

**Aging skin**

**&**

**Vitamin A (retinoids)**

# Major Functions of Skin

## **Barrier**

(excludes infectious agents & some chemicals; retains moisture, prevents desiccation)

## **Temperature control**

(perspiration, insulation)

## **Receptor of sensory stimuli**

(touch, pressure, pain, temperature)

## **Biosynthesis**

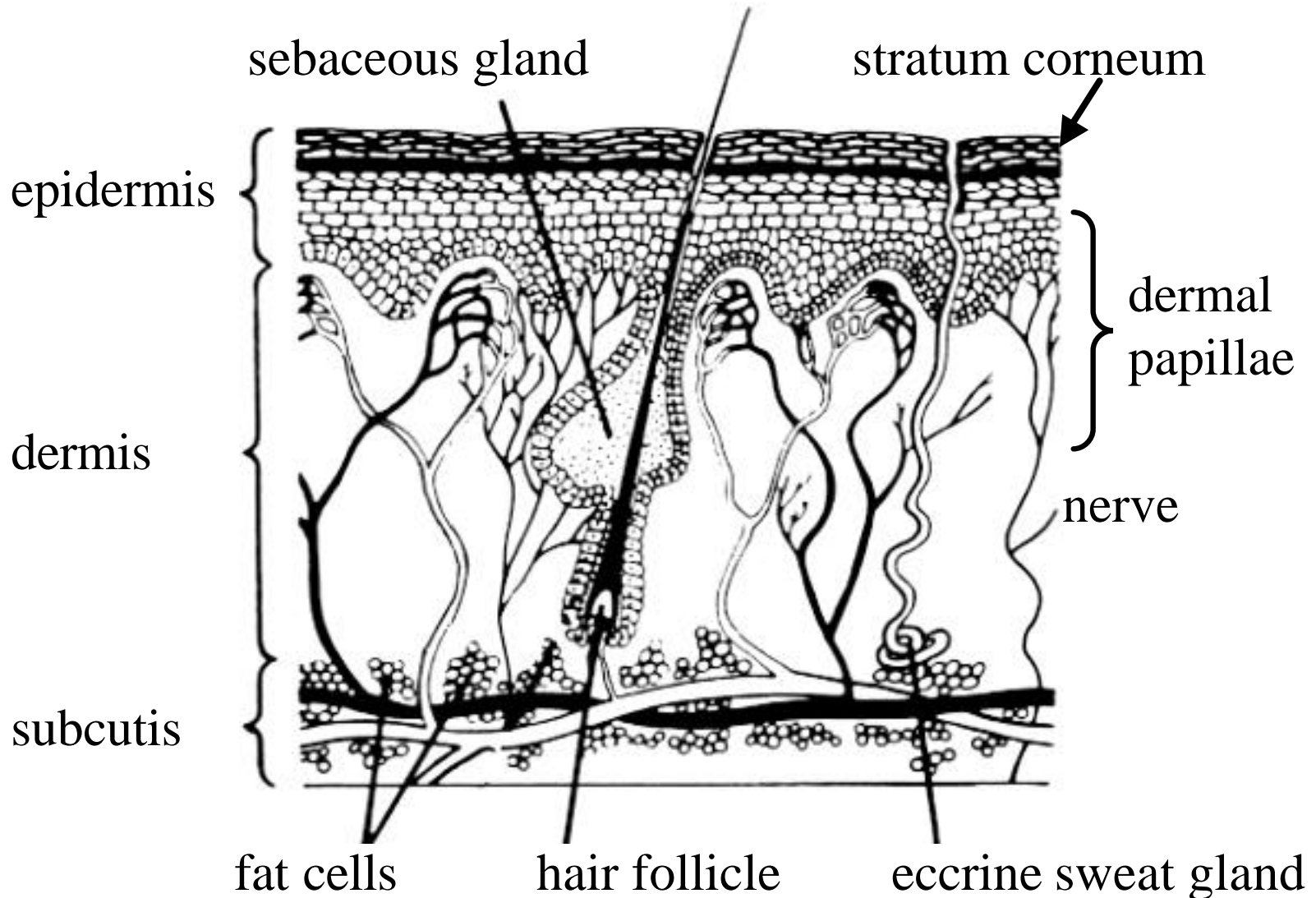
(vitamin D, melanin, estrogen)

## **Inflammatory/immune reactions**

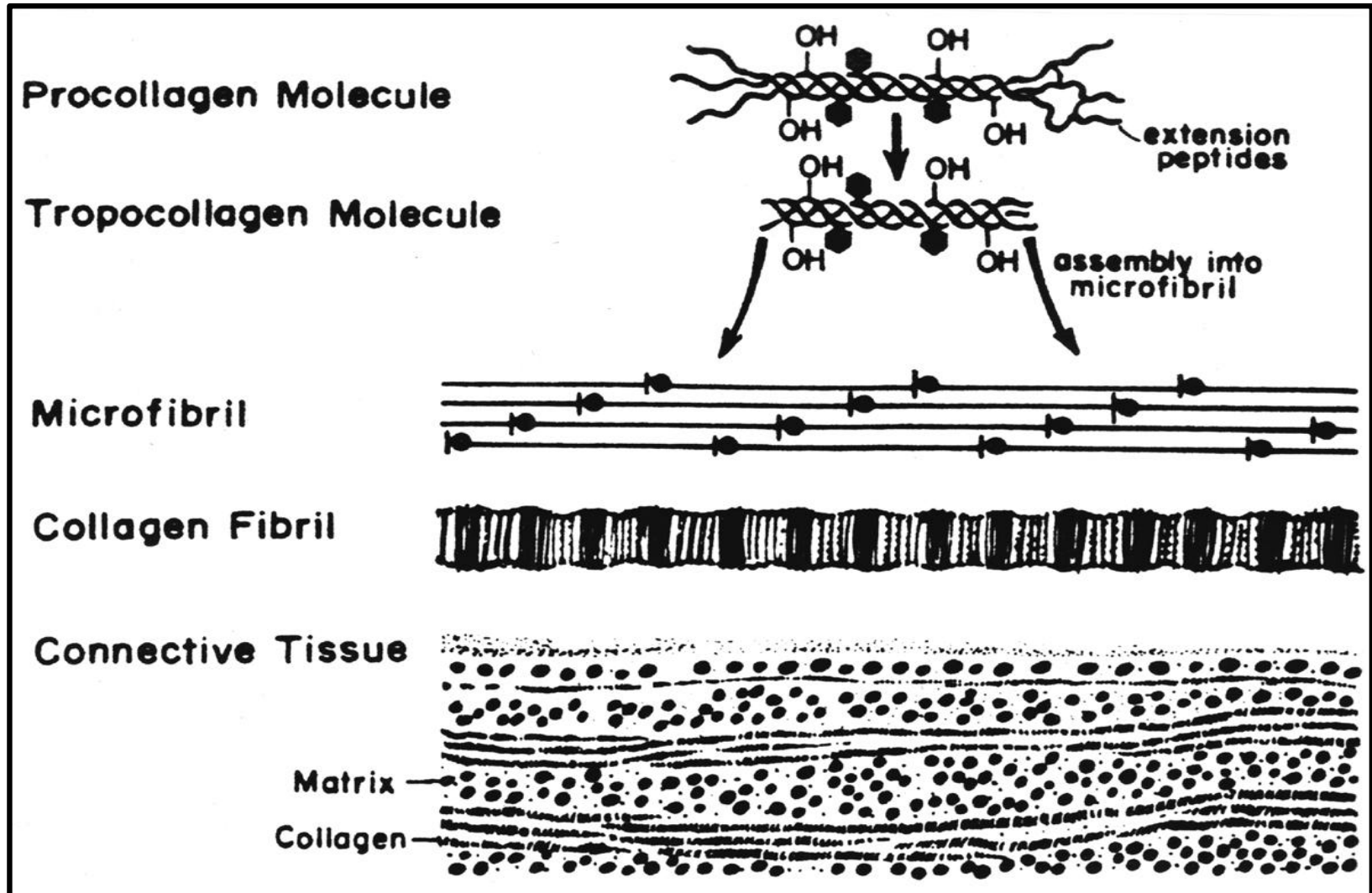
(contact dermatitis)

## **Excretion/secretion** (sweat, milk, pheromones?)

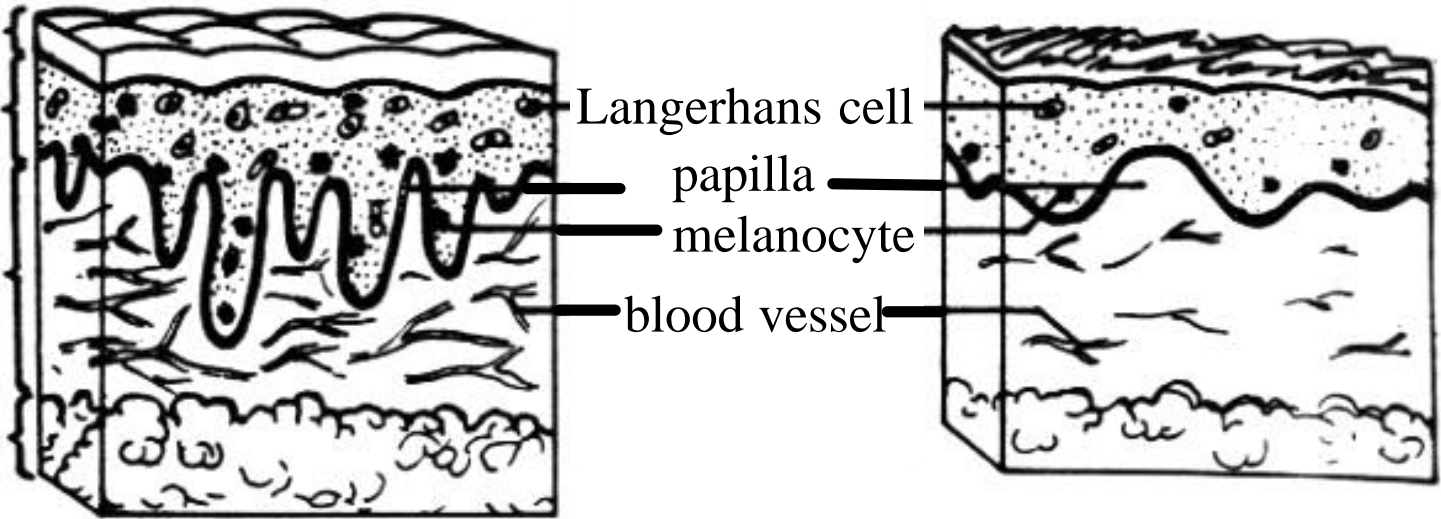
# Human Skin



# The composition of a collagen fibril and the distribution of tropocollagen molecules in connective tissue.



stratum corneum  
epidermis  
dermis  
subcutis

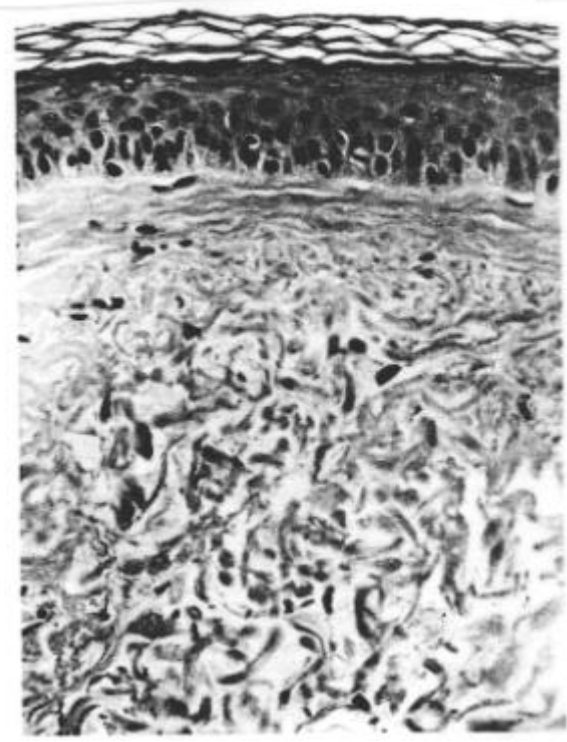
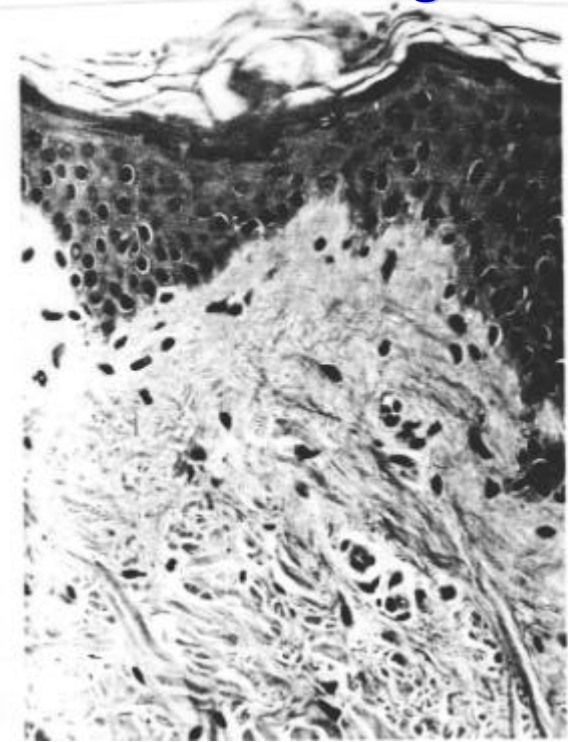


Young

vs.

Old

Aging  
Skin



# Changes in Aging Skin

## Events

Epidermis	↓	cell production, melanocytes, Langerhans cells
Dermis	↓	density, #cells, blood vessels
Other	↓	sweat, sebaceous glands, hair follicles

## Functional consequences

↓ wound healing, immunity, tanning, elasticity,  
clearance of foreign substances, thickness

↑ blisters, infection, roughness, dryness,  
cancer, fragility, insensitivity

# Photoaging

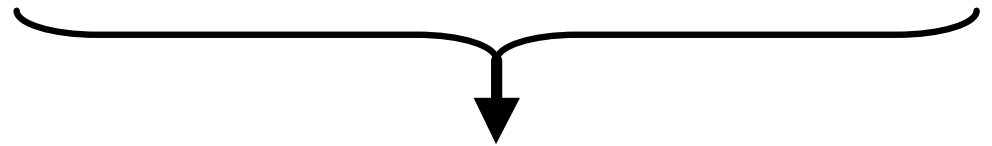


UV (ultraviolet) radiation



affects gene expression in skin

(↑ collagenase      ↓ collagen)



acute collagen loss



imperfect repair



microscars

photoaging



chronic collagen loss

# Treatments for photoaged skin

antioxidants

a-hydroxyacids

Retinoids (vitamin A metabolites and analogs)

*“Of these three approaches only topical retinoids, particularly **retinoic acid** (**all-trans-retinoic acid**), have a well documented ability to repair photoaged skin at the clinical, histological and molecular level. Furthermore, the use of topical retinoids may actually prevent photoaging.”*

C.E. Griffiths, “Drug treatment of photoaged skin”,  
*Drugs and Aging* **14**, 289-301 (1999).



# Vitamin A (retinol) is the parent retinoid

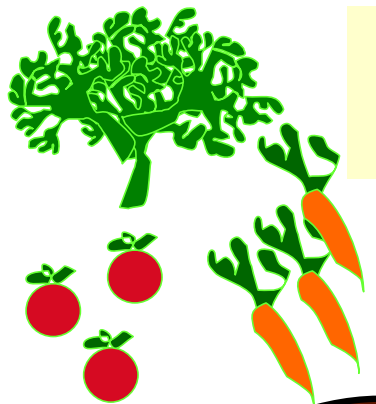
 vision (nyctalopia)

 development, growth, reproduction

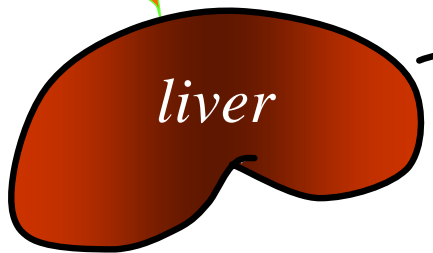
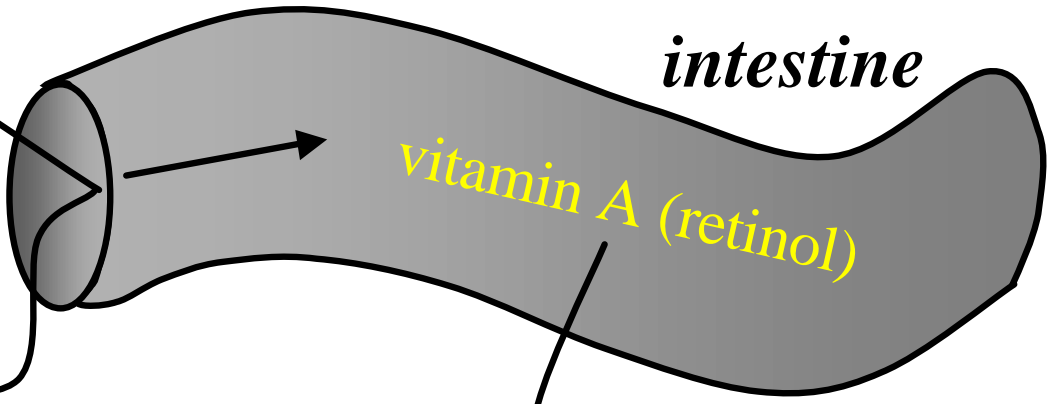
epithelia (skin, trachea, digestive system)

immune system, nervous system

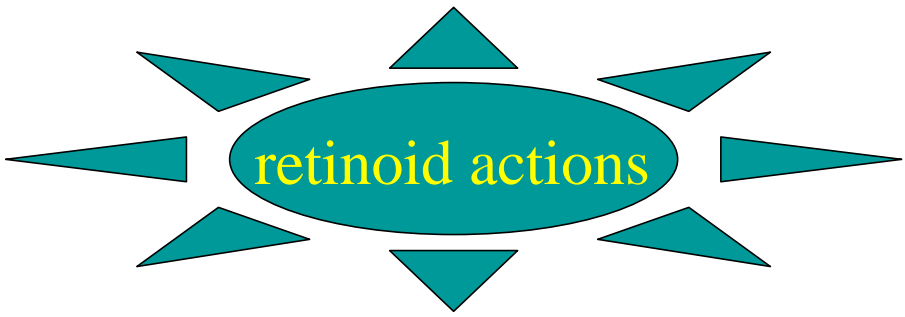
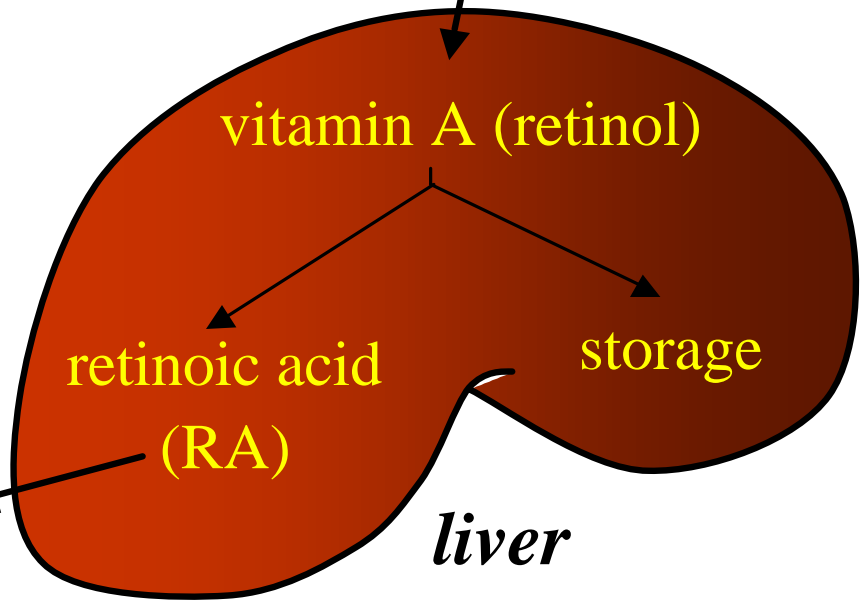
**fruits & vegetables**



carotenoids  
(provitamin A)



(vitamin A esters)



Cells (keratinocytes) convert vitamin A  
(retinol) into  
*all-trans-retinoic acid* (atRA).

atRA regulates gene expression through  
nuclear hormone receptors and thereby  
controls cell differentiation/function.

atRA (tretinoin) = Retin-A<sup>®</sup>, Renova<sup>®</sup>  
Accutane<sup>®</sup>

# Effects of atRA (Renova<sup>®</sup>) on photoaged skin

18 months topical treatment once daily



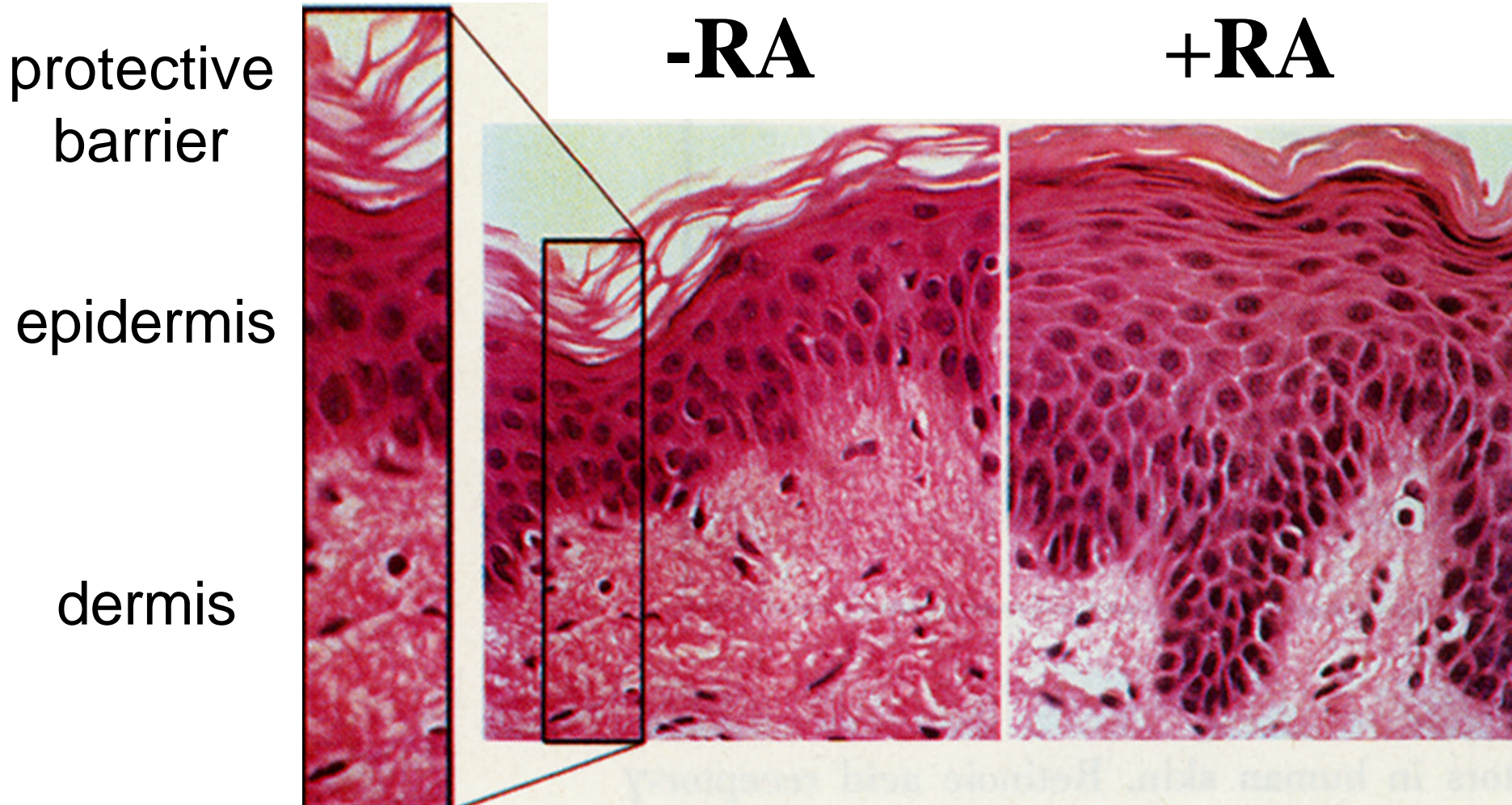
**before**



**after**

C.N. Ellis, et al., J. Amer. Acad. Dermatology 23, 629-637 (1990).

# Effects of retinoic acid on human skin



# Retinoids and cystic acne



# Systemic dosing of RA and cystic acne



**before**



**after RA**

# Severe Darier's disease





# Retinoids and psoriasis vulgaris

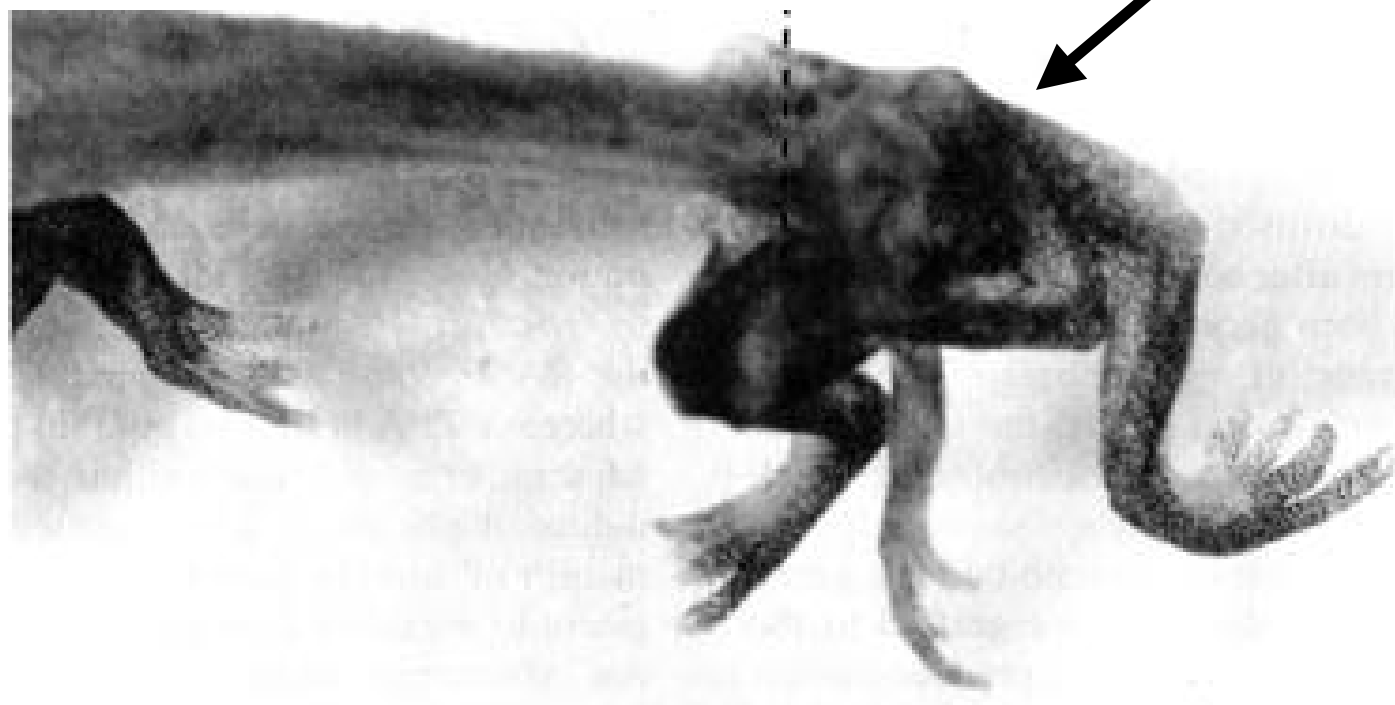
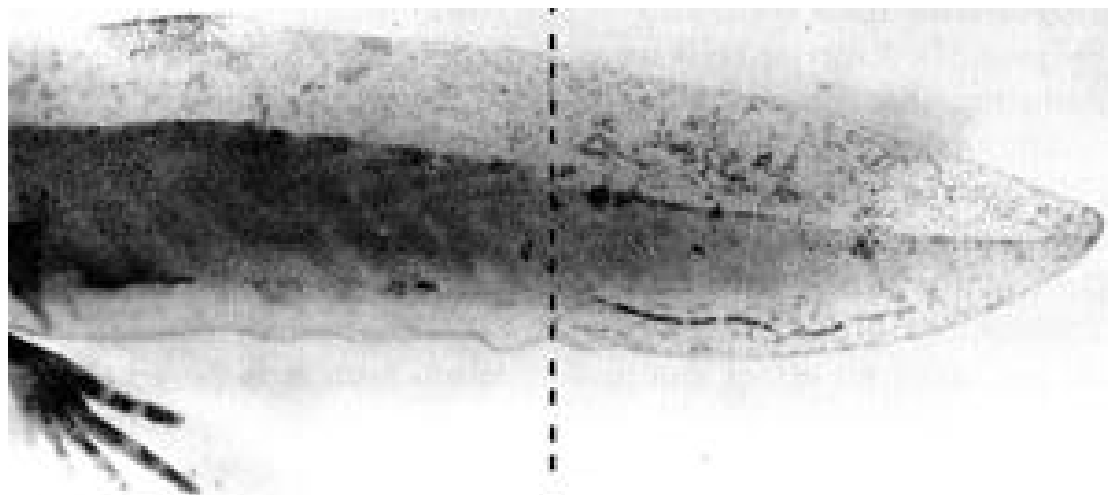


**before**



**after RA**

RA  
effects  
on a  
tadpole  
tail



# Vitamin A toxicity

Single dose—100-fold > DRDA in adults,  
20-fold > in children

Chronic intake—10-fold > DRDA

**RA is teratogenic!**

# Retinoids and over-the- counter skin products

Fewer wrinkles. Firmer skin. SPF 18 protection.  
All in one complete moisturizing treatment!

NEW



**REAL RESULTS:**

- WITHIN 8 DAYS  
FIRMER SKIN
- IN 4 WEEKS  
FEWER WRINKLES\*

**THE COMPLETE TECHNOLOGY:**

- With the power of **Encapsulated Pro-Retinol A** to ensure continuous all-day delivery into skin's surface\*, RevitaLift Complete helps fight the appearance of surface wrinkles all day.
- With **Par-Elastyl**, it noticeably firms.
- With the broad spectrum UVA/UVB protection of **SPF 18**, it helps prevent premature skin aging caused by sun exposure.

\*Upper layer of the skin.

**BECAUSE I'M WORTH IT.™**