Applying Personalized Nutrition for Skin Health & Beauty

Mark Tager, MD

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LinkedIn

DISCLOSURES

- Enzymedica
- The American Nutrition Association
- Designs for Health
- Microbiome Labs
- Pellecome

No products will be mentioned in this session

OBJECTIVES

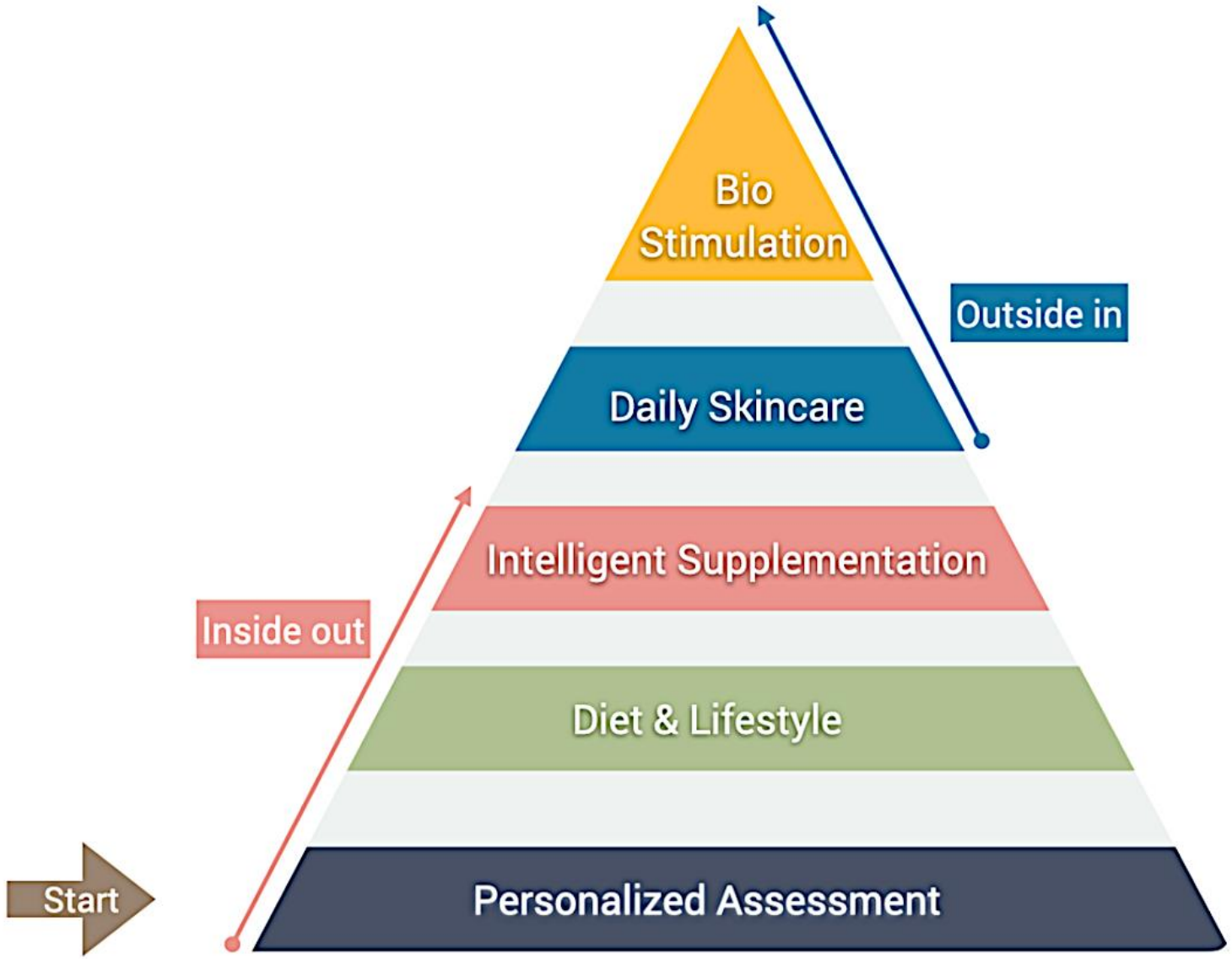
1. Identify the key dietary and lifestyle factors that affect skin health
2. Develop knowledge of the evidence for supplements targeting skin, hair, and nails
3. Discover which specific nutrients support the skin barrier, collagen, hormonal health, acne prevention, and ROS protection
4. Review basic labs, as well as nutrigenomics, microbiome, gut, and food sensitivity testing that can be used to personalize a treatment plan
5. Investigate ways to effectively initiate the “beauty from within” discussion with your patient/client

ABOUT OUR SPEAKER

- CEO ChangeWell Inc, (changewell.com) San Diego
- Early pioneer in Integrative Medicine
- More than 1,200 presentations
- Experience in health promotion, functional, regenerative, and aesthetic medicine
- Conduct presentation coaching for healthcare professionals
- CME programs for A4M, Osher, Duke, AIHM and others
- Producer of the ANA *Personalized Nutrition for Practitioners*; *Inside Skin Beauty* Online Training
- Author/Co-Author of 11 books, >100 training videos
- *Feed Your Skin Right: Your Personalized Nutrition Plan for Radiant Beauty*
- Medical Degree: Duke University, Family Practice: Oregon

There are many doors leading patients to your practice and optimal well-being


SKIN HEALTH
& BEAUTY

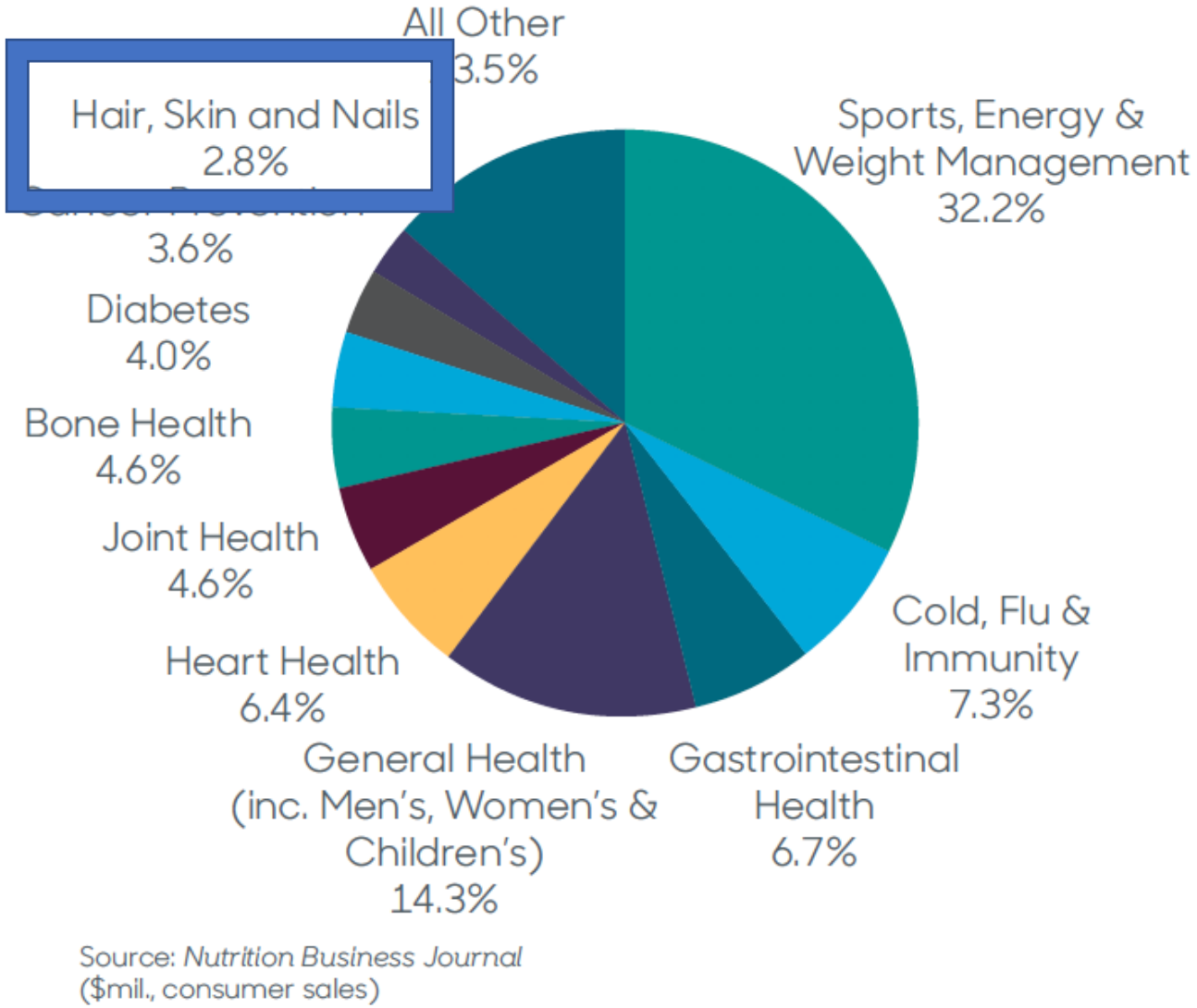

Bio Stimulation
Outside in
Daily Skincare
Intelligent Supplementation
Inside out
Diet & Lifestyle
Personalized Assessment
Start

5 KEY MESSAGES OF PERSONALIZED NUTRITION FOR SKIN HEALTH & BEAUTY

1. There is no substitute for a crappy diet
2. No two patients have the exact same skin
3. Treatments for the gut, and brain also help skin
4. There is rationale to add specific supplement(s) for skin beauty
5. The best skin supplements take advantage of natural synergy


...should an integrative health professional
care about skin health and beauty

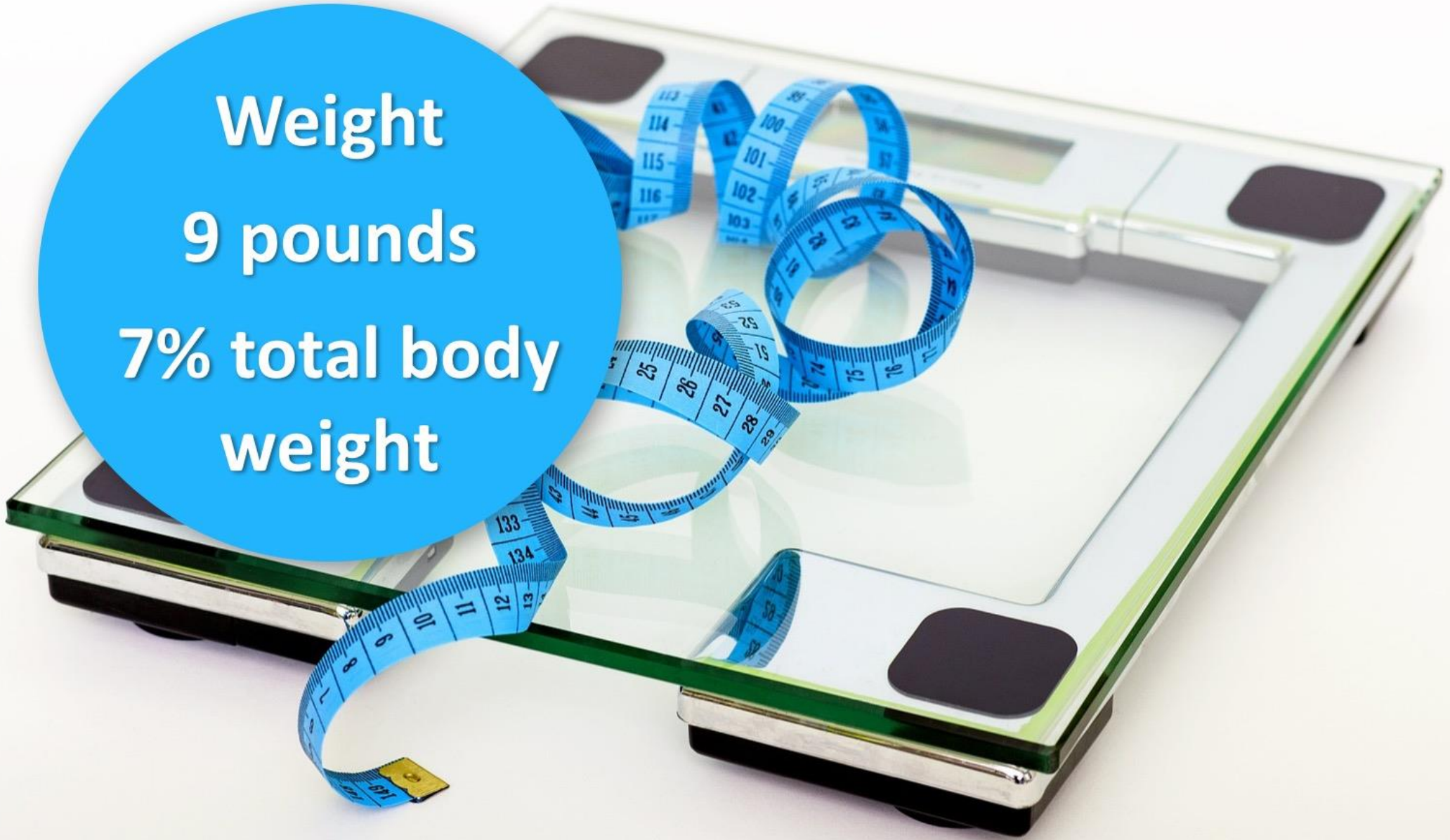
- Respond to patient interest
- Better clinical outcomes: compliance
- Distinguish practice
- Add revenue stream
- Personal interest/passion



The ~$60B Nutritional Supplement Industry
$5.4B Practitioner


HAVE SKIN
IN THE GAME

Bouslimani A, Porto C, Rath CM, Wang M, Guo Y, Gonzalez A, Berg-Lyon D, Ackermann G, Moeller Christensen GJ, Nakatsuji T, Zhang L, Borkowski AW, Meehan MJ, Dorrestein K, Gallo RL, Bandeira N, Knight R, Alexandrov T, Dorrestein PC. Molecular cartography of the human skin surface in 3D. Proc Natl Acad Sci U S A. 2015 Apr 28;112(17):E2120-9. doi: 10.1073/pnas.1424409112. Epub 2015 Mar 30. PMID: 25825778; PMCID: PMC4418856.



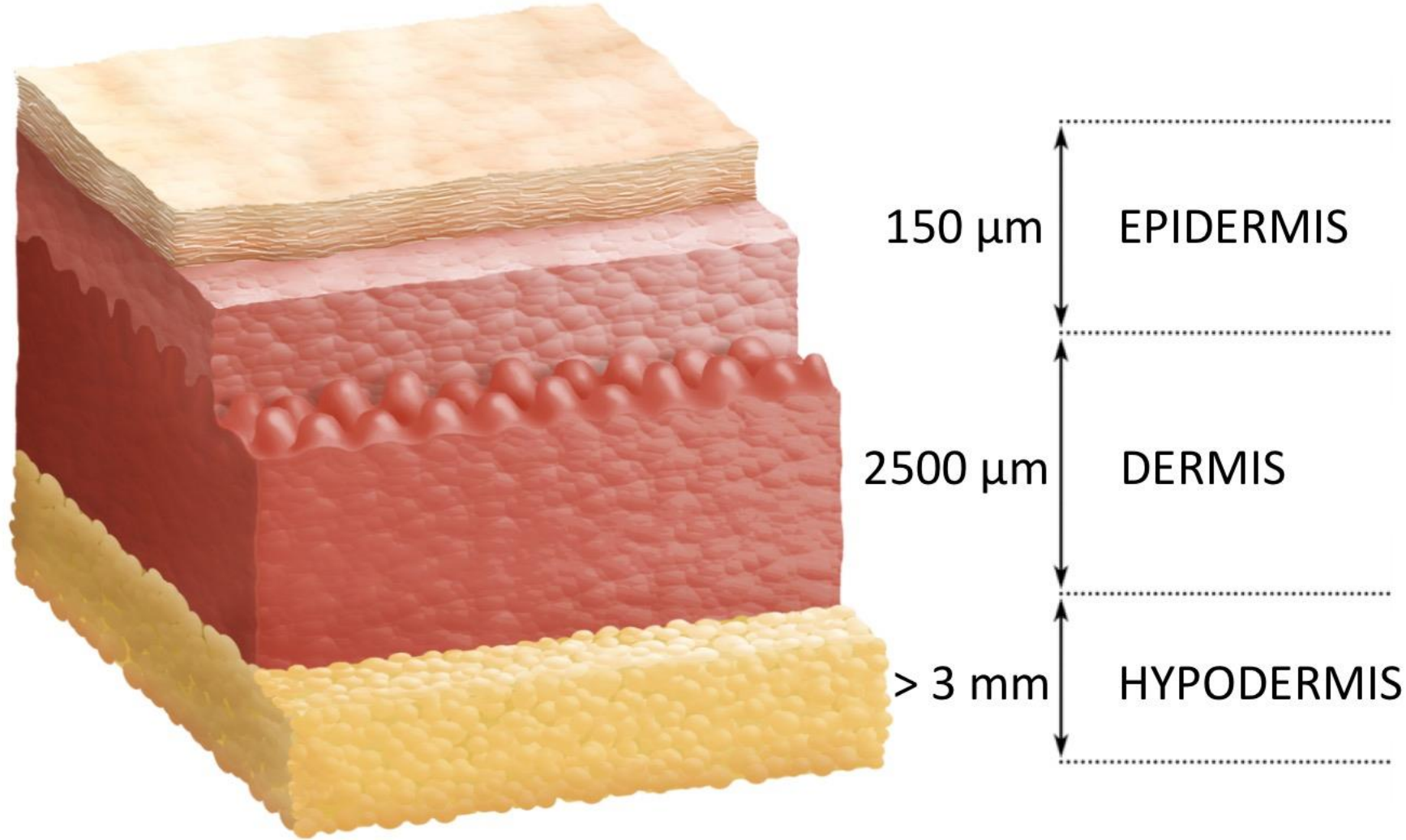
LEIDER M. On the weight of the skin. J Invest Dermatol. 1949 Mar;12(3):187-91. PMID: 18117764.

Thickness:

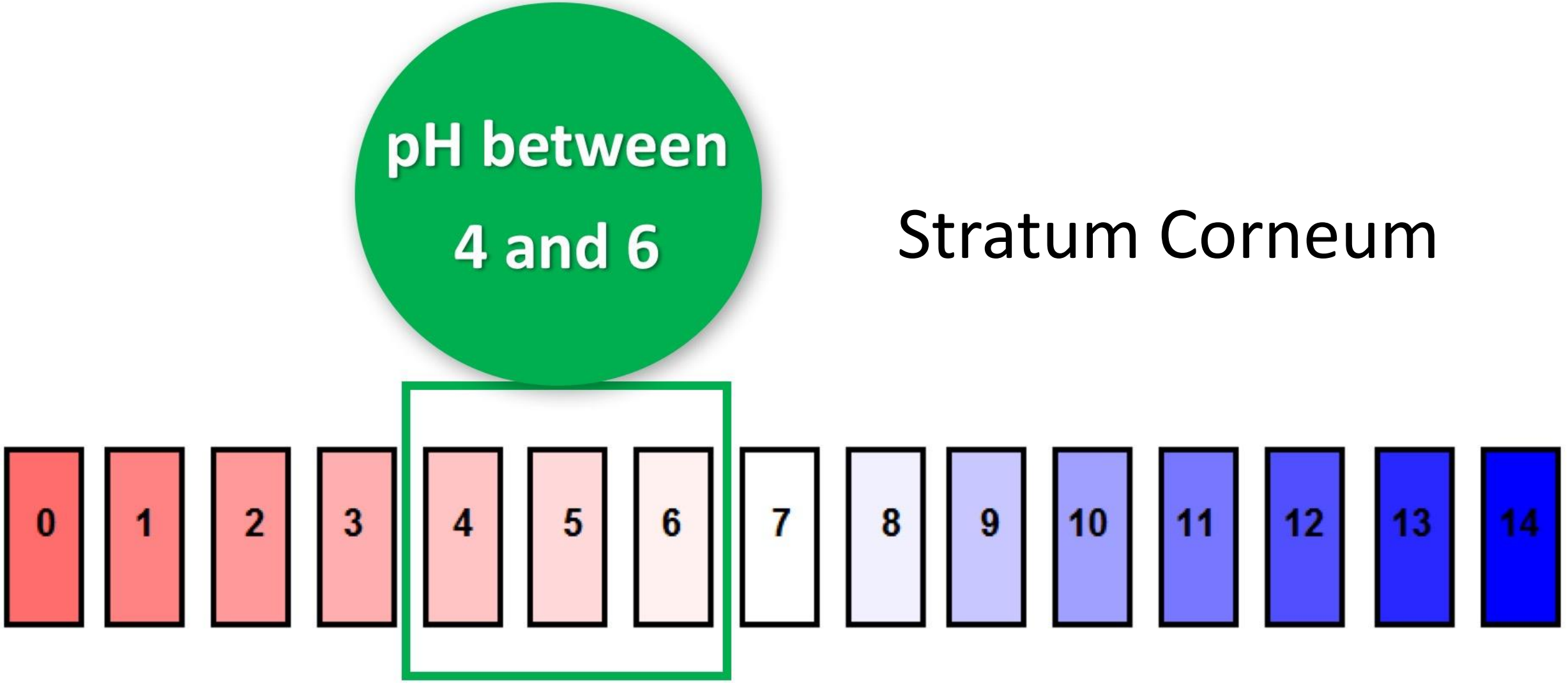
0.5 mm to

4 mm

Depth of each layer

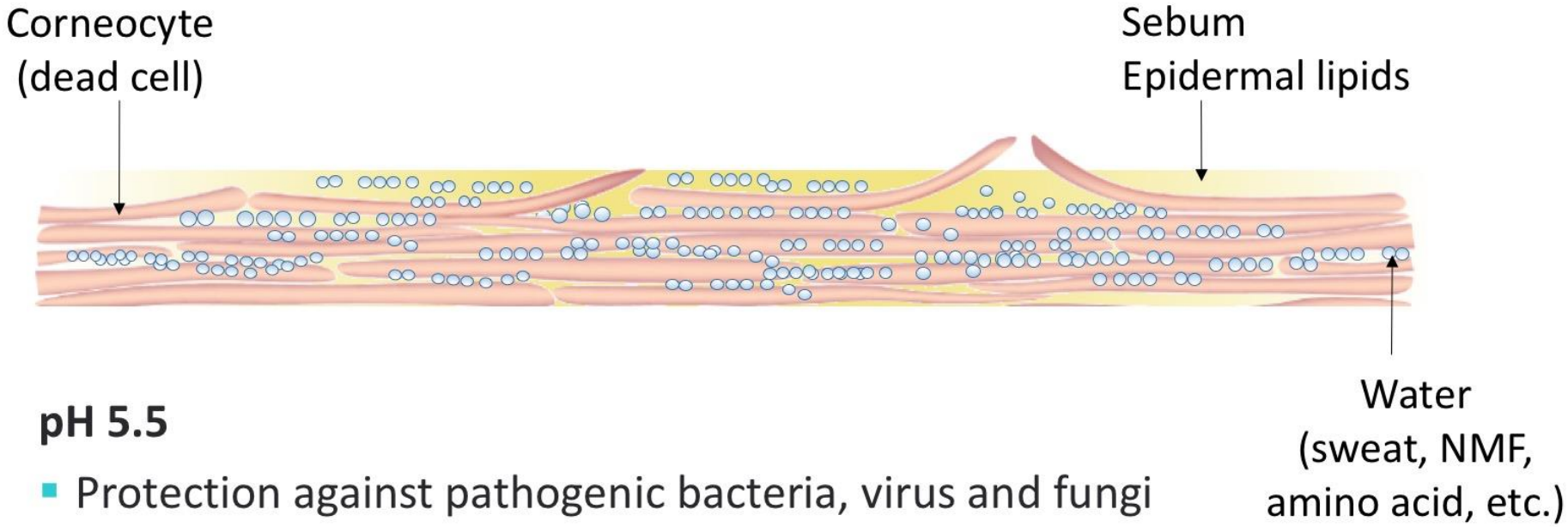


Stratum Corneum



Braun-Falco O, Korting HC. Der normale pH-Wert der menschlichen Haut [Normal pH value of human skin]. Hautarzt. 1986 Mar;37(3):126-9. German. PMID: 3700100.

HYDROLIPID FILM = ACID MANTLE

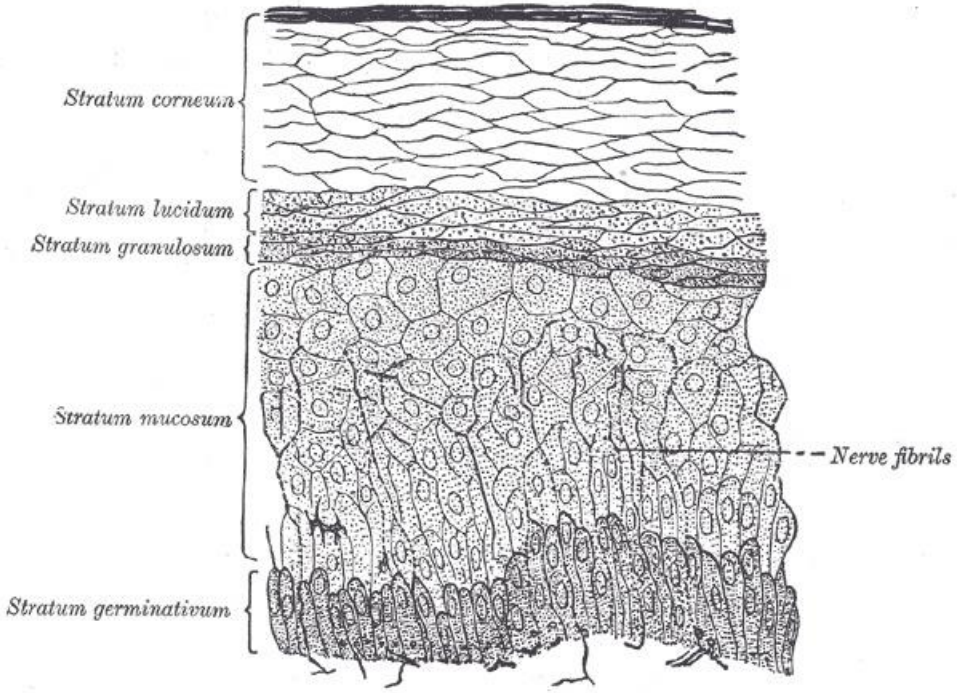


pH 5.5

- Protection against pathogenic bacteria, virus and fungi
- Balanced skin microbiome
- Optimal production of epidermal lipids
- Optimal action of enzymes involved in desquamation
- Optimal renewal of the stratum corneum

Surber C, Humbert P, Abels C, Maibach H. The Acid Mantle: A Myth or an Essential Part of Skin Health? Curr Probl Dermatol. 2018;54:1-10. doi: 10.1159/000489512. Epub 2018 Aug 20. PMID: 30125885.

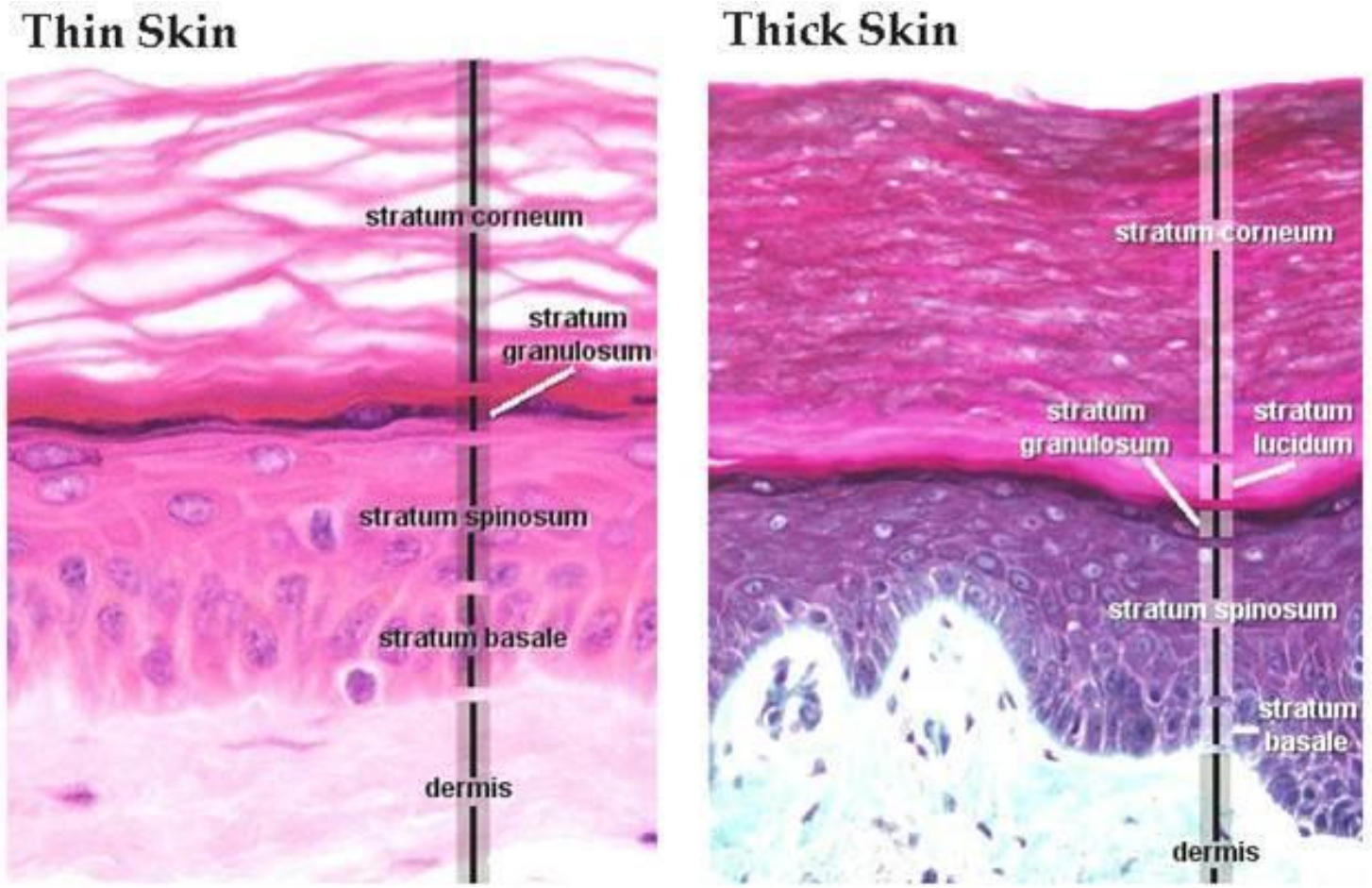
Epidermal Functions



- **Protection:** Dehydration, UV light, mechanical **Sensation**: Pain, temperature, touch, deep pressure
- **Mobility:** Allows smooth movement of the body.
- **Endocrine:** Vitamin D production
- **Exocrine** activity: Releases water, urea, and ammonia. Secretes sebum, sweat, and pheromones
- **Immunity:** against pathogens, secretes cytokines
- **Temperature:** Conserves or releases heat

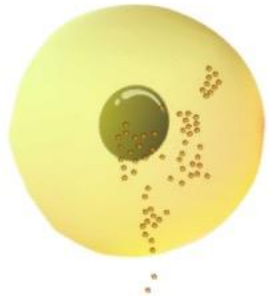
Lopez-Ojeda W, Pandey A, Alhajj M, et al. Anatomy, Skin (Integument) [Updated 2022 Oct 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK441980/#

Understanding Radiance

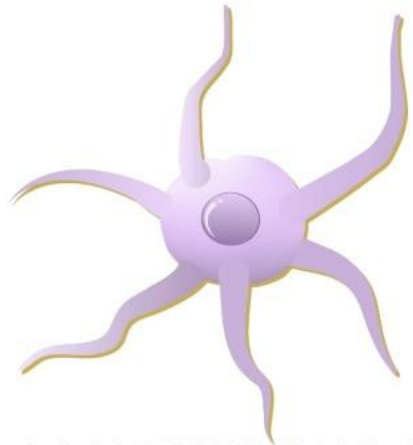


https://www.auladeanatomia.com/en/sistemas/425/integumentary-system

KERATINOCYTE



MELANOCYTE

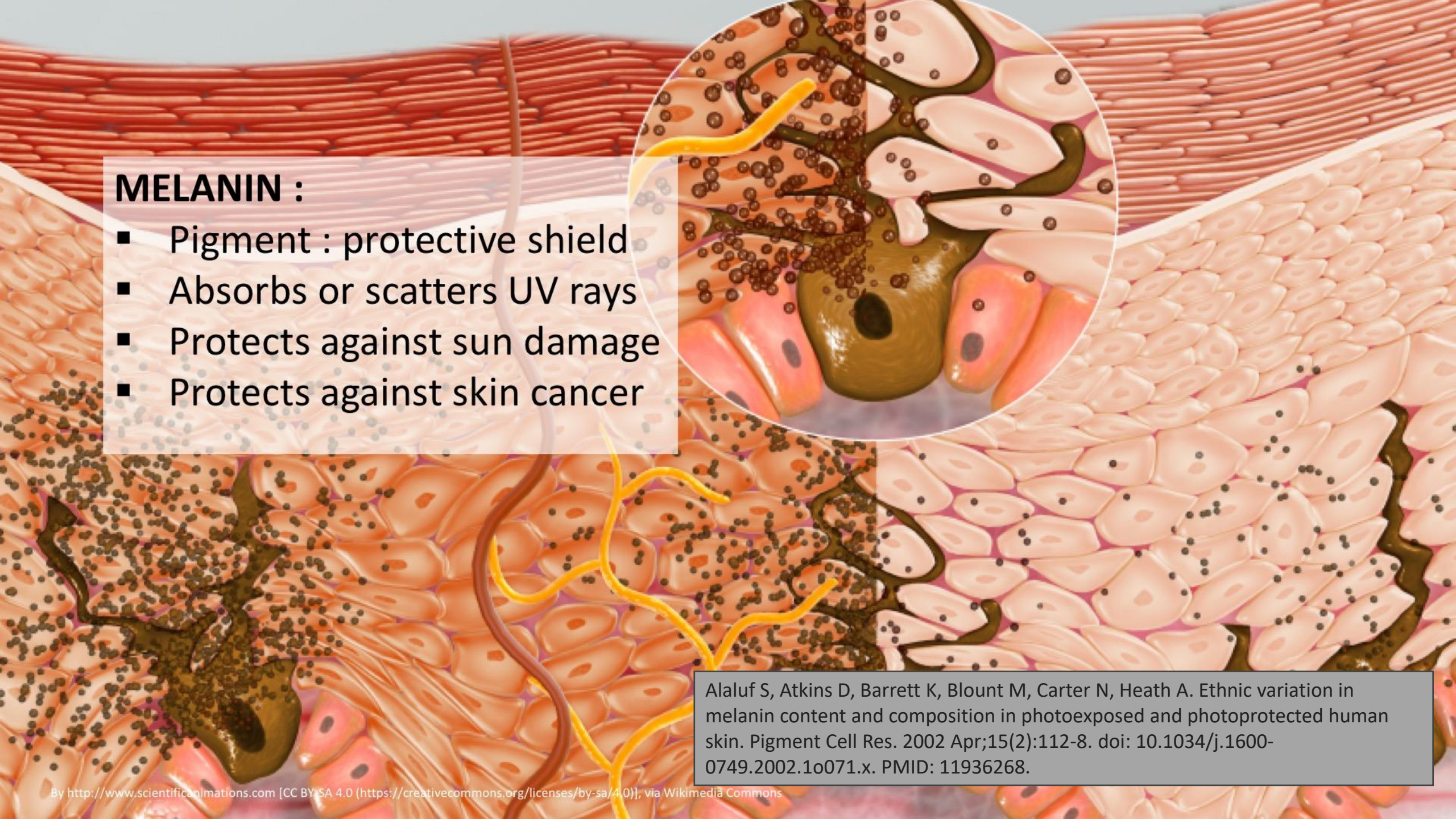


LANGHERANS CELL

STEM CELL

MERKEL CELL

- Attached to nerve ending
- Acts as a mechanoreceptors
- Sensitive to touch



MELANIN :

- Pigment : protective shield
- Absorbs or scatters UV rays
- Protects against sun damage
- Protects against skin cancer

Alaluf S, Atkins D, Barrett K, Blount M, Carter N, Heath A. Ethnic variation in melanin content and composition in photoexposed and photoprotected human skin. Pigment Cell Res. 2002 Apr;15(2):112-8. doi: 10.1034/j.1600-0749.2002.1o071.x. PMID: 11936268.

FITZPATRICK SKIN TYPE CLASSIFICATION

SKIN TYPE	I  *Nicole Kidman*	II  *Sarah J. Parker*	III  *Sarah Bullock*	IV  *Eva Mendez*	V  *Halle Berry*	VI  *Naomi Campbell*
Hair	red, blonde	red, blonde, light brown	chestnut, dark blonde	brown, medium/dark brown	dark brown	black
Eyes	blue, grey, green	blue, grey, green, hazel	brown, blue, grey, green, hazel	hazel, brown	brown	brown
Skin	very pale white, pale white	White, fair	medium, white to olive	olive, moderate brown	brown, dark brown	black, very dark brown to black
Tanning Ability	always burns, never tans	burns easily, rarely tans	sometimes burns gradually tans	hardly ever burn, tans very easily	rarely burns, tans easily & quickly darkens	never burns, tans very easily

Sandra

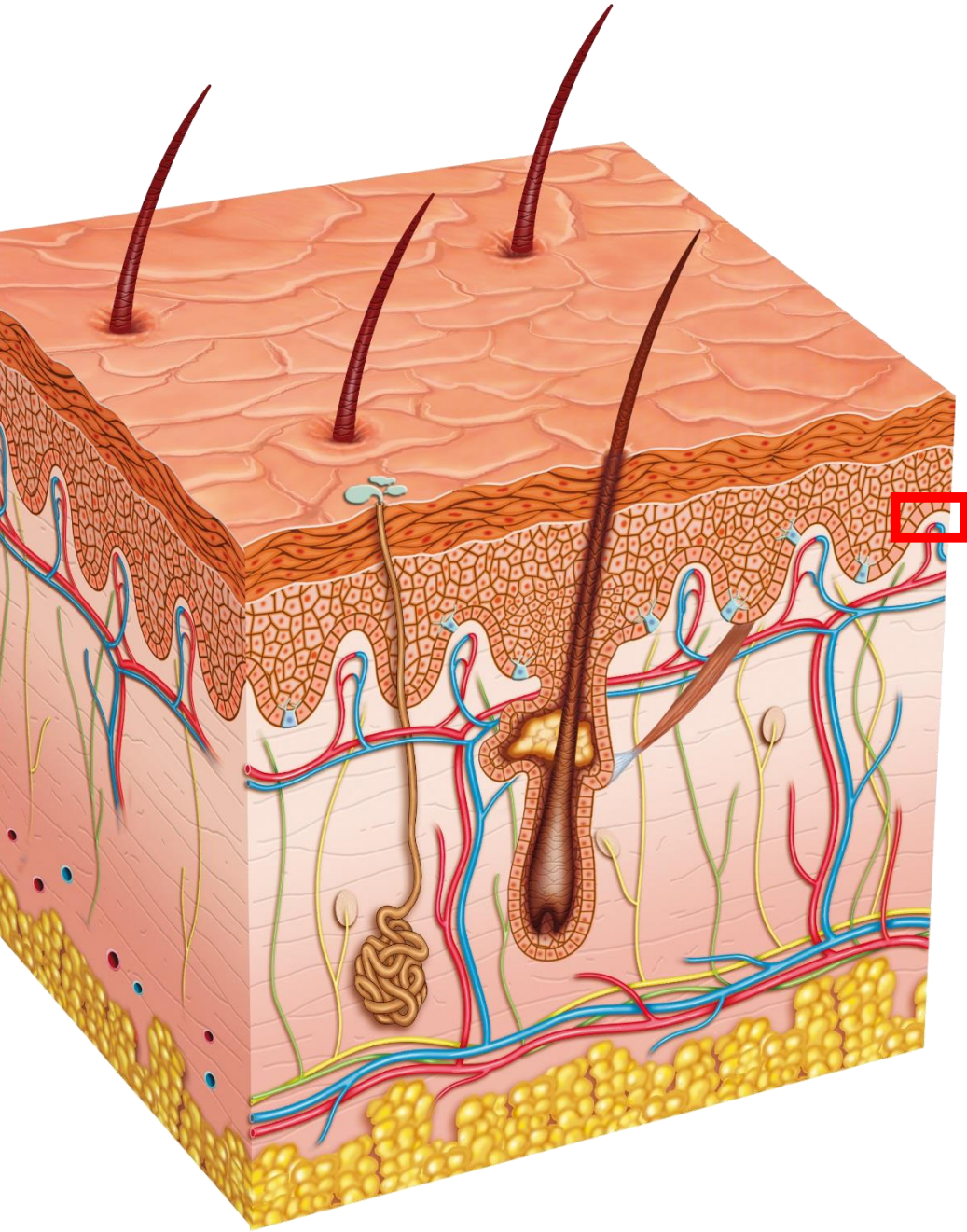
Roberts WE. Skin type classification systems old and new. Dermatol Clin. 2009 Oct;27(4):529-33, viii. doi: 10.1016/j.det.2009.08.006. PMID: 19850202.

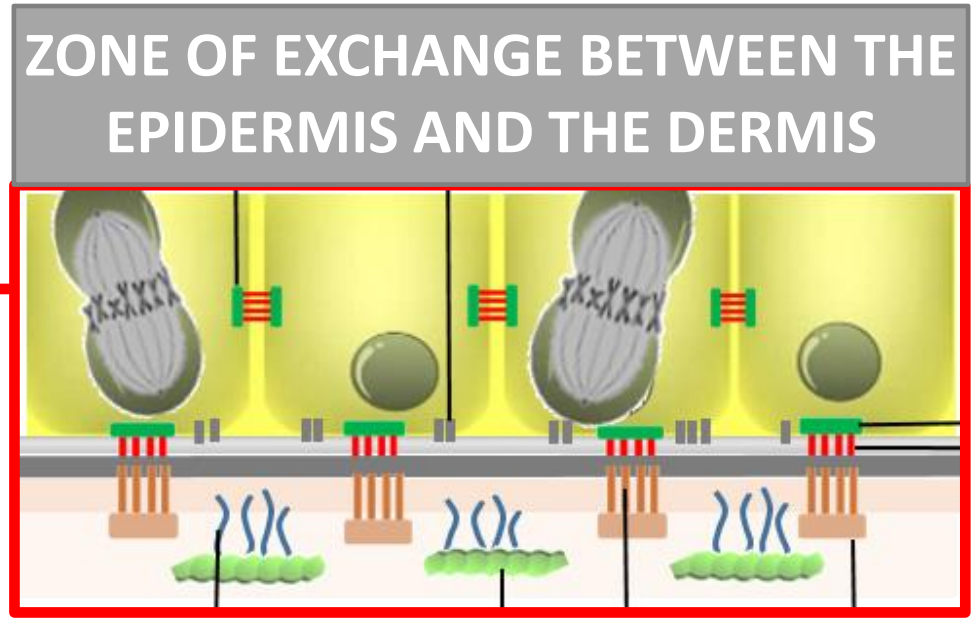
- Light-based technologies
- Mechanical procedures
- Chemical peels

DARKER SKIN TONE

Bhatt N, Alster TS. Laser surgery in dark skin. Dermatol Surg. 2008 Feb;34(2):184-94; discussion 194-5. doi: 10.1111/j.1524-4725.2007.34036.x. PMID: 18230115

Dermoepidermal junction





- ✓Diffusion of nutrients, water, waste
- ✓Irregular undulating basement membrane

WITH AGING

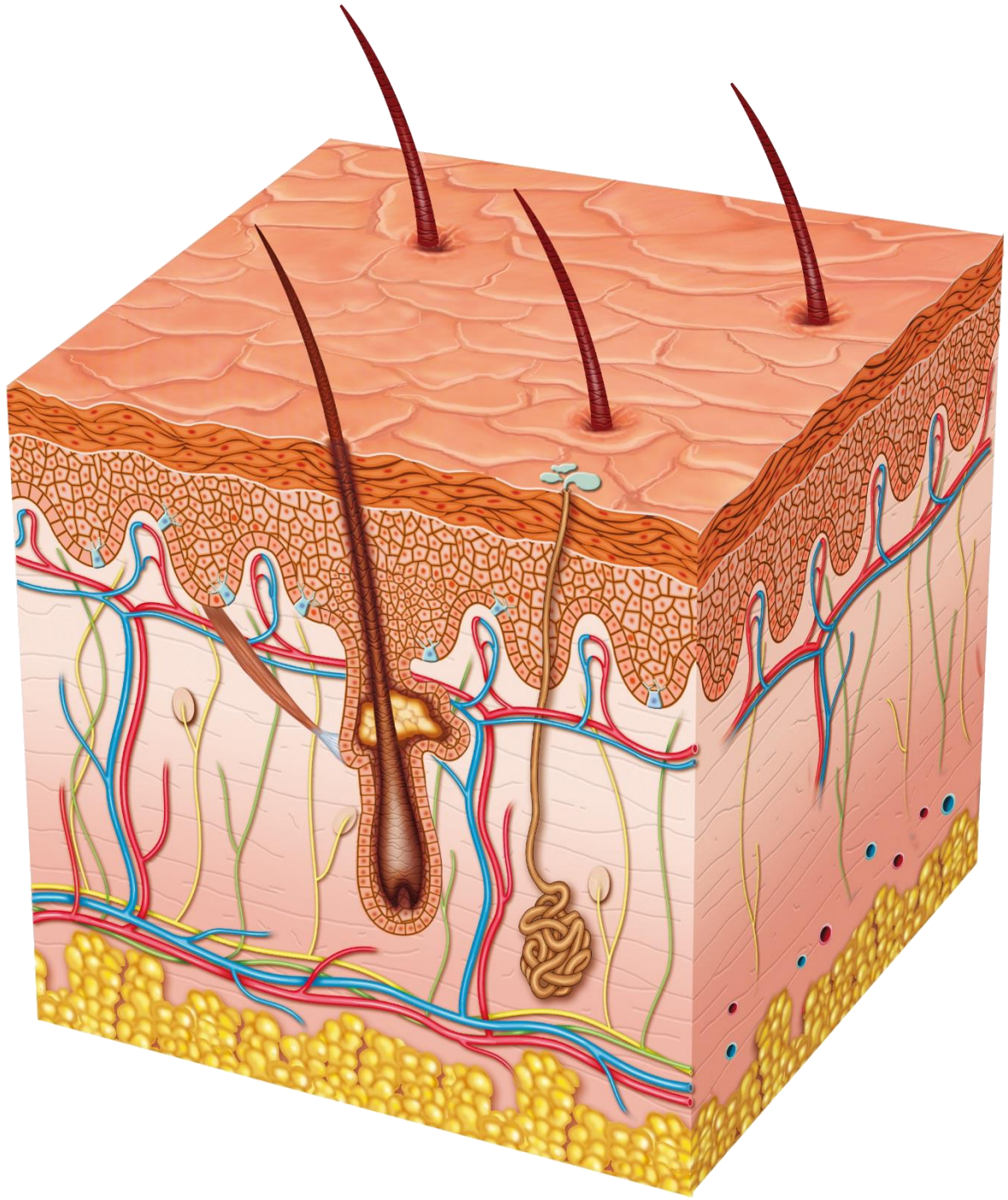
DE junction tends to flatten

Reduction of the surface contact
Skin nutrition becomes compromised

Dermis

2 LAYERS

- Papillary dermis
- Reticular dermis

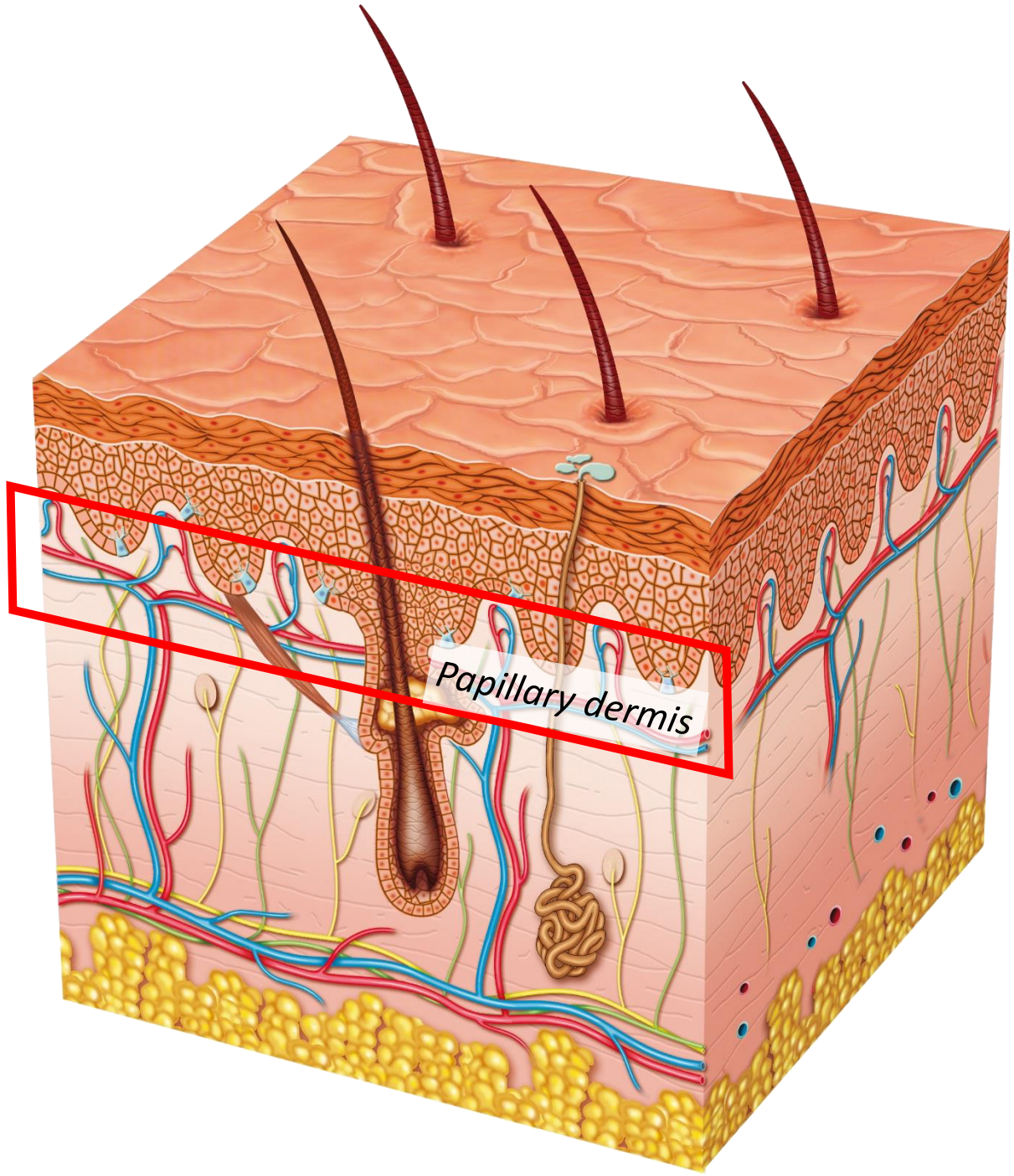


Brown TM, Krishnamurthy K. Histology, Dermis. 2022 Nov 14. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan–. PMID: 30570967.

Dermis

PAPILLARY DERMIS

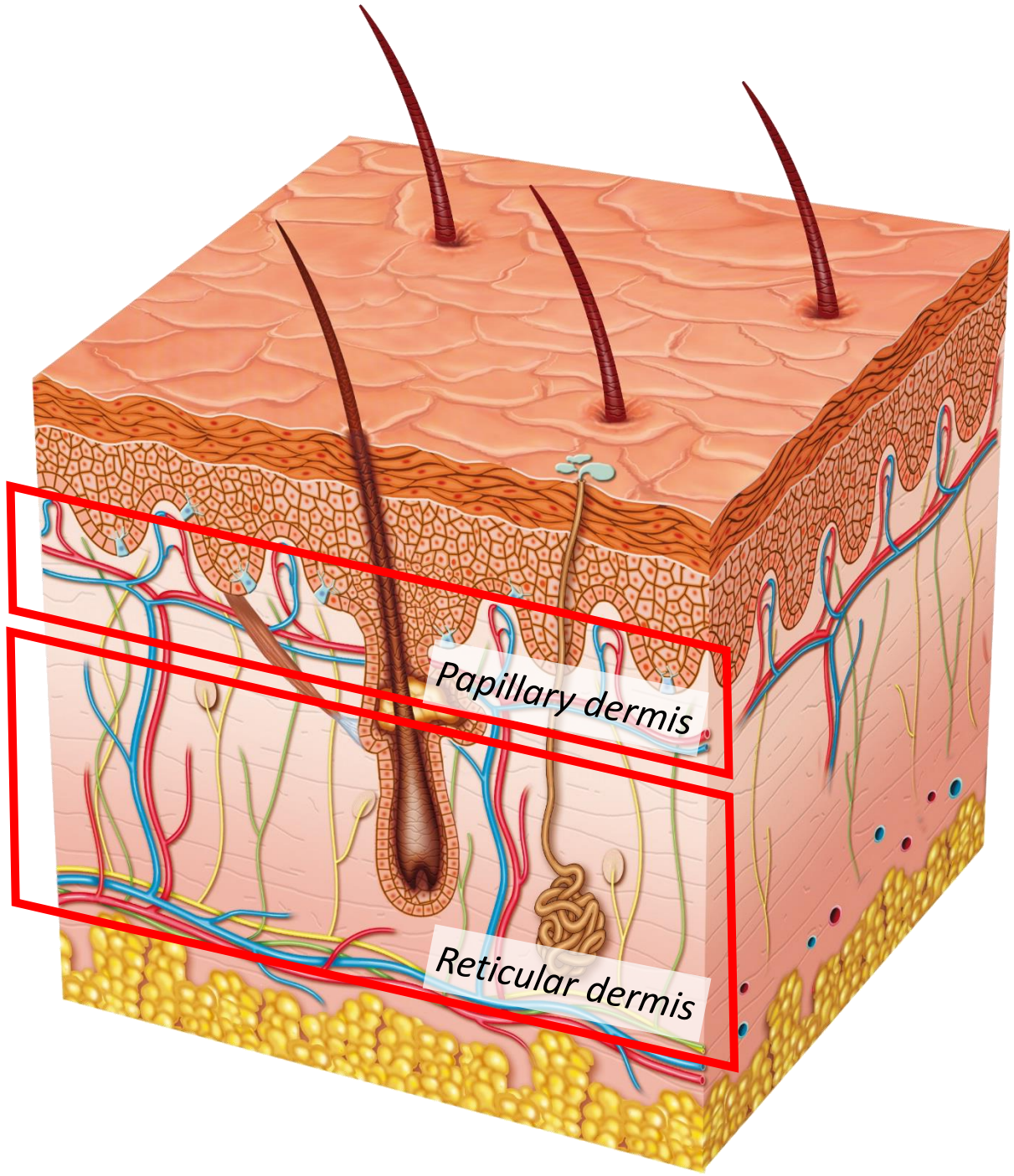
- ✓Thinner upper layer
- ✓Loose connective tissue
  - Capillaries
  - Elastin, reticular and collagen fibers
  - Ground substance (glycoproteins, proteoglycans, ex: hyaluronic acid)



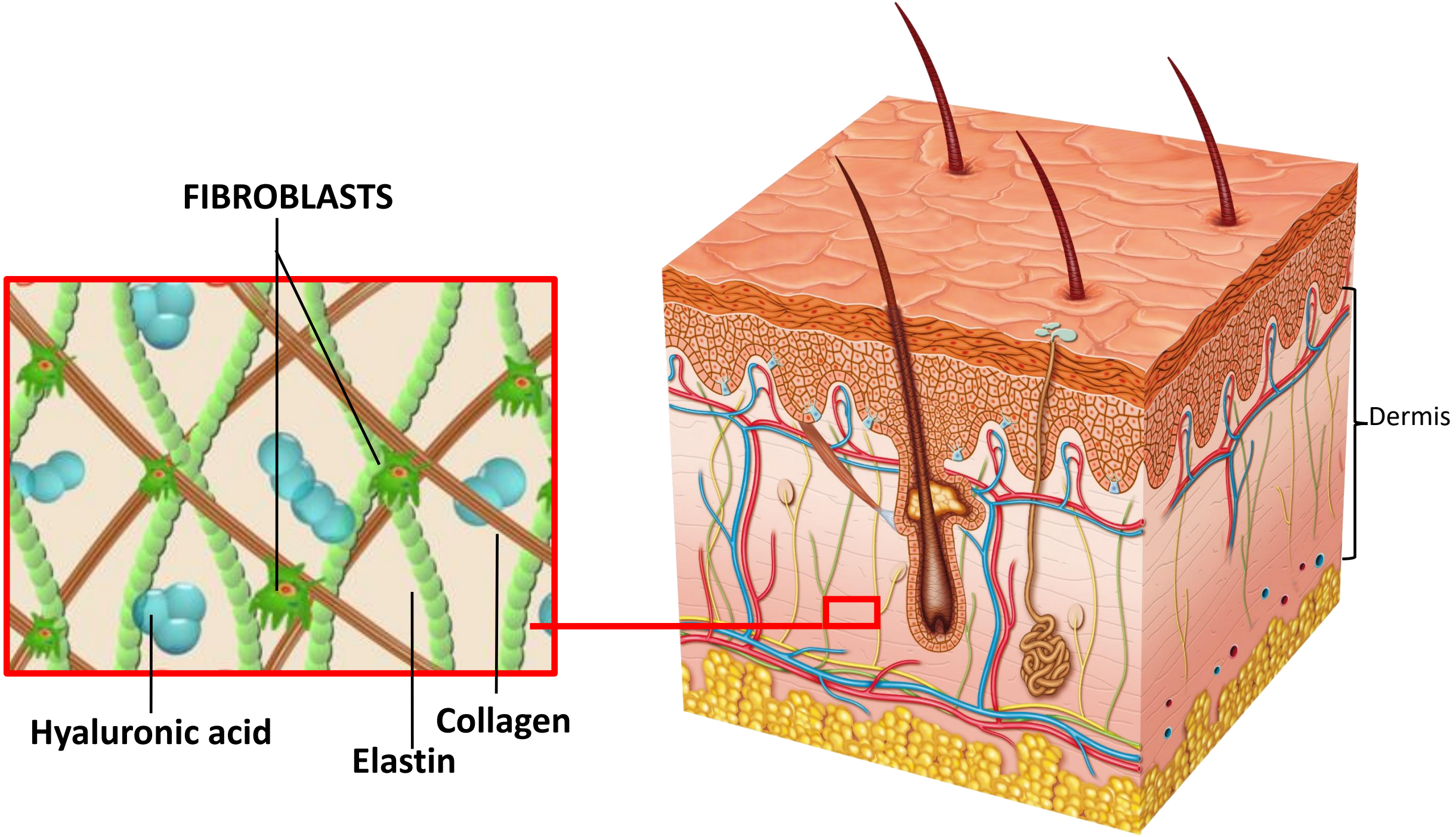
Dermis

RETICULAR DERMIS

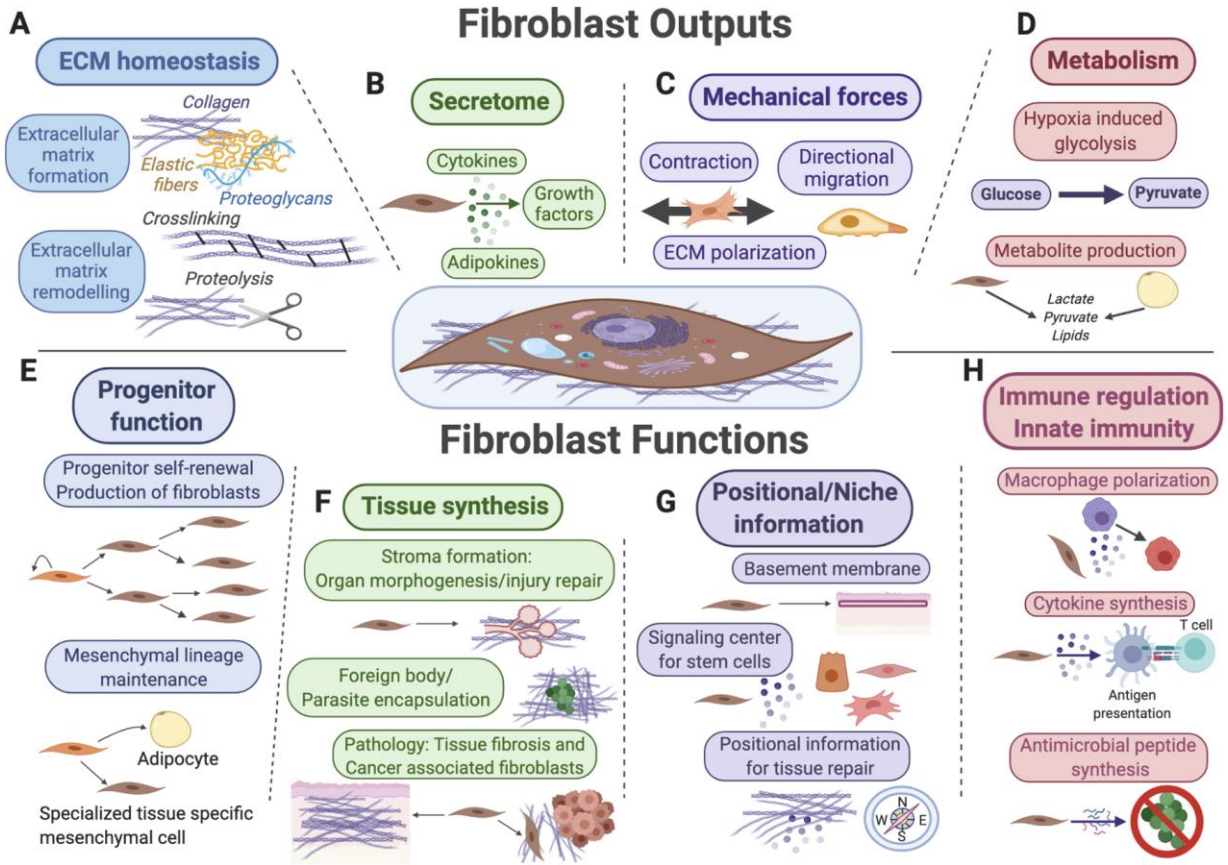
- ✓Thicker lower layer
- ✓Dense connective tissue
  - Large blood vessels
  - Interlaced elastin fibers
  - Coarse network of collagen
  - Ground substance
  - Mast cells & histiocytes



Brown TM, Krishnamurthy K. Histology, Dermis. 2022 Nov 14. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan–. PMID: 30570967.


FIBROBLASTS
Hyaluronic acid
Elastin
Collagen
Dermis

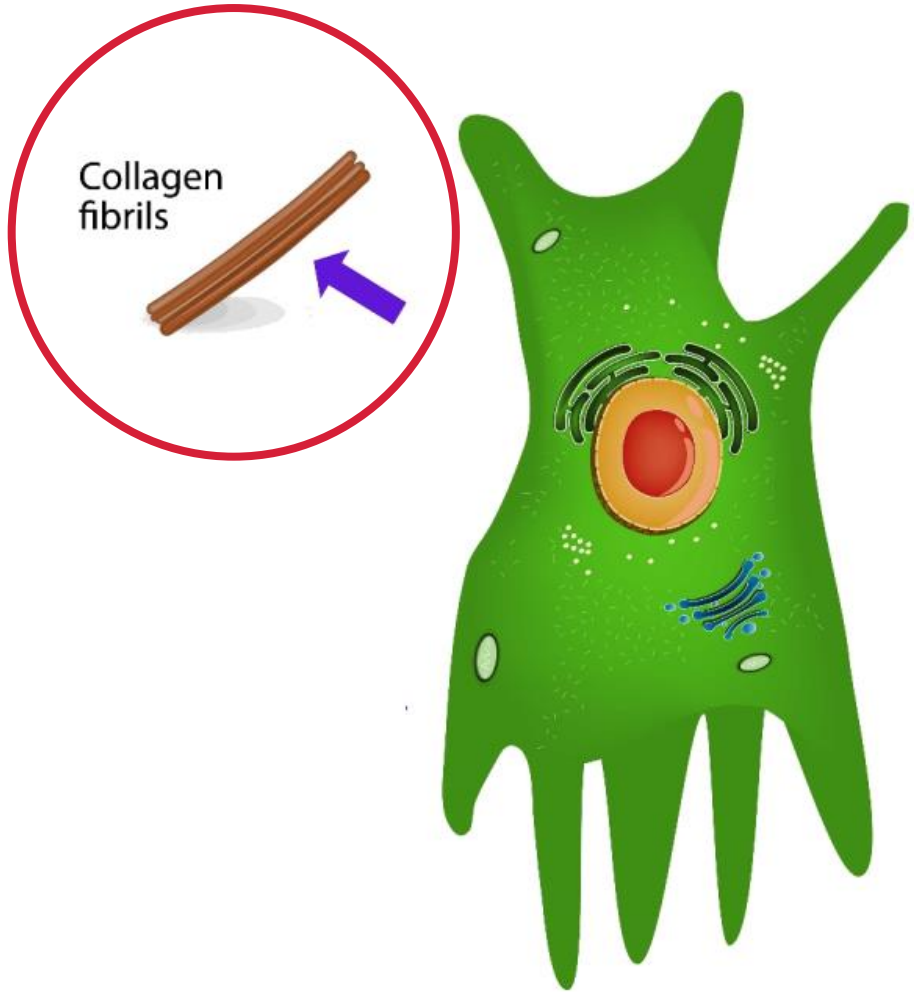
FIBROBLASTS



Plikus MV, Wang X, Sinha S, Forte E, Thompson SM, Herzog EL, Driskell RR, Rosenthal N, Biernaskie J, Horsley V. Fibroblasts: Origins, definitions, and functions in health and disease. Cell. 2021 Jul 22;184(15):3852-3872. doi: 10.1016/j.cell.2021.06.024. PMID: 34297930; PMCID: PMC8566693.

COLLAGEN

- 75% of the skin's dry weight
- Long fibers of protein
- Tough: provides strength to the skin
- **Requires vitamin C and iron to form**
- MMPs constantly break down
- Collagen type I constitutes 80–85% dermal ECM, while collagen type III constitutes about 8–11%

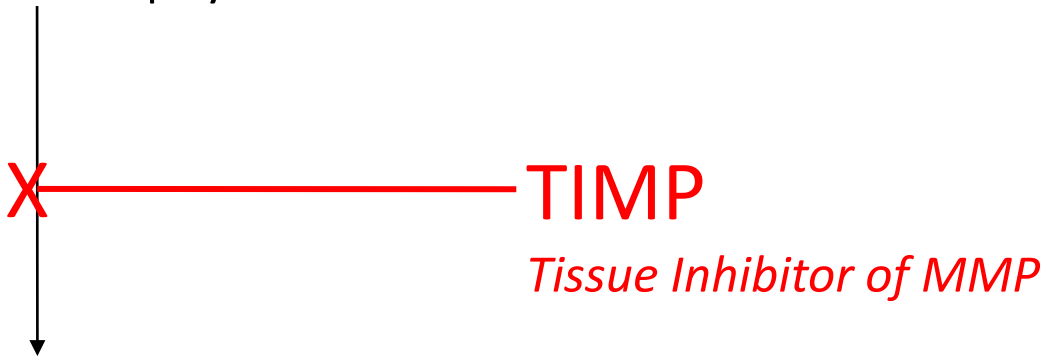


Amirrah IN, Lokanathan Y, Zulkiflee I, Wee MFMR, Motta A, Fauzi MB. A Comprehensive Review on Collagen Type I Development of Biomaterials for Tissue Engineering: From Biosynthesis to Bioscaffold. Biomedicines. 2022 Sep 16;10(9):2307. doi: 10.3390/biomedicines10092307. PMID: 36140407; PMCID: PMC9496548.

MMP

(Matrix – Metallo- Proteinase)

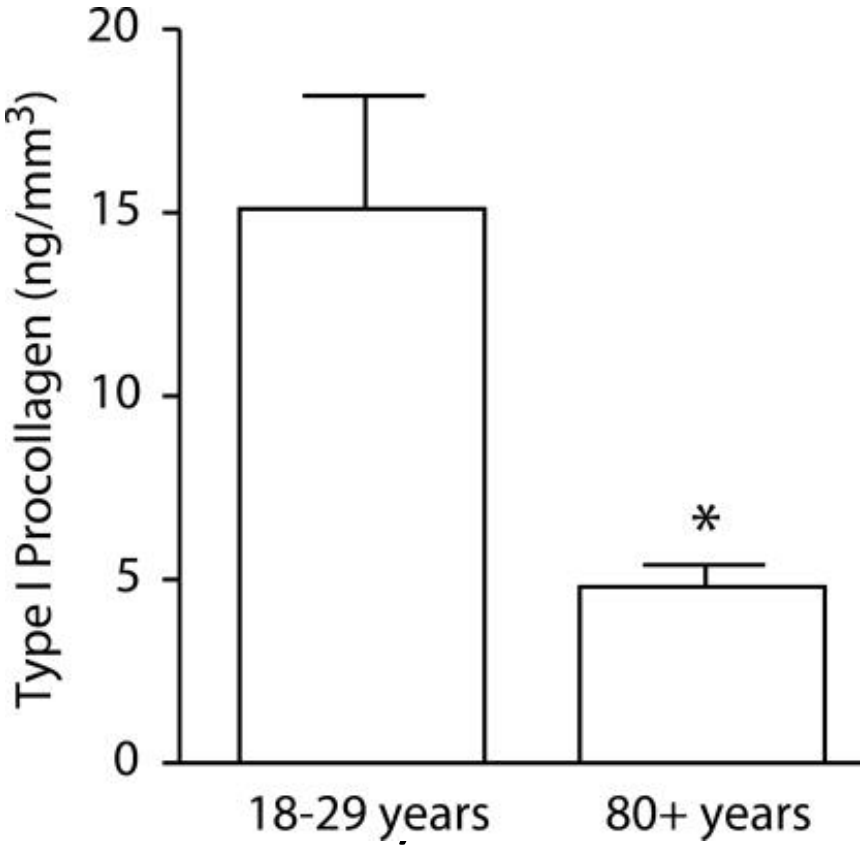
collagenase | elastase | hyaluronidase



DEGRADATION OF

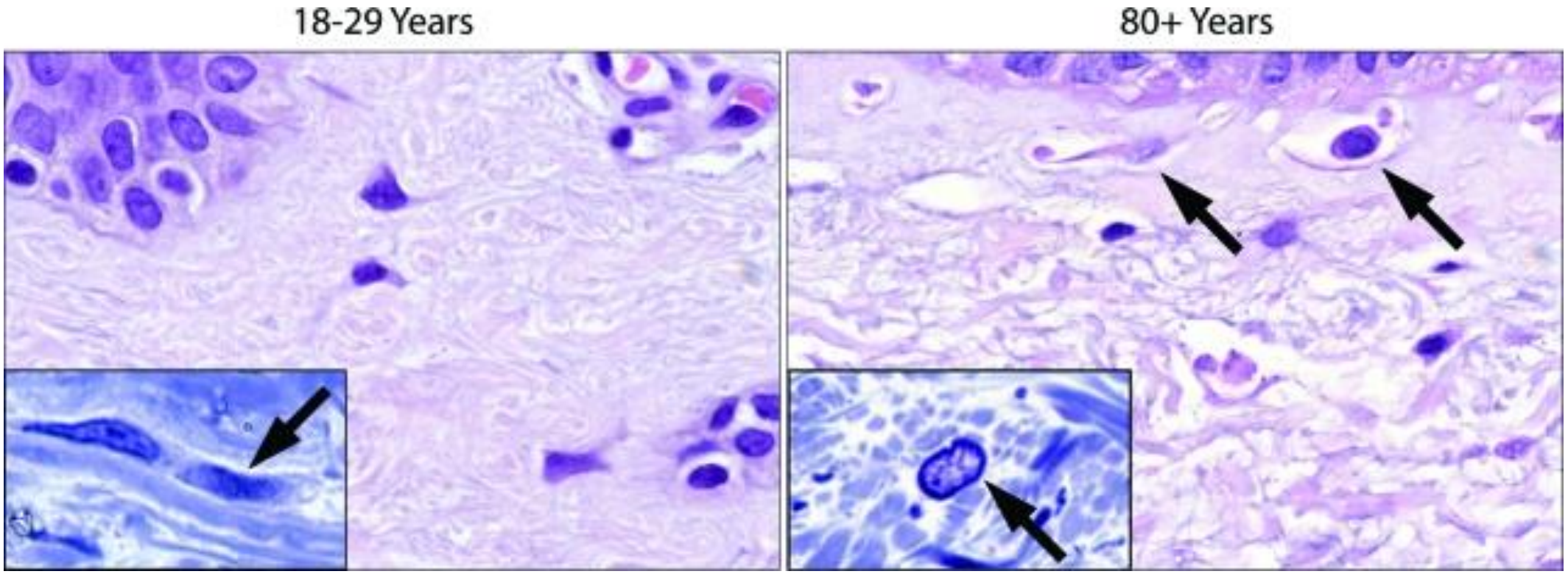
- Collagen
- Elastin
- Hyaluronic acid

Collagen & Aging Skin (Type 1)



Varani J, Dame MK, Rittie L, Fligiel SE, Kang S, Fisher GJ, Voorhees JJ. Decreased collagen production in chronologically aged skin: roles of age-dependent alteration in fibroblast function and defective mechanical stimulation. Am J Pathol. 2006 Jun;168(6):1861-8. doi: 10.2353/ajpath.2006.051302. PMID: 16723701; PMCID: PMC1606623.

Collagen & Aging Skin (Type 1)

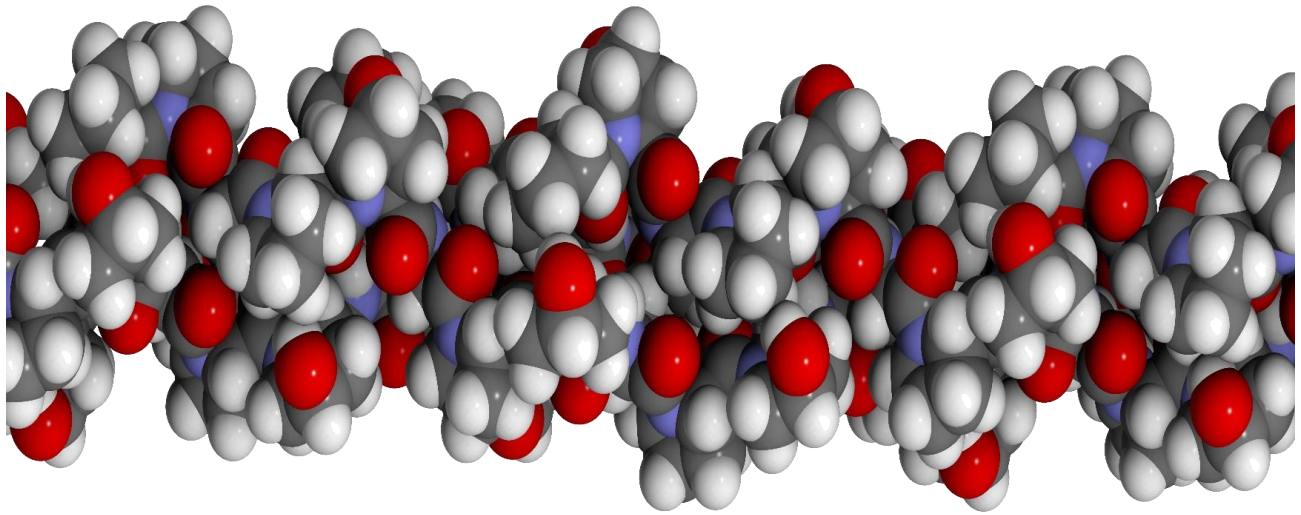


Varani J, Dame MK, Rittie L, Fligiel SE, Kang S, Fisher GJ, Voorhees JJ. Decreased collagen production in chronologically aged skin: roles of age-dependent alteration in fibroblast function and defective mechanical stimulation. Am J Pathol. 2006 Jun;168(6):1861-8. doi: 10.2353/ajpath.2006.051302. PMID: 16723701; PMCID: PMC1606623.

New collagen production: Thermal Stimulation

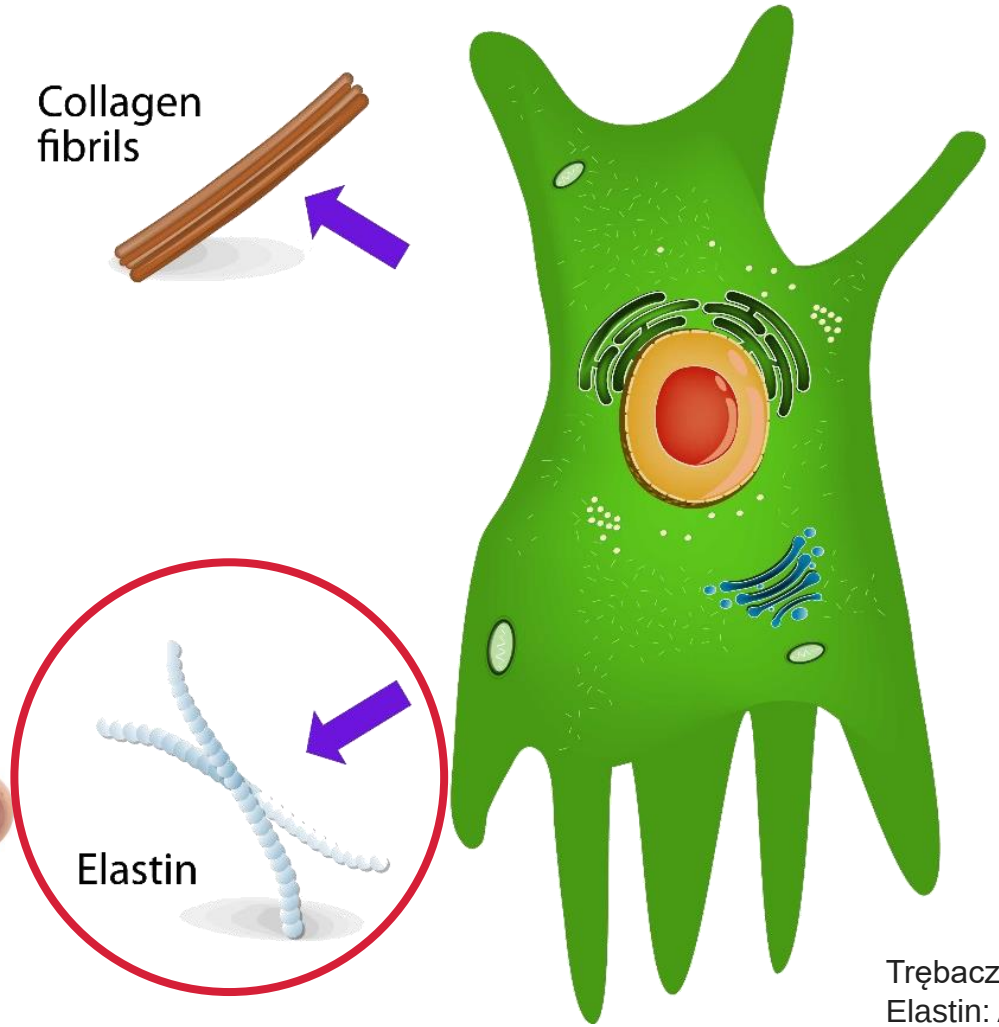
Heat at 66.8˚C:

- ✓Collagen contraction (shortening)
- ✓Stimulates wound healing response
- ✓Fibroblasts start producing growth factors, cytokines, enzymes
- ✓New collagen is produced



Chen SS, Wright NT, Humphrey JD. Heat-induced changes in the mechanics of a collagenous tissue: isothermal free shrinkage. J Biomech Eng. 1997 Nov;119(4):372-8. doi: 10.1115/1.2798281. PMID: 9407273.

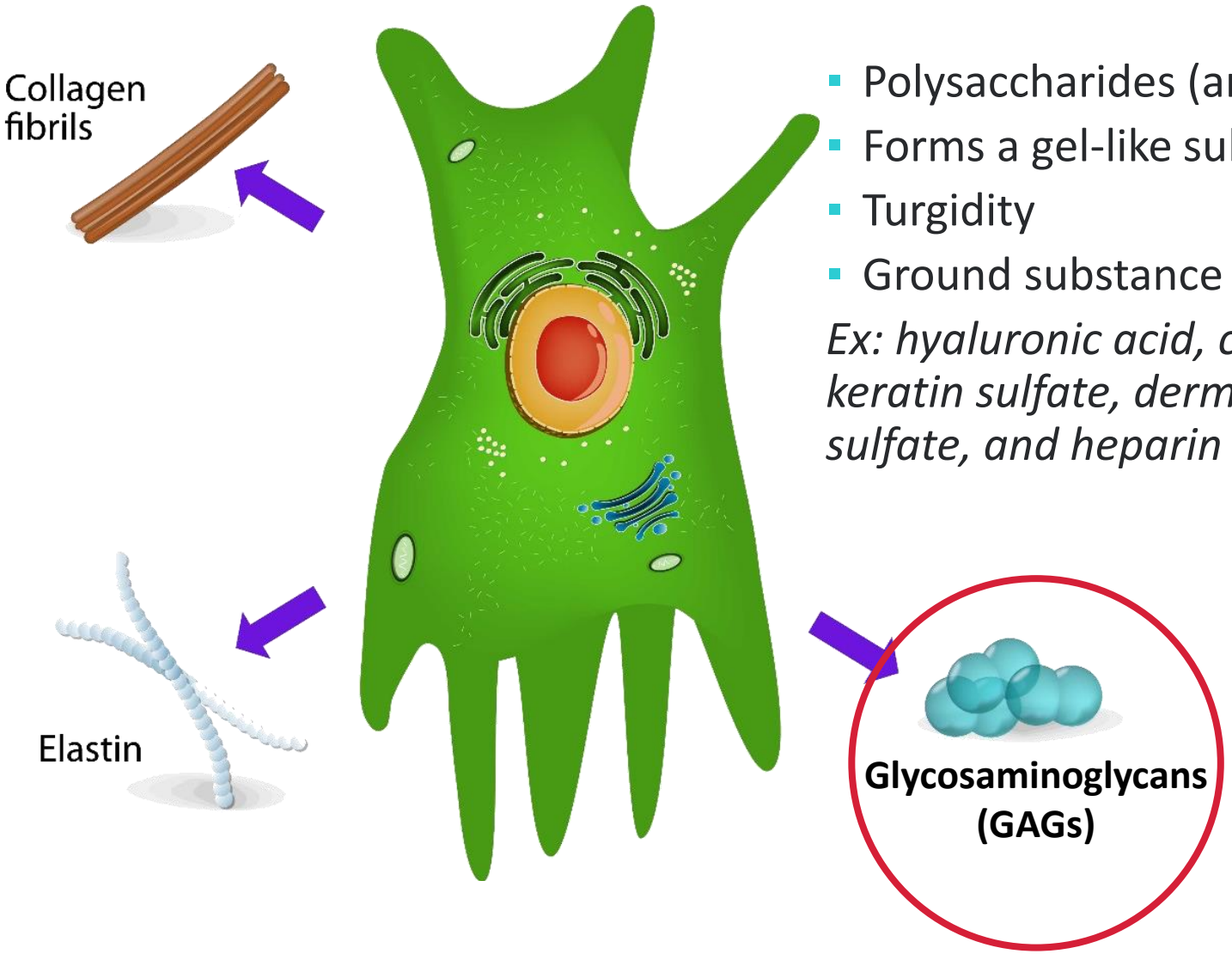
ELASTIN



- <1 % of the skin’s dry weight
- Long fibers of protein
- Stretchy and resilient
- Allow the skin to bounce back
- Aging elastin: sagging and wrinkling

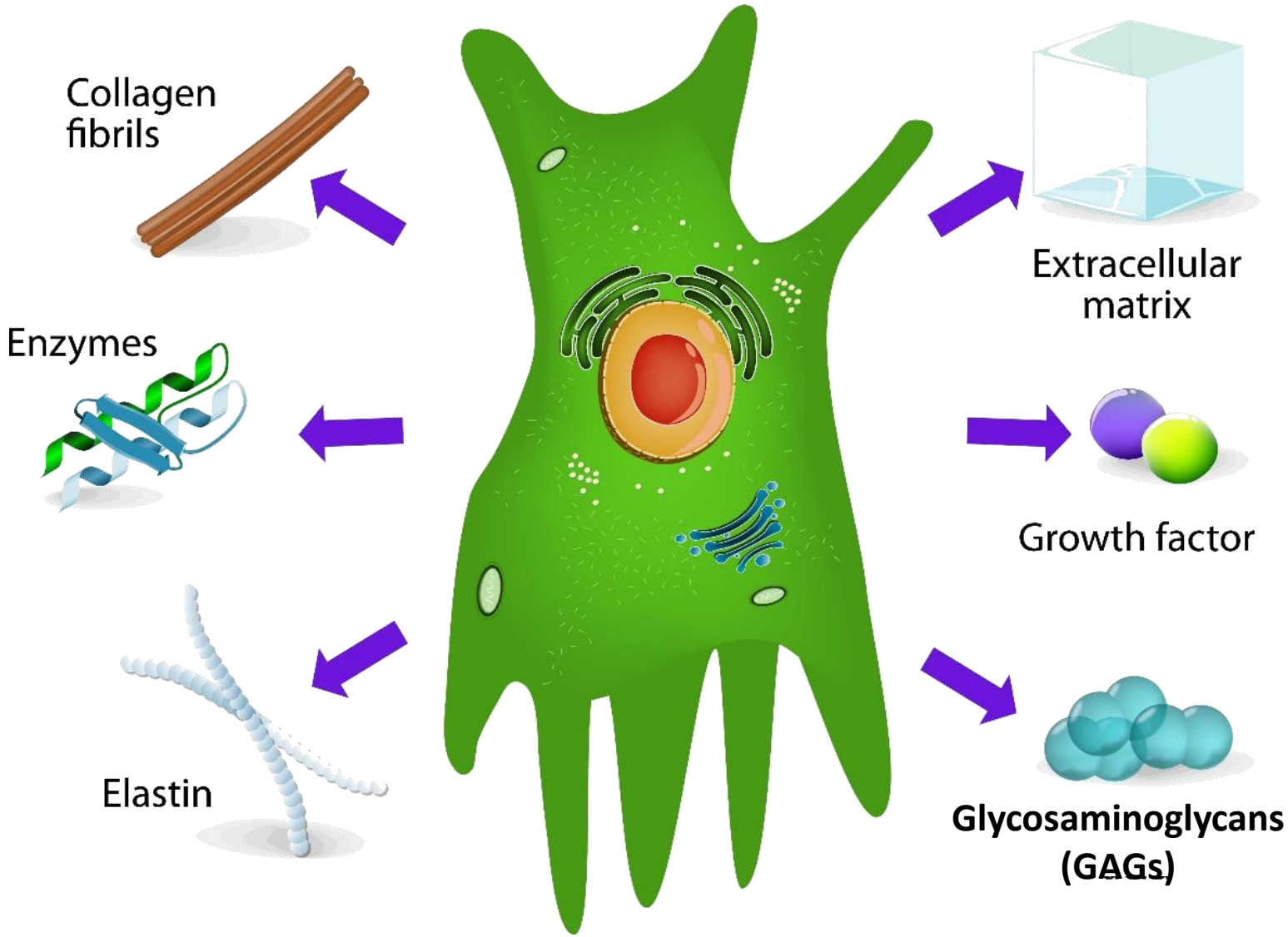
Trębacz H, Barzycka A. Mechanical Properties and Functions of Elastin: An Overview. Biomolecules. 2023 Mar 22;13(3):574. doi: 10.3390/biom13030574. PMID: 36979509; PMCID: PMC10046833.

GLYCOSAMINOGLYCANS (GAGS)

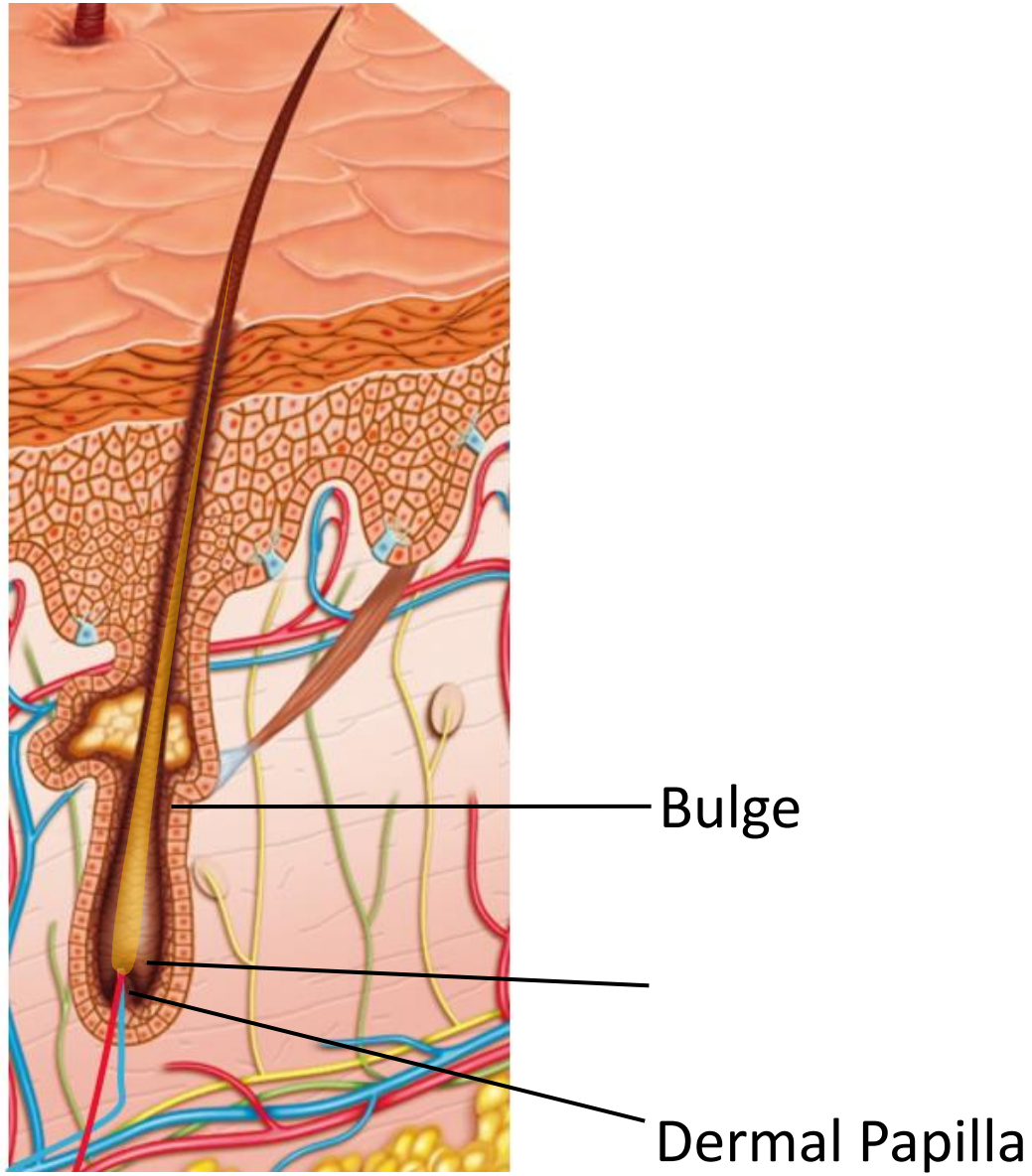


- Polysaccharides (amino sugar)
- Forms a gel-like substance
- Turgidity
- Ground substance fills the space

Ex: hyaluronic acid, chondroitin sulfate, keratin sulfate, dermatan sulfate, heparan sulfate, and heparin

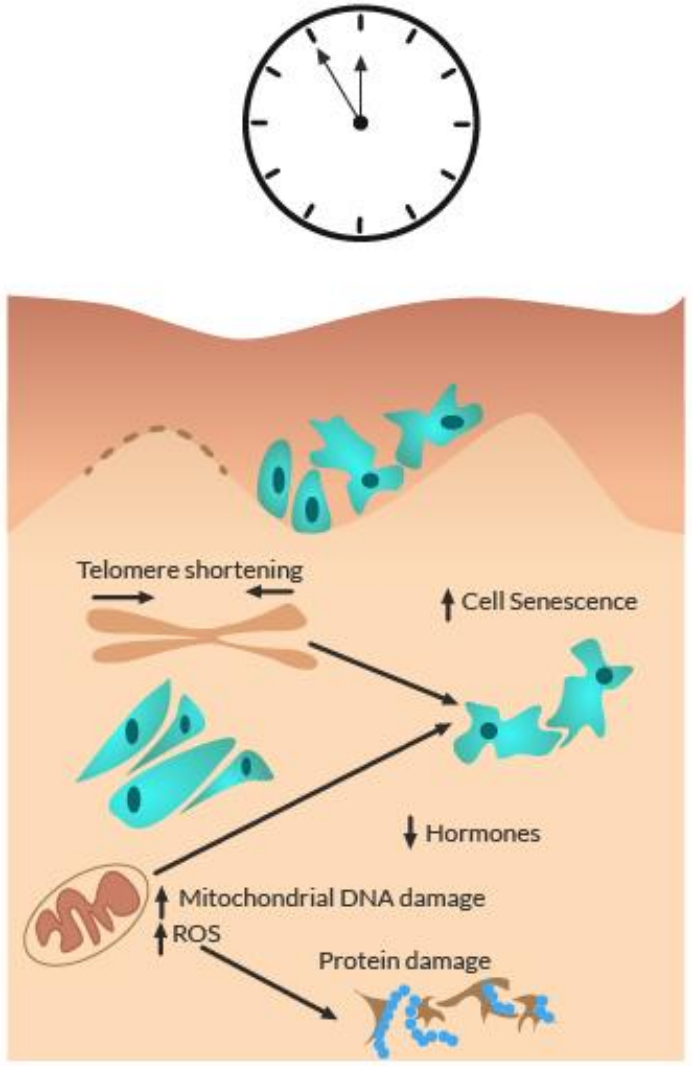

Collagen fibrils
Enzymes
Elastin
Extracellular matrix
Growth factor
Glycosaminoglycans (GAGs)

Hair



5 million hair follicles

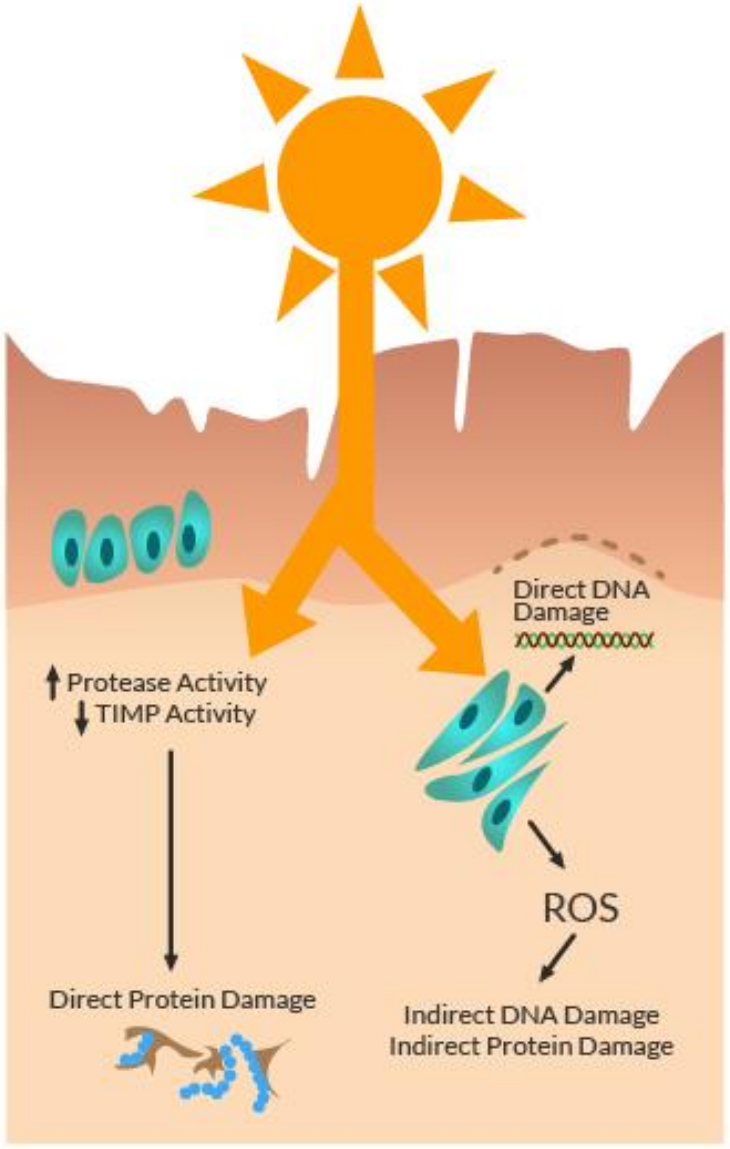
Peterson A, Nair LS. Hair Follicle Stem Cells for Tissue Regeneration. Tissue Eng Part B Rev. 2022 Aug;28(4):695-706. doi: 10.1089/ten.TEB.2021.0098. Epub 2021 Oct 18. PMID: 34238037; PMCID: PMC9419938.



INTRINSIC AGING

- Natural biological aging
- Genetic
- Telomere shortening
- Hormonal decline
- 10%-15% of the aging process
- We can influence but not dictate

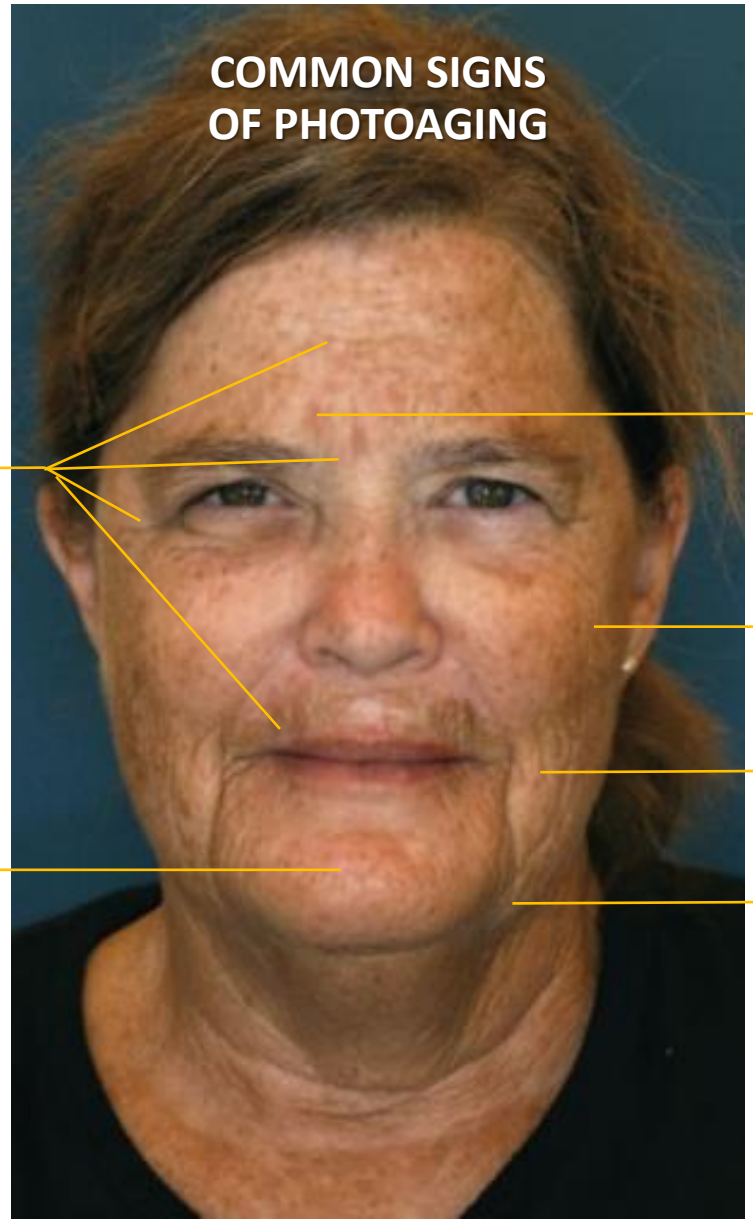
Modified from E.C Naylor and al. / Maturitas 69 (2011) 249-256



Modified from E.C Naylor and al. / Maturitas 69 (2011) 249-256

EXTRINSIC AGING

- UV exposure
- Tobacco
- Diet, alcohol consumption
- Sedentary lifestyle
- Represents 85% to 90% of the aging process



more apparent wrinkles
(number, depth)

actinic keratosis
(red, rough scaly spots)

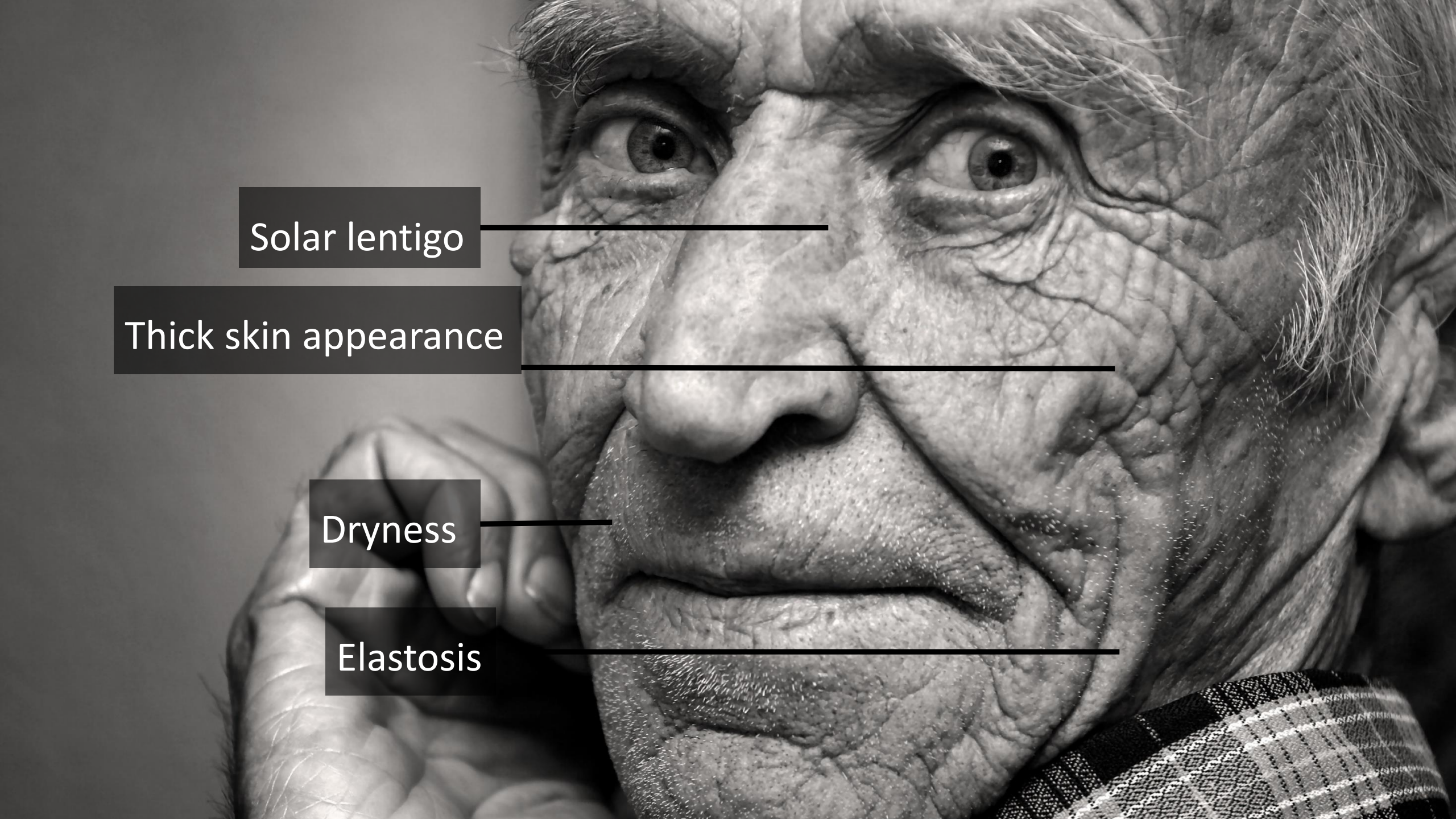
solar lentigo

solar elastosis
(thick skin, yellow tone)

vascular lesions

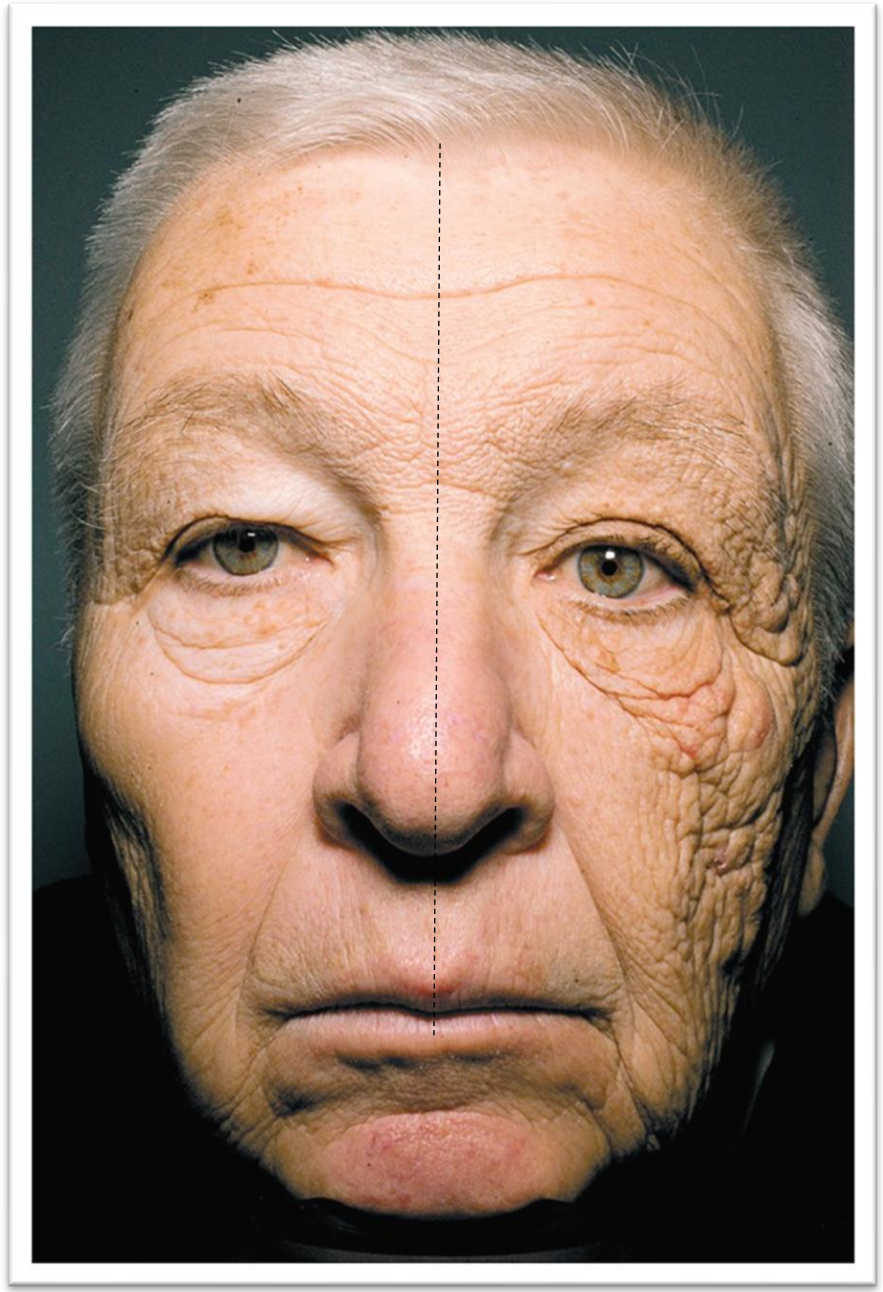
general loss of tone
leathery & saggy skin

Plast Reconstr Surg Glob Open. 2013 Apr; 1(1): e8-e15.
Published online 2013 May
7. doi: 10.1097/GOX.0b013e31828ed1da


Solar lentigo
Thick skin appearance
Dryness
Elastosis

Glogau scale

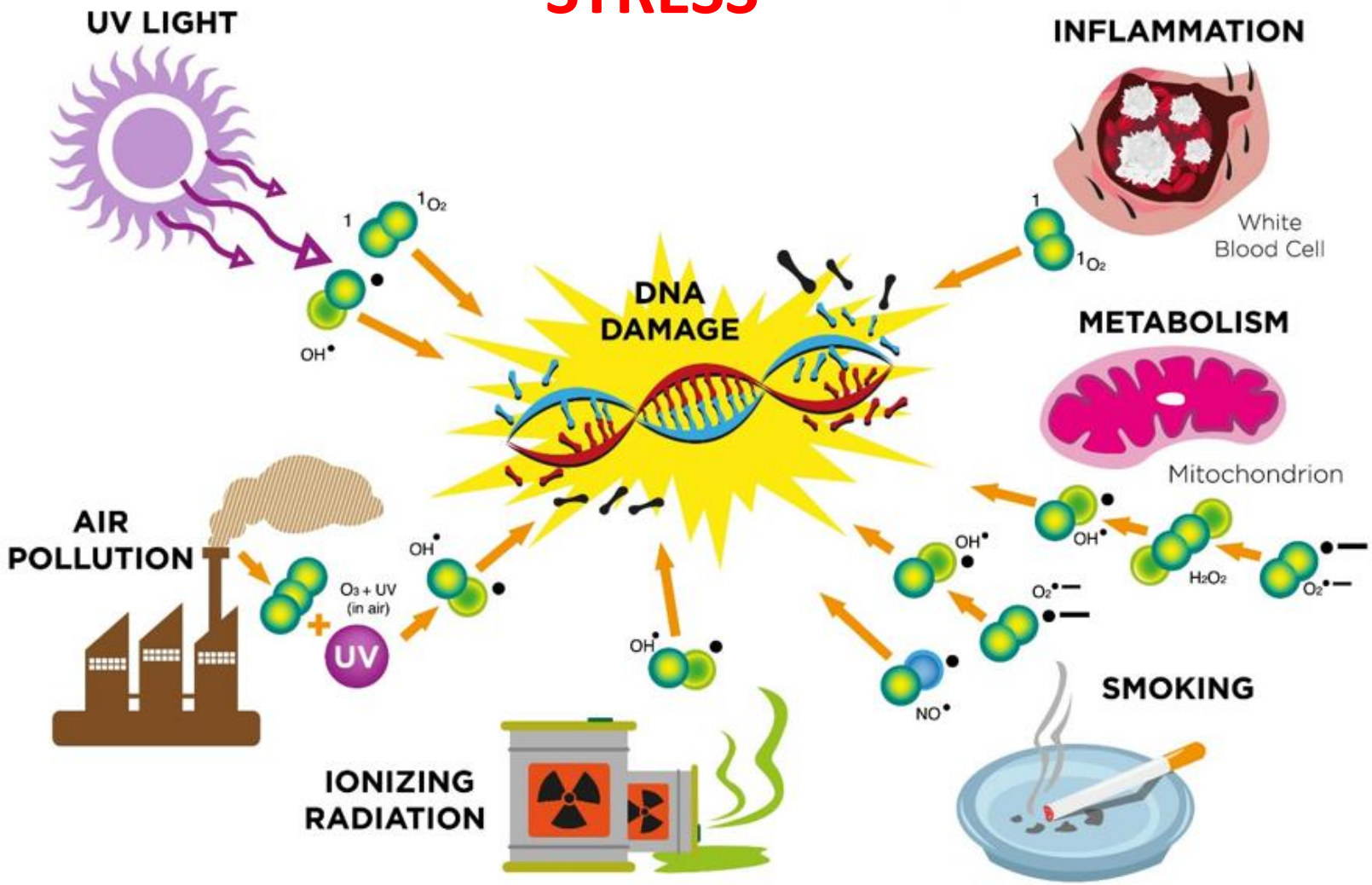
GROUP	CLASSIFICATION	TYPICAL AGE	DESCRIPTION	SKIN CHARACTERISTICS
I	Mild	28-35	No wrinkles	Early photoaging: • Mild pigment changes • No keratosis • Minimal wrinkles, minimal or no makeup
II	Moderate	35-50	Wrinkles in motion	Early to moderate photoaging: • Early brown spots visible • Keratosis palpable but not visible • Parallel smile lines begin to appear • Wear foundation
III	Advanced	50-60	Wrinkles at rest	Advanced photoaging • Obvious discoloration • Visible capillaries • Visible keratosis • Wears heavier foundation
IV	Severe	60 and up	Only wrinkles	Severe photoaging • Yellow / grey skin color • Prior skin malignancies • Wrinkles throughout – no normal skin • Cannot wear make-up “cakes and cracks”



Unilateral Dermatoheliosis
Jennifer R.S. Gordon, M.D., and Joaquin C. Brieva, M.D.
April 19, 2012 N Engl J Med 2012; 366:e25
DOI: 10.1056/NEJMicm1104059

April 19, 2012 N Engl J Med 2012; 366:e25
DOI: 10.1056/NEJMicm1104059

OXIDATIVE STRESS



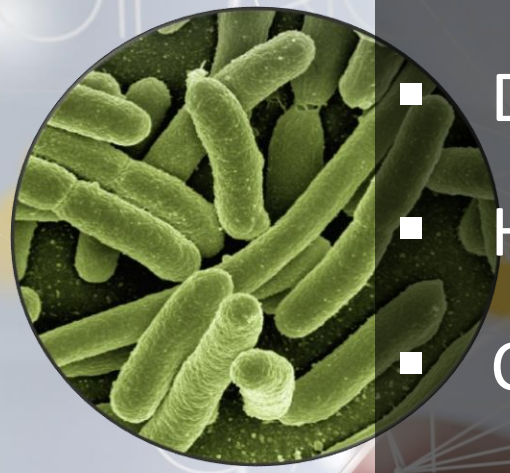
AGING PROCESS

Intrinsic

ROS
GLYCATION

Extrinsic

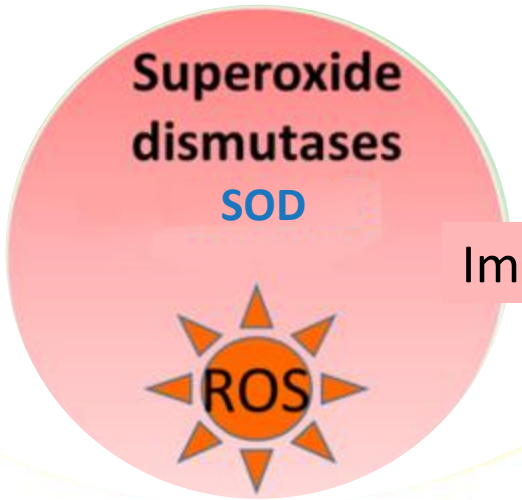
FREE RADICALS :



- Created by multiple reaction in the body
- Digestion, detoxification, cell signaling
- Helps the immune system
- Countered by antioxidants and enzymes to neutralize the harmful effects

OXIDATIVE STRESS

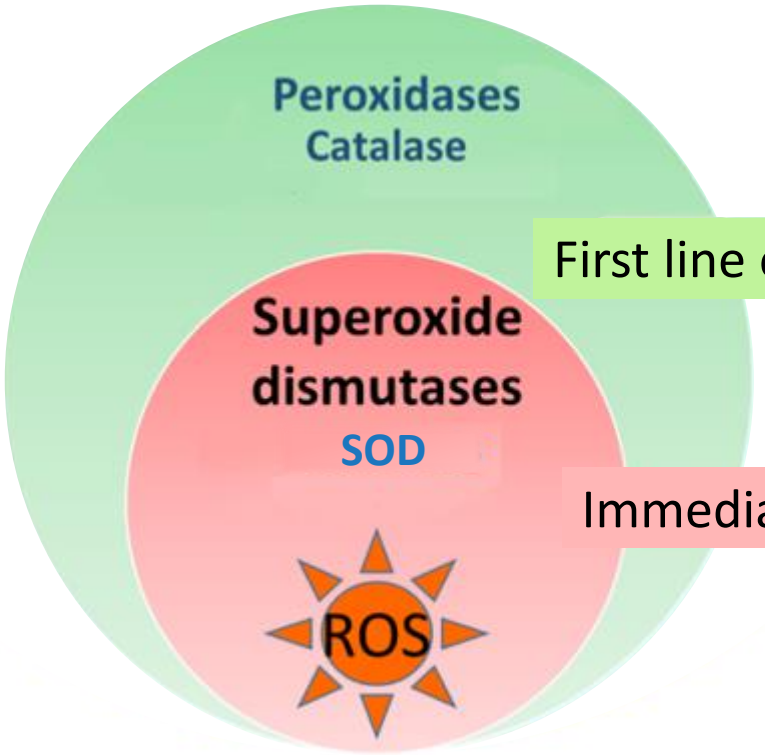
Directly scavange ROS at primary source e.g. removal of superoxides



Immediate defense (Radical dismutation)

Enzymatic antioxidants neutralize H_2O_2 or organic peroxides

Directly scavange ROS at primary source e.g. removal of superoxides



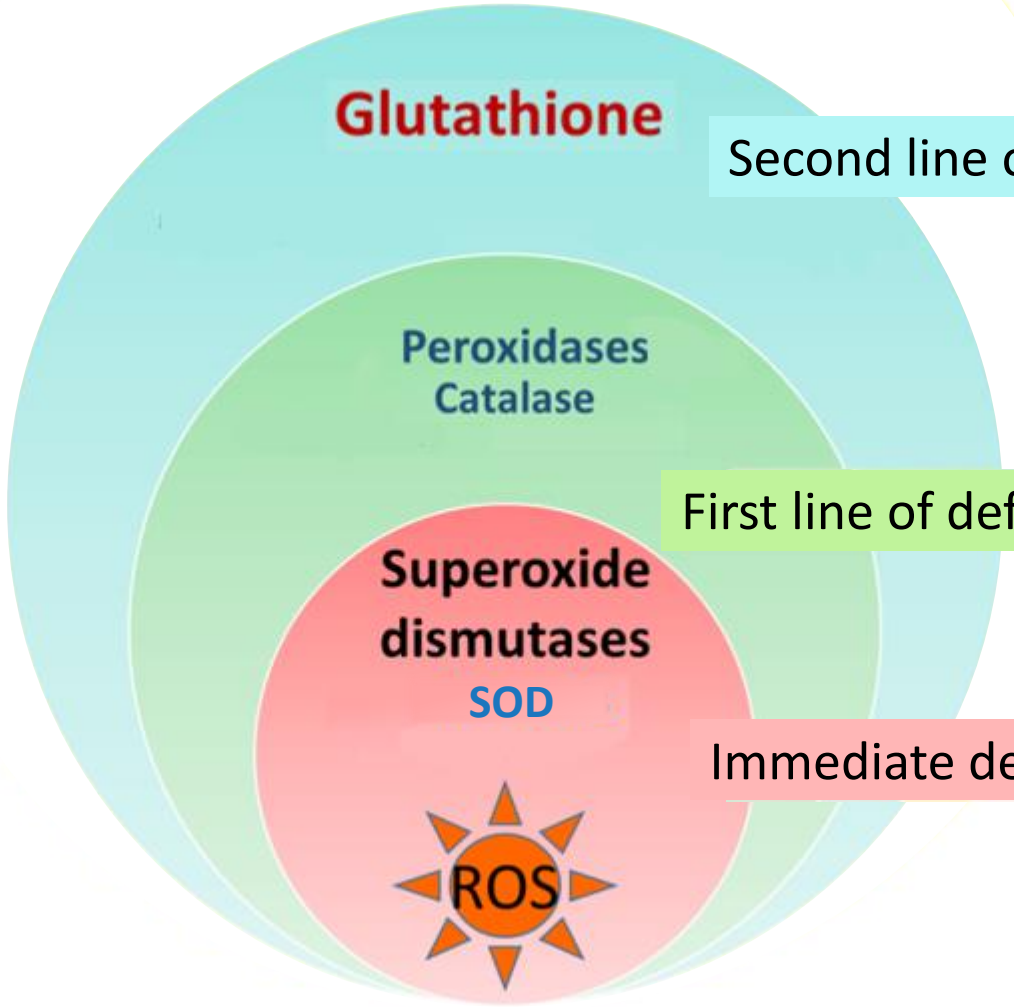
First line of defense (antioxidant enzymes)

Immediate defense (Radical dismutation)

Replenish active form of antioxidant enzyme or maintained reduced state

Enzymatic antioxidants neutralize H_2O_2 or organic peroxides

Directly scavange ROS at primary source e.g. removal of superoxides



Second line of defense (ancillary factors)

First line of defense (antioxidant enzymes)

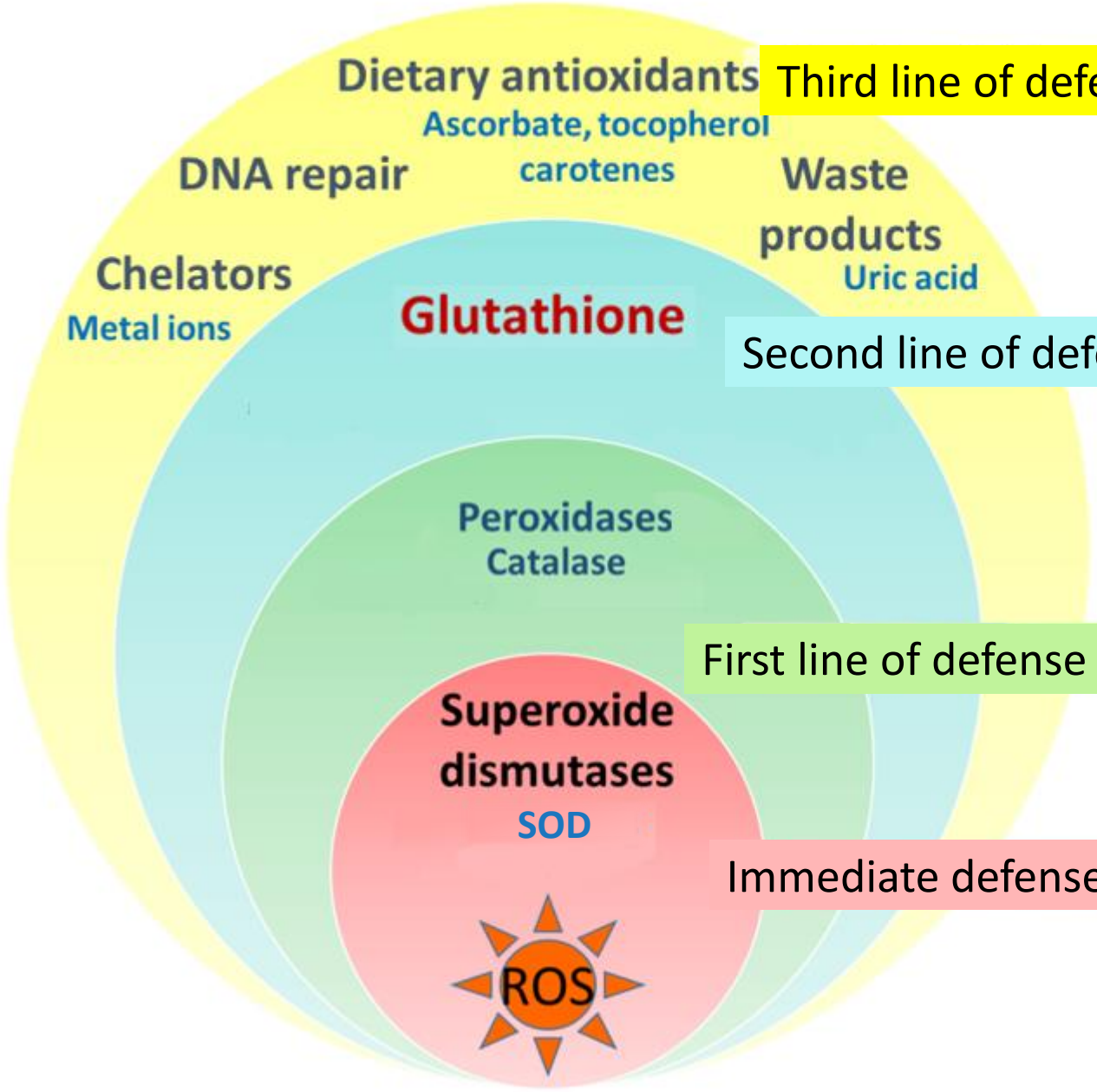
Immediate defense (Radical dismutation)

Reduce the radicals and other oxidants in cells

Replenish active form of antioxidant enzyme or maintained reduced state

Enzymatic antioxidants neutralize H_2O_2 or organic peroxides

Directly scavange ROS at primary source e.g. removal of superoxides

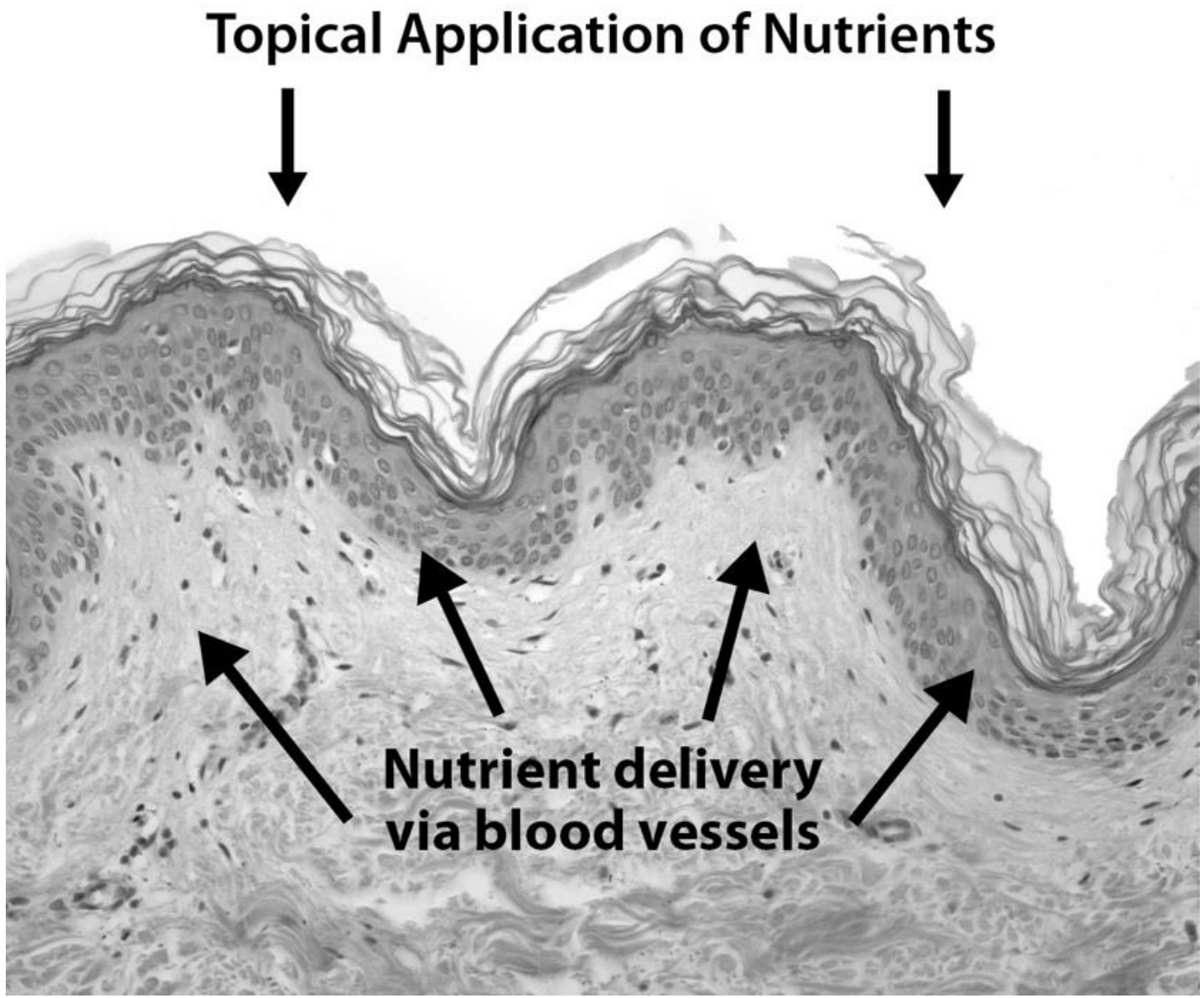


Third line of defense (Small molecules)

Second line of defense (Ancillary factors)

First line of defense (Antioxidant enzymes)

Immediate defense (Radical dismutation)


Topical Application of Nutrients
Nutrient delivery
via blood vessels

ANNUAL REVIEWS

Annual Review of Food Science and Technology

Skin Health from the Inside Out

Brittany Woodby,[1] Kayla Penta,[1] Alessandra Pecorelli,[1] Mary Ann Lila,[1] and Giuseppe Valacchi[1,2,3]

[1]Plants for Human Health Institute, Department of Animal Science, North Carolina State University, Kannapolis, North Carolina 28081, USA; email: gvalacc@ncsu.edu

[2]Department of Biomedical and Specialist Surgical Sciences, University of Ferrara, 44121 Ferrara, Italy

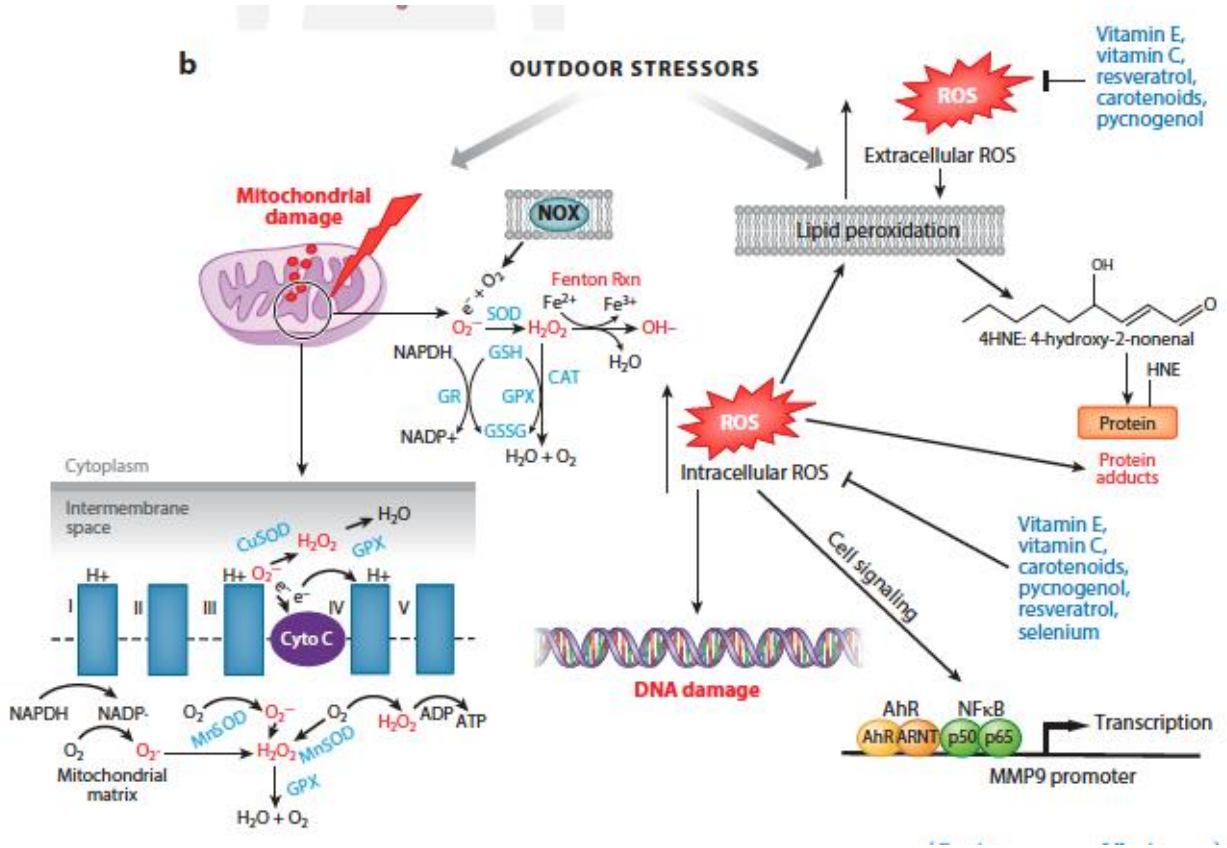
[3]Department of Food and Nutrition, Kyung Hee University, 02447 Seoul, South Korea

THE CONCENTRATION EFFECT AT THE BASAL LAYER

Table 1 Antioxidant gradient the skin

Endogenous enzymes	Concentration in epidermis versus dermis
Superoxide dismutase	126% higher in epidermis
Glutathione peroxidase	61% higher in epidermis
Catalase	720% higher in epidermis
Glutathione reductase	215% higher in epidermis
Nonenzymatic antioxidants	
α-Tocopherol (vitamin E)	90% higher in epidermis
Ascorbic acid (vitamin C)	425% higher in epidermis
Coenzyme Q	900% higher in epidermis
Uric acid	488% higher in epidermis

[a]Data from Shindo et al. (1994a).



ANTIOXIDANT RECOMMENDATIONS

Vitamin E
Vitamin C
Carotenoids
Pycnogenol
Resveratrol
Selenium

Nutrients. 2018 Apr; 10(4): 522.
Published online 2018 Apr 22. doi: [10.3390/nu10040522]
PMCID: PMC5946307
PMID: 29690549

Astaxanthin in Skin Health, Repair, and Disease: A Comprehensive Review

Sergio Davinelli,[1,*] Michael E. Nielsen,[2] and Giovanni Scapagnini[1]

The main components that confer an aged skin appearance are damaged structural and functional proteins that form the ECM. Damage to these structures leads to the production of reactive intermediates, cell death, and inflammatory responses. Moreover, UV irradiation significantly induces pigmentation, skin wrinkling, and immunosuppression, resulting in the acceleration of photoaging. UV-induced damage of DNA can lead

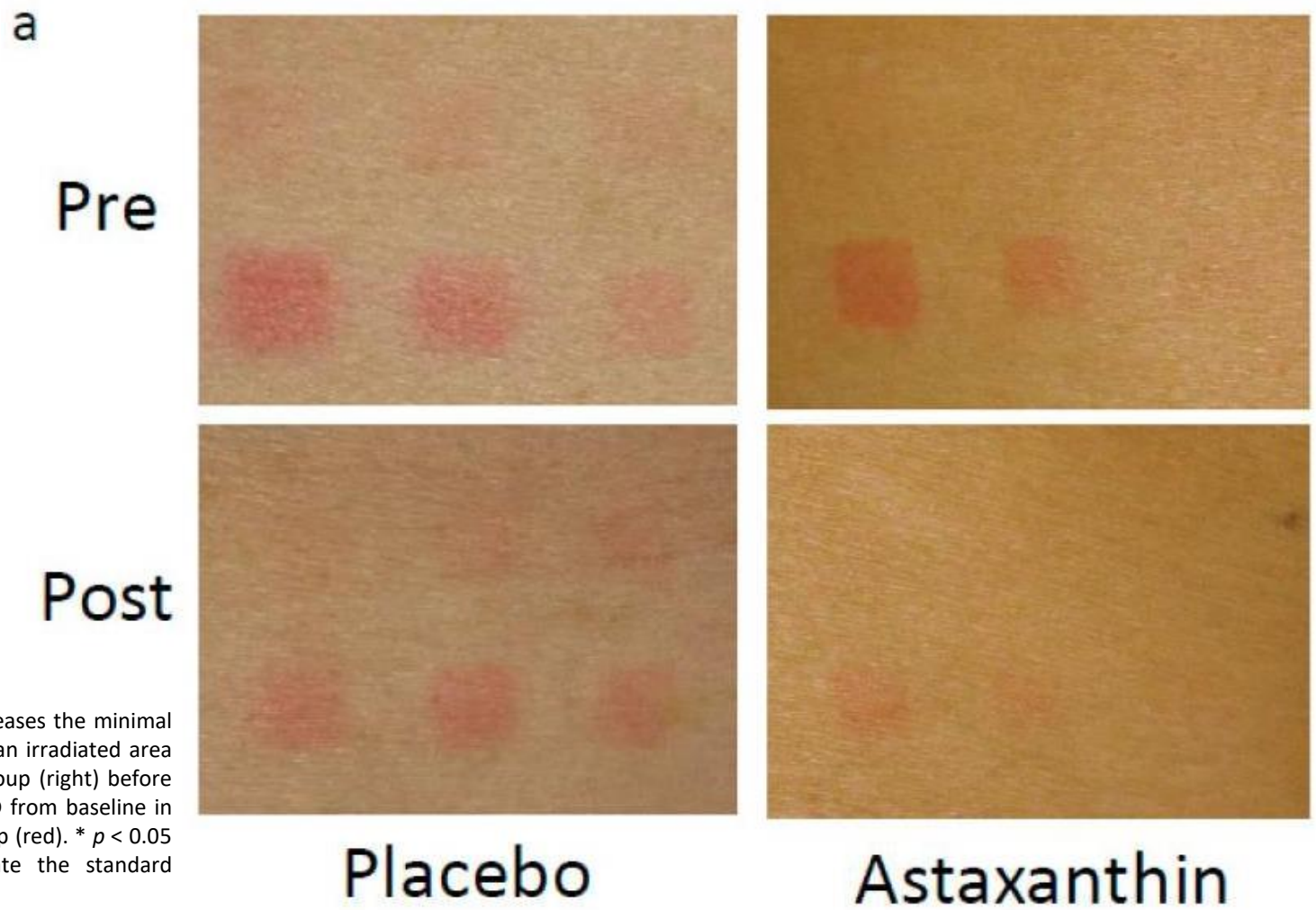
ASX inhibits collagenases, MMP activity, inflammatory mediators, and ROS induction resulting in potent antiwrinkle and antioxidant effects…may prevent UV-induced immunosuppression.

and ROS induction, resulting in potent antiwrinkle and antioxidant effects. Moreover, ASX may prevent UV-induced immunosuppression. Toxicological aspects have been characterized and ASX appears to be a safe and bioavailable compound. Some clinical studies have shown a relationship between the intake of

Nutrients. 2018 Jul; 10(7): 817.
Published online 2018 Jun 25. doi: [10.3390/nu10070817]
PMCID: PMC6073124
PMID: 29941810

The Protective Role of Astaxanthin for UV-Induced Skin Deterioration in Healthy People—A Randomized, Double-Blind, Placebo-Controlled Trial

Naoki Ito,* Shinobu Seki, and Fumitaka Ueda



Dietary supplementation with astaxanthin increases the minimal erythema dose. (**a**) Representative imaging of an irradiated area in the placebo group (left) and astaxanthin group (right) before and after supplementation; (**b**) Change in MED from baseline in the placebo group (black) and astaxanthin group (red). * $p < 0.05$ by Mann–Whitney *U*-test. Error bars indicate the standard deviation (SD).

The Journal of Clinical and Aesthetic Dermatology
www.jcadonline.com

J Clin Aesthet Dermatol. 2015 Feb; 8(2): 19–23.

PMCID: PMC4345929
PMID: 25741399

Safety and Efficacy of Oral *Polypodium leucotomos* Extract in Healthy Adult Subjects

Mark S. Nestor, MD, PhD,[a,b] Brian Berman, MD, PhD,[a,b] and Nicole Swenson, DO[a]

Author information · Copyright and License information Disclaimer

Abstract

Go to:

Objective: The objective of this study was to determine the safety of oral *Polypodium leucotomos* extract administered twice daily to healthy adults for 60 days and assess its ability to provide protection against exposure to ultraviolet radiation. **Design:** This was a randomized, double-blind, placebo-controlled study. **Setting:** A single clinical research center. **Participants:** Healthy adult men and women between 18 and 65 years of age with Fitzpatrick skin types I to IV. **Measurements:** Safety assessments included a physical examination, vital signs, and clinical laboratory parameters including hematology, comprehensive metabolic panel, and prothrombin time-partial thromboplastin time were obtained at baseline and at the end of the study. Reports of adverse events were recorded. Efficacy assessments were changes in minimal erythema dose testing, ultraviolet-induced erythema intensity response, and sunburn history during the prior 60 days. **Results:** After two months of treatment, there were no changes in any safety assessments. The subjects in the placebo group showed a greater likelihood of experiencing >1 episodes of sunburn (2 vs. 8 subjects; p=0.04) At Day 28, *Polypodium leucotomos* extract-treated subjects showed greater likelihood of an increased minimal erythema dose (8 vs. 1 subject; p=0.01) and greater likelihood of decreased ultraviolet-induced erythema intensity (10 subjects vs. 3 subjects; p<0.01). **Conclusion:** *Polypodium leucotomos* extract 240mg taken twice daily for 60 days was a safe and effective means for reducing the damaging effects of ultraviolet radiation. Based on the excellent safety profile of *Polypodium leucotomos,* additional studies using higher doses may be warranted.

Polypodium leucotomos extract 240mg bid for 60 days. Greater likelihood:

* increased minimal erythema dose
* decreased ultraviolet-induced erythema intensity

Journal List › Dermatoendocrinol › v.4(3); 2012 Jul 1 › PMC3583891

Dermato Endocrinology

Dermatoendocrinol. 2012 Jul 1; 4(3): 298–307.
doi: 10.4161/derm.22876

PMCID: PMC3583891
PMID: 23467449

Discovering the link between nutrition and skin aging

Silke K. Schagen,[1,†] Vasiliki A. Zampeli,[1,2,†] Evgenia Makrantonaki,[1,2] and Christos C. Zouboulis[1,*]

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β-carotene and lycopene are usually the dominating carotenoids in human blood and tissues and are known to modulate skin properties when ingested as supplements or as dietary products. While they cannot be compared with sunscreen, there is evidence that they protect the skin against sunburn (solar erythema) by increasing the basal defense against UV light-mediated damage.

Exp. Geront. Vol. 15, pp. 575–591.
Pergamon Press Ltd. 1980. Printed in Great Britain.

MITOCHONDRIAL ROLE IN CELL AGING

J. MIQUEL*, A. C. ECONOMOS†, J. FLEMING* and J. E. JOHNSON, JR.‡

(*Received* 14 *June* 1980)

INTRODUCTION

DESPITE a wealth of data, there is no agreement on the role played by mitochondria in cell aging. Thus, Huemer *et al.* (1971) note that, although age-related changes in mitochondria may be secondary effects of extramitochondrial processes, there is no reason to rule out mitochondrial degeneration as the primary cause of all other manifestations of senescence. Further, Munkres (1979) concludes from his exhaustive research on *Neurospora* aging that of all cellular membranes, the inner mitochondrial membrane may be the "Achilles heel" of the aging cell. An opposite and perhaps more popular view is that, since mitochondria are replaceable organelles, they are not likely to sustain intrinsic senescent change (Comfort, 1974; Kohn, 1977).

Alpha-lipoic acid (ALA)
Arginine
Carnitine
Citruline
Coenzyme-Q10
Creatine
Folinic Acid
Niacin
NAD+ (nicotinamide adenine dinucleotide)
Riboflavin
Thiamin
Vitamin C, E & K
Magnesium

https://ods.od.nih.gov/factsheets/PrimaryMitochondrialDisorders-HealthProfessional/

Oxid Med Cell Longev. 2016;2016:2019643. doi: 10.1155/2016/2019643. Epub 2016 Mar 6.

Magnesium Supplementation Diminishes Peripheral Blood Lymphocyte DNA Oxidative Damage in Athletes and Sedentary Young Man.

Petrović J[1], Stanić D[1], Dmitrašinović G[2], Plećaš-Solarović B[1], Ignjatović S[2], Batinić B[1], Popović D[1], Pešić V[1].

Sedentary lifestyle is highly associated with increased risk of cardiovascular disease, obesity, and type 2 diabetes. It is known that regular

Four week supplementation has marked effects on protecting the DNA from oxidative damage.

supplementation has marked effects in protecting the DNA from oxidative damage in both rugby players and in young men with sedentary lifestyle. Clinical trial is registered at ANZCTR Trial Id: ACTRN12615001237572.

Magnesium supplementation significantly decreased the number of cells with high DNA damage

Postepy Hig Med Dosw (Online). 2007 Oct 8;61:548-54.

[Magnesium in skin allergy].

[Article in Polish]

Błach J[1], Nowacki W, Mazur A.

Magnesium is involved in many biological processes within the body. Magnesium deficiency causes many disorders, including impairment of immunity. This review summarizes present knowledge on the relationship between magnesium and skin allergy reactions. Special focus is on allergy types I and IV. At present the best knowledge is on allergy I. Magnesium deficiency in experimental animals, mainly rats, leads to characteristic hyperemia, an increase in IgE, neutrophilia and eosinophilia, an increase in the level of proinflammatory cytokines, mastocyte degranulation, histaminemia, and splenomegaly. These symptoms observed in hypomagnesemic rats are similar to those in atopic patients. Data on the relationship between magnesium and other types of allergy are scarce. Clinical observations show the beneficial effect of topical and oral administration of magnesium salts in patients with skin allergy. All the presented data point to an important role of magnesium in allergy reactions. Other studies are needed to better understand the mechanism of magnesium's action. Well-controlled clinical protocols

Clinical observations show the beneficial effect of topical and oral administration of magnesium salts in patients with skin allergy


PERSONALIZED
NUTRITION
AESTHETICS

SKIN HEALTH & BEAUTY THROUGH THE LENS OF PERSONALIZED NUTRITION

THE PERSONALIZED NUTRITION CLINICAL INTERVENTION

1. What are you ASKING?
2. What are you observing?
3. What are you assessing?
4. What are you explaining?
5. What are you recommending?

INSIDE-OUT SKIN BEAUTY BEGINS WITH YOUR FORK (or CHOPSTICKS)

Incorporate Diet-related Questions in Intake

- Ask Basic Questions: Listen
  - (open-ended behavioral questions, typical intakes)
- 24hr Recall
- Food Frequency Questionnaires
- Diet History Food Diaries

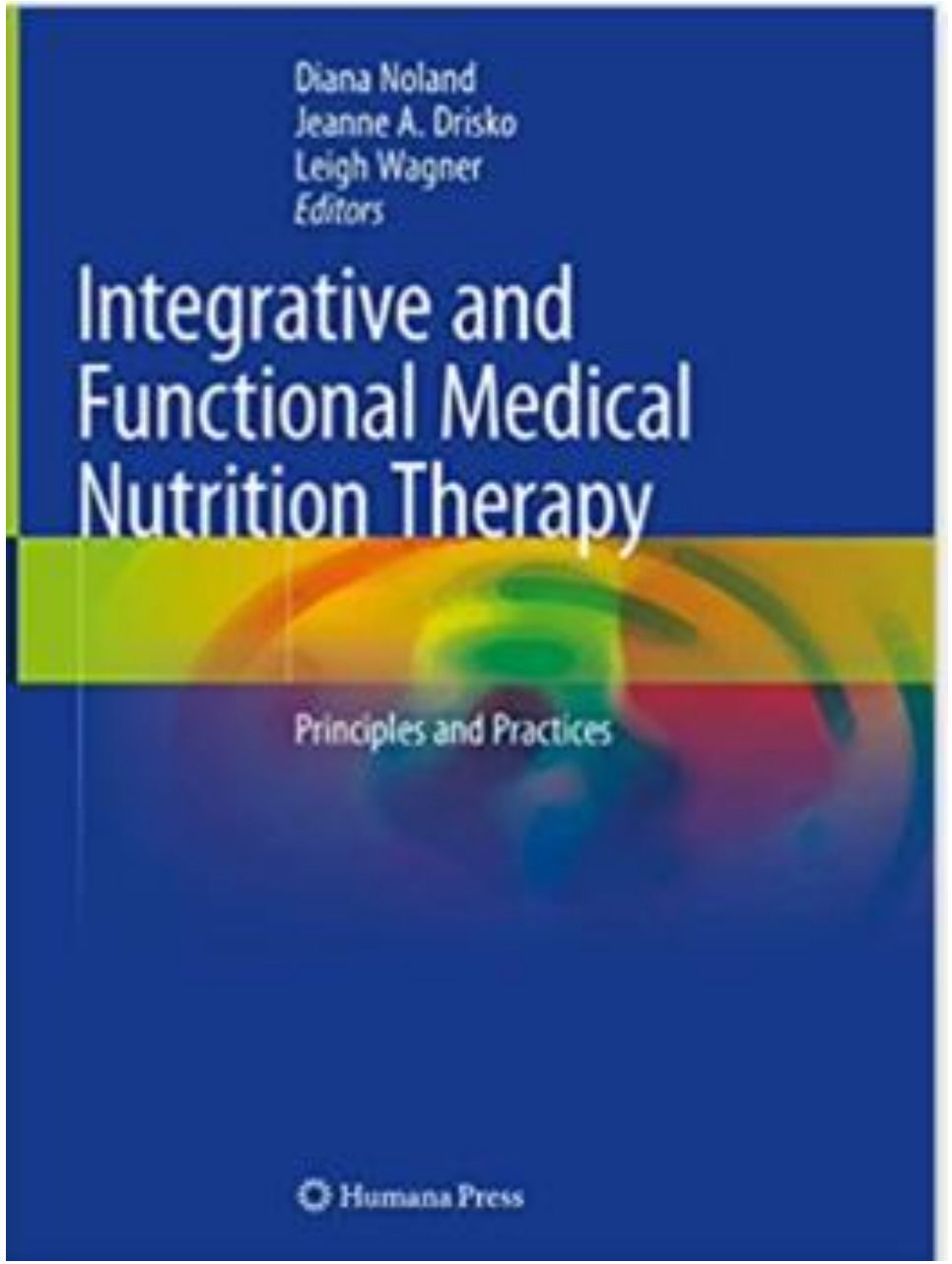
EXAMPLES: Drug Nutrient Depletion (DND)

DRUG CATEGORY	DEPLETION
ANTACIDS	**H2 antagonists: vitamin B12, calcium, folate, iron, zinc, chromium** **Proton pump inhibitors: magnesium, vitamin B12, calcium, vitamin C, zinc, iron, beta-carotene**
ANTIBIOTICS	**beneficial intestinal bacteria, vitamin K, potassium, B vitamins, zinc, magnesium, folate, iron**
ANTI-ANXIETY MEDICATIONS	**vitamin K**
ORAL CONTRACEPTIVES	**vitamin B6, vitamin B12, folate, calcium, magnesium, vitamin C, vitamin E**
ANTI-HYPERTENSIVES	**ACE inhibitors: zinc** **calcium channel blocker: CoQ10, vitamin C**
STATINS	**CoQ10, vitamin D, vitamin E, beta carotene**

Source: Medication-Induced Nutrient Depletion Chart from Designs for Health

THE PERSONALIZED NUTRITION PROCESS

1. What are you asking?
2. What are you OBSERVING?
3. What are you assessing?
4. What are you explaining?
5. What are you recommending?



The Skin, Selected Dermatologic Conditions, and Medical Nutrition Therapy

P. Michael Stone

53.1 Introduction – 000

53.2 Overview of Skin Function and Composition – 000
53.2.1 Epidermis – 000
53.2.2 Dermis – 000
53.2.3 Skin Immunity – 000

53.3 Nutrition Deficiency and the Skin – 000

53.4 Skin Conditions and Medical Nutrition Therapy – 000

53.5 Macro- and Micronutrient Deficiencies Influencing Skin Health – 000
53.5.1 Protein – 000
53.5.2 Essential Fatty Acid – 000
53.5.3 Fat-Soluble Vitamins – 000
53.5.4 Water-Soluble Vitamins – 000
53.5.5 Minerals – 000
53.5.6 Nutrition Excesses and Dermatologic Conditions – 000

53.6 Dietary Interventions – 000
53.6.1 Mediterranean Diet – 000
53.6.2 Modified Elimination Diet – 000
53.6.3 Modified Elimination Diet in Autoimmunity, IgE Reactions, IgG Hypersensitivity, and Other Immune Reactions – 000
53.6.4 Dermatologic Findings in Obesity – 000
53.6.5 Therapeutic Uses of Probiotics and Fermented Food in Skin Disorders – 000

53.7 Autoimmune or Hypersensitivity Reactions to Food Proteins – 000
53.7.1 Autoimmunity-Triggered Dietary Antigens – 000
53.7.2 Dermatologic Findings in Inflammatory Bowel Disease – 000
53.7.3 Food Bioactives in the Treatment of Conditions – 000
53.7.4 Conclusion – 000

References – 000

D. Noland et al. (eds.), *Integrative and Functional Medical Nutrition Therapy*,
https://doi.org/10.1007/978-3-030-30730-1_53

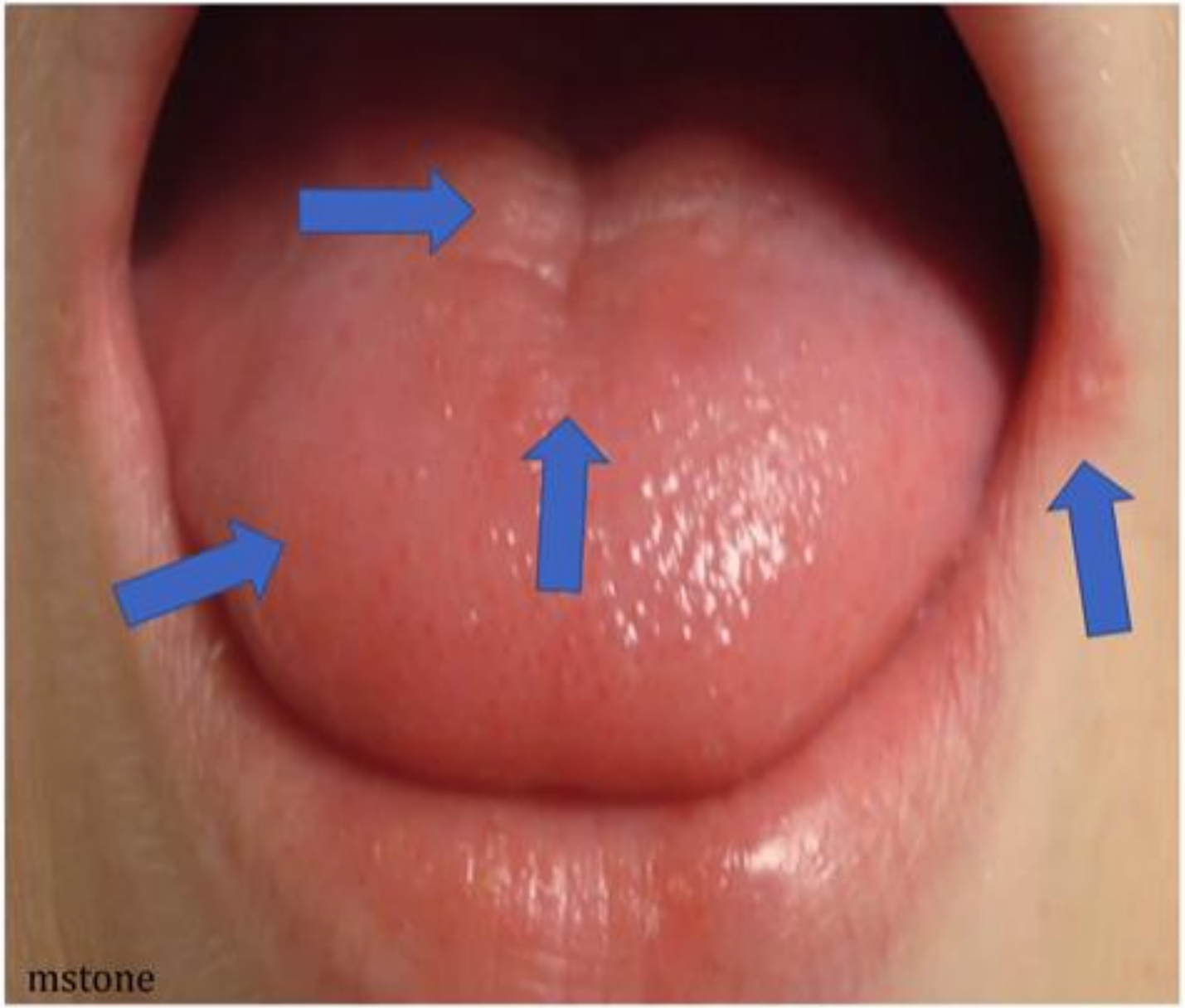
Hair and Scalp Findings and Their Nutrient Associations

Findings	Nutrient Association
Dry Hair	Essential fatty acids
Alopecia- hair thinning	Zinc, Iron, Protein, Biotin, CoQ10, Phytonutrients
Dandruff	Essential fatty acids, Zinc
Dull hair (lack of luster)	Protein, Iron
Premature gray hair	Copper, B12
Hair depigmentation	Protein, Copper, Zinc, Biotin, B12
Corkscrew hair	Vitamin C
Swan neck hair	Vitamin C
Menke's hair	Copper
Hair thinning	Protein, Zinc, Selenium

Tobin DJ, Paus R. Graying: Gerontobiology of the hair follicle pigmentary unit. Exp Gerontol. 2001;36:29–54. [PubMed: 11162910] Hammond, KA.Nurs Clin North Am 32(4):779, 1997 | Investig Dermatol Symp Proc. 2007 Dec;12(2):2-5.

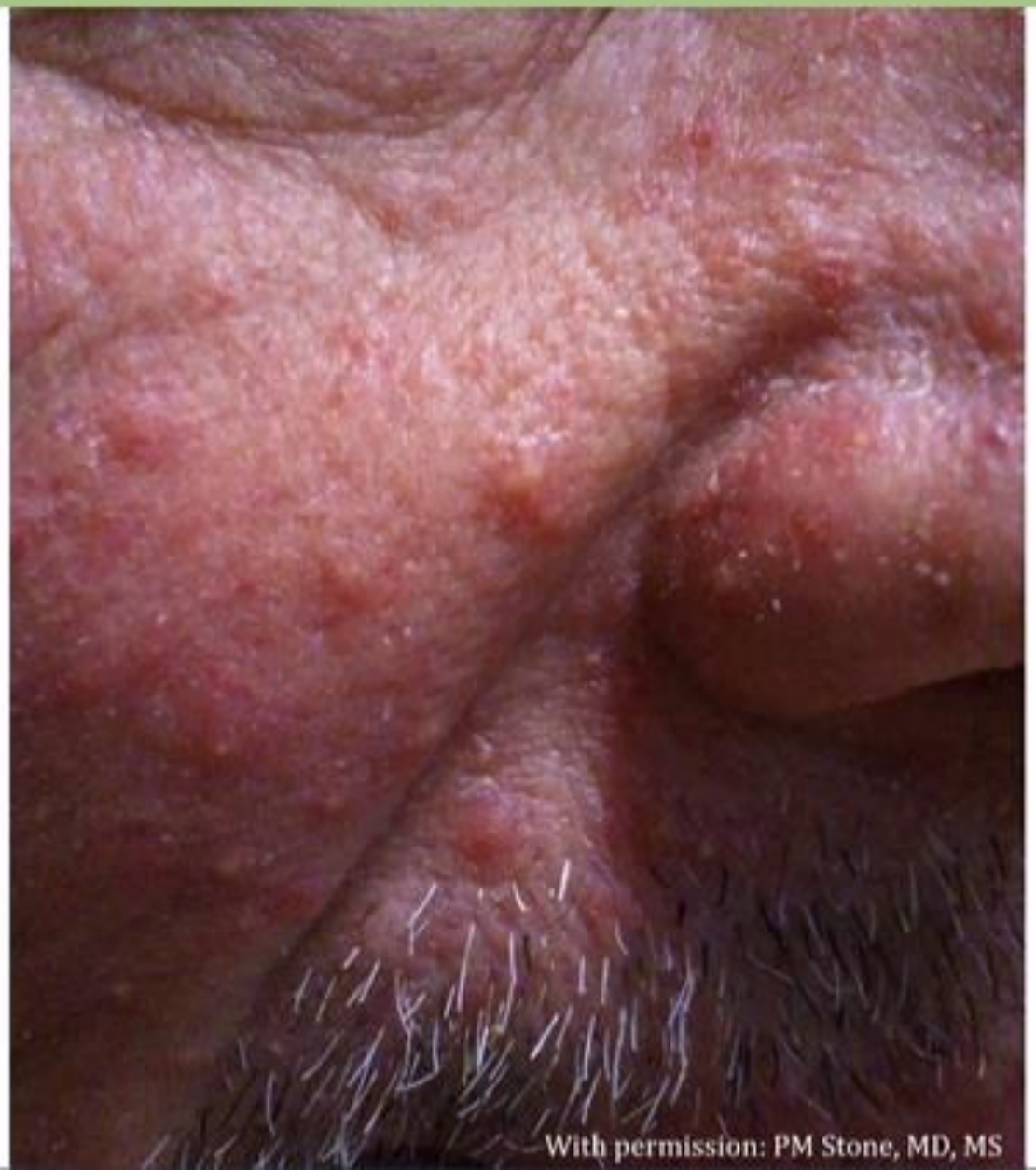
What do you See?

- Chelitis
- Smooth Tongue
- Transverse and mild midline fissure



Acne

Consider Insufficiency in
EFA,
Zinc, Selenium,
Vit A., E, B6,
Pantothenic Acid and
Vitamin C
Altered microflora/
dysbiosis or SIBO



Constellation:
Acne, Leukonychia, Hyperkeratosis pilari

Zinc Insufficiency Common with these 3
Vitamin A, EFA common with Acne and
Hyperkeratosis PilariCommon

THE PERSONALIZED NUTRITION CLINICAL PROCESS

1. What are you asking?
2. What are you observing?
3. What are you ASSESSING?
4. What are you explaining?
5. What are you recommending?

HISTORY & PHYSICAL

The history jumpstarts the educational/consulting process

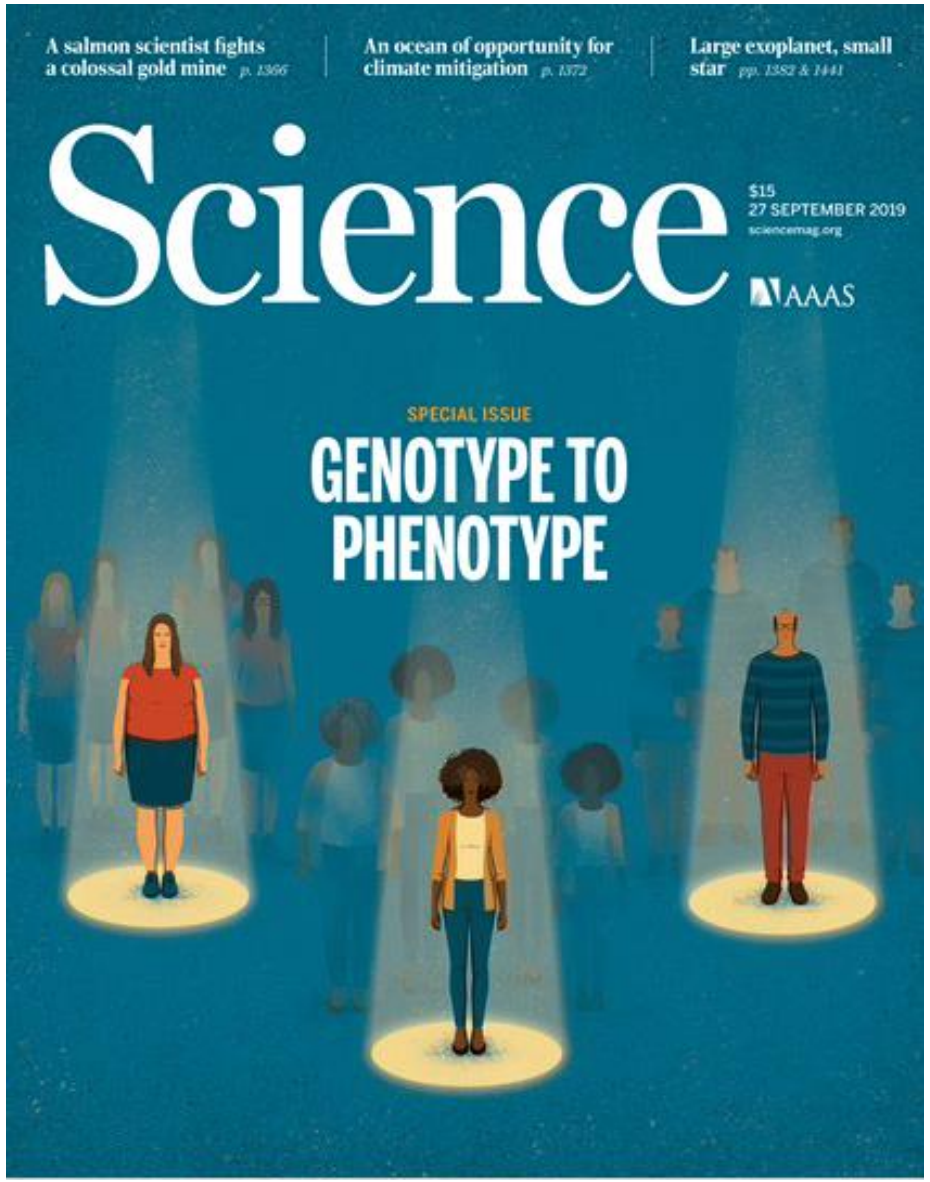
- Dietary history: food frequency
- Food sensitivities
- Lifestyle questions: sleep, stress, movement
- Medications for DNDs, hair loss
- Hormone/metabolic
- GI questions Gut-Brain-Skin


BASIC LABS

Testing Females

- CBC
- Vitamin D, Omega 6/3 ratio.
- Selected minerals: iron, consider Mg, zinc
- Hormone panel (Serum)
  - Free and total testosterone
  - Estradiol, FSH
  - Progesterone
  - DHEA
  - TSH, free T4, free T3
  - SHBG Optional
- Dried urine and saliva hormones


Key
0-4 : Minimal Need for Support
5-7 : Moderate Need for Support
8-10 : High Need for Support
Need for Antioxidant Support
Oxidative Stress
7
Cyst(e)ine
Lipid Peroxides
8-OHdG
Glutathione
Taurine
Citric Acid
cis-Aconitic Acid
Need for Mitochondrial Support
Mitochondrial Dysfunction
6
cis-Aconitic Acid
Isocitric Acid
α-Ketoglutaric Acid
Succinic Acid
Malic Acid
Adipic Acid
Suberic Acid
Need for Inflammation Support
Omega Imbalance
3
Need for Reduced Exposure
Toxic Exposure
0
cis-Aconitic Acid
Isocitric Acid
Glutaric Acid
Need for Methylation Support
Methylation Imbalance
4
Methylmalonic Acid
Methionine
Glutathione
FIGLU
Sarcosine
Vanilmandelic Acid
Arginine
Glycine
Serine
Creatinine
ADVANCED LABORATORY TESTING IN PERSONALIZED NUTRITION



THE GENE-NUTRIENT-PHENOTYPE CONNECTION

(Jeffrey Bland, PhD)

- We are a food-based culture, but…
- Physiology is determined by nutrients, whose need is…
- Determined by the genotype of the individual
- Food represents the delivery system for the nutrients that modulate an individual's phenotype

--Nutrigenomics

Science September 27, 2019; 365: 1394-1413

NUTRIGENOMICS TESTING

SNP Testing for:

Essential Nutrients that Affect the Skin

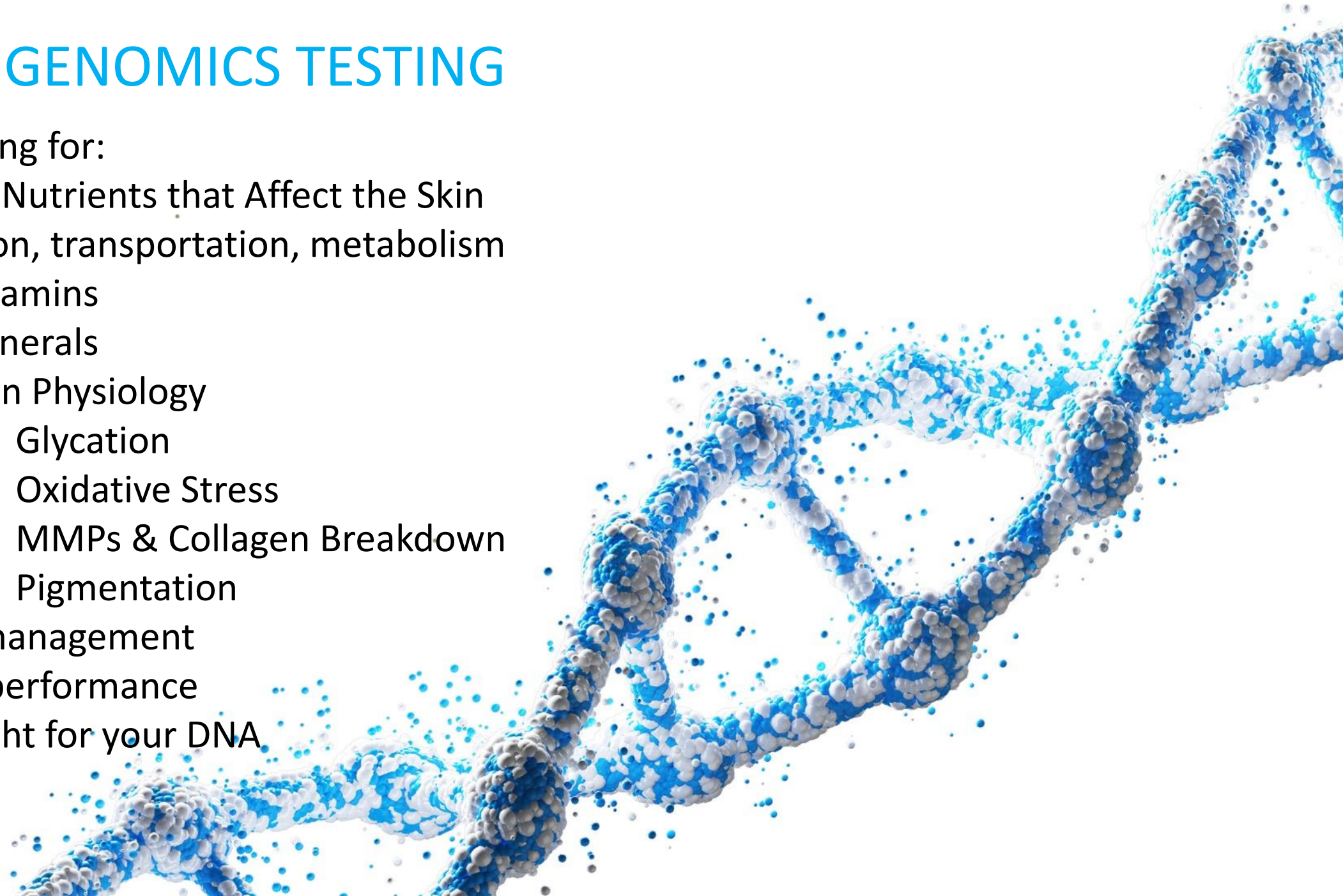
Absorption, transportation, metabolism

- Vitamins
- Minerals
- Skin Physiology
  - Glycation
  - Oxidative Stress
  - MMPs & Collagen Breakdown
  - Pigmentation

Weight management

Athletic performance

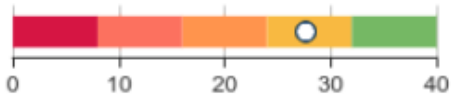
Eating right for your DNA



Improve Dysbiosis

Report Summary

Gut Microbiome Index

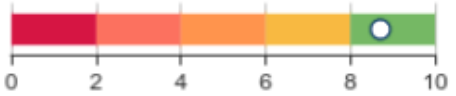


My Gut Microbiome Index:

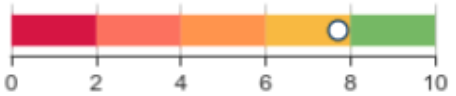
27.65 / 40

Diversity

Alpha Diversity Index = 8.71

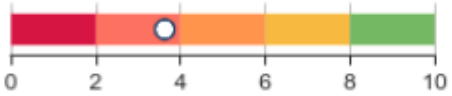


Beta Diversity Index = 7.71



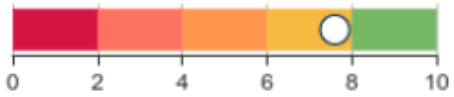
AMR Richness

Resistome Occurrence Index = 3.63



Pathogens

Pathogen Control Index = 7.6



Out of range:

Bilophila wadsworthia	High

Keystone Species

Out of range:

Akkermansia muciniphila	High
Ruminococcus bromii	High
Ruminococcus flavefaciens	Low
Bifidobacterium longum	High
Lactobacillus species	High
Butyricicoccus pullicaecorum	Low

Functions

Out of range:

Butyrate production	Low
Lactate production	High
GABA	Low
Vit B9 - Folate	High
Vit B12 - Cobalamin	High
Proteolytic fermentation	High
Sulfate Reduction	Low

THE PERSONALIZED NUTRITION CLINICAL PROCESS

1. What are you asking?
2. What are you observing?
3. What are you assessing?
4. What are you EXPLAINING?
5. What are you recommending?

1  Nourish Hair, Skin & Nails*

2  Build Collagen*

3  Fortify the Skin Barrier*

4  Strengthen the Gut-Skin Connection*

5  Balance Hormonal Health*

6  Clear Complexion*

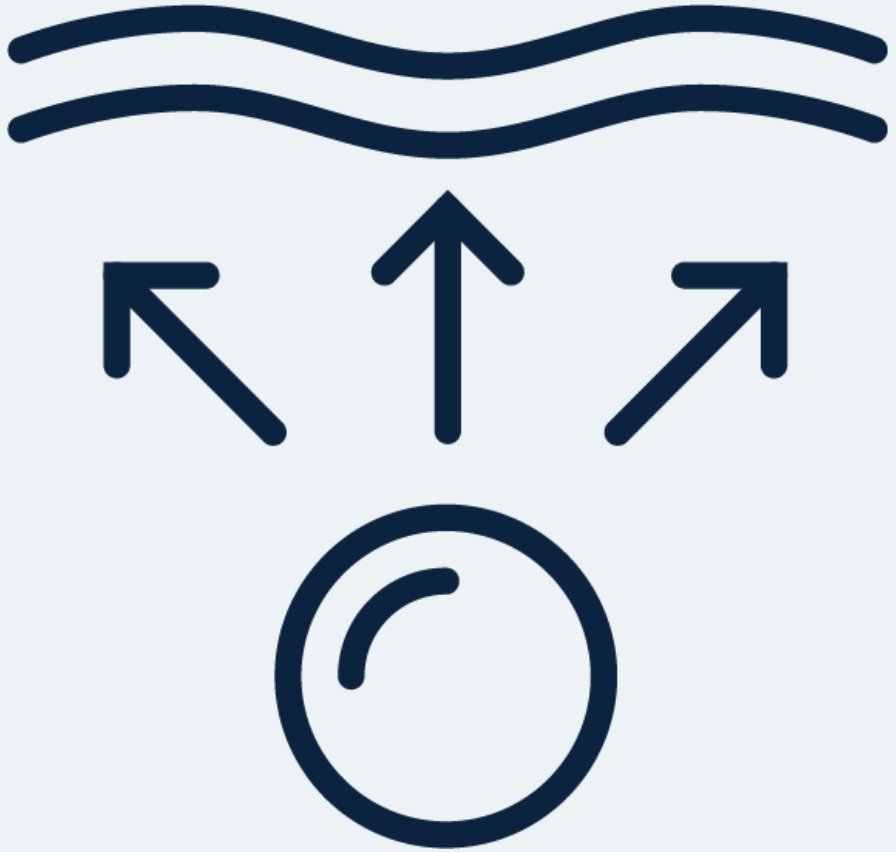
7  Support Healthy Circulation*

7

Personalized Nutrition Conversations


Foster Introspection
Make Lifestyle & Clinical Connections
Build on Beauty Motivations

1. Nourish Hair, Skin & Nails




BARRIERS TO HEALTHY NOURISHMENT
Low nutritional content
Exposure to toxins
SAD diet
Inflammation
Leaky gut

Table 1. NHANES 2007-2010: Usual Micronutrient Intake from Food Sources and Prevalence of Micronutrient Inadequacies Among US Residents Ages ≥4 Years (26)

Micronutrient	Mean Daily Intake from Food*	% < EAR
Folate	542 µg DFE	9.5
Niacin	24.7 mg	1.1
Riboflavin	2.2 mg	2.1
Thiamin	1.6 mg	4.7
Vitamin A	621 µg RAE	43.0
Vitamin B_6	2.0 mg	9.5
Vitamin B_{12}	5.3 µg	2.5
Vitamin C	84.0 mg	38.9
Vitamin D	4.9 µg	94.3
Vitamin E[#]	7.4 mg	88.5
Vitamin K	85.2 µg	66.9[†]
Calcium	987 mg	44.1
Copper	1.3 µg	4.2
Iron	15.1 mg	7.4
Magnesium	286 mg	52.2
Phosphorus	1,350 mg	1.0
Potassium	2,595 mg	100[†]
Selenium	108 µg	0.3
Sodium	3,433 mg	0.1[†]
Zinc	11.7 mg	11.7
Choline[††]	315 mg	91.7[†]

% NOT MEETING ESTIMATED AVERAGE REQUIREMENT (EAR) FOR ADULTS

Vitamin D: 94%
Vitamin E: 89%
Magnesium: 52%
Calcium: 44%
Vitamin C: 39%
Vitamin B6: 10%
Vitamin K: 67%
Zinc: 12%
Choline: 92%

https://lpi.oregonstate.edu/mic/micronutrient-inadequacies/overview

National Institutes of Health Office of Dietary Supplements
http://ods.od.nih.gov/factsheets/list-all/

DIET CONTRIBUTION TO BEAUTIFUL SKIN

- Slow down inflammaging
- Reduce glycation
- Improve leaky gut
- Build the short-chain fatty acids
- Obtain mild sun protection
- Improve skin barrier
- Slow down mitochondrial skin aging
- Support skin immune function

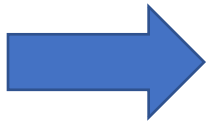
THE BEAUTY FROM WITHIN PROCESS OF INQUIRY

Totally at the discretion of the patient. Stay within scope of practice and competency.

Would you be interested in exploring whether your diet may be affecting your skin?
Would you like to explore whether some changes in diet might help your skin?
Would you like some help making sure your diet complements your treatments for best results?

NO

At least you've planted to seed



Well, if this is ever of interest for you, we're here for you

THE BEAUTY FROM WITHIN PROCESS OF INQUIRY

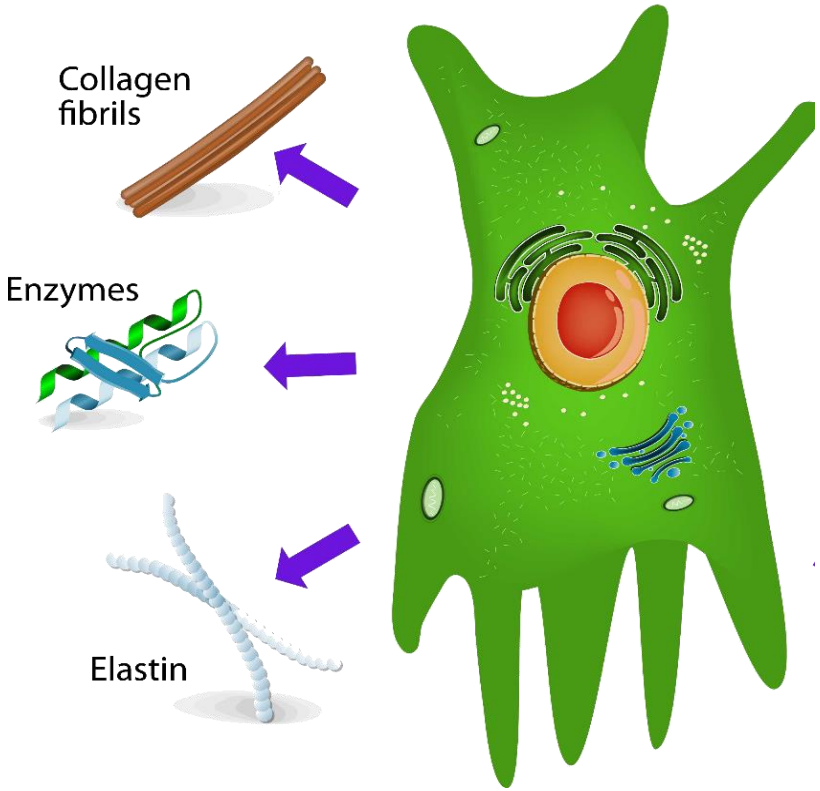
- How would you describe your diet?
- Are you on a special diet?
- What does eating “healthy” mean for you?
- What does a typical eating day look like for you?
  Let’s take a few minutes and recall the last 24hrs.
  What did you have for breakfast? Lunch? Dinner? Snacks?
- None of us has a perfect diet, myself included, but we all kinda know what we eat too much of and don’t get enough of.. You?
- How is your GI tract working: bloating, constipation, bowel movements?
- Are you taking supplements? If so, what types?
- Anything specifically for hair, skin, or nails?

Key Points

- Are they currently taking a multivitamin/mineral? ~ 70% of people are
- Is it a high-quality professional supplement? Encourage switch.
- Are they taking a specific supplement for hair, skin & nails?
- Purchasing online?
- Guard against overdoing minerals and fat-soluble vitamins
- Explain the benefit of selected herbs/botanicals and special formulations
- Highlight that supplements are "*conditionally essential nutrients*" and your patient should be clear on why they need certain ones. It's your job to guide them in this understanding.

2. Build Collagen

COLLAGEN



- **Amino Acids**: proline, glycine, and hydroxyproline
- **Vitamin C:** promotes the production of fibers.
- **Copper**: cross-linking of collagen fibers
- **Zinc:** involved in collagen synthesis.
- **Vitamin A:** Regulates the production & breakdown
- **Silica:** supports collagen formation and helps maintain healthy connective tissues.
- Required for the enzymatic reactions

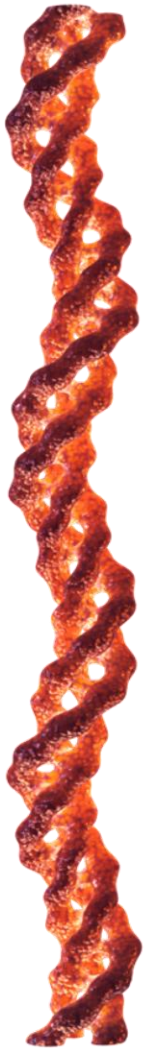
Type I collagen comprises 80%-90% of the skin's collagen, followed by type III (8%-12%) and type V (5%)

Bechara N, Flood VM, Gunton JE. A Systematic Review on the Role of Vitamin C in Tissue Healing. Antioxidants (Basel). 2022 Aug 19;11(8):1605. doi: 10.3390/antiox11081605. PMID: 36009324; PMCID: PMC9405326.

https://pubmed.ncbi.nlm.nih.gov/35223163

https://pubmed.ncbi.nlm.nih.gov/38009842/

COLLAGEN



- Collagen supplements have gained popularity: “*which* not *whether*”
- Oral & topical collagen: A systematic search: 12 relevant articles published between 2010 and 2020
- The reviewed studies, mainly randomized controlled trials conducted in high- to middle-income countries, indicated that both oral and topical collagen supplements are effective in delaying aging, without significant differences between the two forms
- **Oral collagen supplements were found to improve skin moisture, elasticity, hydration, and reduce wrinkles and roughness.**
- No side effects

Al-Atif H. Collagen Supplements for Aging and Wrinkles: A Paradigm Shift in the Fields of Dermatology and Cosmetics. Dermatol Pract Concept. 2022 Jan 1;12(1):e2022018. doi: 10.5826/dpc.1201a18. PMID: 35223163; PMCID: PMC8824545.

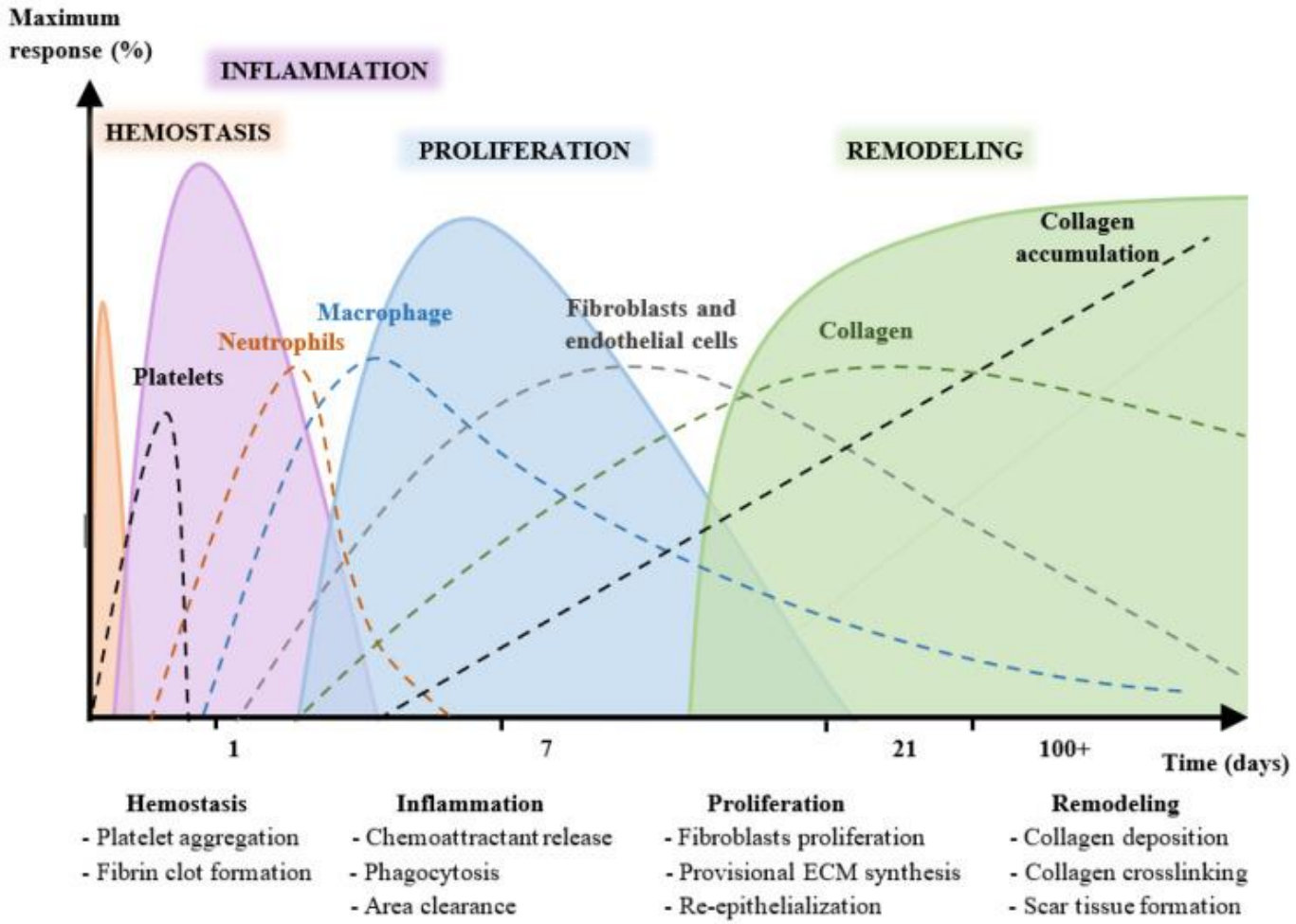
The Collagen Story:

Have they had a resurfacing/rejuvenation process previously or with you now?

“We disrupt the skin’s collagen either with needles, heat, or cold and the collagen unwinds. It becomes the scaffold on which the new collagen is created. This is called remodeling. When we do a procedure like a laser procedure for resurfacing or deep heating for tightening, collagen remodeling takes place for up to 6-9 months. This is why it is so important to supplement collagen and get enough of the other nutrients that help the body create new collagen.”

3. Fortify the Skin Barrier

Wound Healing



Arribas-López E, Zand N, Ojo O, Snowden MJ, Kochhar T. The Effect of Amino Acids on Wound Healing: A Systematic Review and Meta-Analysis on Arginine and Glutamine. Nutrients. 2021 Jul 22;13(8):2498. doi: 10.3390/nu13082498. PMID: 34444657; PMCID: PMC8399682.

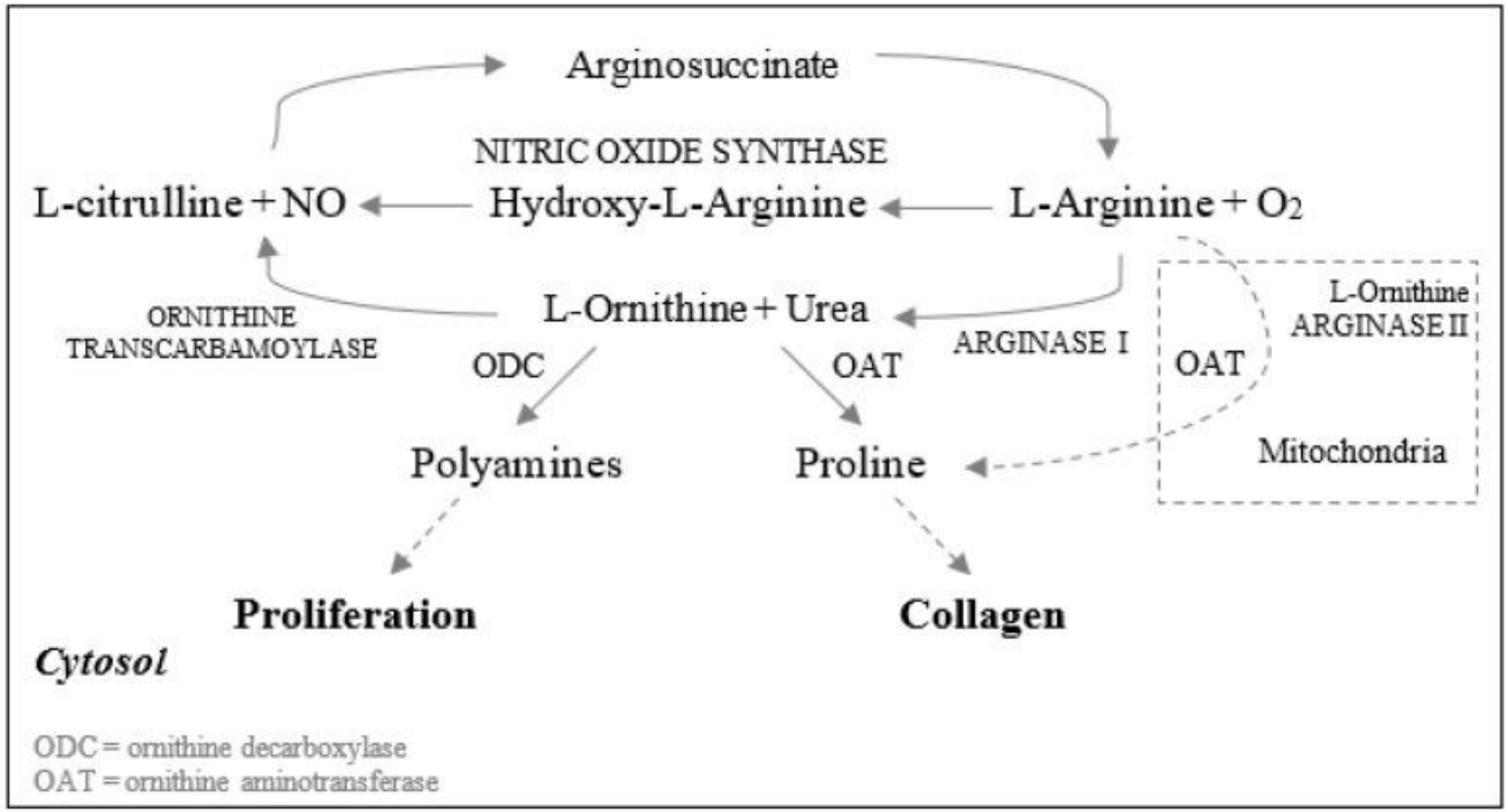
Nutrients. 2021 Aug; 13(8): 2498.
Published online 2021 Jul 22. doi: 10.3390/nu13082498
PMCID: PMC8399682
PMID: 34444657

The Effect of Amino Acids on Wound Healing: A Systematic Review and Meta-Analysis on Arginine and Glutamine

Elena Arribas-López,[1] Nazanin Zand,[1,*] Omorogieva Ojo,[2] Martin John Snowden,[1] and Tony Kochhar[3]

Roberto Iacone, Academic Editor

The overall meta-analysis demonstrated a significant effect of arginine supplementation on hydroxyproline content (MD: 4.49, 95% CI: 3.54, 4.45, $p < 0.00001$). Regarding glutamine supplementation, there was significant effect on nitrogen balance levels


Arginosuccinate
NITRIC OXIDE SYNTHASE
L-citrulline + NO
Hydroxy-L-Arginine
L-Arginine + O2
ORNITHINE TRANSCARBAMOYLASE
L-Ornithine + Urea
ARGINASE I
L-Ornithine ARGINASE II
OAT
ODC
OAT
Mitochondria
Polyamines
Proline
Proliferation
Collagen
Cytosol
ODC = ornithine decarboxylase
OAT = ornithine aminotransferase

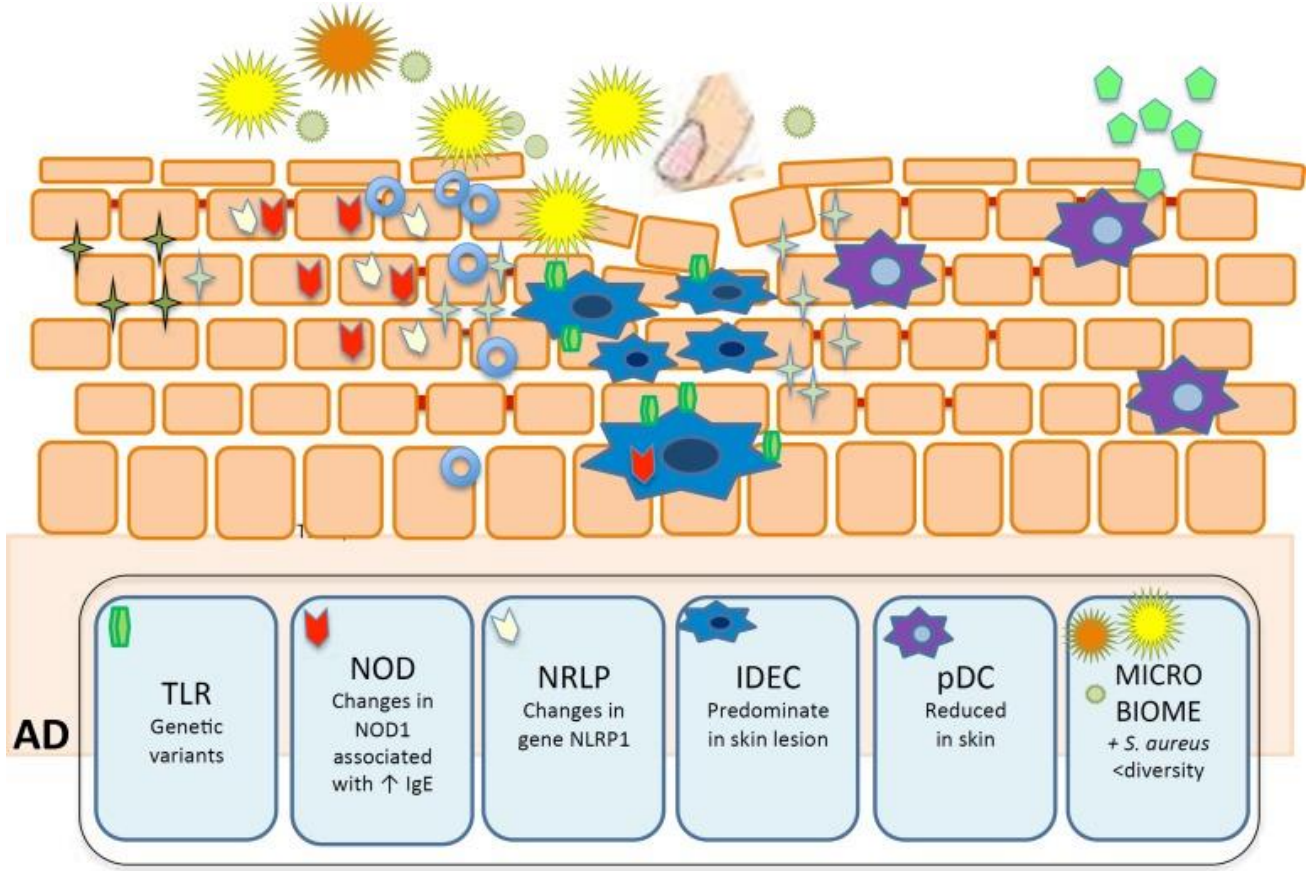
Nutrients. 2021 Mar; 13(3): 975.
Published online 2021 Mar 17. doi: 10.3390/nu13030975
PMCID: PMC8002755
PMID: 33802917

Effect of a Food for Special Medical Purposes for Muscle Recovery, Consisting of Arginine, Glutamine and Beta-Hydroxy-Beta-Methylbutyrate on Body Composition and Skin Health in Overweight and Obese Class I Sedentary Postmenopausal Women

Mariangela Rondanelli,[1,2] Mara Nichetti,[3] Gabriella Peroni,[3,*] Maurizio Naso,[3] Milena Anna Faliva,[3] Giancarlo Iannello,[4] Enrica Di Paolo,[5] and Simone Perna[6]

Variable	Intervention Intra-Group β (95%CI)	Placebo Intra-Group β (95%CI)	Intervention Effect between Groups Mean difference
Bright	**1.400 (0.758; 2.042)**	0.000 (−0.313; 0.313)	1.400
Elasticity	**0.900 (0.239; 1.561)**	0.000 (−0.313; 0.313)	0.900
Wrinkles	**0.800 (0.276; 1.324)**	−0.100 (−0.310; 0.110)	0.900
Total score	**3.000 (1.871; 4.129)**	−0.100 (−0.477; 0.277)	3.100

Multiple Pathways for Skin Barrier Protection



Zaniboni MC, Samorano LP, Orfali RL, Aoki V. Skin barrier in atopic dermatitis: beyond filaggrin. An Bras Dermatol. 2016 Jul-Aug;91(4):472-8. doi: 10.1590/abd1806-4841.20164412. PMID: 27579743; PMCID: PMC4999106.

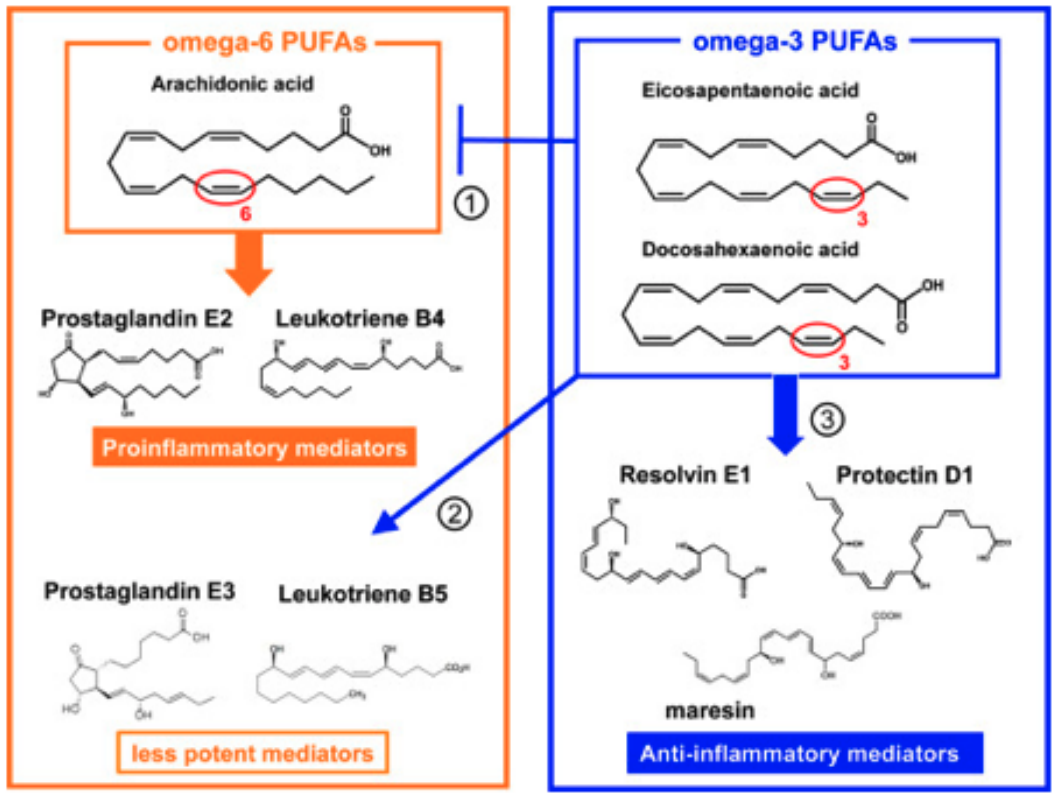
Omega 3 Fatty Acid and Skin Diseases

Yu Sawada [1], Natsuko Saito-Sasaki [1], Motonobu Nakamura [1]

Affiliations + expand

PMID: 33613558 PMCID: PMC7892455 DOI: 10.3389/fimmu.2020.623052

Free PMC article



Abstract

Humans are exposed to various external environmental factors. Food intake is one of the most influential factors impacting daily lifestyle. Among nutrients obtained from foods, omega-3 polyunsaturated fatty acids (PUFAs) have various beneficial effects on inflammatory diseases. Furthermore, omega-3 PUFA metabolites, including resolvins, are known to demonstrate strong anti-inflammatory effects during allergic and inflammatory diseases; however, little is known regarding the actual impact of these metabolites on skin diseases. In this review, we focused on metabolites that have strong anti-inflammatory actions in various inflammatory diseases, as well as those that present antitumor actions in malignancies, in addition to the actual effect of omega-3 PUFA metabolites on various cells.

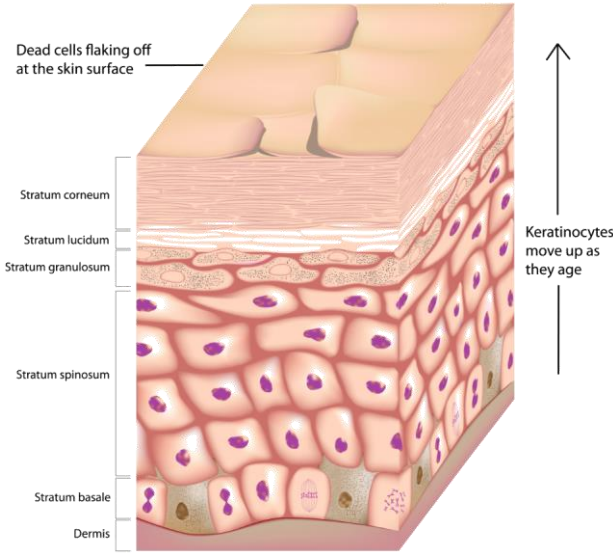
Use the analogy of the mortar between bricks

Just like in a brick wall, there's "mortar between the seven layers of skin cells holding them together. It is designed to keep the skin from leaking, preventing harmful toxins from getting into the body, and keeping moisture in. This helps prevent wrinkles, keeps the skin plump, and wards off infections. This healthy skin barrier is important for immune defense.

I've noticed that your skin barrier could use some fortifying. I'm observing _____. The most important element for skin barrier protection is ***Omega-3 fatty acids****.*

They make up a big part of the "glue" holding the epidermis – the outer layer of skin – together. It's important to have the right type of omega 3-s, as well as the right amount, so (make recommendation)."

Ask about capsules v. liquid preference.



Review > Skin Pharmacol Physiol. 2018;31(2):74-86. doi: 10.1159/000485132.
Epub 2018 Jan 6.

Vitamin D and the Pathophysiology of Inflammatory Skin Diseases

Meenakshi Umar [1], Konduru S Sastry, Fatima Al Ali, Moza Al-Khulaifi, Ena Wang, Aouatef I Chouchane

Affiliations + expand

PMID: 29306952 DOI: 10.1159/000485132

Results: Vitamin D is integrally connected to the skin for its synthesis, metabolism, and activity. It regulates many physiological processes in the skin ranging from cellular proliferation, differentiation, and apoptosis to barrier maintenance and immune functions. Vitamin D deficiency is associated with the risk of psoriasis and atopic dermatitis, and several clinical/observational studies have suggested the beneficial effect of vitamin D in the therapy of these 2 inflammatory skin disorders.

“Take a guess what percentage of Americans don’t meet the estimated average recommended amount of vitamin D. I was shocked to learn it was 92%, according to government statistics.”

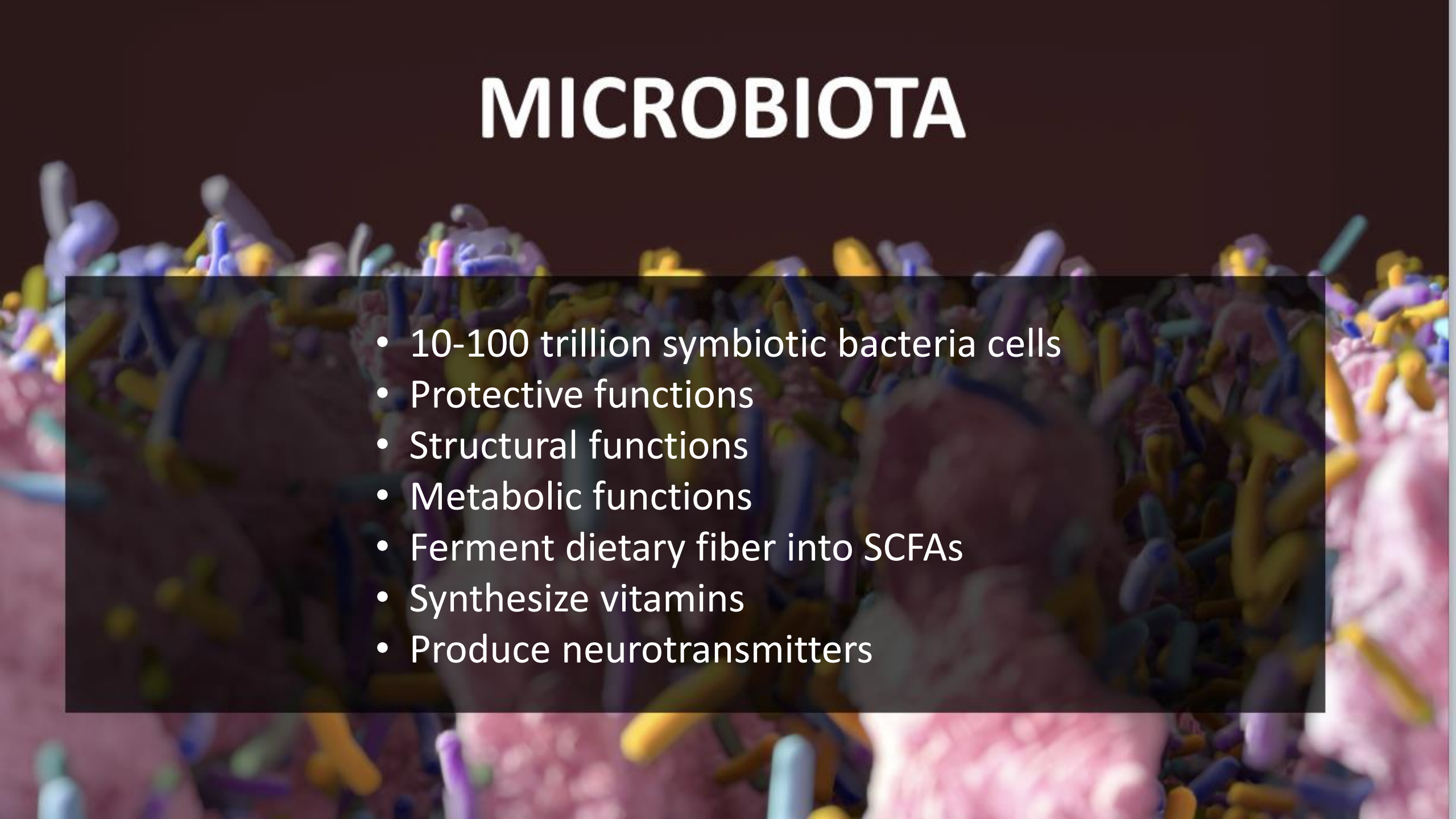
In fact, most people don’t even know what their vitamin D level is.

Refer to their levels if available.
Suggest fingerstick to check.

Note the benefits of Vitamin D, one of which is fortifying the skin barrier through immune protection.

4. Strengthen the Gut-Skin Connection

MICROBIOTA



- 10-100 trillion symbiotic bacteria cells
- Protective functions
- Structural functions
- Metabolic functions
- Ferment dietary fiber into SCFAs
- Synthesize vitamins
- Produce neurotransmitters

Do a bit of a dive into gut health

- ✓ Ask how much they know about the gut, how it relates to other organs especially skin, and the role of the microbiome in health. ~ 50%will have some knowledge. Are they on a probiotics? Give the fabulous fiber talk!

Do a bit of a dive into gut health

- ✓Go into a short discussion on how the gut, brain, and skin are connected chemically through the neurotransmitters and short chain fatty acids (which get to the skin), and vitamins produced by the 3-4 pounds of bacteria in our gut. The gut also communicates via the nervous system to other organs. The result is that what happens in the gut – through these chemical and electrical signals affects both the brain and the skin. So, a good place to start your journey to better skin is by having a better gut.

Do a bit of a dive into gut health

- ✓ Bring up any GI issues that surfaced during the history. Ask about medication use, specifically PPIs, NSAIDS, alcohol, food allergies, that affect GI health.

Do a bit of a dive into gut health

- ✓ Encourage regular probiotic use (many patients are taking them…the overwhelming majority are confused.). Talk up benefits, dysbiosis, and importance of right kind and right amount.

- ✓ If it is within your competencies, encourage GI testing and use in counseling.

Open Access Review

Functional Role of Probiotics and Prebiotics on Skin Health and Disease

by Vasiliki Lolou and Mihalis I. Panayiotidis *

Department of Applied Sciences, Northumbria University, Newcastle Upon Tyne NE1 8ST, UK

* Author to whom correspondence should be addressed.

Fermentation **2019**, *5*(2), 41; https://doi.org/10.3390/fermentation5020041

Received: 6 March 2019 / Revised: 10 May 2019 / Accepted: 10 May 2019 / Published: 17 May 2019

Probiotics are shown to decolonise skin pathogens (e.g., *P. aeruginosa*, *S. aureus*, *A. Vulgaris*, etc.) while kefir is also shown to support the immunity of the skin and treat skin pathogens through the production of antimicrobial substances and prebiotics. Finally, prebiotics (e.g., Fructo-oligosaccharides, galacto-oligosaccharides and konjac glucomannan hydrolysates) can contribute to the treatment of diseases including ACD, acne and photo aging primarily by enhancing the growth of probiotics.

Allergy Asthma Immunol Res. 2018 Jul; 10(4): 354–362.
Published online 2018 Feb 26. doi: 10.4168/aair.2018.10.4.354
PMCID: PMC6021588
PMID: 29949831

Microbiome in the Gut-Skin Axis in Atopic Dermatitis

So-Yeon Lee,[1] Eun Lee,[2] Yoon Mee Park,[3] and Soo-Jong Hong[1]

The compositional and proportional differences in the gut microbiome are associated with the development of AD via an immunomodulatory effect of the gut microbiome. The gut microbiome may contribute to the development, persistence, and severity of AD via immunologic, metabolic, and neuroendocrine pathways.

Dermatology and Therapy
Adis
adis.com

Dermatol Ther (Heidelb). 2021 Feb; 11(1): 1–12.
Published online 2020 Nov 10. doi: 10.1007/s13555-020-00460-1

PMCID: PMC7859152
PMID: 33170492

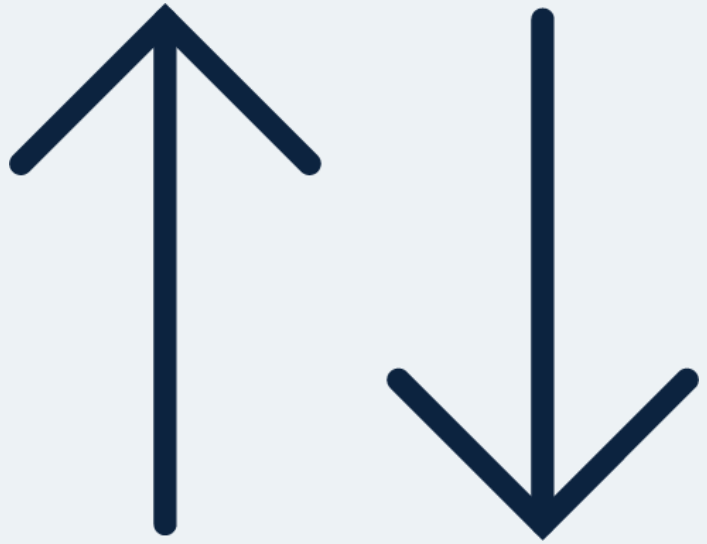
Rosacea and the Microbiome: A Systematic Review

Hala Daou,[1] Michela Paradiso,[2] Kerry Hennessy,[3] and Lucia Seminario-Vidal[3]

Author information ▸ Article notes ▸ Copyright and License information Disclaimer

Microbial induction extends beyond the skin to include the GI microbiome and complications therein. Additional GI pathologies have been implicated, including infection by *H. pylori* and IBD.

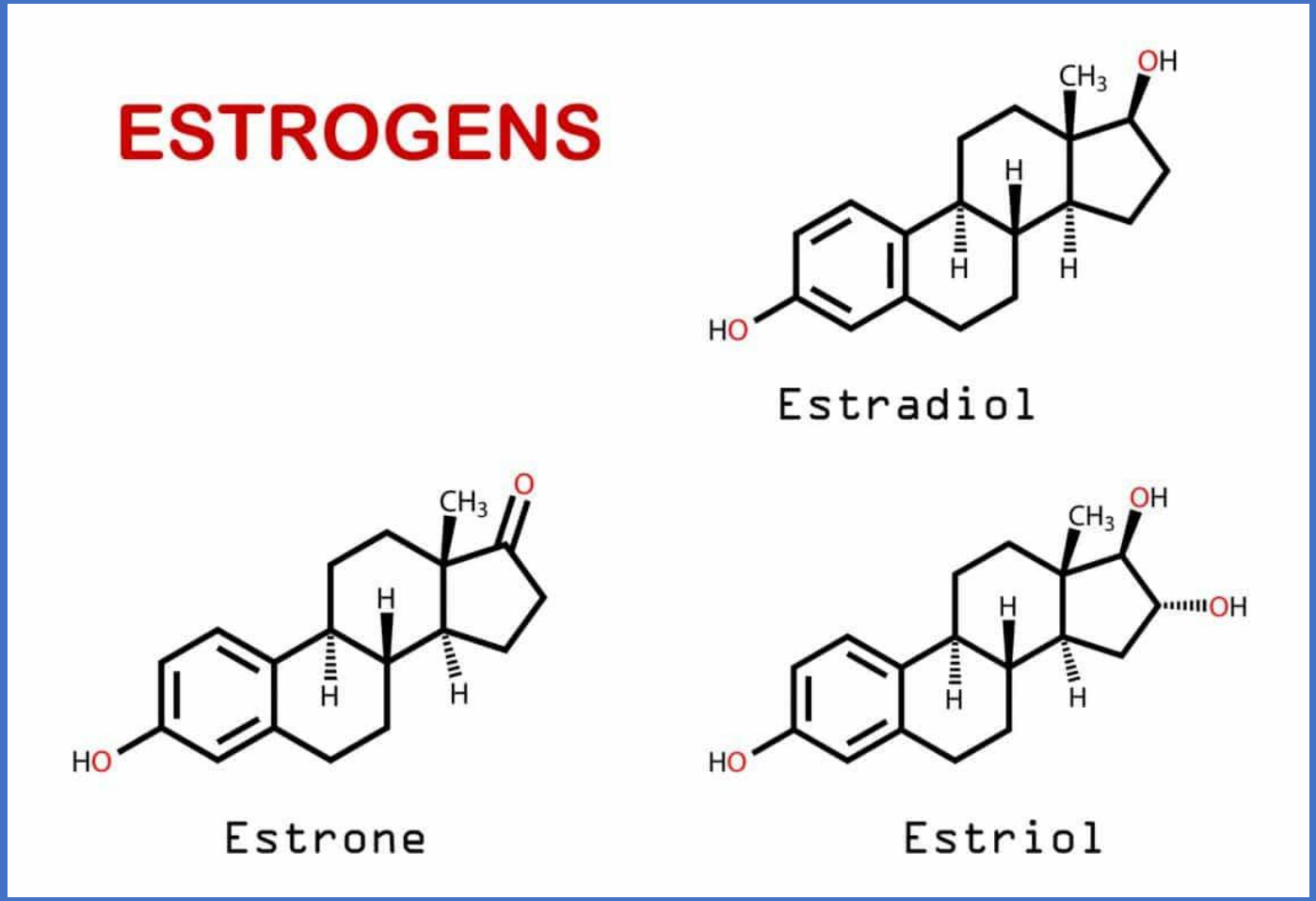
5. Balance Hormones



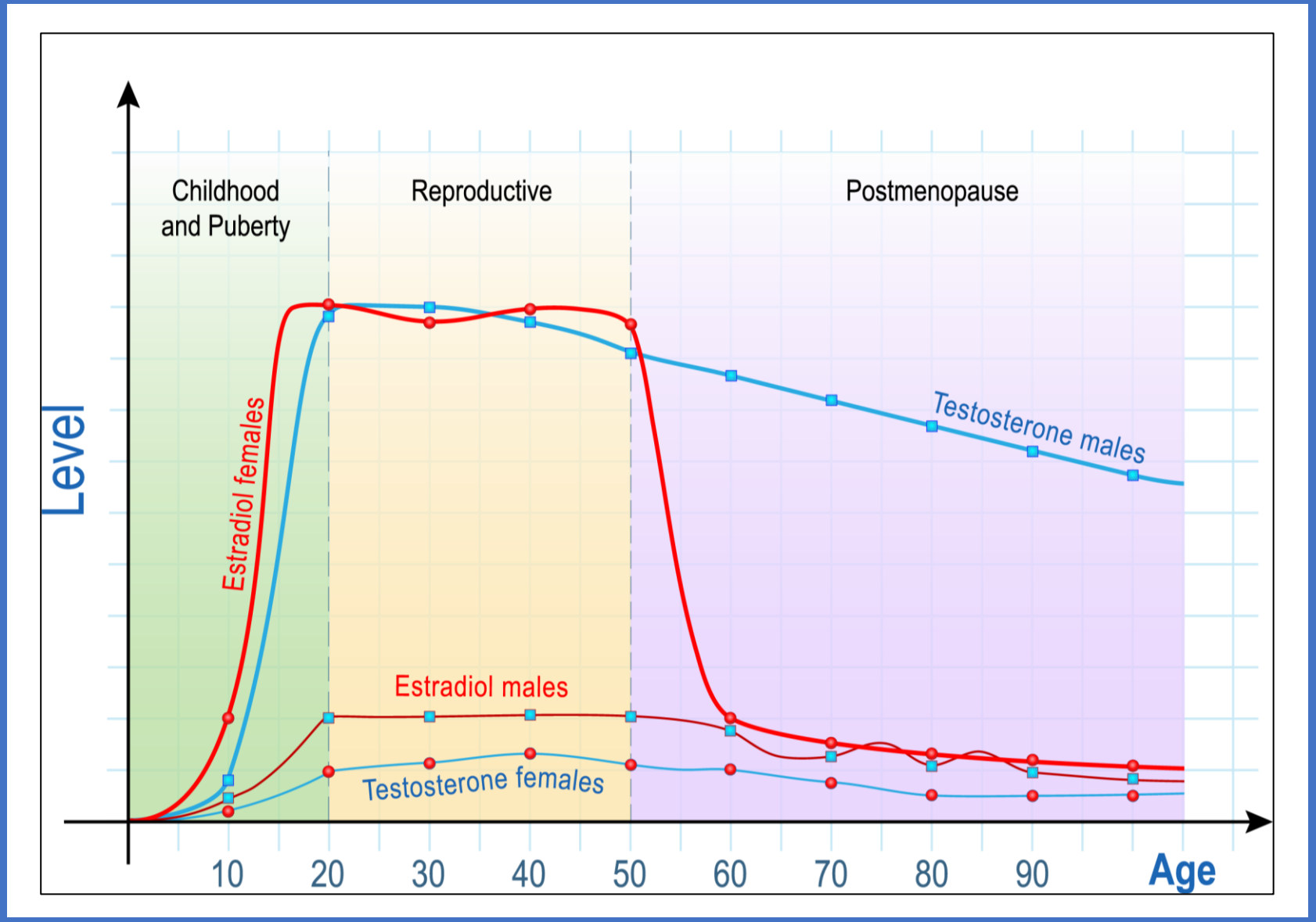
Estradiol

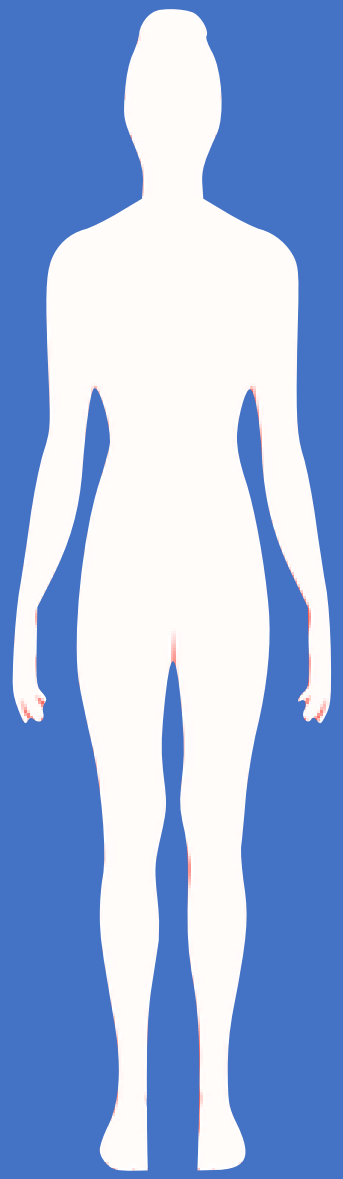
Estrogen Types

E2 Main Estrogen Reproductive Years



Decline with Age





Estrogen

- Sexual development
- Reproduction
- Lactation
- Metabolism
- Cardiovascular health
- Brain health
- Bone formation
- Skin health

Estrogen Decrease and Skin


Review > Am J Clin Dermatol. 2001;2(3):143-50. doi: 10.2165/00128071-200102030-00003.

Estrogen and skin. An overview

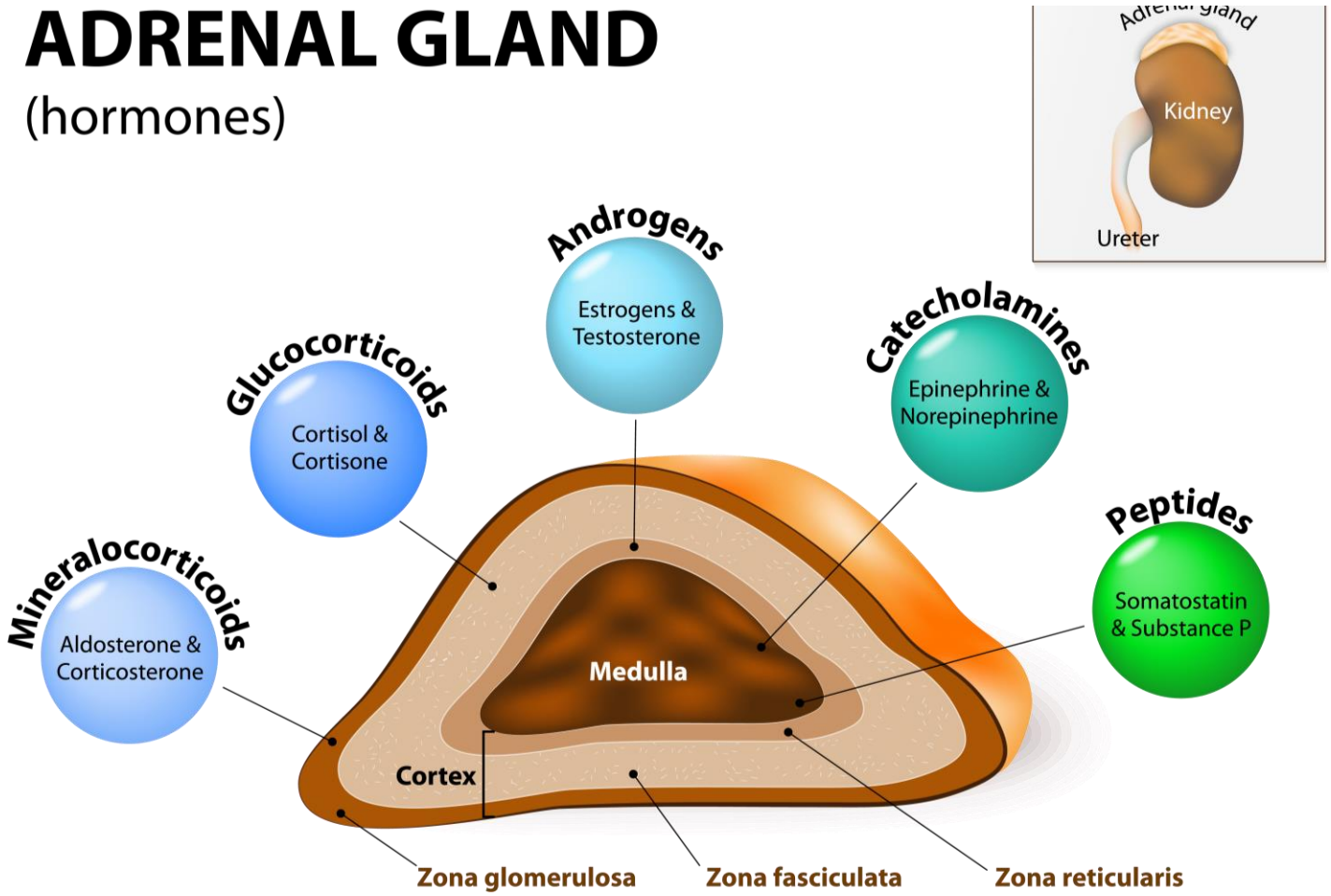
M G Shah [1], H I Maibach

Affiliations + expand

PMID: 11705091 DOI: 10.2165/00128071-200102030-00003

- pH changes, microbiome shifts
- Diminished blood flow, loss of collagen, elastin, fibroblasts contribute to thinning, loss of resilience, wrinkles, slack, crepey skin (“turkey neck”, “batwings”)
- Acne
- Increased susceptibility to injury, slower healing and rashes, easy bruising, flares and appearance of new onset inflammation
- VMS causes flushing and redness, may contribute to vicious cycle of pH, microbiome, odor, irritation

Estrogen Synthesis

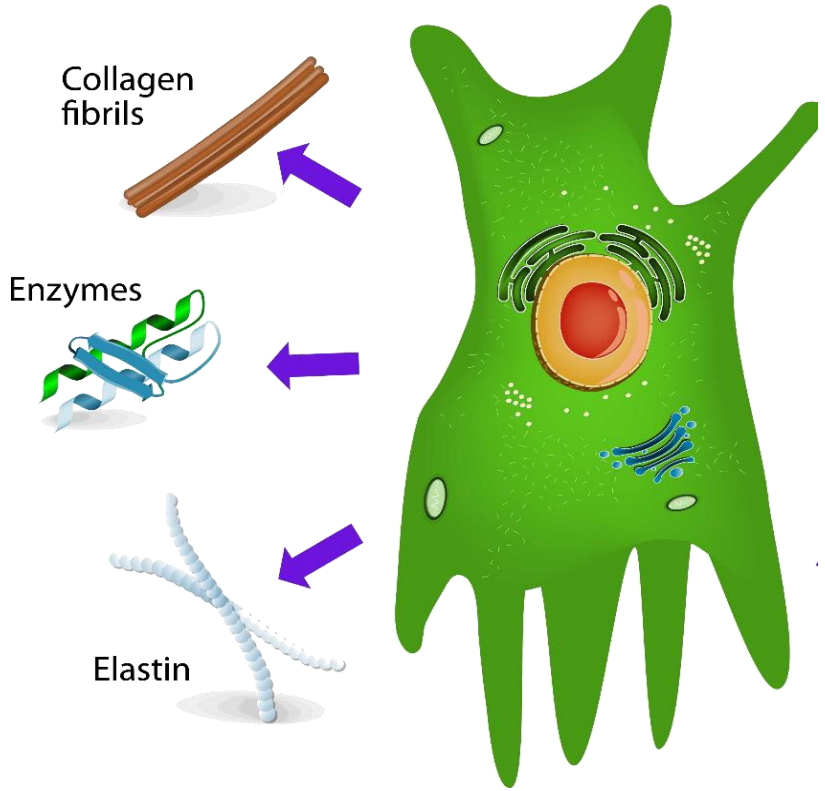


Estrogen & Collagen

- 30% decline in skin collagen in the first 5 years after menopause, ~ 2% per year decline over next 20 years

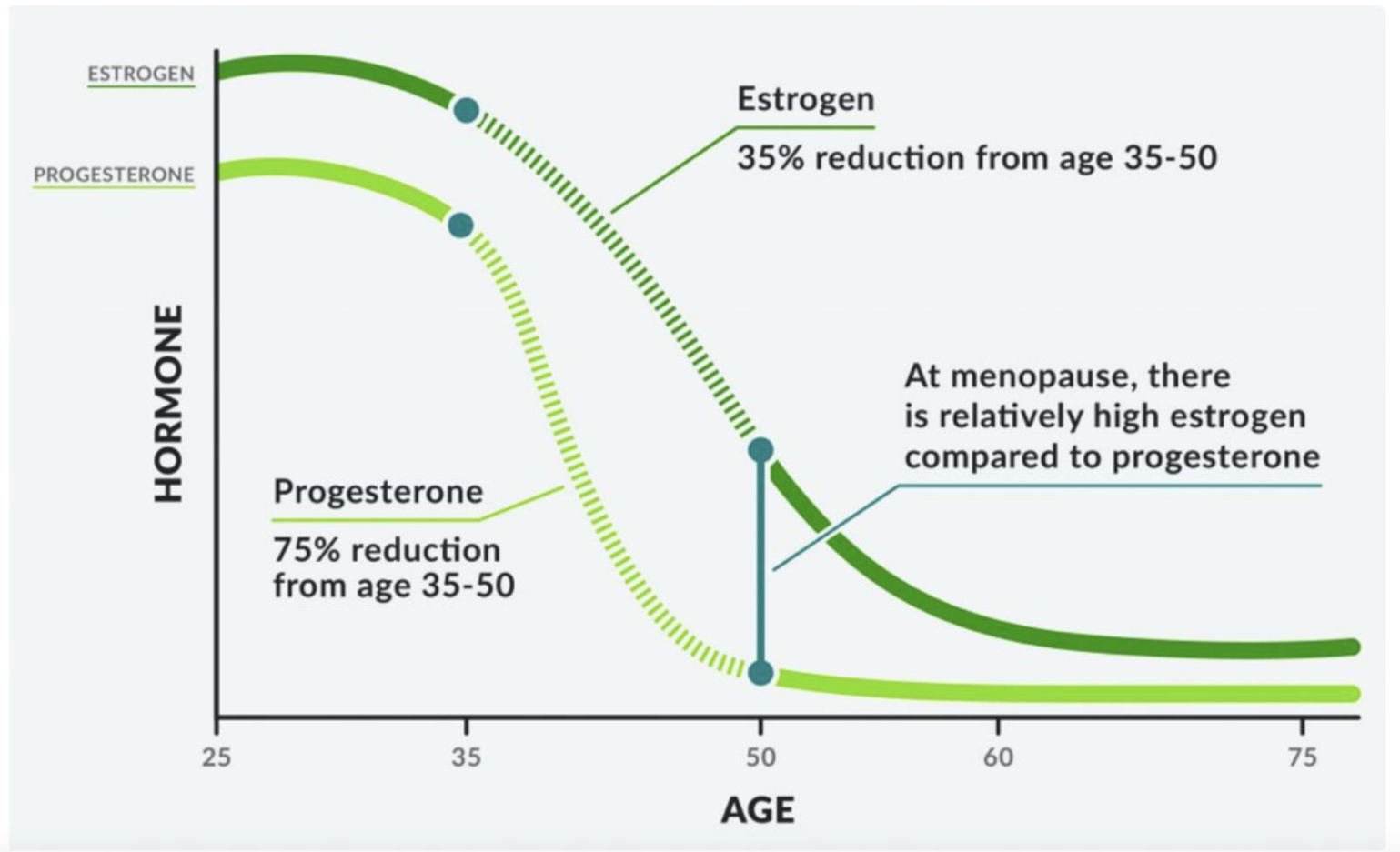
- Greater correlation between skin thickness and skin collagen content with years since menopause than with chronologic age

- Estrogen receptors are present in significant numbers in skin



Brincat M, Moniz CJ, Studd JW, Darby A, Magos A, Emburey G, Versi E. Long-term effects of the menopause and sex hormones on skin thickness. Br J Obstet Gynaecol. 1985 Mar;92(3):256-9. doi: 10.1111/j.1471-0528.1985.tb01091.x. PMID: 3978054.

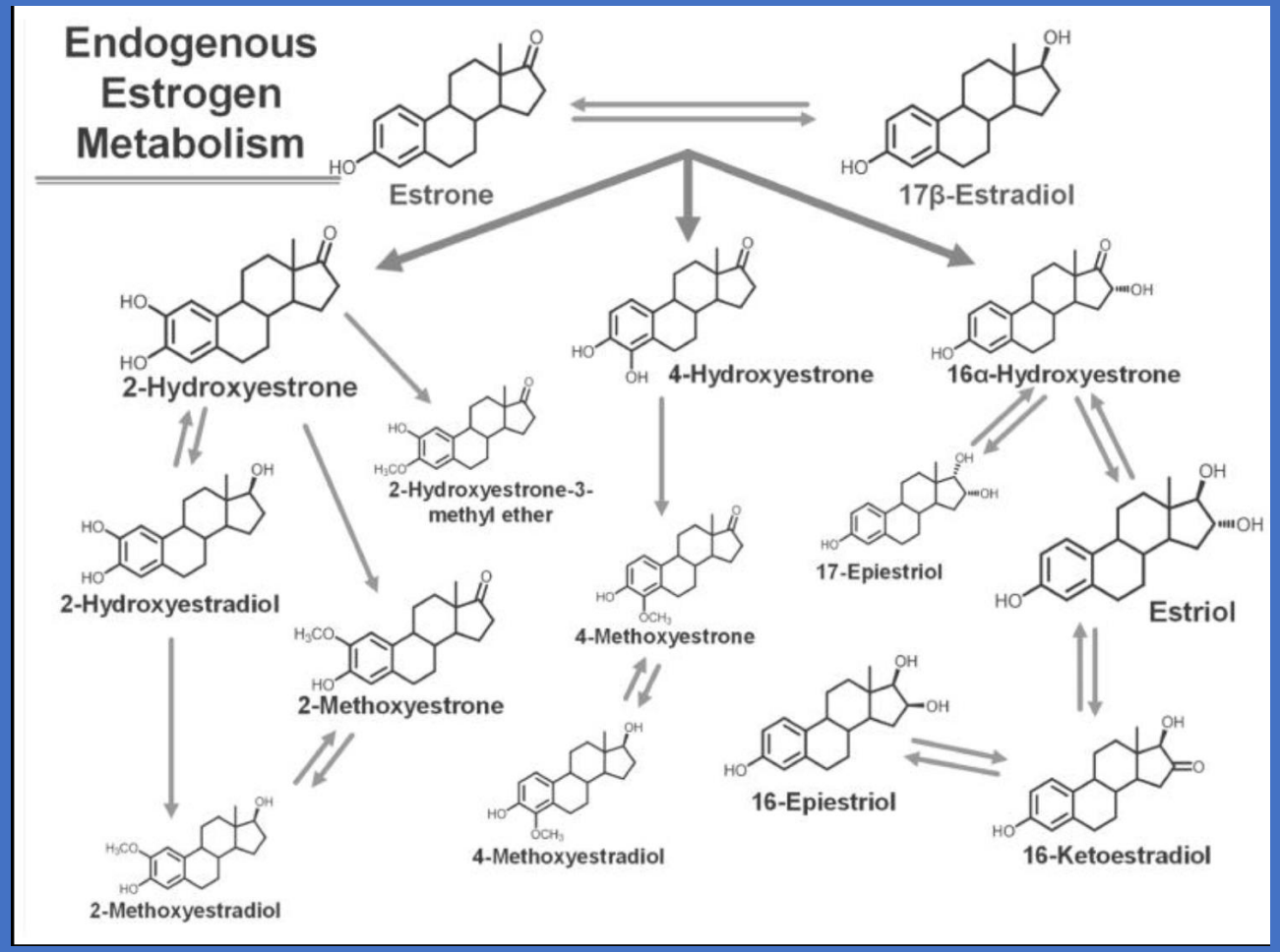
Estrogen Dominance



Cruciferous Vegetables
DIM
Red Clover
Black Cohosh
Maca
Milk thistle
Rhubarb root

Franco OH, Chowdhury R, Troup J, Voortman T, Kunutsor S, Kavousi M, Oliver-Williams C, Muka T. Use of Plant-Based Therapies and Menopausal Symptoms: A Systematic Review and Meta-analysis. JAMA. 2016 Jun 21;315(23):2554-63. doi: 10.1001/jama.2016.8012. PMID: 27327802.

Estrogen Metabolism



Steroids. 2015 Jul; 99(Pt A): 67–75

Key Points:

- Listen well
- Remember perimenopause can last 10 years
- Suggest sleep hygiene and possibly melatonin/inositol
- Provide stress management guidance
- Address estrogen dominance
- Decide the extent to which you want to manage patient (refer)
- Inquire as to whether on HRT or not
- If appropriate, draw labs, counsel, and Rx (injection, topical, pellet, oral)

6. Clear Complexion

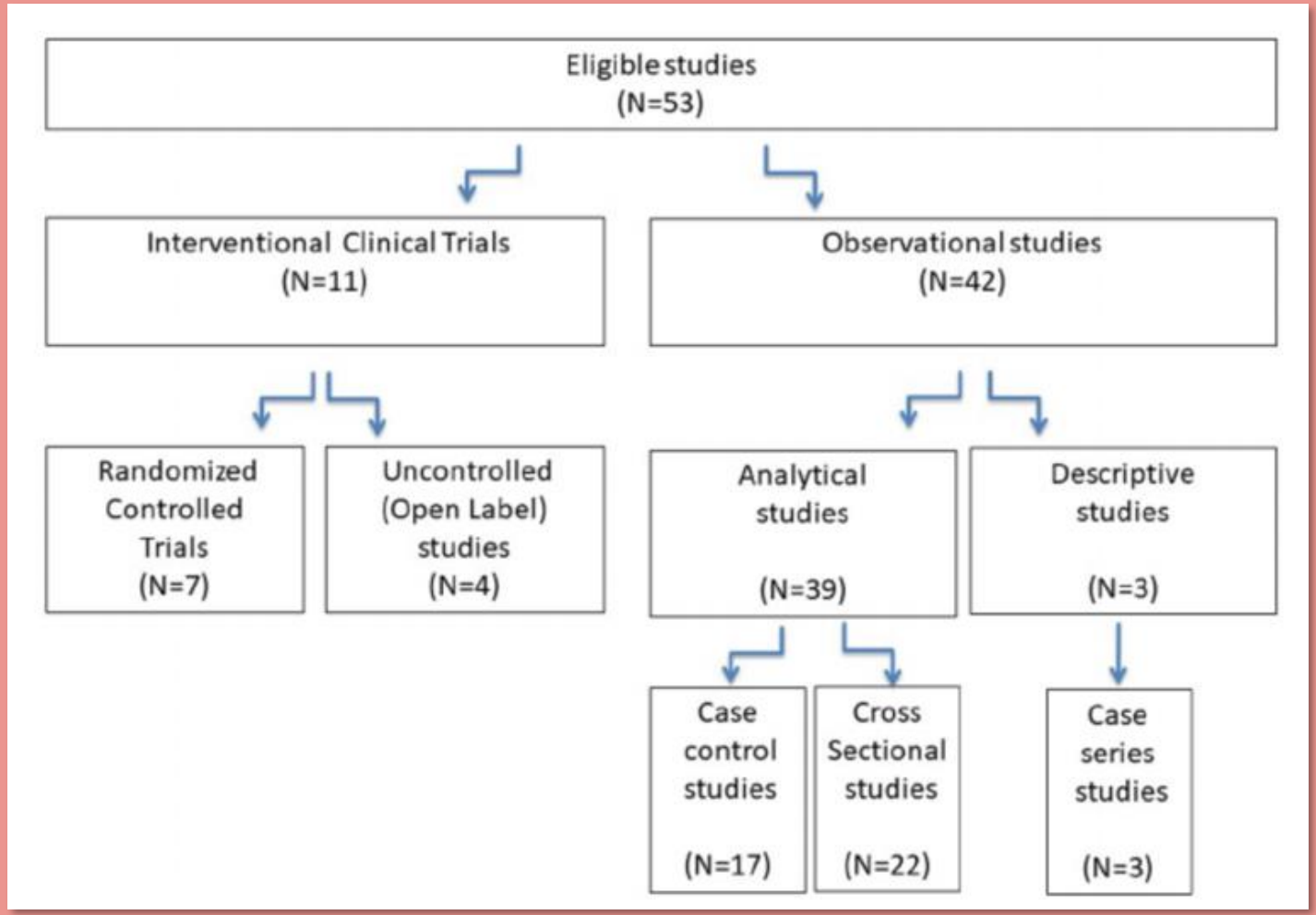
DIET FIRST: FOODS & ACNE

✓**Negative**

- high glycemic index/load foods
- dairy products
- fried fatty foods

✓**Beneficial**

+ fruits & vegetables
+ Mediterranean diet
+ low glycemic diet



Dall'Oglio F, et al., Diet and acne: review of the evidence from 2009 to 2020. Int J Dermatol. 2021 Jun;60(6):672-685

Postepy Dermatol Alergol. 2016 Apr; 33(2): 81–86.
Published online 2016 May 16. doi: [10.5114/ada.2016.59146]
PMCID: PMC4884775
PMID: 27279815

Significance of diet in treated and untreated acne vulgaris

Alicja Kucharska,[✉] Agnieszka Szmurło, and Beata Sińska

Zinc

Go to:

Zinc is a micronutrient that is essential for the development and functioning of the human skin. It has been shown to be bacteriostatic against *Propionibacterium acnes*, to inhibit chemotaxis and to reduce production of pro-inflammatory cytokine – tumor necrosis factor α (TNF-α) [44].

Zinc has been shown to be bacteriostatic against *P. acnes*, to inhibit chemotaxis and to reduce production of TNF-alpha. Shown to have a positive effect on acne vulgaris.

GUT MICROBIOME CHANGES IN ACNE

✓31 participants with moderate to severe acne

- 31 matched controls

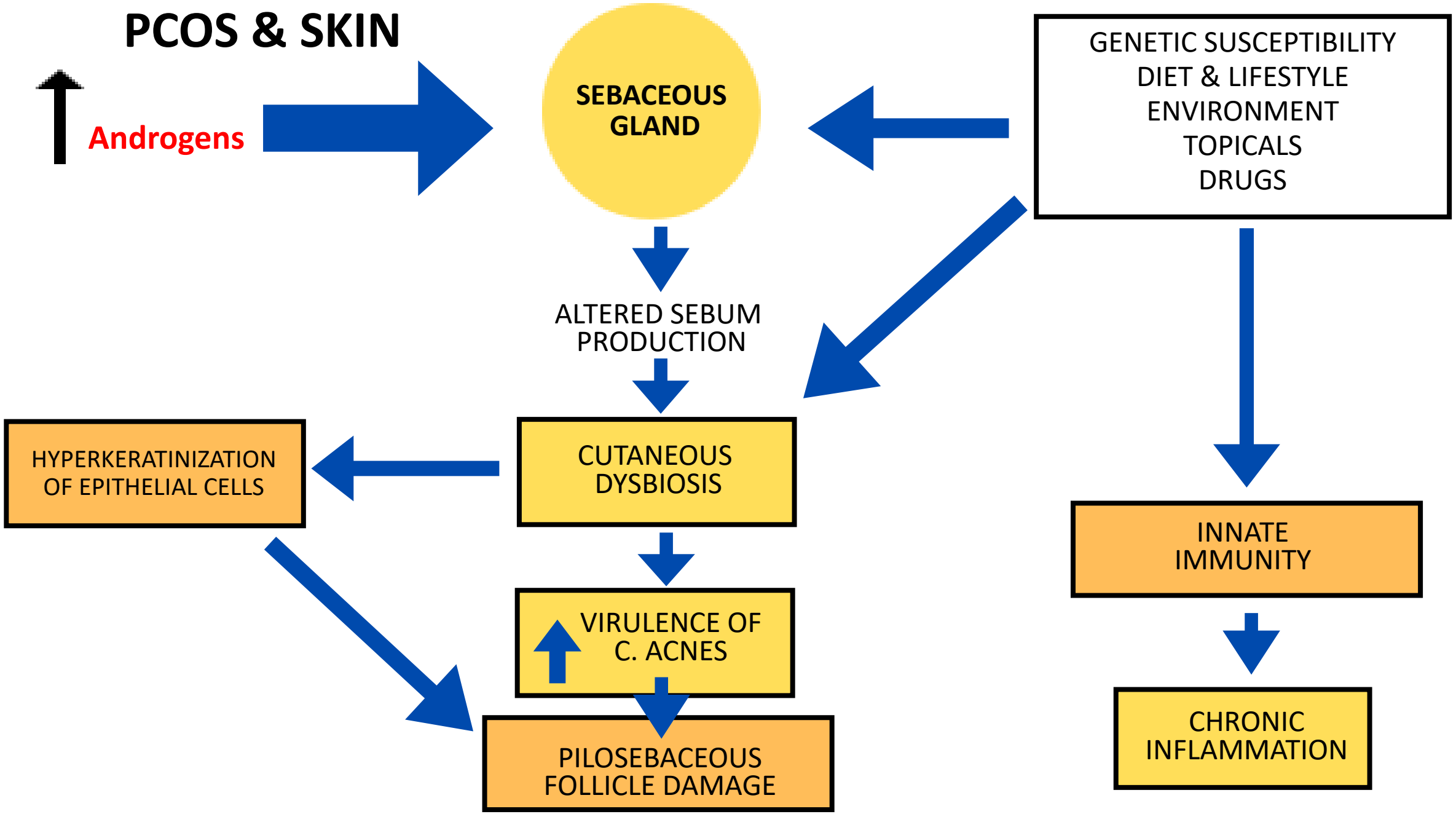
Table 3. Major taxonomic differences between acne patients (P) and healthy controls (N)

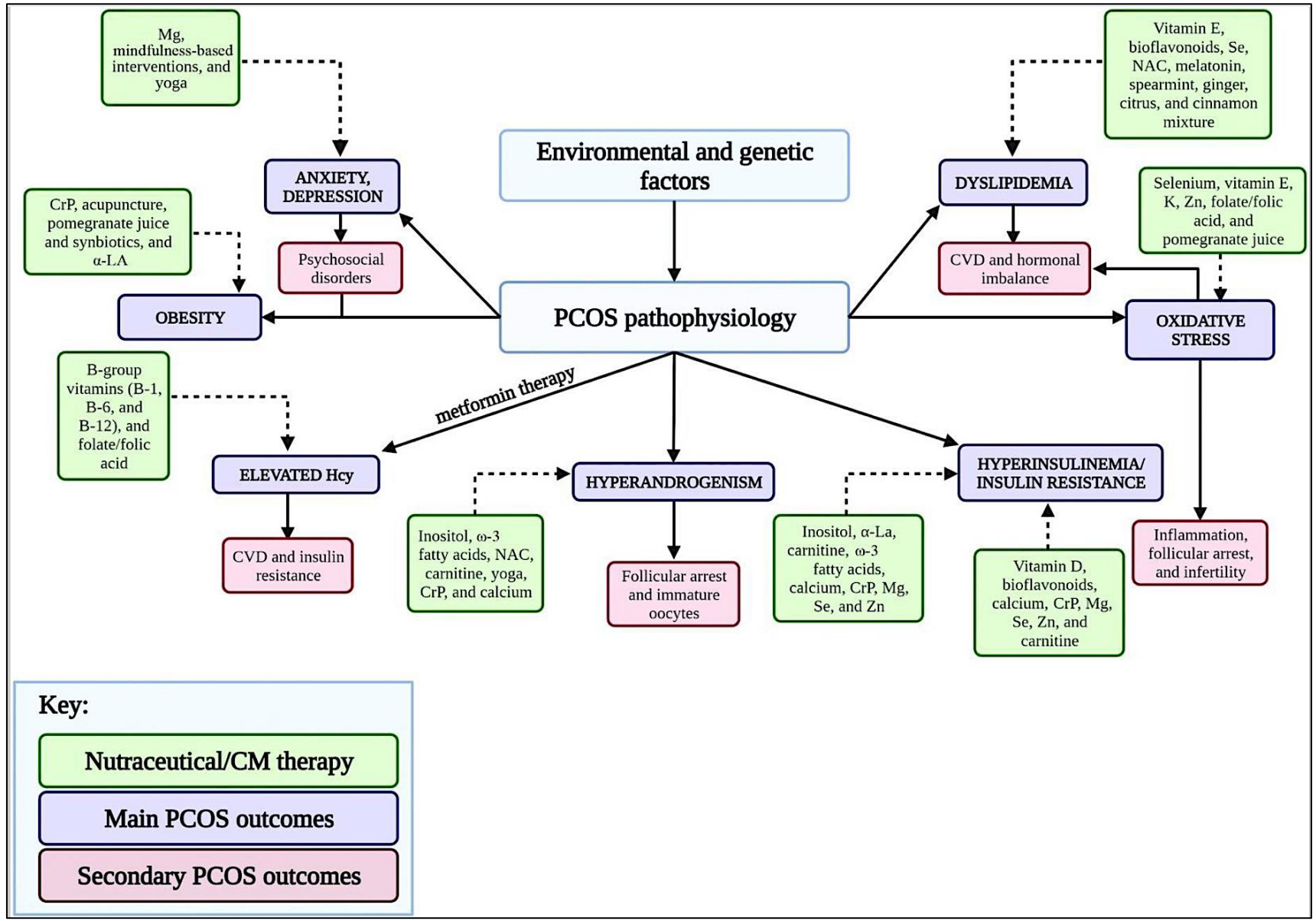
	Mean relative abundance (%)		M (P_{25}, P_{75})			
	Group N	Group P	Group N	Group P	*Z*	*P*
Phylum						
Actinobacteria	2.84	0.89	1.15 (0.32–2.46)	0.44 (0.11–0.80)	−2.879	0.004
Proteobacteria	7.01	8.35	3.88 (2.61–6.17)	5.98 (3.96–9.15)	−2.161	0.031
Genus						
Bifidobacterium	2.66	0.69	1.01 (0.26–2.42)	0.28 (0.05–0.67)	−2.668	0.007
Lactobacillus	0.07	0.04	0.005 (0–0.03)	0.001 (0–0.04)	−2.074	0.038
Butyricicoccus	0.003	0.001	0 (0–0.003)	0 (0–0)	−2.492	0.013
Coprobacillus	0.0008	0	0 (0–0)	0 (0–0)	−2.050	0.042
Allobaculum	0.0002	0	0 (0–0)	0 (0–0)	−2.050	0.042

P/A ratio in Acne: 9.38

P/A ratio in Controls: 2.47

Yan HM et al. Gut microbiota alterations in moderate to severe acne vulgaris patients. J. Dermatol. 2018


PCOS & SKIN
Androgens
SEBACEOUS GLAND
GENETIC SUSCEPTIBILITY
DIET & LIFESTYLE
ENVIRONMENT
TOPICALS
DRUGS
ALTERED SEBUM PRODUCTION
HYPERKERATINIZATION OF EPITHELIAL CELLS
CUTANEOUS DYSBIOSIS
INNATE IMMUNITY
VIRULENCE OF C. ACNES
CHRONIC INFLAMMATION
PILOSEBACEOUS FOLLICLE DAMAGE



Adv Nutr. 2022 Jul; 13(4): 1243–1266.
Published online 2021 Nov 23. doi: 10.1093/advances/nmab141
PMCID: PMC9340985
PMID: 34970669

Nutritional Supplements and Complementary Therapies in Polycystic Ovary Syndrome

Simon Alesi, Carolyn Ee, Lisa J Moran, Vibhuti Rao, and Aya Mousa[✉]

> Endocr J. 2019 Oct 28;66(10):859-870. doi: 10.1507/endocrj.EJ18-0567. Epub 2019 Jul 3.

Inulin and metformin ameliorate polycystic ovary syndrome via anti-inflammation and modulating gut microbiota in mice

Jing Xue [1], Xiaorong Li [2], Ping Liu [3], Ke Li [4] [5], Liping Sha [3], Xiaoli Yang [4], Lili Zhu [1], Zhen Wang [4], Youping Dong [3], Li Zhang [3], Hong Lei [3], Xiaoxia Zhang [6], Xiaoying Dong [3], Hao Wang [1]

Affiliations + expand

PMID: 31270279 DOI: 10.1507/endocrj.EJ18-0567

7. Support Circulation

Would you like to learn more about a critical molecule that has:

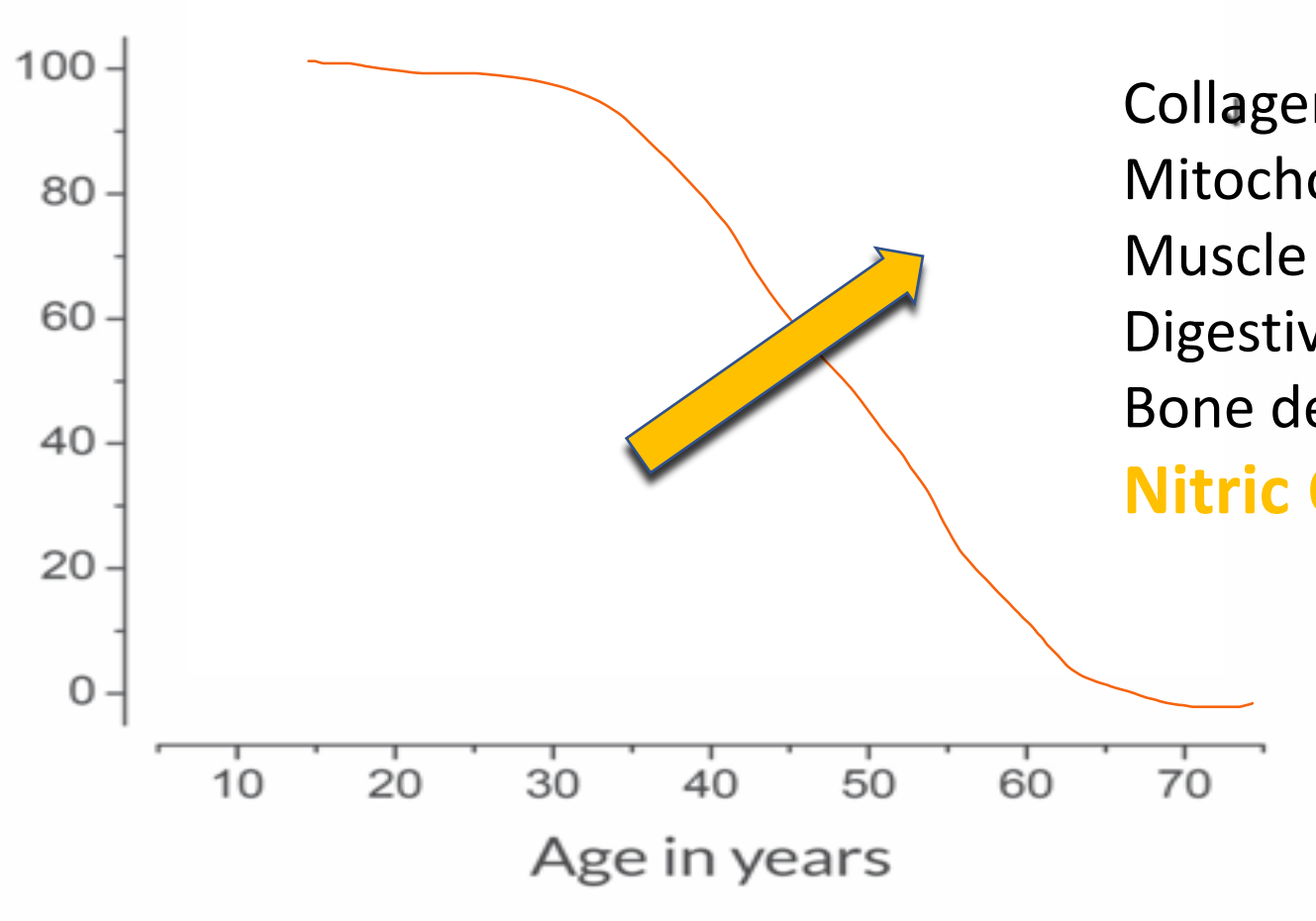
- Anti-inflammatory
- Immunomodulatory
- Antimicrobial
- Vasodilatory and
- Skin beautification properties?

https://jddonline.com/articles/spotlight-on-the-use-of-nitric-oxide-in-dermatology-what-is-it-what-does-it-do-can-it-become-an-impo-S1545961617S0004X/?_page=4

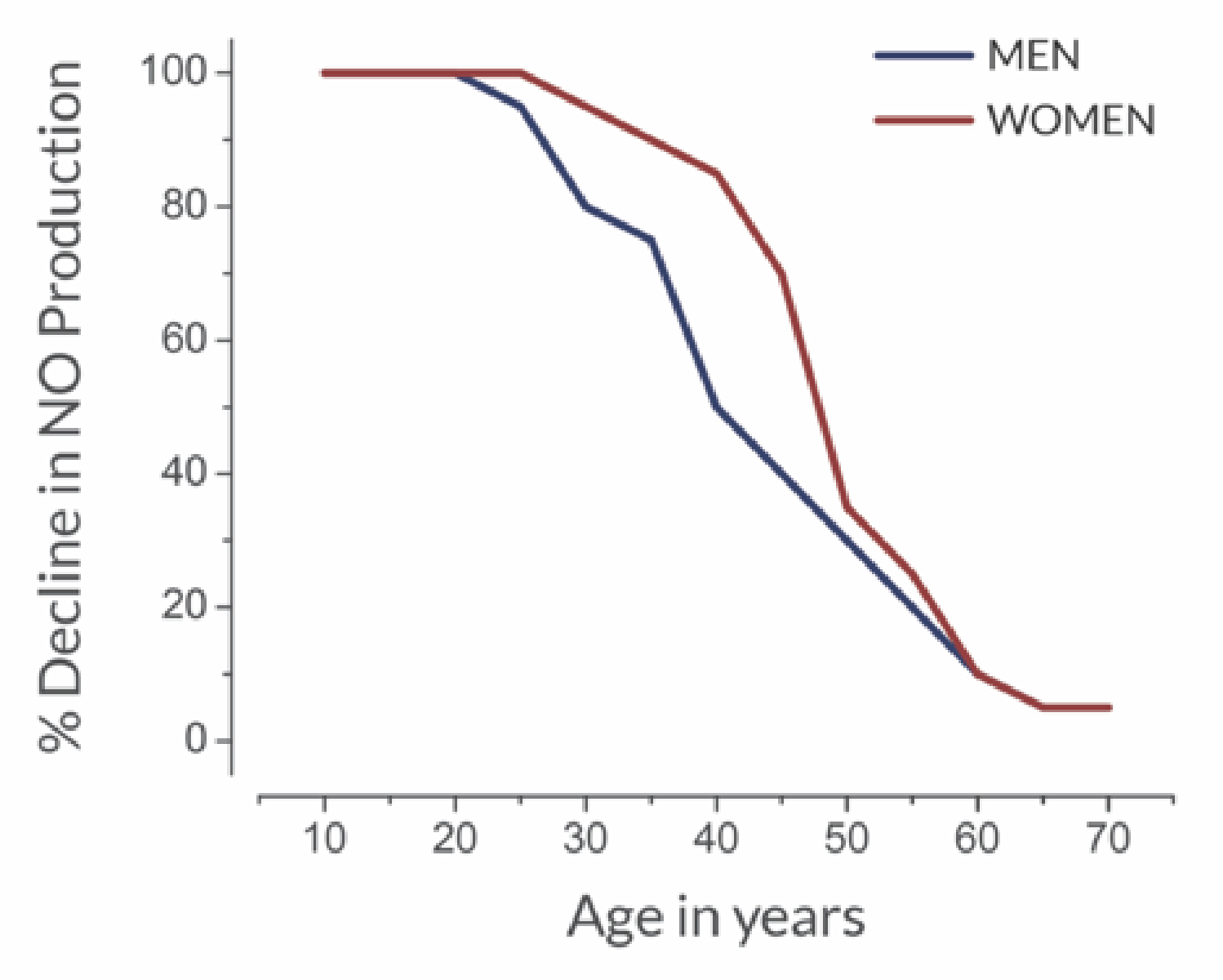

NO!

Personally, we all hate this type of curve
Professionally, it's why we're in business

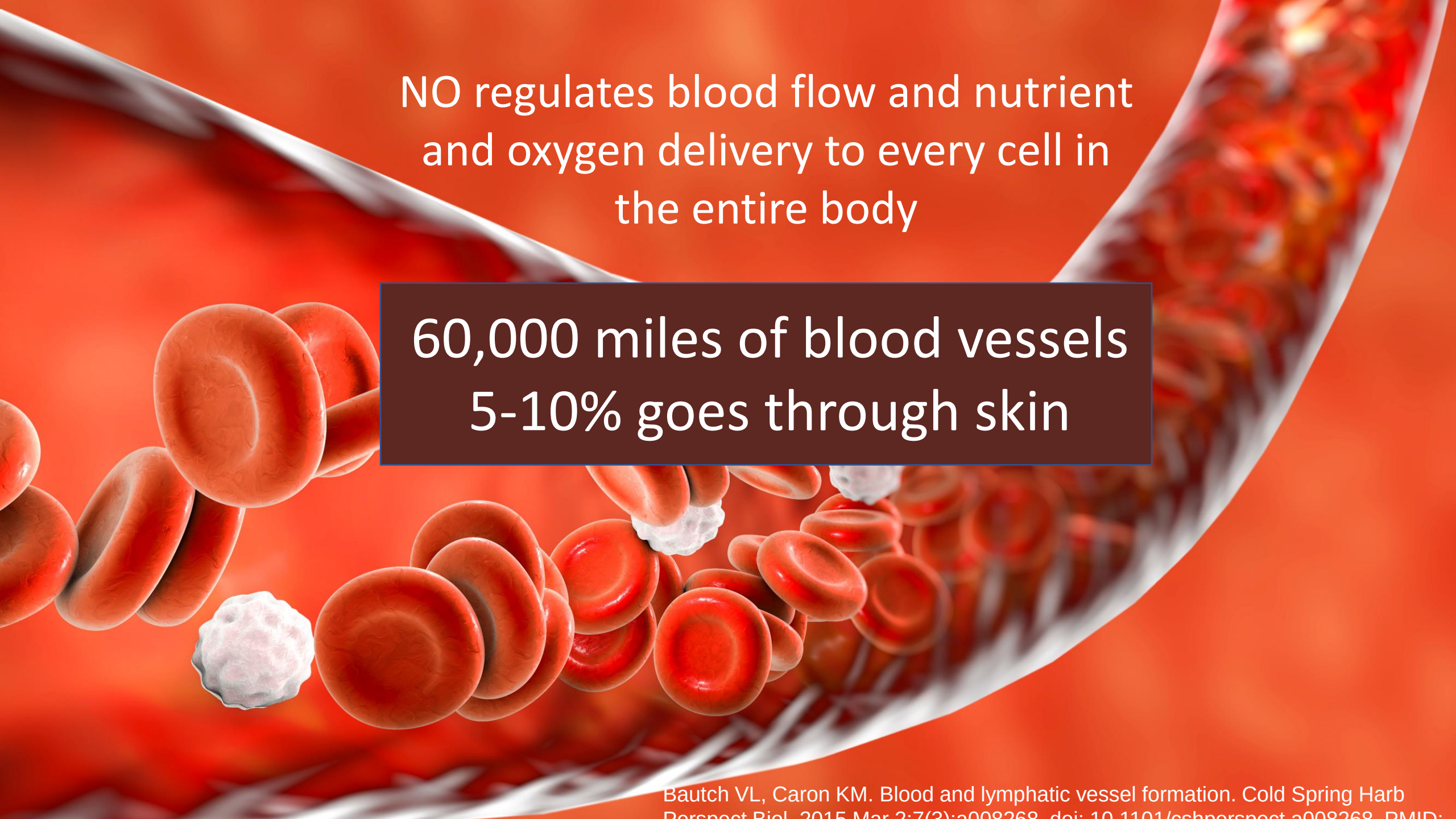
% Function



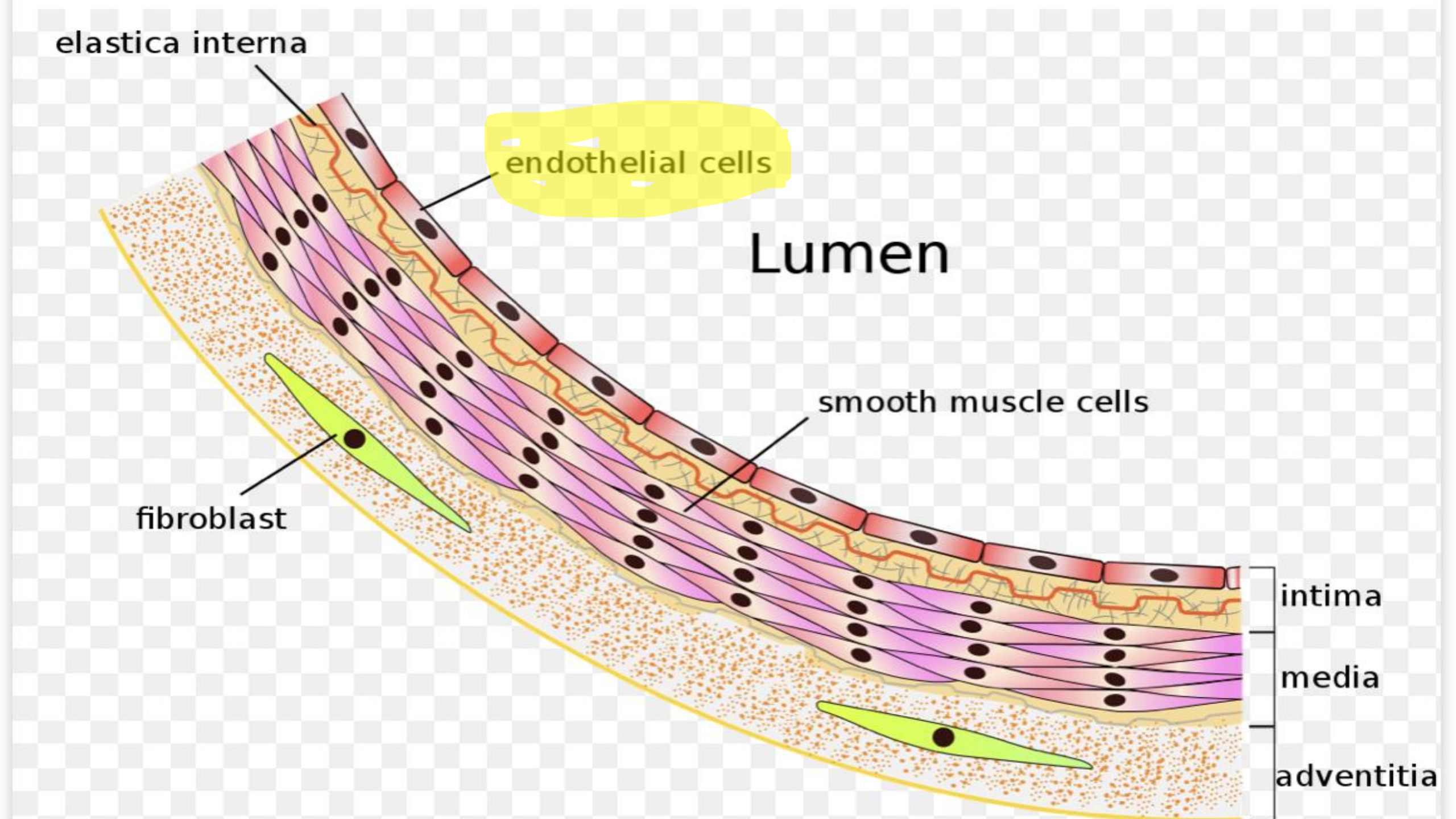
Collagen & elastin
Mitochondrial function
Muscle mass
Digestive enzymes
Bone density
Nitric Oxide



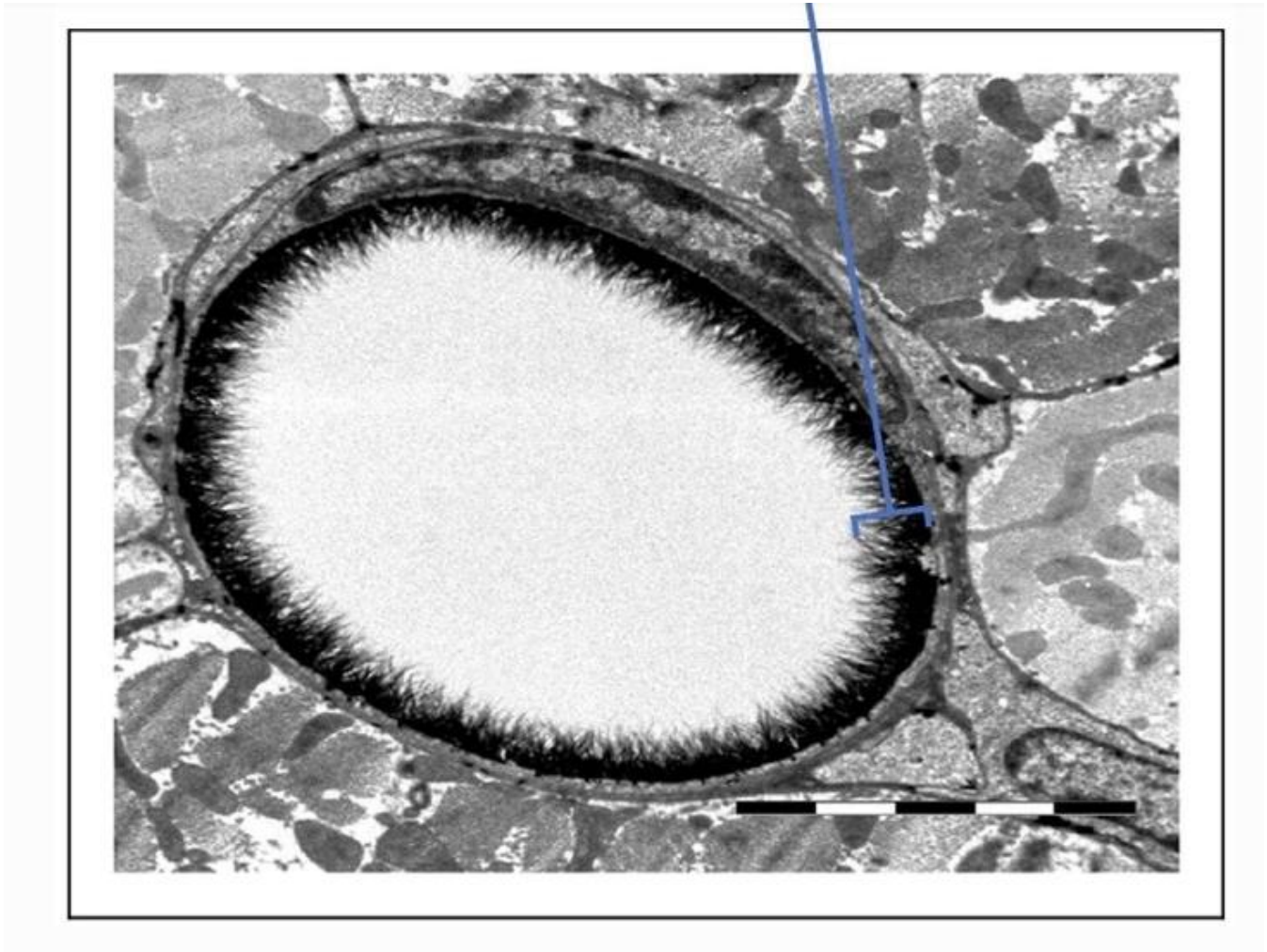
Sverdlov AL, Ngo DT, Chan WP, Chirkov YY, Horowitz JD. Aging of the nitric oxide system: are we as old as our NO? J Am Heart Assoc. 2014 Aug 18;3(4):e000973. doi: 10.1161/JAHA.114.000973. PMID: 25134680; PMCID: PMC4310385.



Bautch VL, Caron KM. Blood and lymphatic vessel formation. Cold Spring Harb Perspect Biol. 2015 Mar 2;7(3):a008268. doi: 10.1101/cshperspect.a008268. PMID:

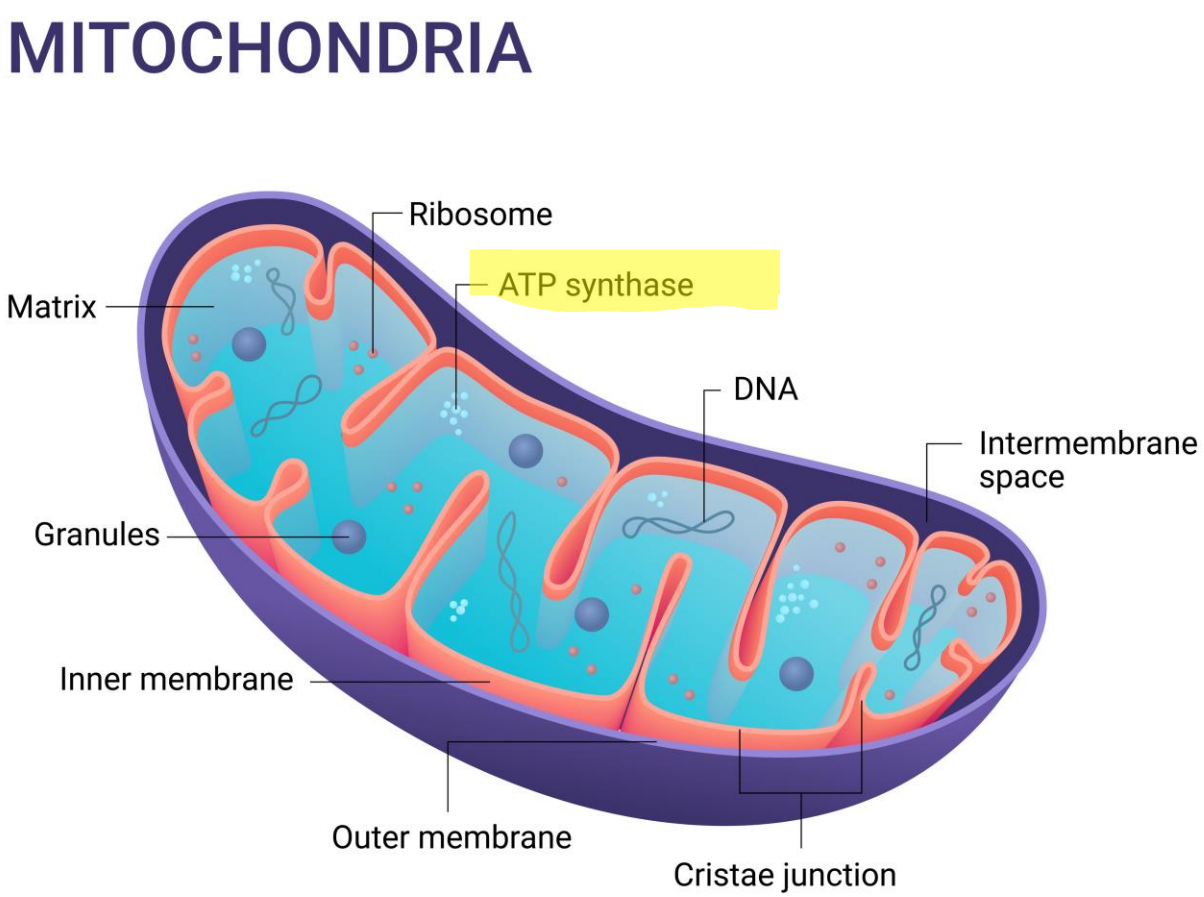

elastica interna
endothelial cells
Lumen
smooth muscle cells
fibroblast
intima
media
adventitia

NO helps to maintain the glycocalyx

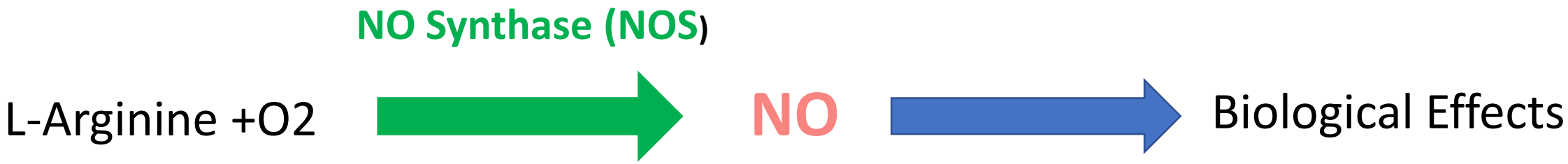


Electron micrograph of a cross-sectional image of a coronary endothelial glycocalyx (courtesy of B. van den Berg, Maastricht University).

NO controls mitochondrial ATP production



PATHWAY #1 and PROBLEM



PROBLEM

- With aging we lose enzyme ability
- People may have NOS SNPs that affect the L-Arginine conversion (NOS3)
- Male shoutout: pathway relaxes corpus cavernosum for penile erection

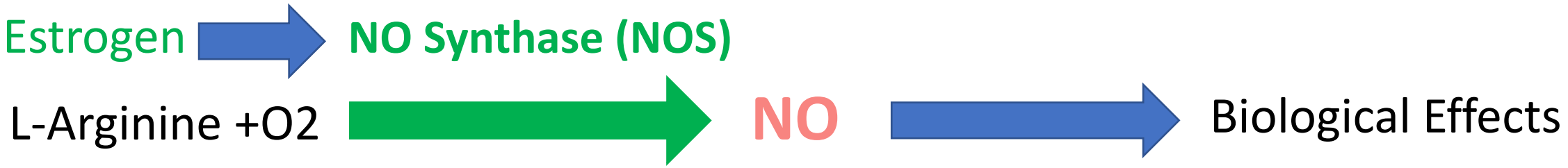
PATHWAY #2 and PROBLEM

Dietary Nitrate → Nitrite → **NO** → Biological Effects

PROBLEM

- SAD diet is low in nitrates.
- Depends on farming practices, soil quality, food transportation and storage

PATHWAY #1 and PROBLEM COMPOUNDED



PROBLEM

- With aging we lose enzyme ability
- Estrogen (estradiol) activates endothelial nitric oxide synthase (NOS)
- Drops in estradiol in menopause lower NOS
- Lower NO levels can promote endothelial dysfunction

J Clin Invest. 1999 Feb;103(3):401-6. doi: 10.1172/JCI5347.


SKIN HEALTH
& BEAUTY

Putting Your Program in Place

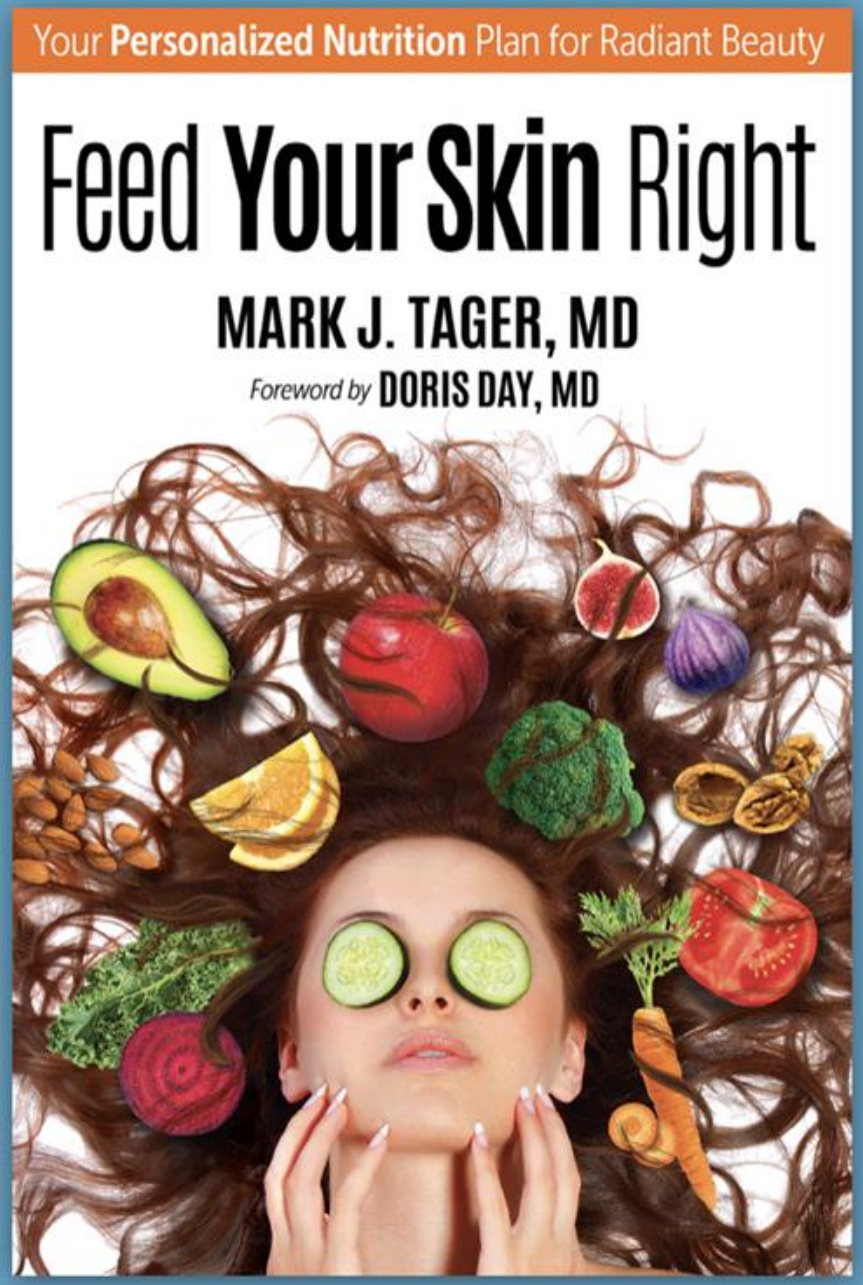
The Aesthetic Pathway

4. Implement the Conversations

3. Get team trained with Online Programs

2. Determine Scope

1. Identify a “*Champion*” in the practice



What should I eat?
What supplements should I take?
What topicals should I apply?
What procedures should I have?

THANK YOU!

- mtager@changewell.com
- Linkedin
- @drmtager

Integrative Healthcare SYMPOSIUM

Thursday 1:30pm – 2:30pm

Applying Personalized Nutrition for Skin Health and Beauty

Please scan this QR code on you mobile

or tablet device to access the session feedback survey

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