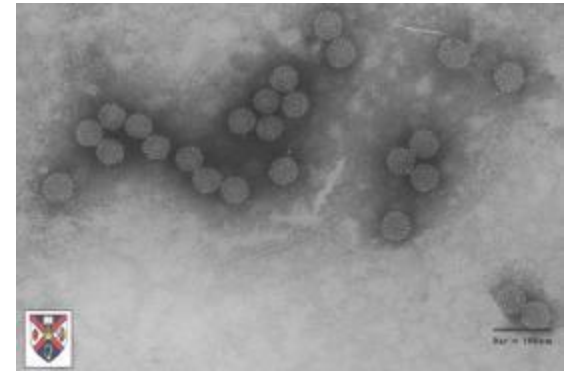
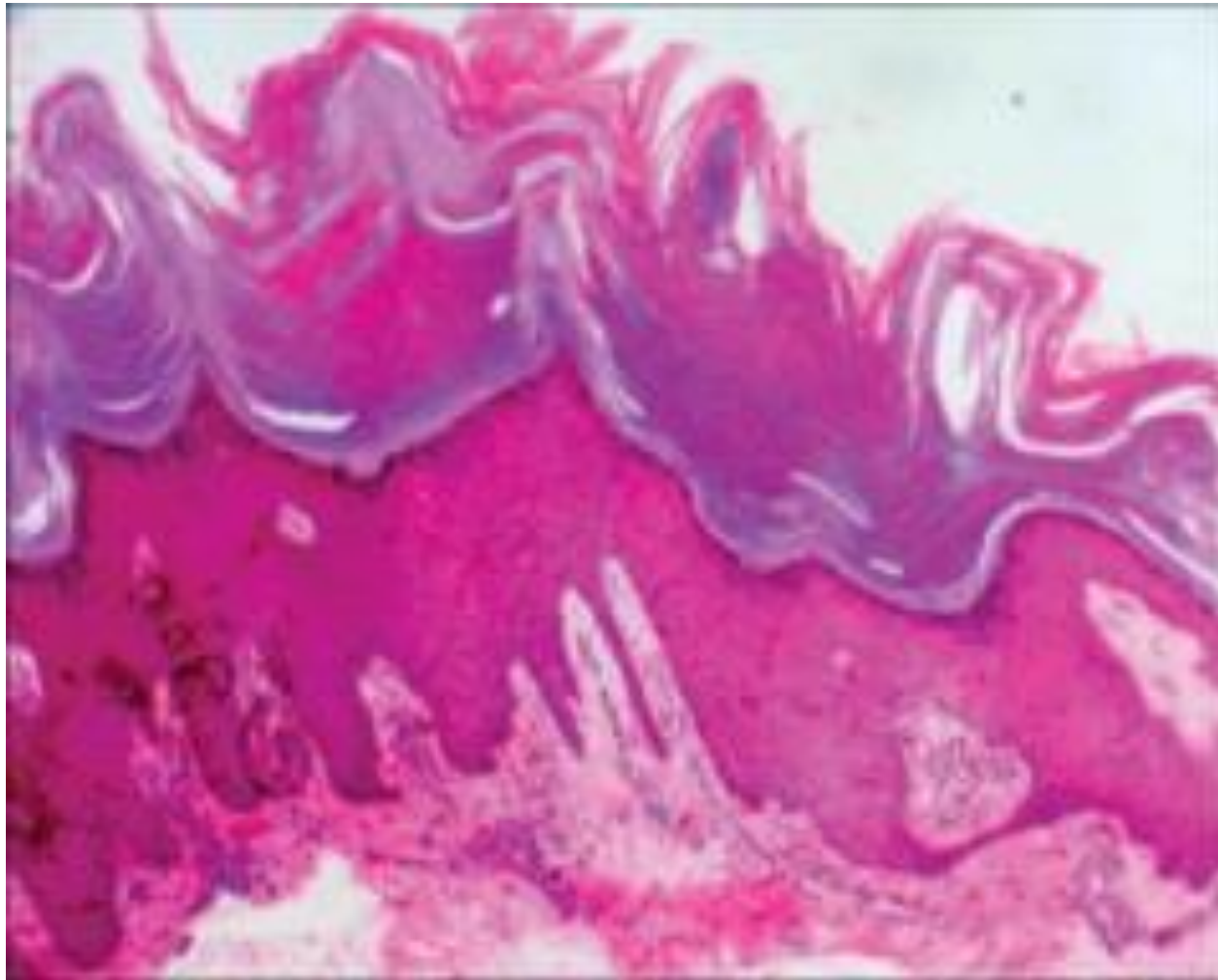












Cutaneous Tumors

Basal cell tumor

- ❖ Solitary, few are multiple ranges from 0.5-10cm in diameter
- ❖ Tumor discrete firm masses usually well demarcated from underlying tissue.
- ❖ Cut surface grayish white
- ❖ Cells have prominent oval nuclei and relatively little cytoplasm.
- ❖ Cells small and uniform size, nuclei are hyperchromatic and closely resemble those of basal cells of epidermis.
- ❖ lacking “intercellular bridges of the cell boundaries are poorly defined.

Solid, cystic, ribbon

Cutaneous Tumors

| | |
|------------------------|---|
| Cutaneous histiocytoma | <ul style="list-style-type: none">•Circular raised alopecic tan nodule, spontaneously regress, non encapsulated, solid dermal mass protruding above the epidermal surface, elevates the epidermal surface(dome or button shape)•Uniform sheets of cells ,cells densely packed at dermis layer, loose at epidermis•Cells round to ovoid in shape with large nuclei.•Cytoplasm pale staining and abundant•High mitotic index. |
| Mastocytoma | <ul style="list-style-type: none">a) Well circumscribed nodules 1-10cm, cut surface is grayish white.b) Mast cells round or ovoid, uniform in sizec) Have well defined cytoplasmic borders.d) Nuclei are uniformly spherical in shapee) Cytoplasm crowded with large granules that stain metachromatically with toluidine blue.f) Mitotic figures are extremely rareg) Cells are usually loosely arranged.h) Cells can be arranged in cords and nests. |

Cutaneous Tumors

| | |
|-----------------|--|
| Fibrosarcoma | Enlarged, cause ulceration of epidermis, locally invasive difficult to excise completely, haphazardly arranged intersecting bundles of anaplastic spindle shaped neoplastic cells with a collagenous stroma, pleomorphic, variable size, shape have large vesicular nucleus with increase size and number of nucleoli, Numerous mitotic figures are present. |
| Hemangiomas | Raised red to dark red, circumscribed masses in non pigmented and sparsely haired skin, well defined mass of proliferating, blood filled vascular channels in the dermis, well differentiated endothelial cells form single uniform layer. |
| Hemengiosarcoma | Multiple raised red masses, poorly demarcated margin between tumor and normal tissue, highly irregular vascular channels lined by plump, hyper chromatic endothelial cells with numerous mitotic figures. |

Cutaneous Tumors

| | |
|-------------------------------------|---|
| Infundibular keratinizing acanthoma | Horny growth, irregularly sized lobules of stratified squamous cornifying epithelium, separated by small quantity of collagen stroma, often cystic and contain lamination of st. cornium which can extend through the epidermal surface and form a cutaneous horn. |
| Sebaceous gland adenoma | Protruded above epidermal surface, greasy, lobules well differentiated, sebaceous glands are present in dermis cause polypoid elevation of overlying epidermis. |
| Melanoma | Raised pigmented brown to black hairless mass, dermis diffusely infiltrated by sheets of variable pigmented melanocytes which have prominent nucleoli and moderate variation in the size of cells and nuclei, clusters of pigmented melanocytes within the epidermis. |