

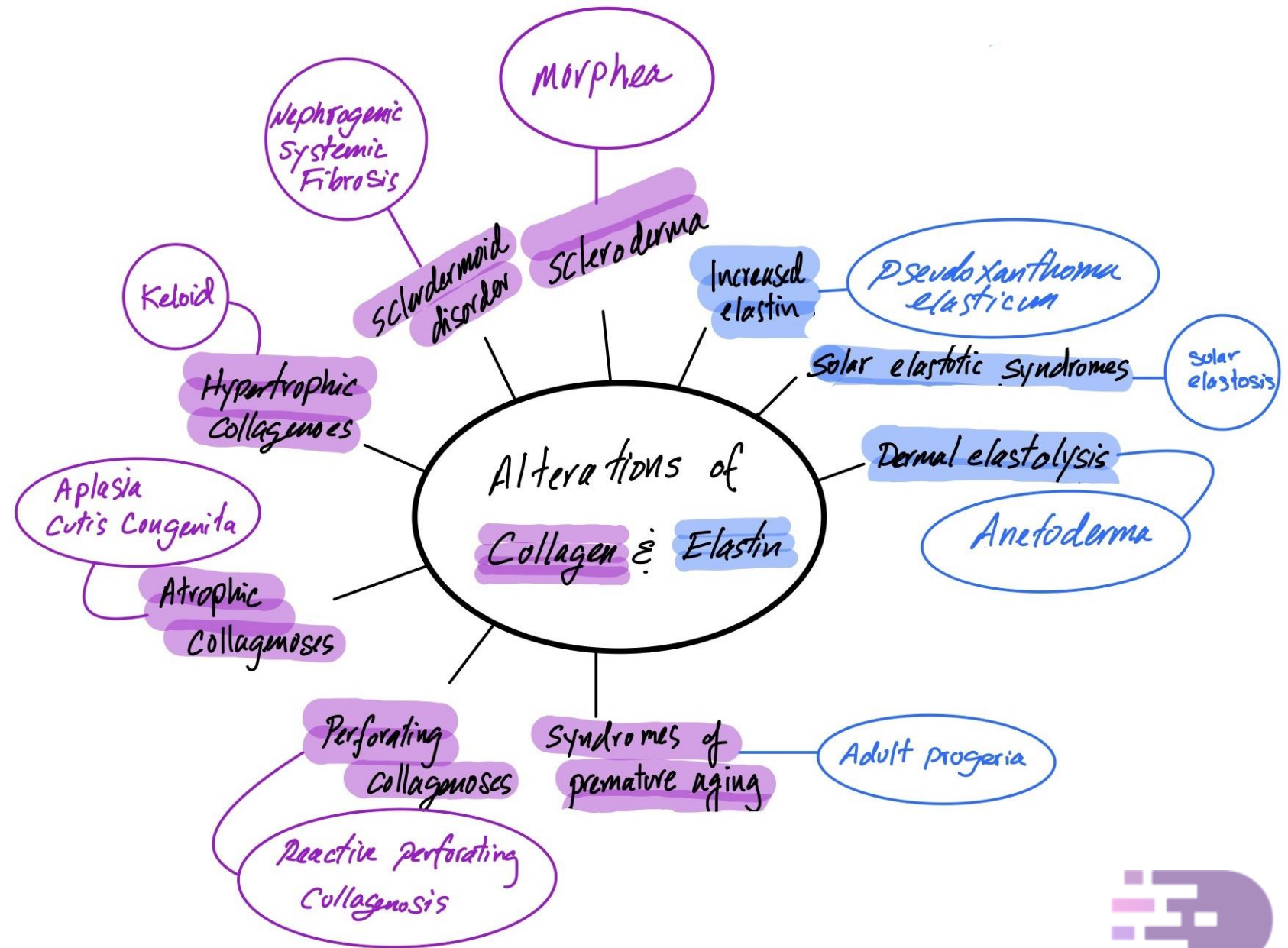
DISEASES OF COLLAGEN AND ELASTIC TISSUE

Soheil S. Dadras MD-PhD

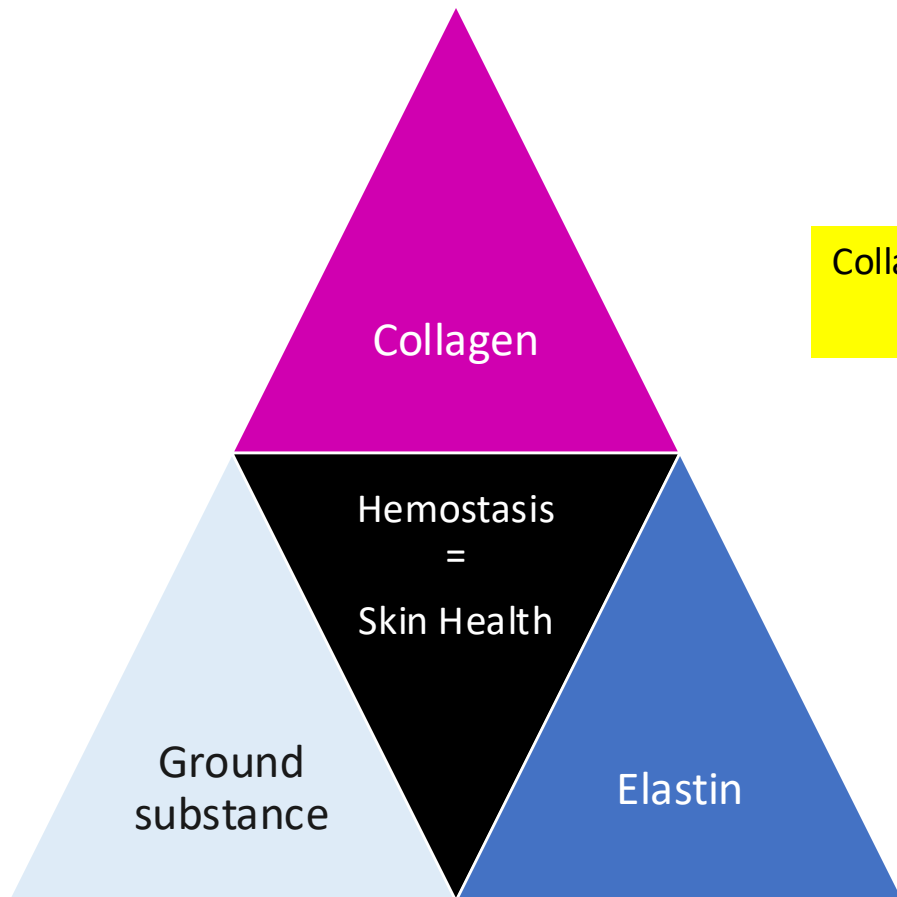
Classification of disorders of collagen and elastic tissue

- Solar elastosis
- Morphea
- Scleroderma
- Sclerodermoid GVHD
- Eosinophilic fasciitis
- Radiation dermatitis
- Pseudoxanthoma elasticum
- Ehlers-Danlos Syndrome
- Cutis laxa
- Anetoderma
- Acrodermatitis chronica atrophicans
- Focal dermal hypoplasia (Goltz syndrome)
- Aplasia cutis congenita
- Perforating disorder of diabetes and renal failure
- Elastosis perforans serpiginosa
- Reactive perforating collagenosis
- Wrinkling due to mid-dermal elastolysis

Chapter mind mapping



Interplay of three major components in maintaining the integrity and elasticity of skin

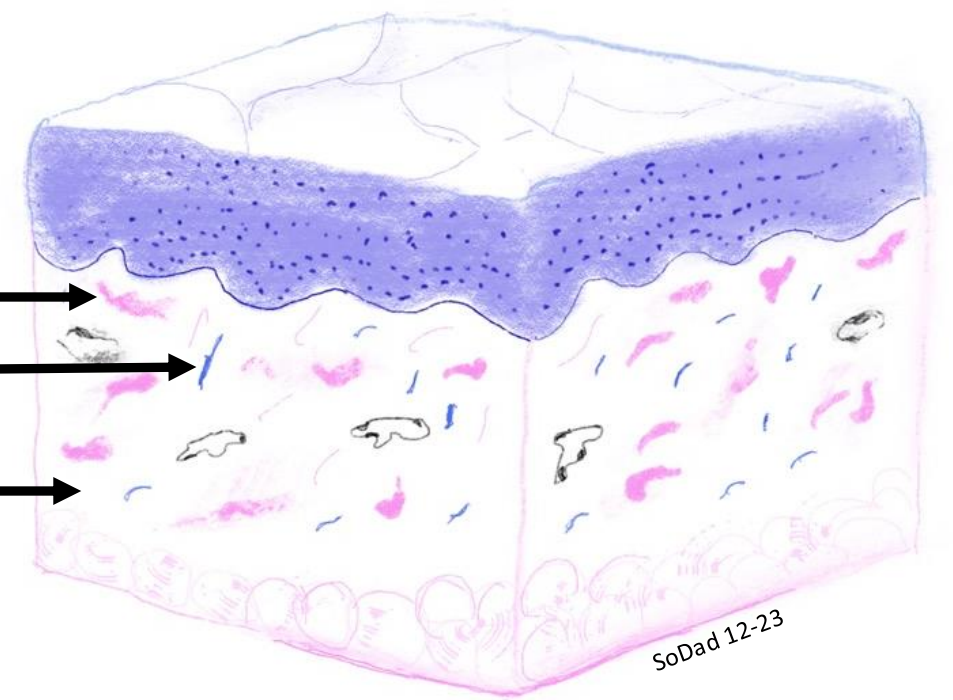


Collagen bundles (80% by dry weight)
type I to XIX

Elastic fibers

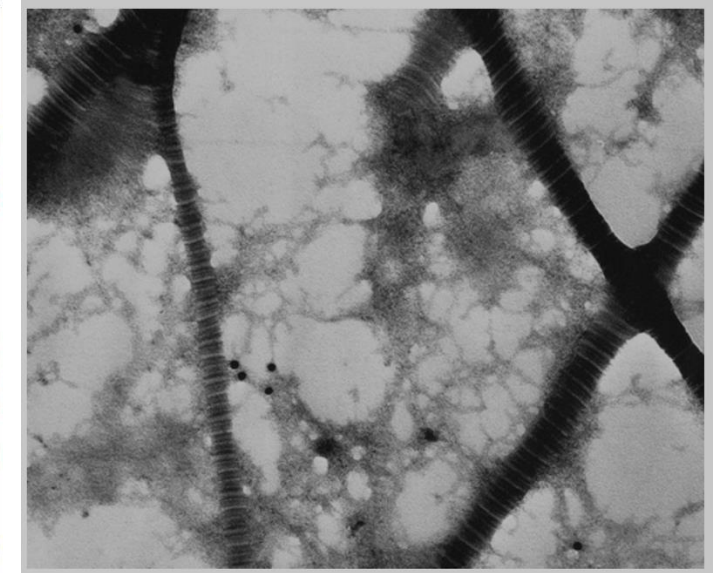
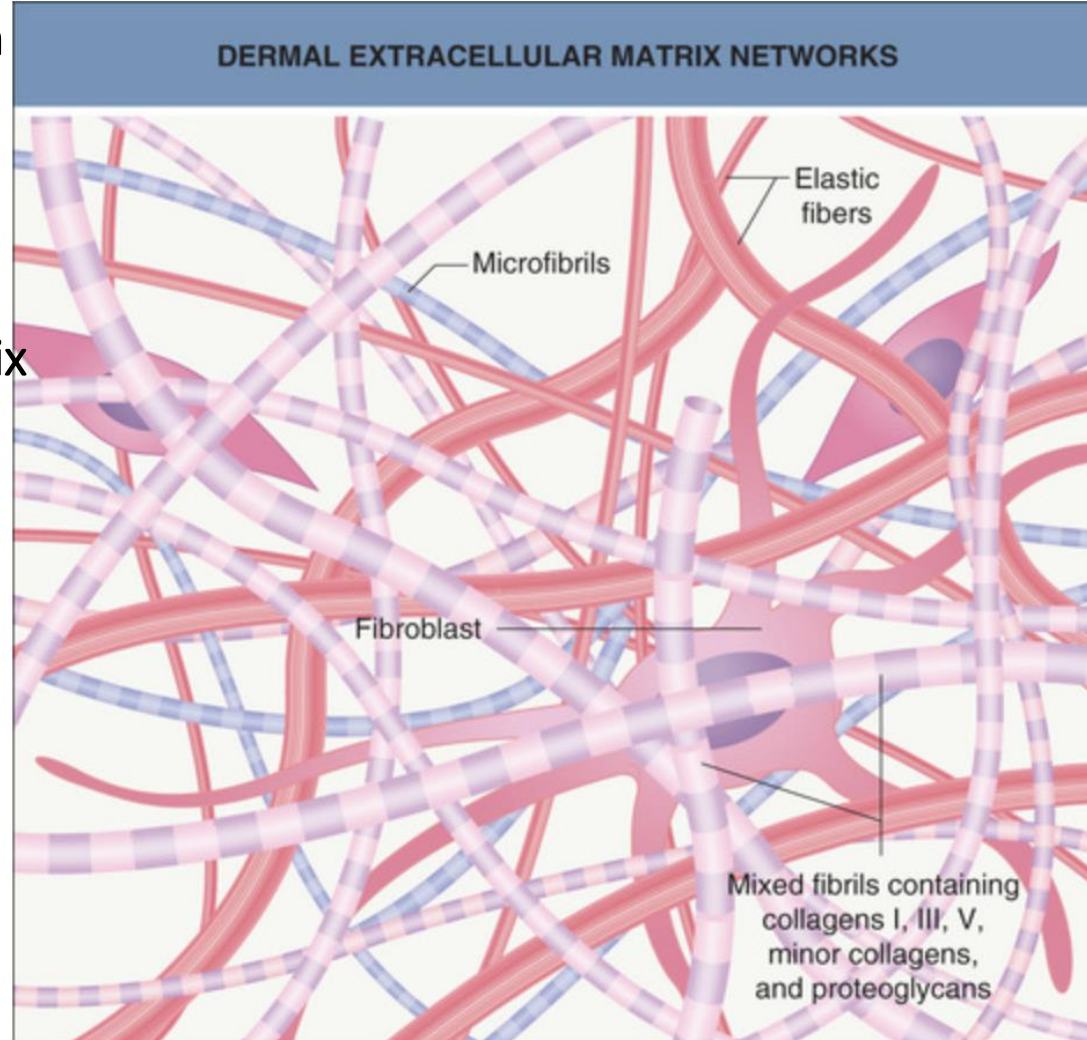
Ground substance:

- Hyaluronic acid
- Proteoglycans
- Glycoproteins



What is dermal ECM? What is its function?

- Filamentous network with microfibrillar and basement membrane components
- Dermal extracellular matrix (ECM) provide tissue support and regulate cell function

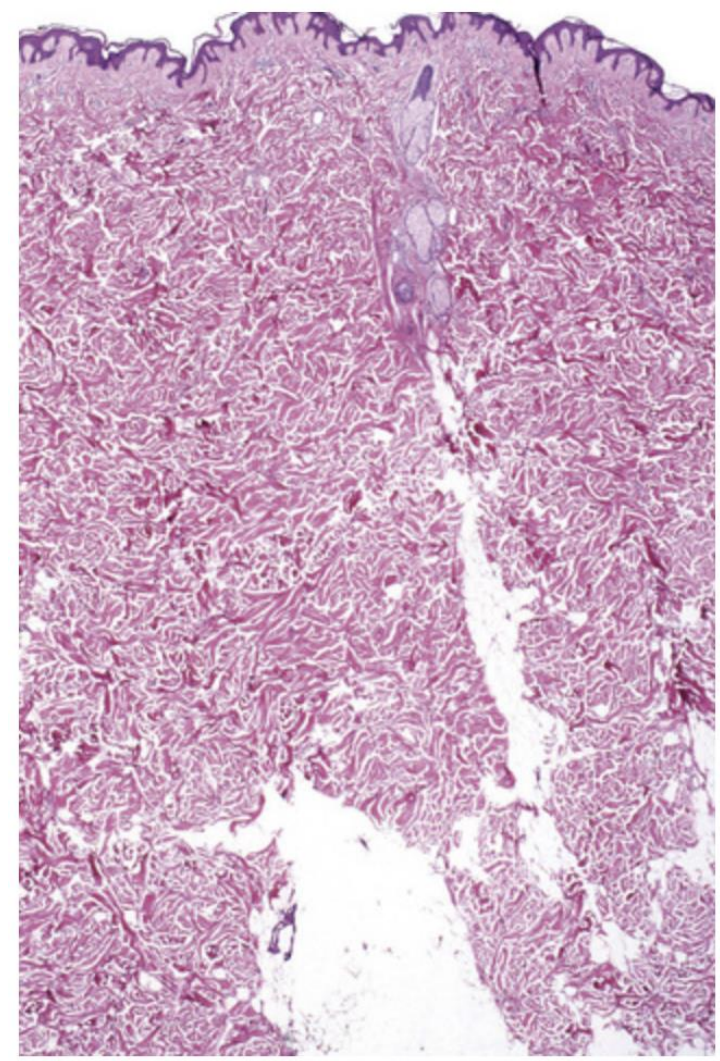


Immunoelectron photomicrograph:
gold particles coupled to anti-collagen
IV antibodies

Bologna, Jean, L. et al.
Dermatology

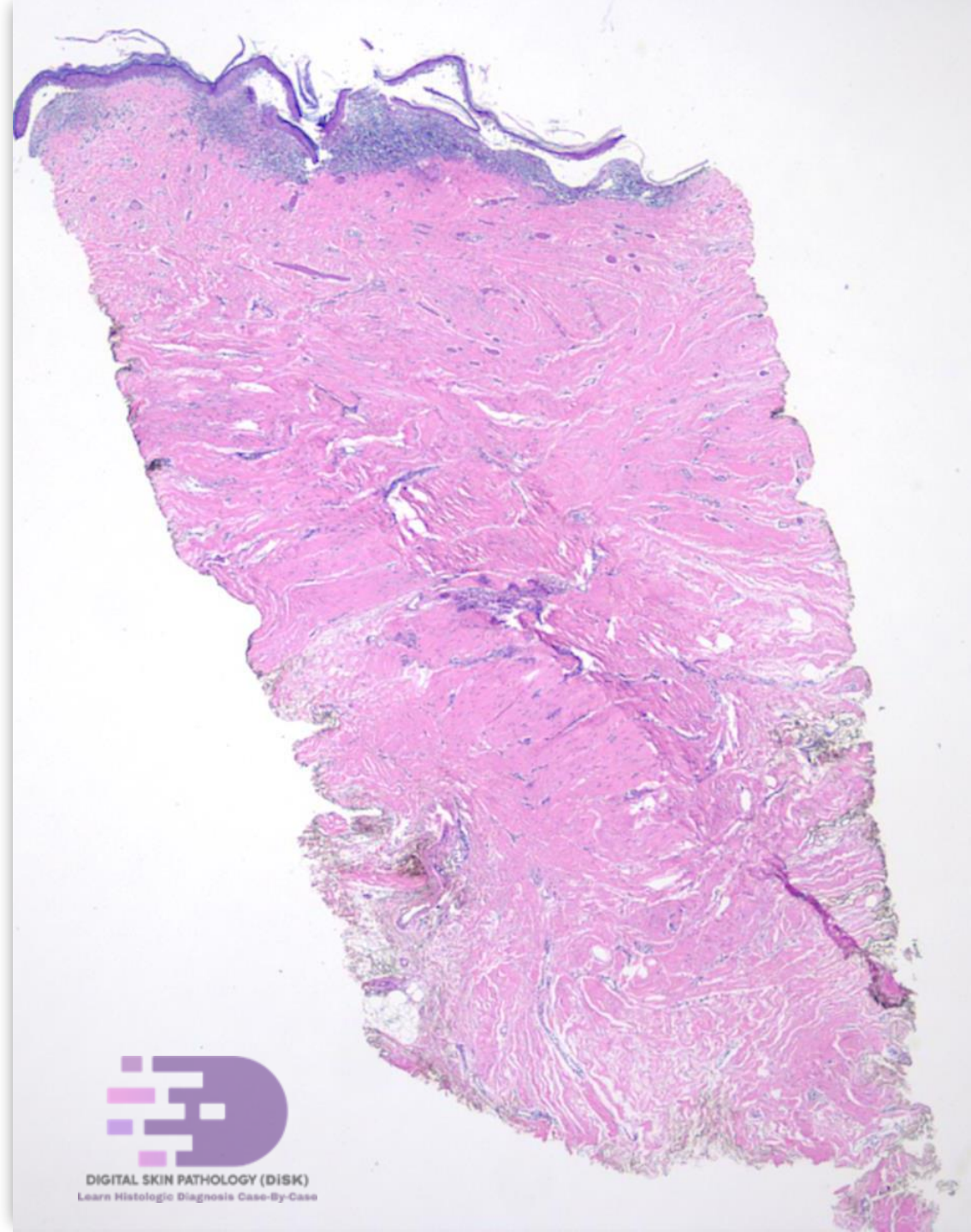
Differential diagnosis of normal skin histology

- Amyloidosis
- Anetoderma
- Atrophoderma of Pasini and Pierini
- Café-au-lait spot
- Connective tissue nevus
- Dermatophytosis
- Graft versus host disease
- Ichthyosis
- Myxedema
- Scleroderma
- Scleromyxedema
- Urticaria
- Urticaria pigmentosa



Differential diagnosis of a rectangular/square punch biopsy

- Normal back skin
- Morphea/scleroderma
- Scar/keloid
- Chronic graft –vs – host disease
- Radiation dermatitis
- Connective tissue nevus
- Scleredema



What are the useful ancillary tests?

- Special stains:

Elastic -→ Elastic fibers

Trichrome -→ Collagen bundles

von Kossa -→ Ca^{2+}



Shape
Size
Quality
Quantity

- Immunohistochemistry:

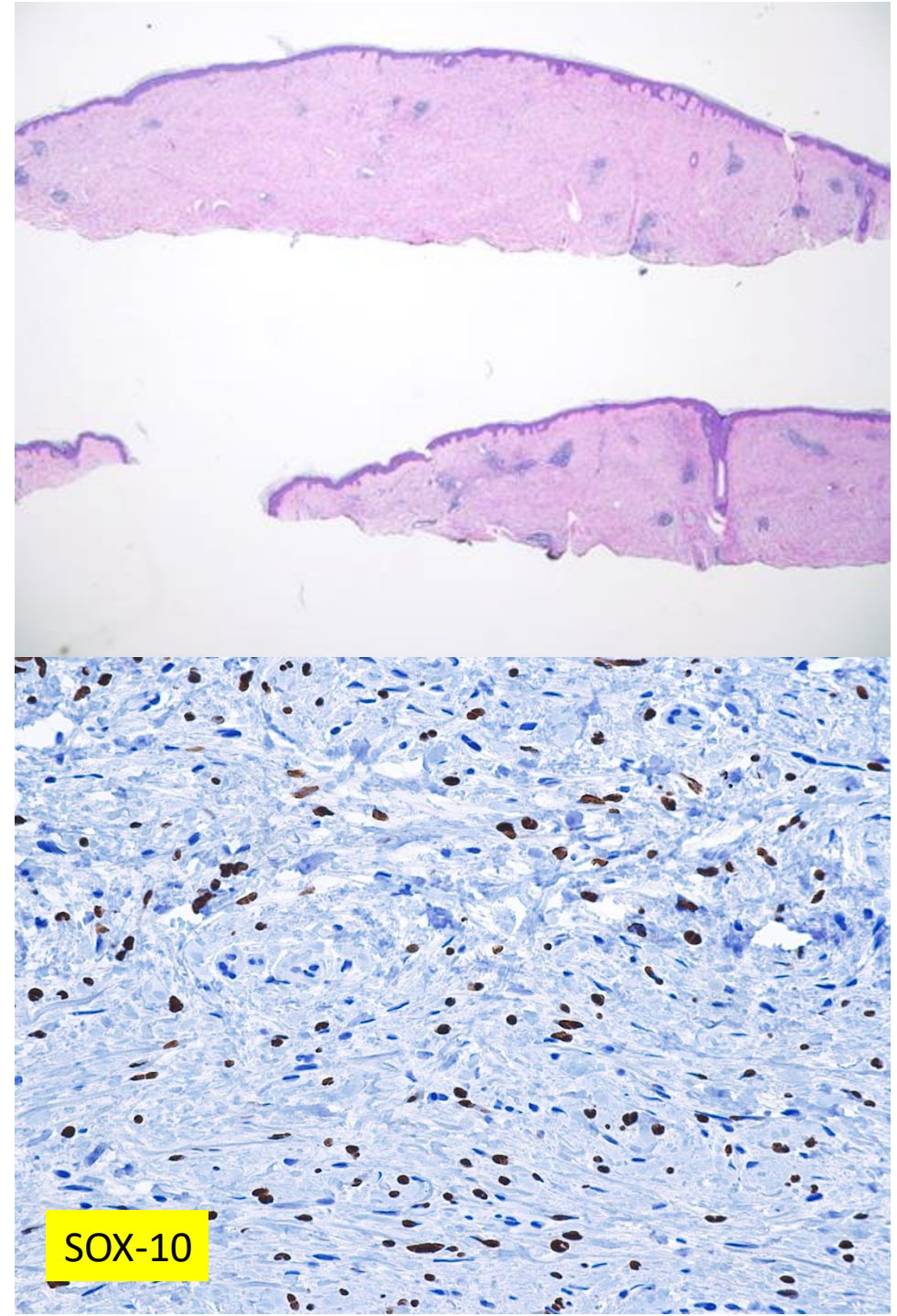
CD34 -→ Nephrogenic systemic fibrosis (increased)

-→ Morphea (decreased)

SOX-10 -→ Desmoplastic melanoma (pure variant)

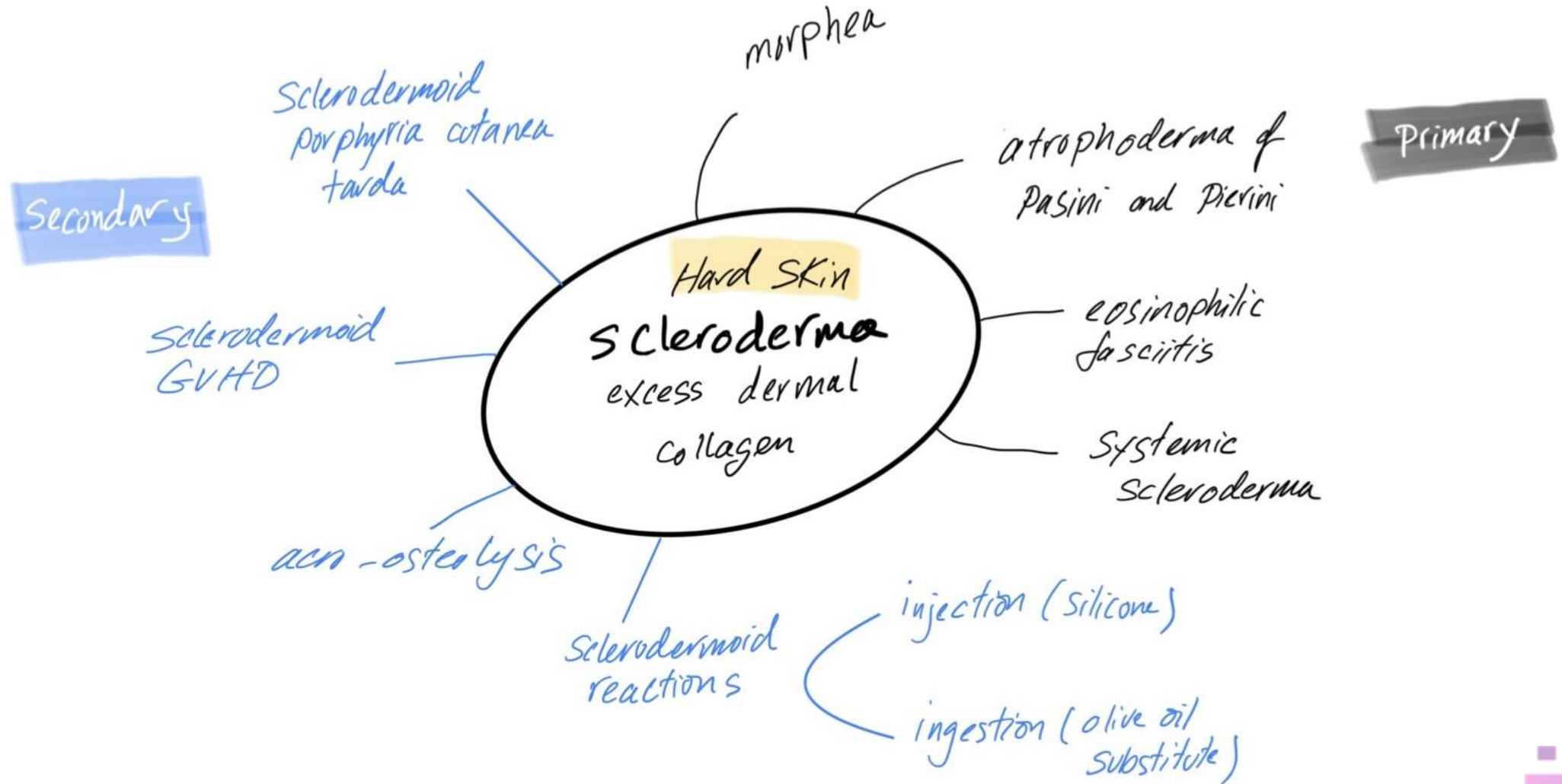
<https://digitalskinpathology.com>

- Histologic comparison to clinically “normal” skin



SOX-10

What is scleroderma?



Diseases related to ECM defects: alterations of collagen

↑ Excess (thickened dermis/septa):

- Scleroderma/morphea
- Scar/keloid
- Eosinophilic fasciitis
- Connective tissue nevus
- Striae distensae
- Sclerodermoid disorders

↓ Reduced (atrophic collagenoses):

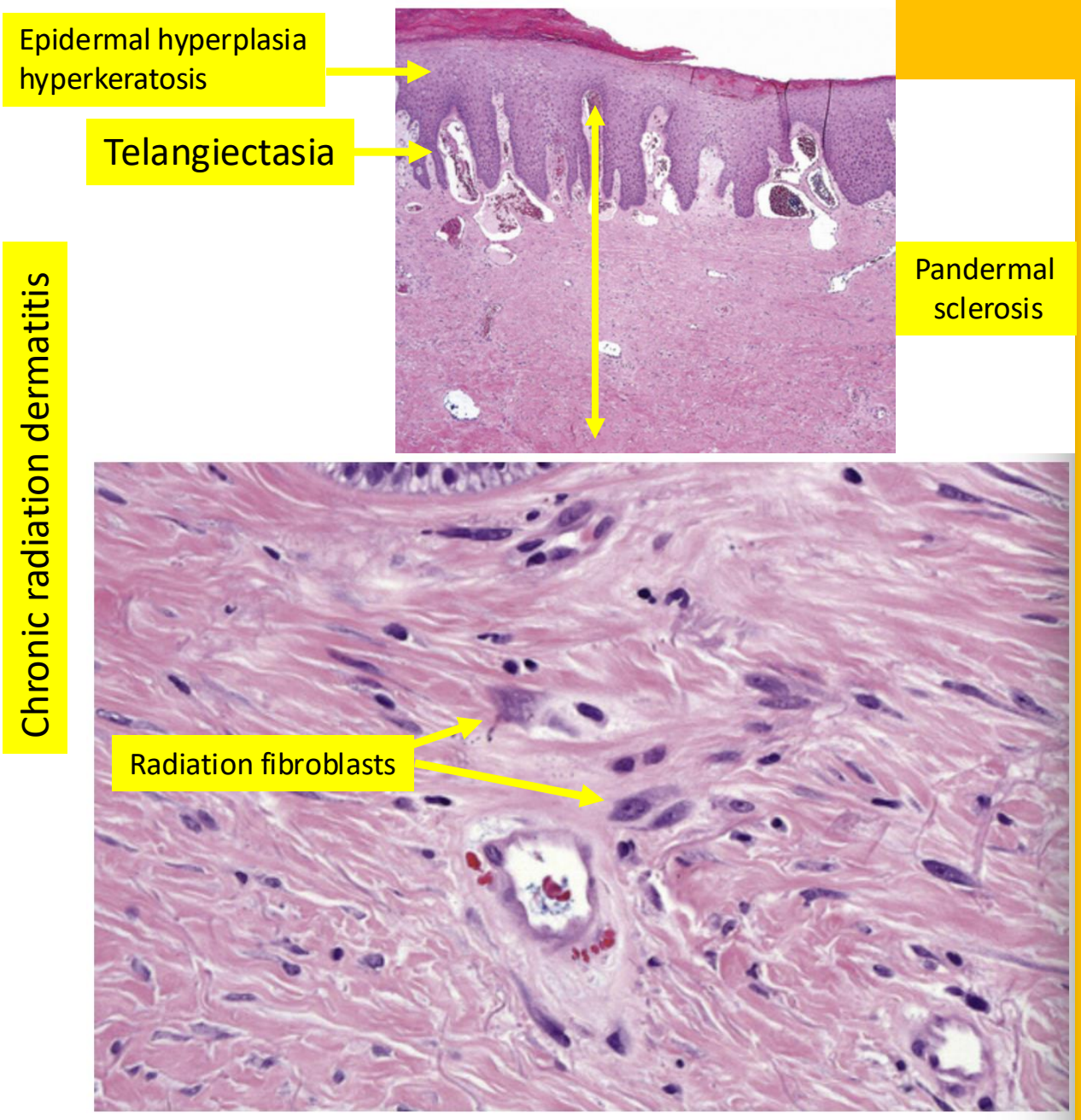
- Scurvy
- Aplasia cutis congenita
- Focal dermal hypoplasia

Collagen

What are sclerodermoid disorders?

- Clinical features
 - Variable induration of skin
- Histopathologic features
 - Indistinguishable from morphea/scleroderma
- Sclerodermoid variants:
 - Porphyria cutanea tarda
 - Graft – versus – host disease
 - Reactions to injections of bleomycin and silicone
 - Ingestion of olive oil substitute
 - Nephrogenic systemic fibrosis
 - Chronic radiation dermatitis

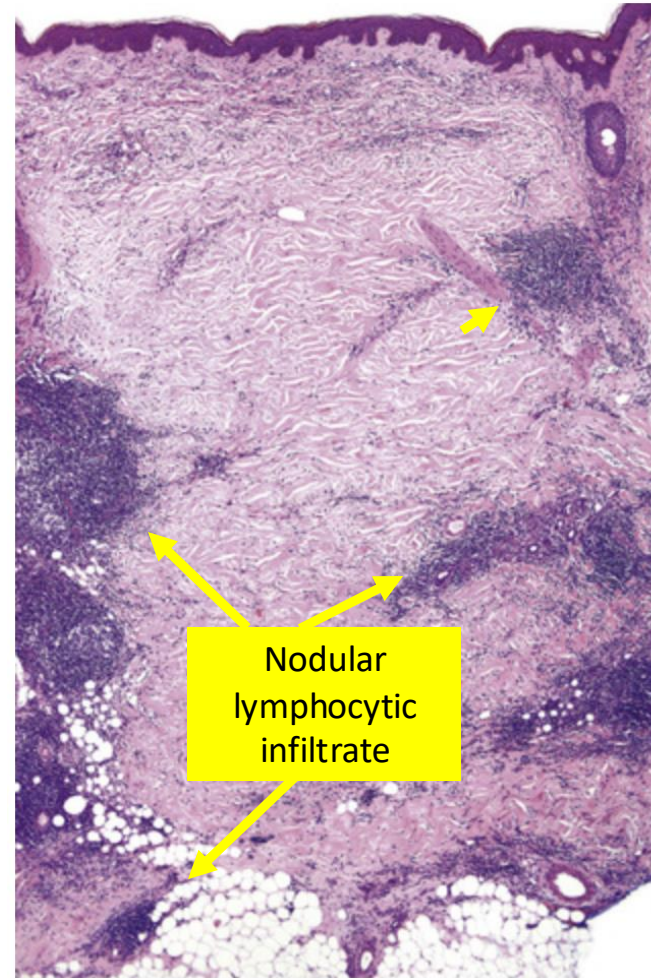
Chronic radiation dermatitis



Morphea (localized scleroderma)

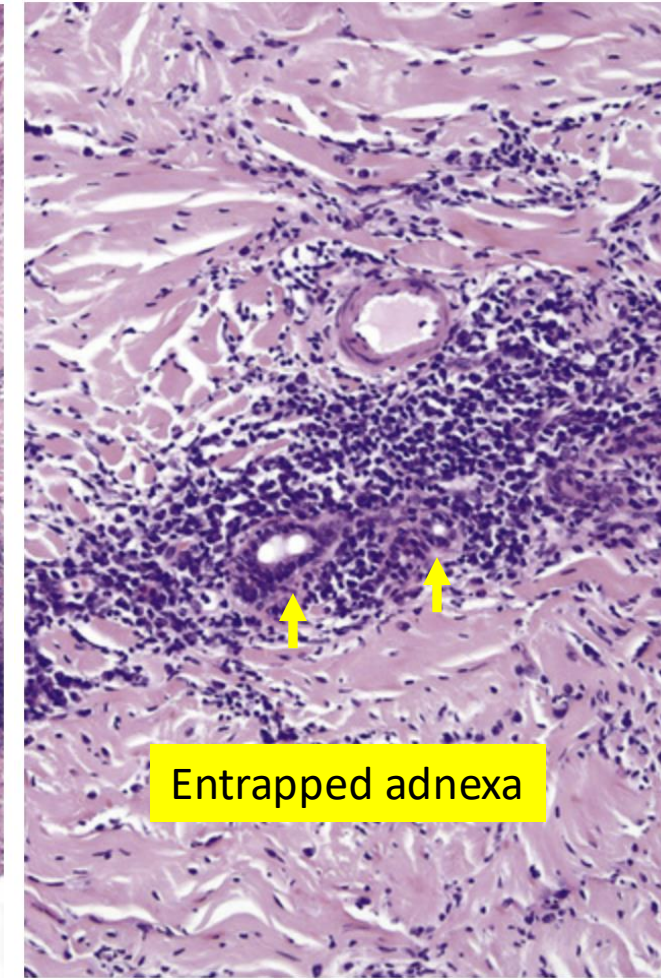
- Clinical features
 - Adult women > men
 - Sclerotic plaques with lilac ring
 - Localized, generalized, linear (en coup de sabre), segmental, subcutaneous, nodular (keloid), bullous, facial hemiatrophy, pansclerosis, morphea profunda
- IHC: ↓CD34-positive dermal dendrocytes
- DDX:
 - Scleroderma, eosinophilic fasciitis, atrophoderma of Pasini and Pierini, and sclerodermoid disorders
- <https://digitalskinpathology.com>

Sclerosis of reticular dermis and septa



Rectangular punch biopsy: thickening of dermis and subcutaneous septa

Thickened collagen bundles, narrowing of interbundle spaces

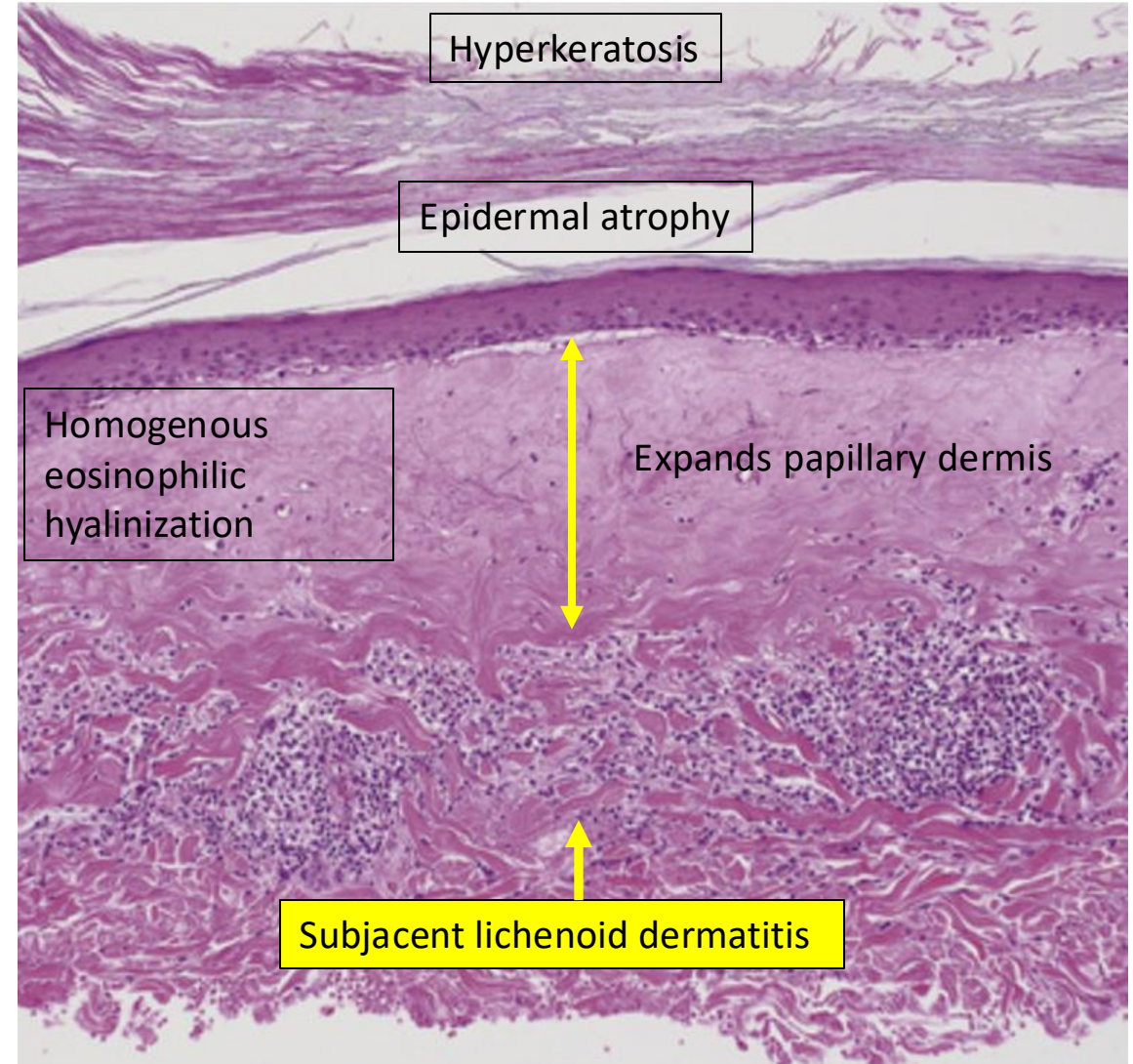


Entrapped adnexa

Lymphocytes, plasma cells and occasional eosinophils

Lichen sclerosis

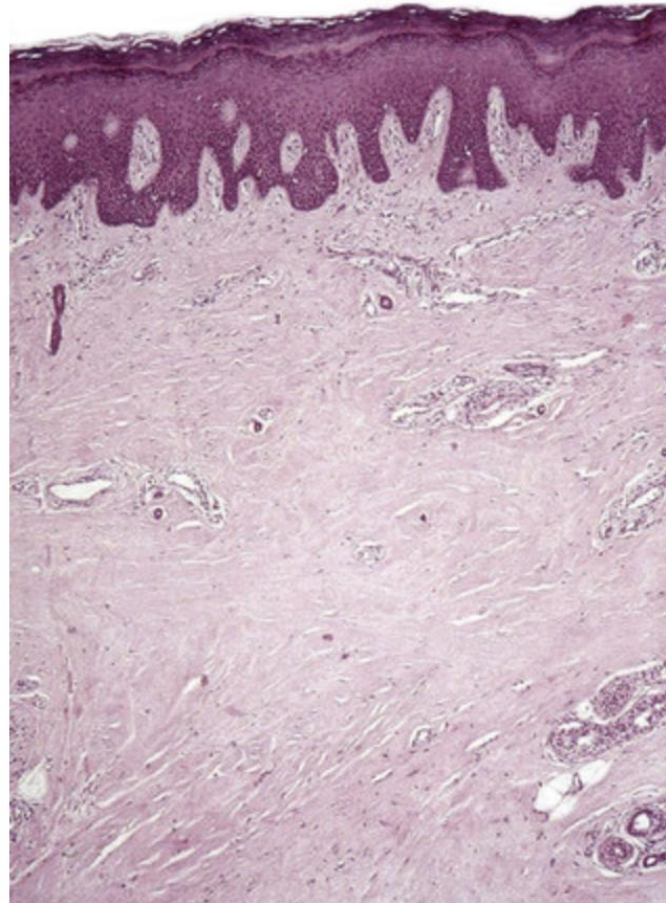
- Erythematous patch/plaque edematous white center
- Localized (perineum) to widespread
- Genital skin (women), children and men (balanitis xerotica obliterans)
- Vulva: associated with dVIN/SCC/p53
- DDX:
 - Morphea
 - Lichen sclerosis-morphea overlap
 - Lupus erythematosus
 - Chronic radiation dermatitis



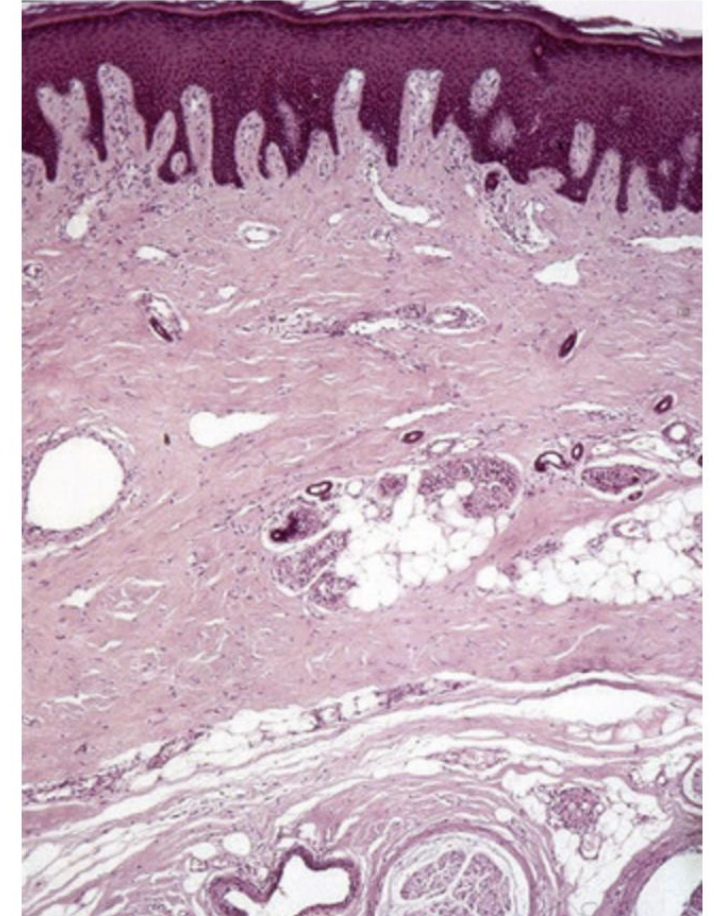
Systemic scleroderma (progressive systemic sclerosis)

Less inflammation < morphea

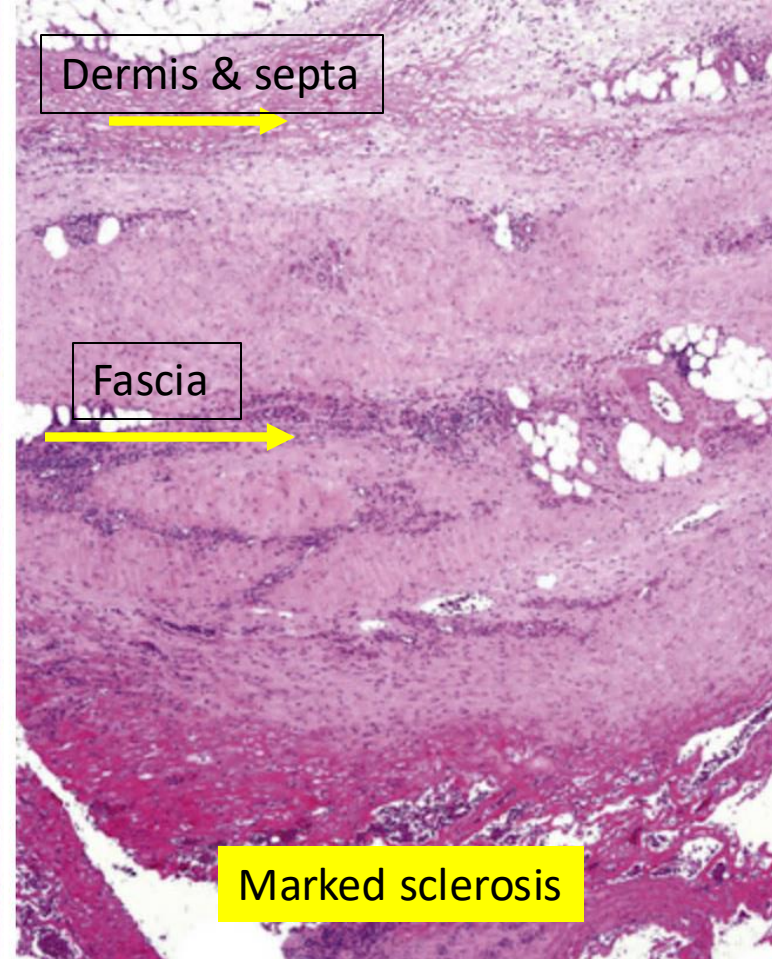
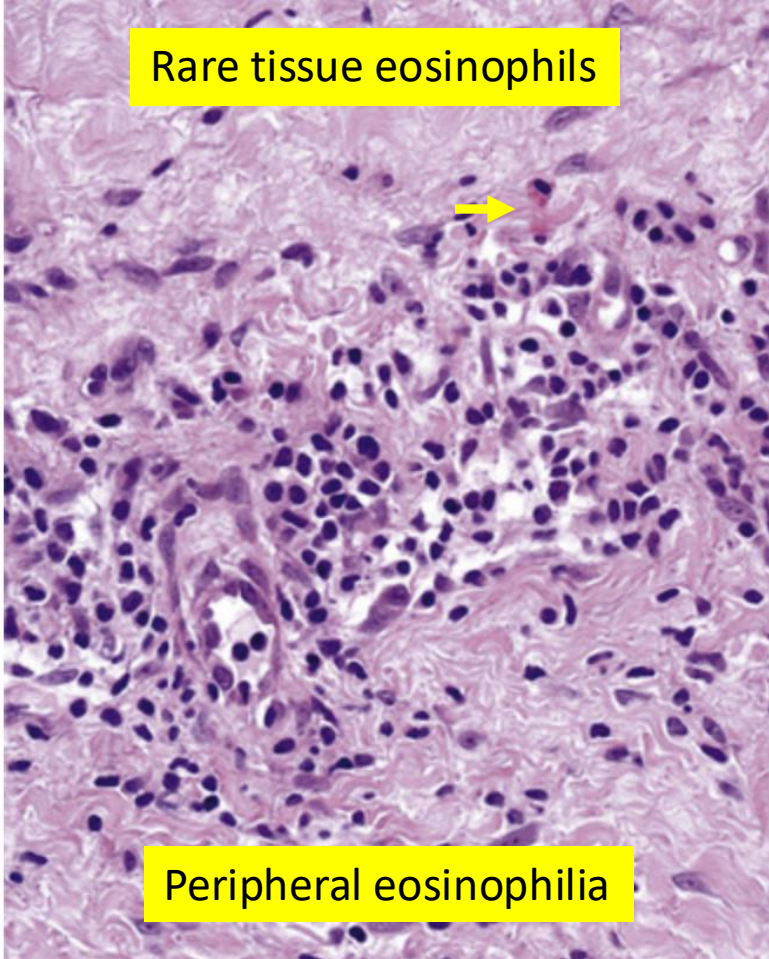
- Clinical features
 - Adult women > men
 - Non-pitting edema of extremities and digits
 - Acrosclerosis versus diffuse sclerosis of the face and trunk
 - Internal organ involvement
 - CREST syndrome
- DDX:
 - Morphea, mixed connective, tissue, disease, eosinophilic, fasciitis, and sclerodermoid disorders



Dermal homogenized sclerosis in lower half of reticular dermis and subcutaneous septa

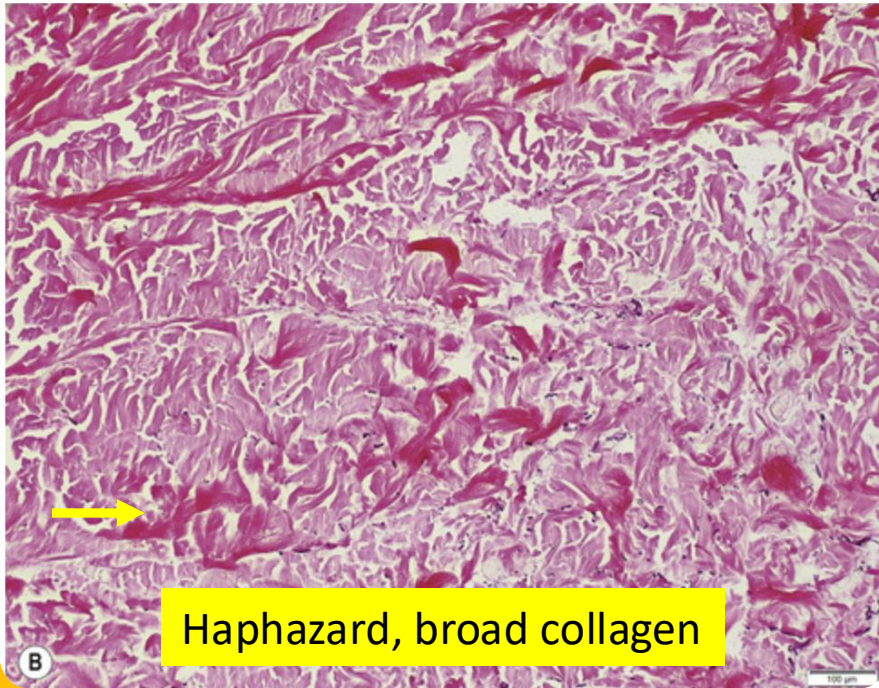
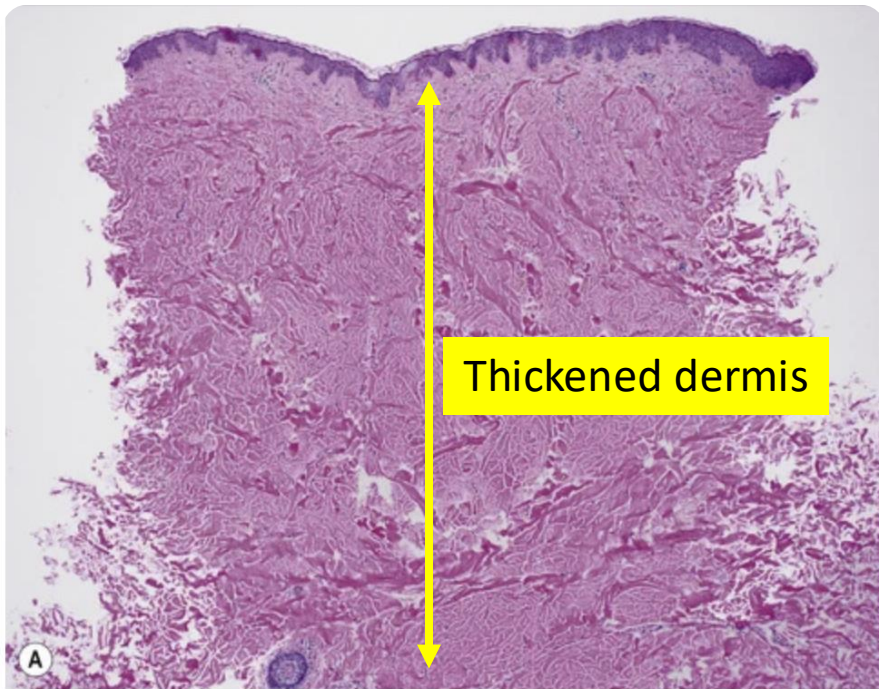


Perineural fibrosis and vascular involvement (intimal fibrosis and lumen obliteration)



Eosinophilic fasciitis (Shulman syndrome)

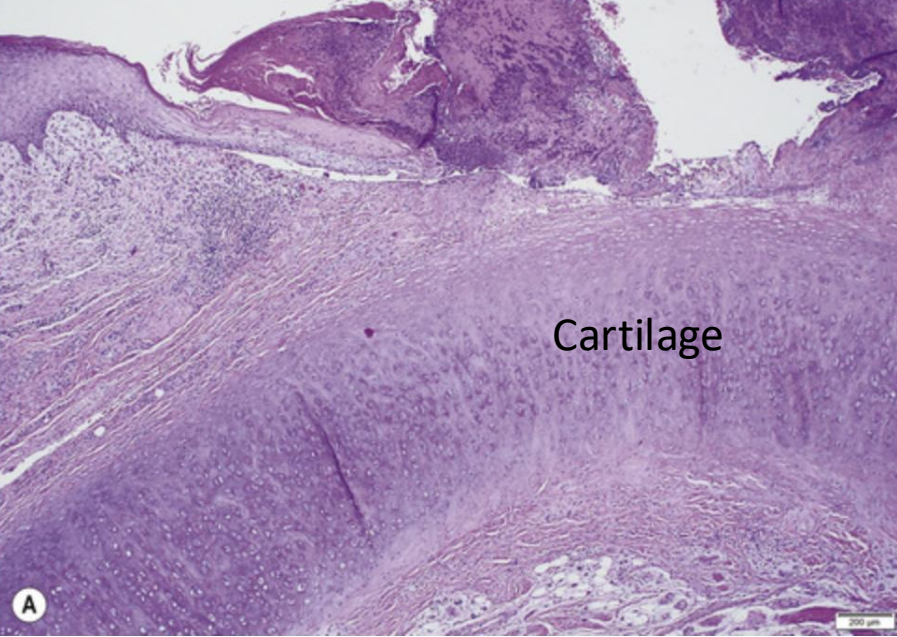
- Clinical features
 - Rapid onset
 - Exercise related, often
 - Scleroderma – like changes on extremities
 - Absent Raynaud phenomenon and visceral involvement
 - Steroid responsiveness
- Differential diagnosis
 - Morphea, scleroderma, and sclerodermoid disorders
- ≠ Eosinophilic cellulitis (many eosinophils, flame figures)



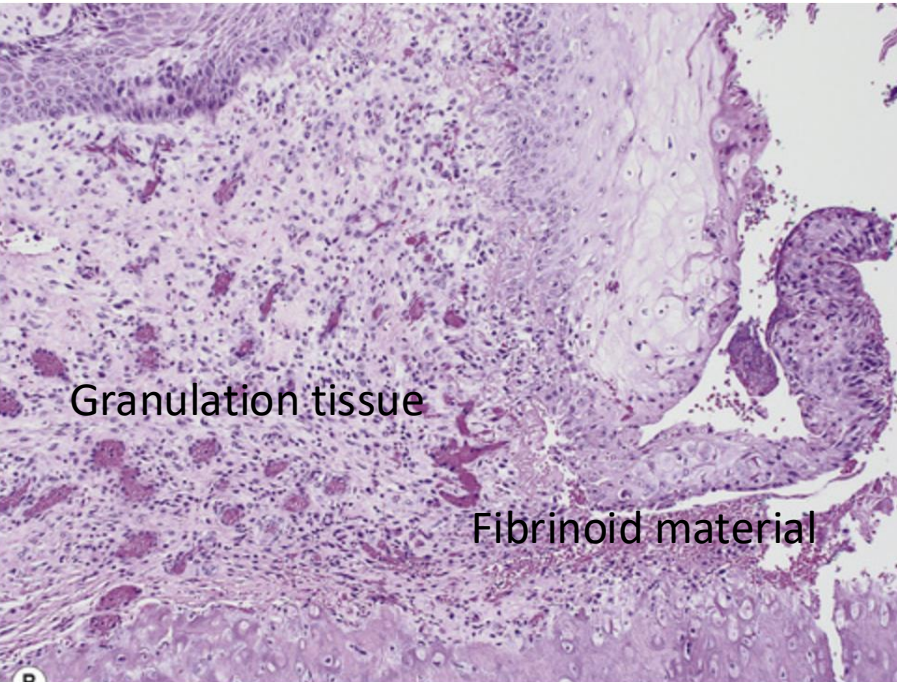
Connective tissue nevi

- Cutaneous hamartomas
- One of the components of ECM is present in abnormal amounts
 - Shagreen patch
 - Fiber, connective tissue nevus
 - Elastoma
 - Proteoglycan type
- Collagenoma (collagen type)
 - Firm, skin – colored plaques and nodules
 - Trunk and upper arms
 - Solitary or syndromic

Ulcer, scale-crust



Cartilage

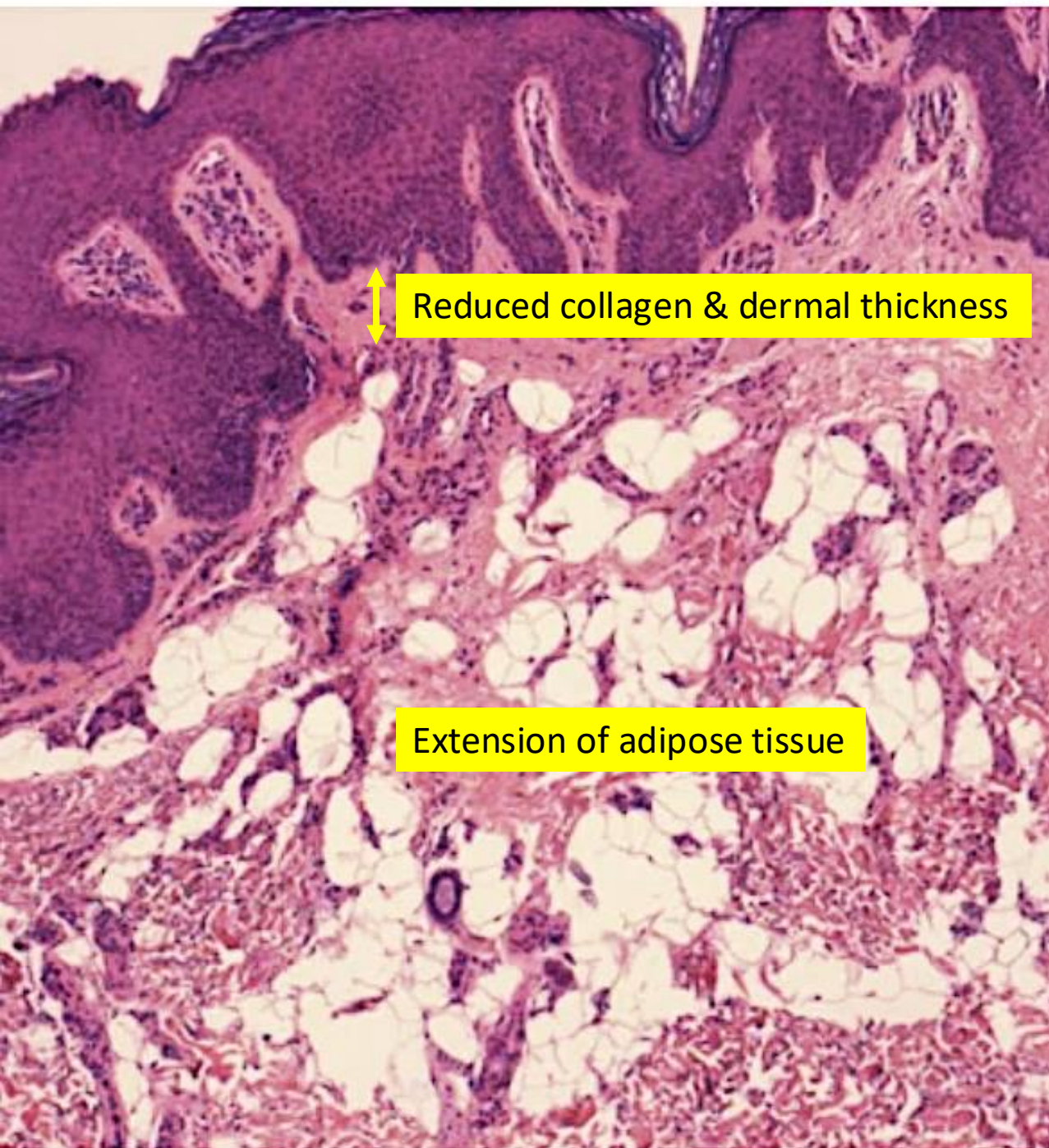


Granulation tissue

Fibrinoid material

Perforating collagenoses

- Reactive perforating collagenosis (rare)
 - Clinical features
 - Acquired: Diabetes and chronic renal failure
 - Early childhood: response to superficial trauma
 - Dome-shaped papules with central umbilication, cornified plug
- Chondrodermatitis nodularis helcis
 - Clinical features
 - Small 2–3 mm dome – shaped papules at the apex of helix or antihelix
 - Exquisitely tender



Focal dermal hypoplasia (Goltz syndrome)

- Clinical features
 - Cribriform or retiform linear dermal thinning
 - Soft yellow nodules (adipocyte herniation) some with ulcers
 - Lobster – claw deformity with syndactyly
 - Abnormal hair, nails, and teeth
 - Osteopathia striata
- DDX: nevus lipomatosis superficialis, fibrolipoma

Diseases related to ECM defects: Alterations of elastic fibers

↓ Reduced (dermal elastolysis):

- Total: cutis laxa, anetoderma
- Zonal: papillary elastolysis
- Focal: striae, scar

Elastin



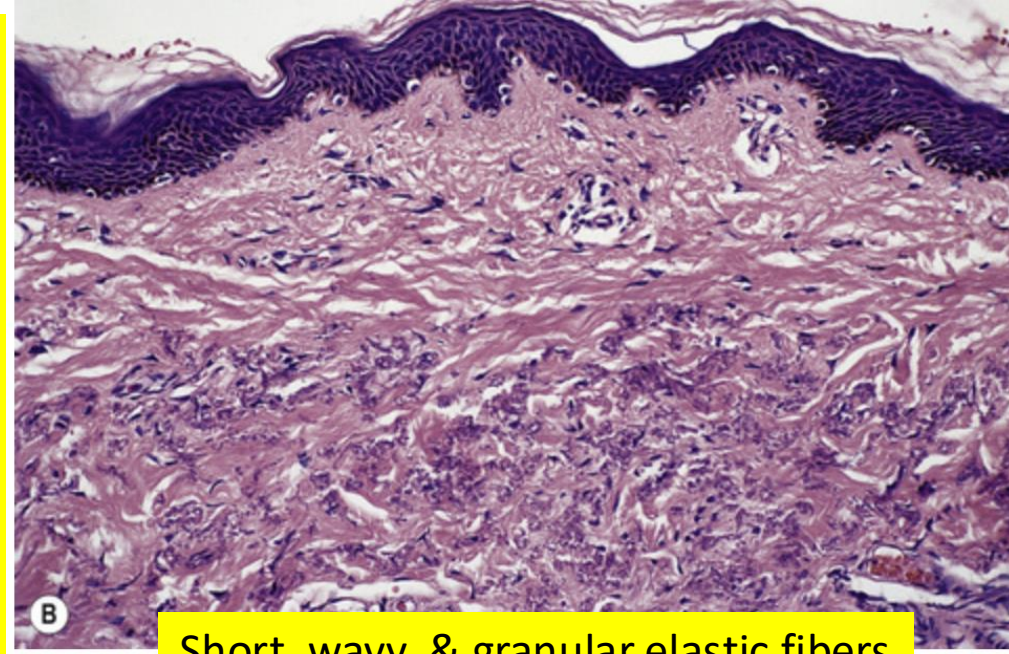
↑ Excess

- Solar elastotic syndromes:
 - Solar elastosis
 - Elastotic nodules of the ear
 - Collagenous & elastotic plaques of the hands
 - Erythema ab igne
- Elastofibroma/elastoma
- Elastosis perforans serpiginosa
- Pseudoxanthoma elasticum

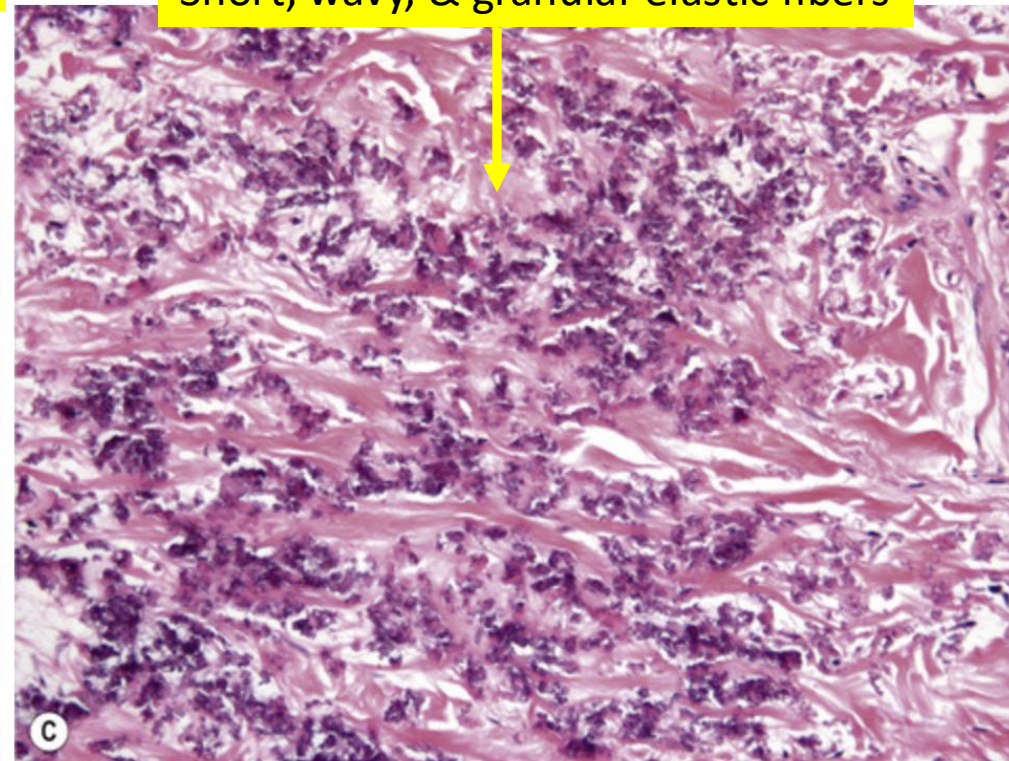
Pseudoxanthoma elasticum

- Clinical features (*ABC66* mutation)
 - Yellowish plaques with pebbly surfaces (chicken skin)
 - Flexures: lateral neck, groin, axillae, and anti-cubital fossae
 - May resemble xanthoma or actinic keratosis
- DDX: solar elastosis

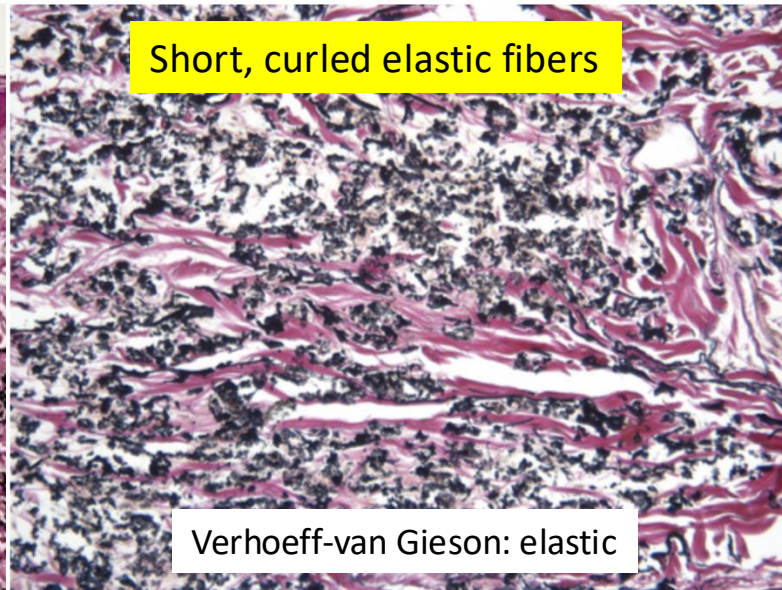
Middle third of reticular dermis



Short, wavy, & granular elastic fibers

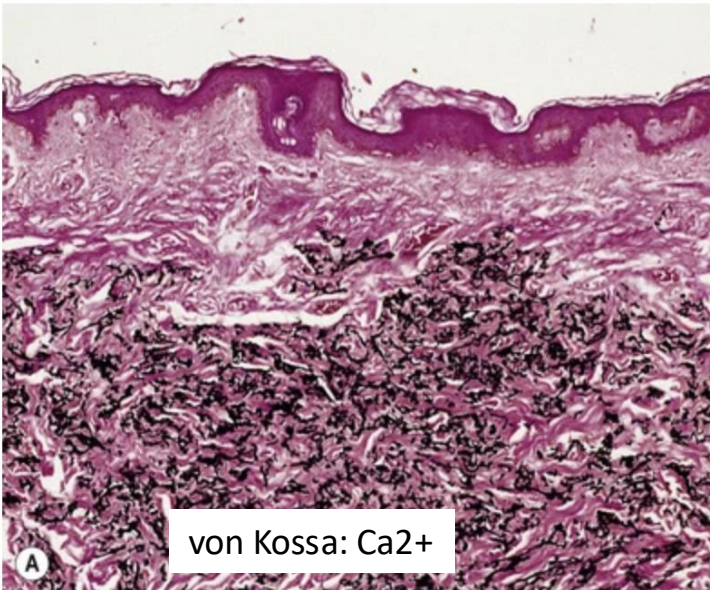


Short, curled elastic fibers



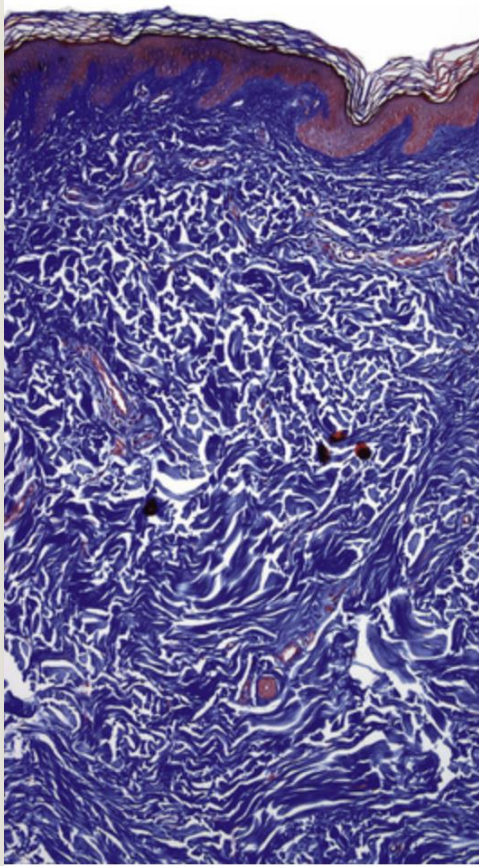
Verhoeff-van Gieson: elastic

von Kossa: Ca²⁺

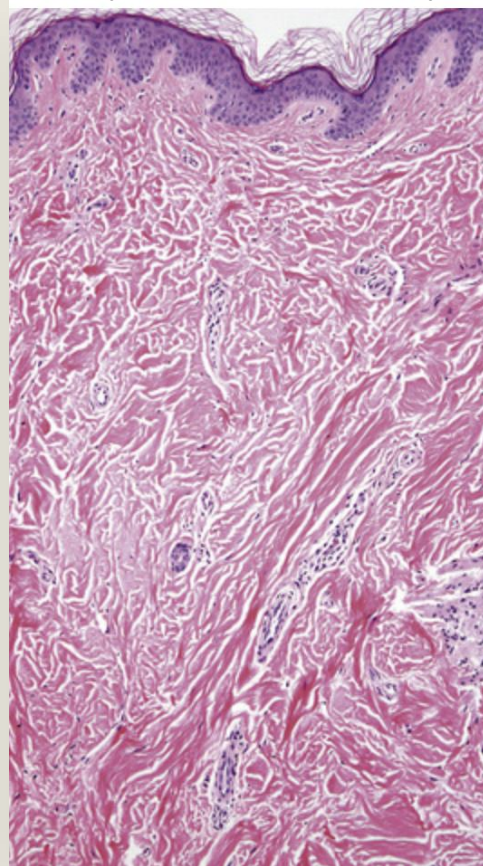


Anetoderma (Macular atrophy)

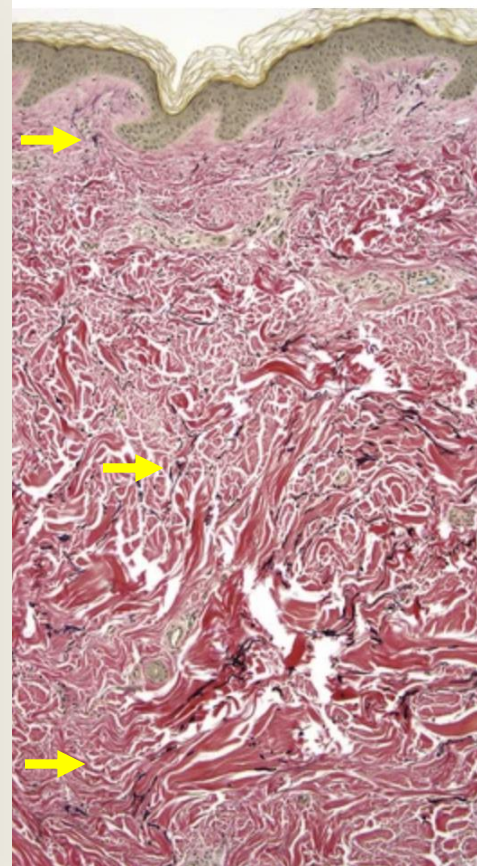
Trichrome: collagen
normal



Histology: normal
(normal skin ddx)



Elastic stain: reduced
blue-black fibers



- Clinical features
 - May develop after inflammatory rash or spontaneously
 - Round to oval atrophic patches on trunk
 - Skin bulges with movement
 - Palpation suggests orifice
- DDX:
 - Atrophoderma of Pasini and Pierini

Early lesion: plasma cells, eosinophils, neutrophils, or epithelioid histiocytes

References

Dermatopathology,
3rd edition, Barnhill

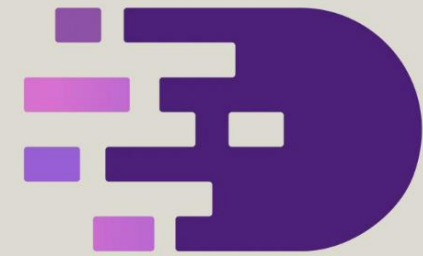
*McKee's pathology
of the skin*

Digital collection
(Dadras)

Digital Skin Pathology

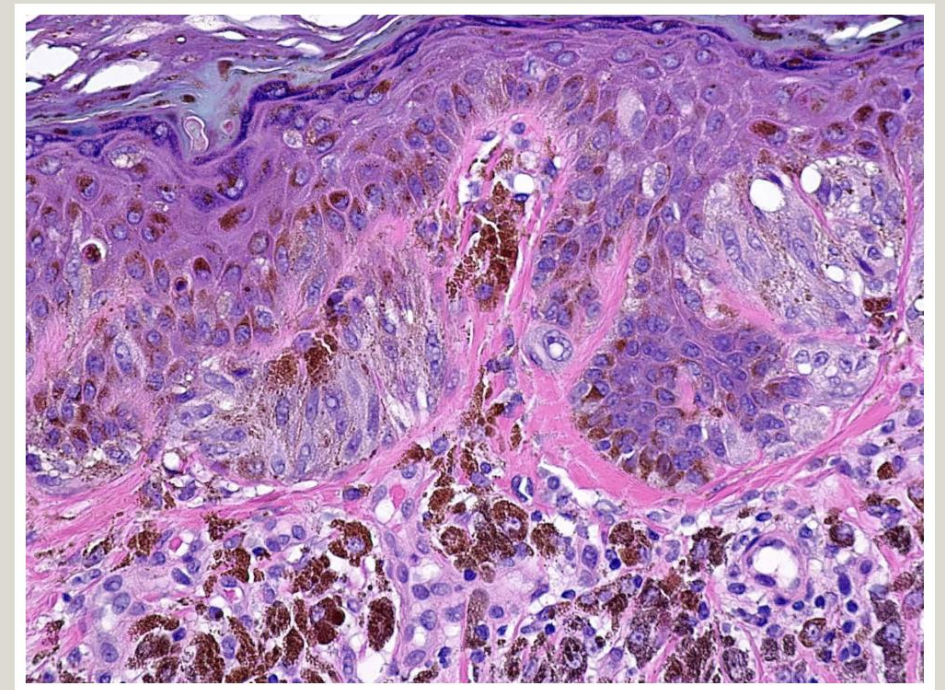
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- Meet the challenges of the growing needs for dermatopathology knowledge
 - Lectures
 - Case-by-case approach using real-life examples
 - Quizzes
- Residents of Dermatology and Pathology
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**DERMATOPATHOLOGY: LEARN HOW TO
DIAGNOSE SKIN DISEASES DERM PATH
DIAGNOSTICS**



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