



¿Cómo afecta el exposoma a nuestra piel?

Ana María Molina Ruiz. Fundación Jiménez Díaz.

Universidad Autónoma de Madrid.

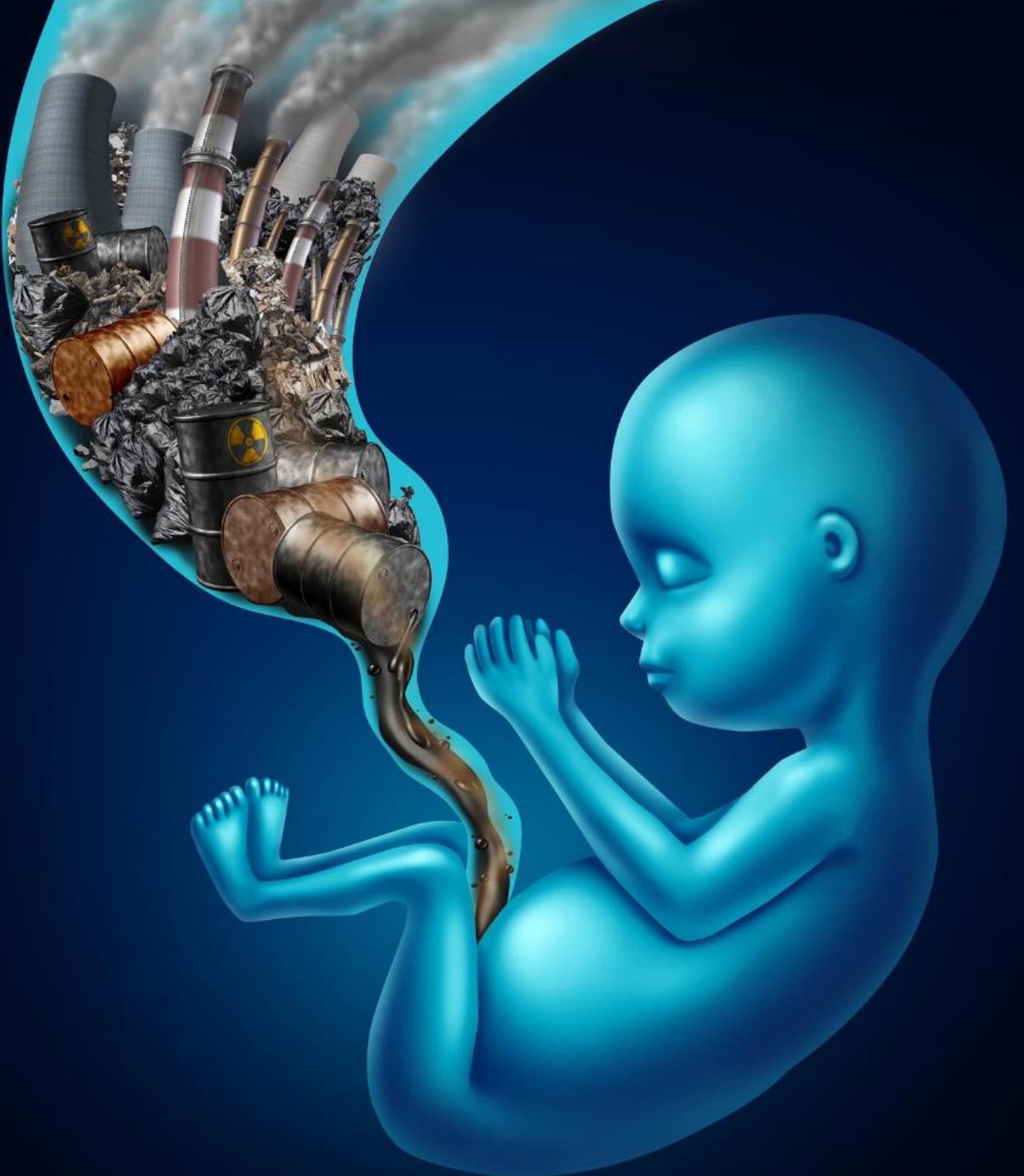
EXPOSOMA



E X P L : S O M A

*Concepto
Exposoma*





**"Suma total de los
múltiples factores de
exposición que
llenan la vida de una
persona"**

C. Wild, 2005

EXPO-SICIÓN





LA
RED



CONSTANTE CAMBIO

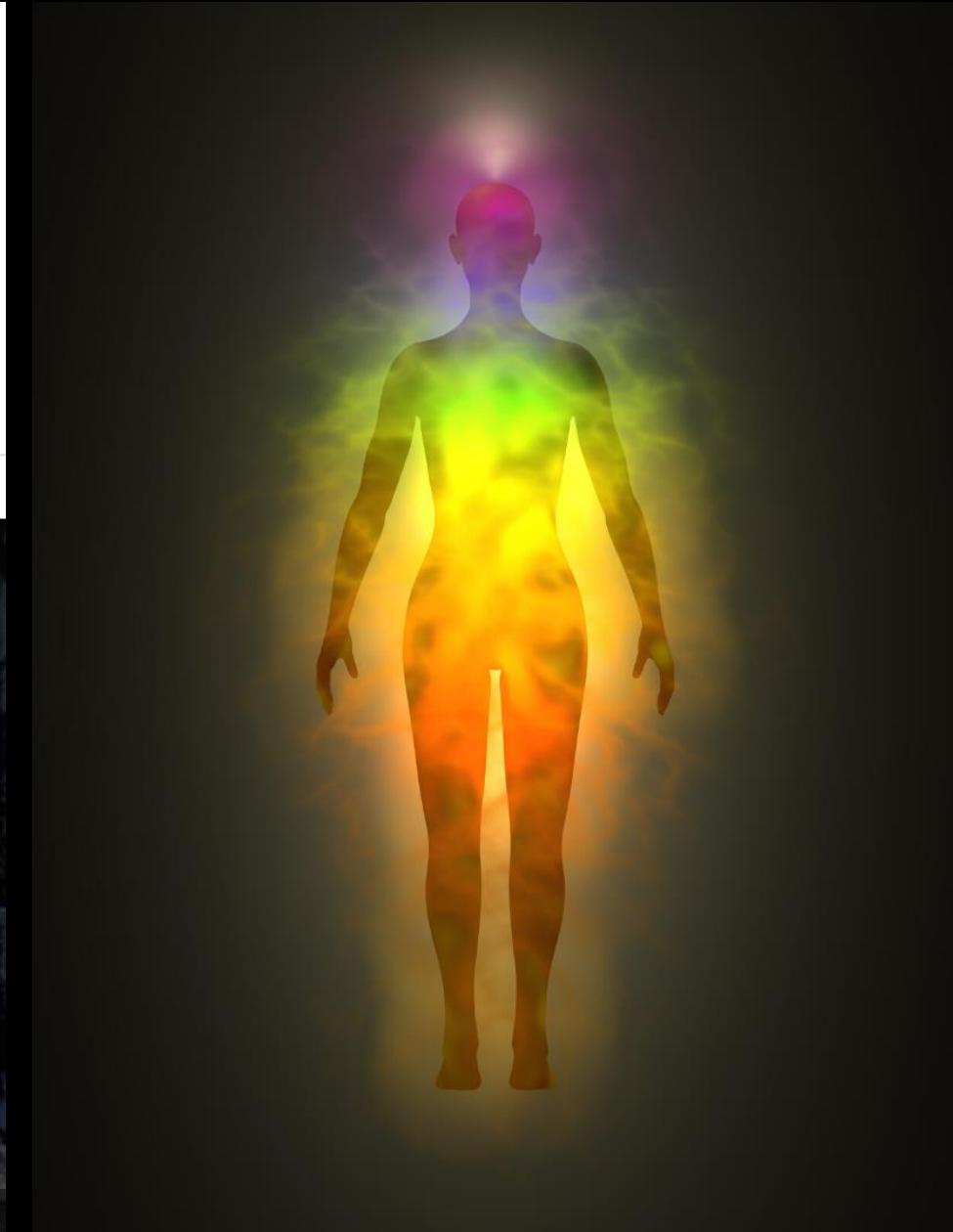


Qué es el exposoma humano: el "aura viviente" individual que nos rodea (y qué dice de nuestra salud)

Jorge Carrasco
BBC News Mundo

⌚ 19 octubre 2018

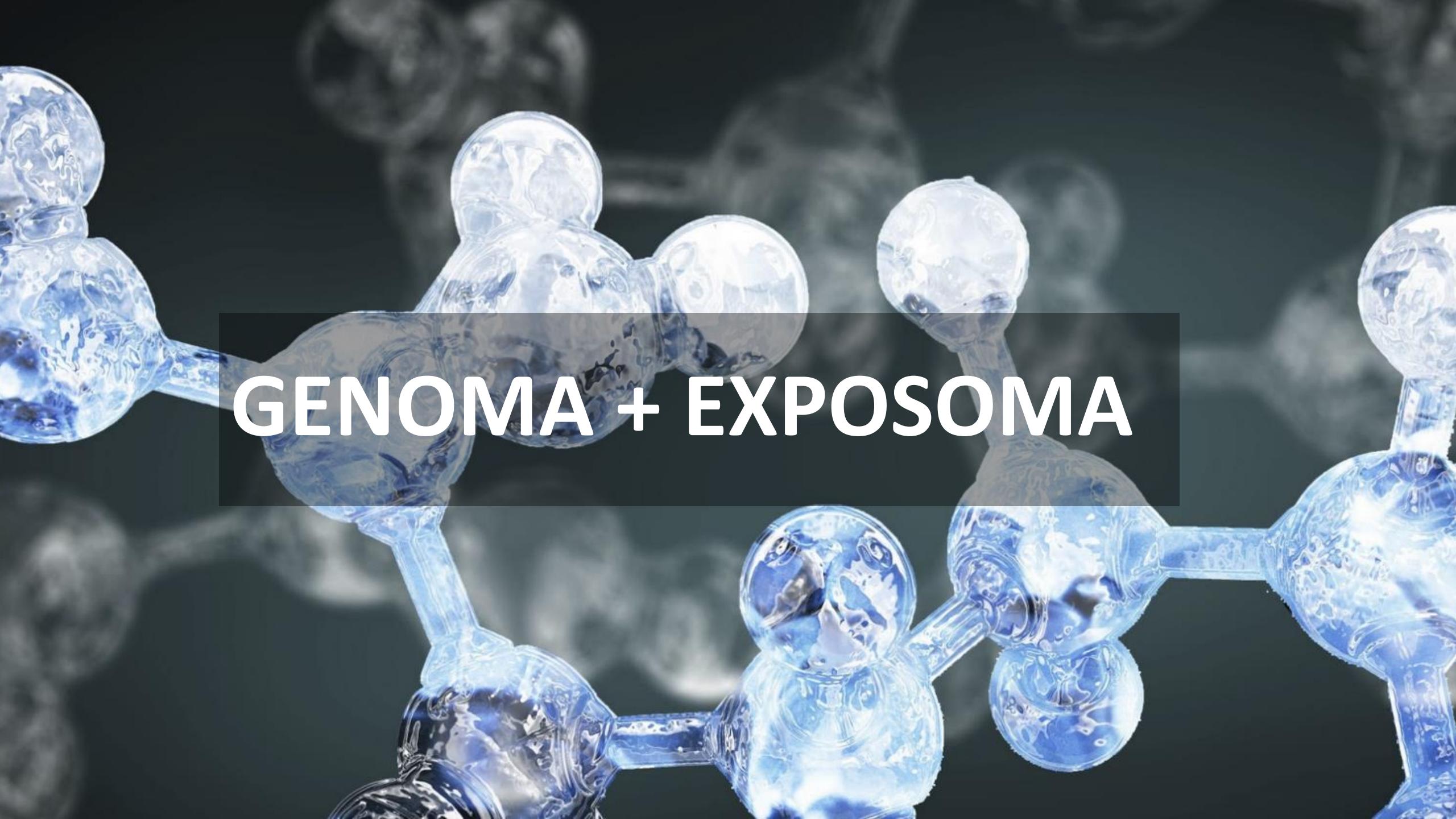
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#SOUL
FY





GENOMA + EXPOSOMA

"FIEBRE GENÓMICA"



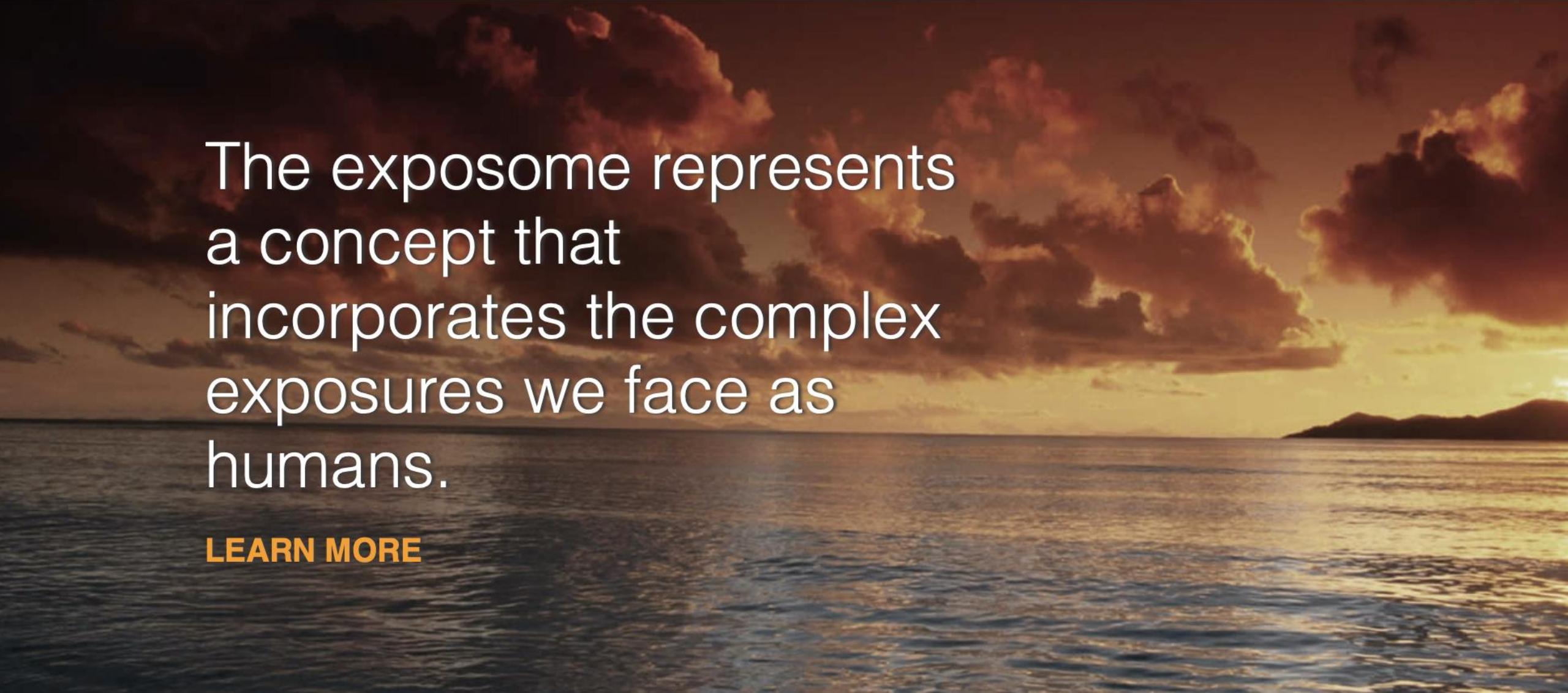
The Human Genome Project



The Human Genome Project (HGP) was one of the great feats of exploration in history. Rather than an outward exploration of the planet or the cosmos, the HGP was an inward voyage of discovery led by an international team of researchers looking to sequence and map all of the genes -- together known as the genome -- of members of our species, *Homo sapiens*. Beginning on October 1, 1990 and completed in April 2003, the HGP gave us the ability, for the first time, to read nature's complete genetic blueprint for building a human being.

HUMAN EXPOSOME PROJECT





The exposome represents a concept that incorporates the complex exposures we face as humans.

LEARN MORE

¿Innovación
o Marketing?



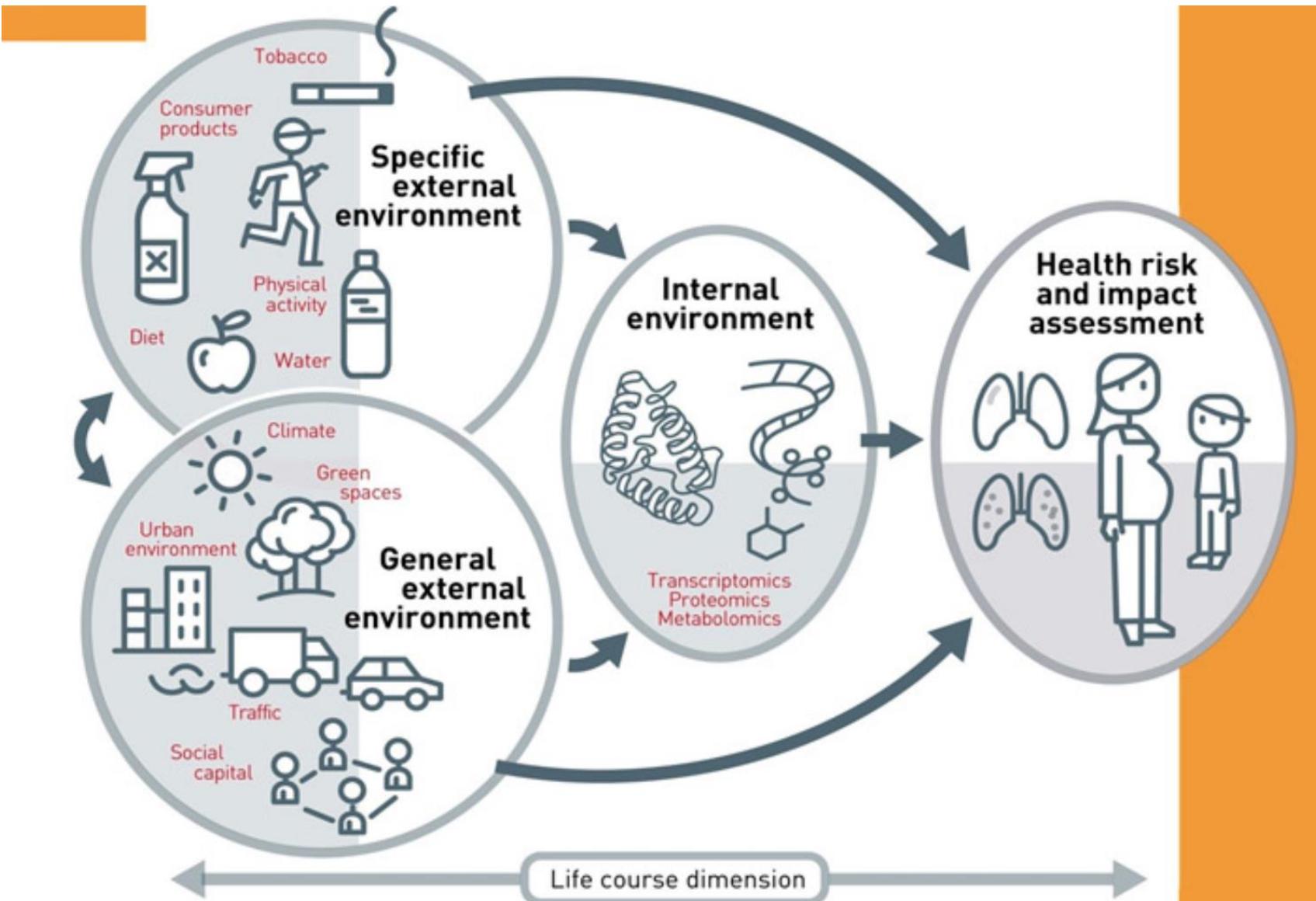
A professional portrait of Christopher Wild, a middle-aged man with short, light-colored hair, smiling warmly at the camera. He is wearing a dark grey suit jacket over a white shirt with thin blue stripes and a red patterned tie. The background is a soft-focus mural featuring stylized blue and yellow DNA helixes.

*Christopher
Wild*

DIRECTOR DE LA AGENCIA
INTERNACIONAL PARA LA
INVESTIGACIÓN DEL CÁNCER
DE ESTADOS UNIDOS

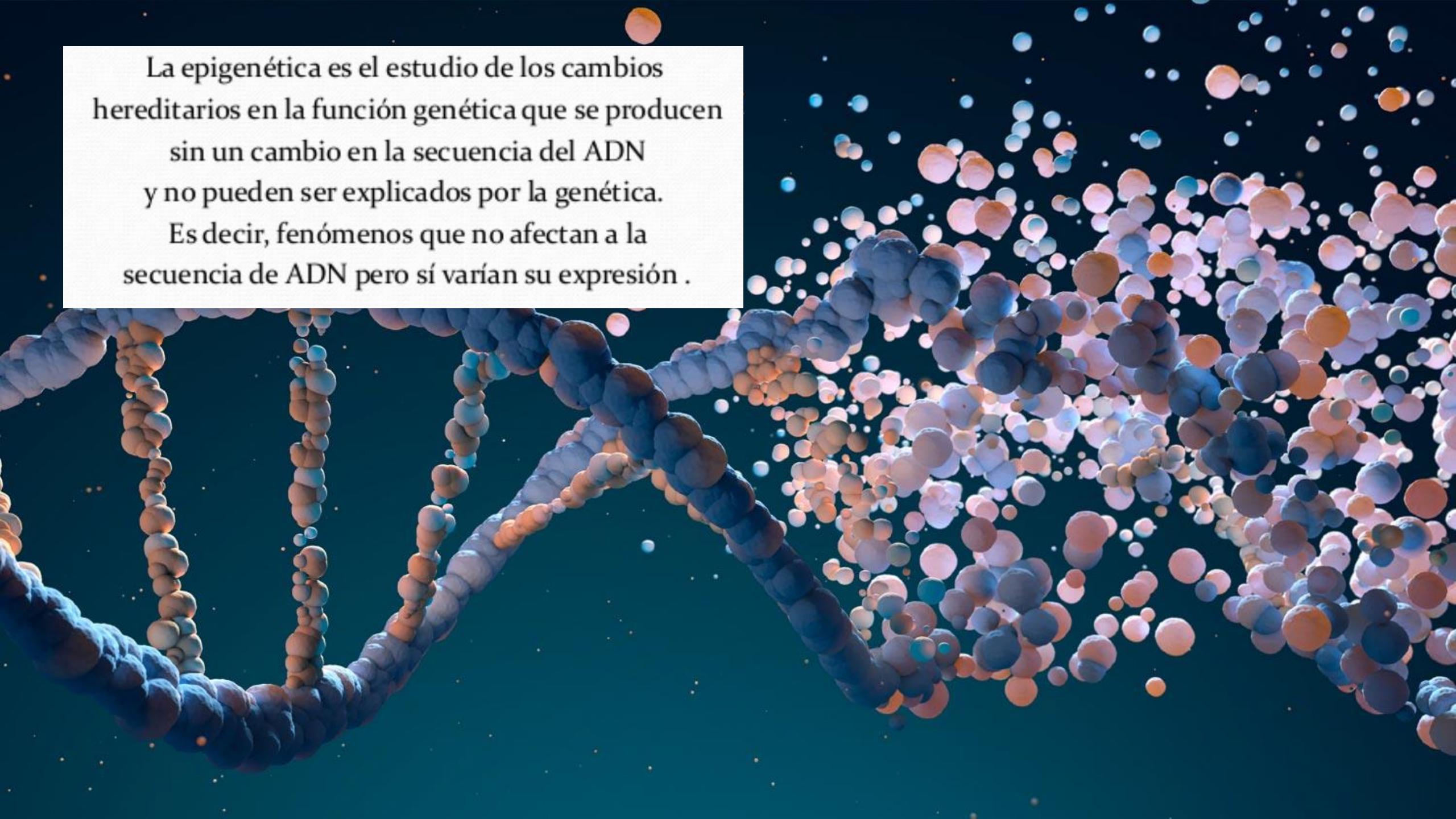


SALUD
PÚBLICA



La epigenética es el estudio de los cambios hereditarios en la función genética que se producen sin un cambio en la secuencia del ADN y no pueden ser explicados por la genética.

Es decir, fenómenos que no afectan a la secuencia de ADN pero sí varían su expresión .



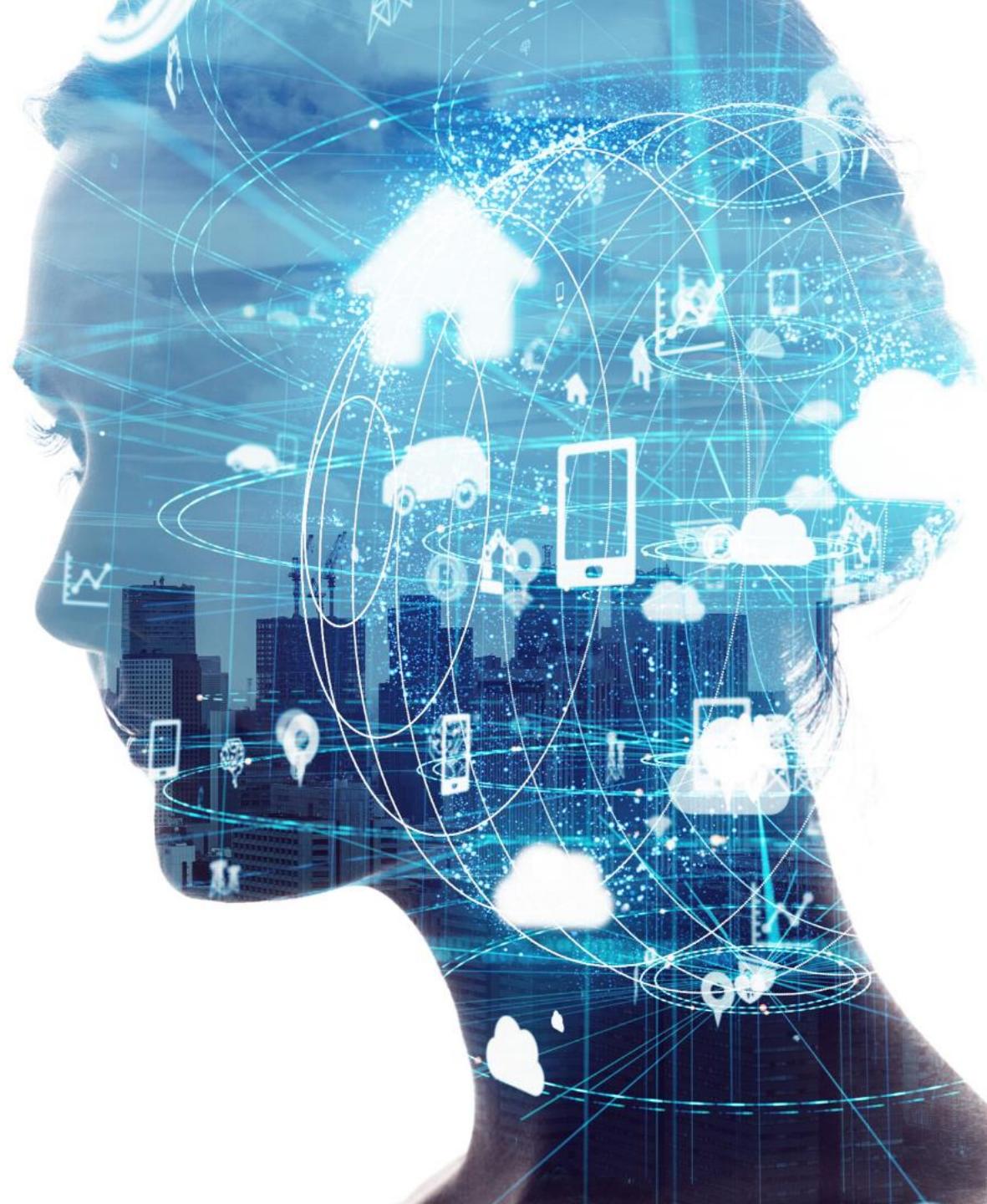
"SOMOS LO QUE HABITAMOS"

PSICOGEOGRAFÍA



"EL LUGAR EN EL QUE VIVIMOS DETERMINA EL RIESGO DE CÁNCER, DE ENFERMEDADES CARDIOVASCULARES, METABÓLICAS –COMO LA DIABETES Y LA OBESIDAD"

Martine Vrijheid





"SE TRATA DE DESENMARAÑAR
LA RED MÁS INTRINCADA A LA
QUE SE HAYA ENFRENTADO
LA HUMANIDAD. VISTO EN FRÍO,
EL EMPEÑO PARECE IMPOSIBLE:
EXPLICAR EL CAOS Y LA
ENTROPÍA QUE ENVUELVEN AL
SER HUMANO"

C. Wild

Las carambolas exposómicas son casi infinitas

$$q_{X_{min}}(R) = \sum_{j=1}^{\ell(X_{min})} q_j \delta^3(R - R_j)$$





¿Lo conseguiremos?

BIG DATA



TRAILER VITAL







My Skin Track UV La Roche Posay

The image shows the product packaging for My Skin Track UV. It features the La Roche-Posay logo at the top, followed by "LABORATOIRE DERMATOLOGIQUE". Below this is a circular image of the device itself, which is a small, white, disc-shaped sensor with a blue and white electronic component attached. At the bottom left, the text "MY SKIN TRACK UV" is written in a stylized font, with "MY" and "TRACK" in black and "SKIN" and "UV" in blue. A small descriptive text at the bottom reads: "A wearable sensor and companion app to measure your exposure to UV, pollution, pollen, and humidity."

MY SKIN TRACK UV

Wearable Technology and Companion App

★★★☆☆ 2.9 (13)

Refer a Friend

BETTER LOOKING SKIN STARTS WITH HEALTHY SKIN HABITS: My Skin Track UV and its companion app measures your exposure to environmental aggressors including UV, pollution, pollen and humidity and provides personalized advice and product recommendations to help improve your healthy skin habits.

[LEARN MORE](#)

\$59.95

1 Piece

01 ▾

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Share

A Google Street View car is surrounded by a dense crowd of people at the Tomatina festival. The car is white with green and blue stripes and features a "Google Street View" logo on its side. Numerous people are throwing red tomatoes at the car, which is covered in tomato pulp. The scene is chaotic and captures a moment of pure fun during the annual tomato fight.

Google Street View car pureed at Spanish tomato-throwing festival



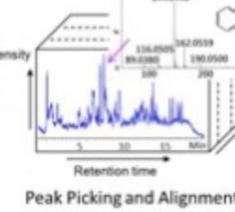
Welcome Letter

HEALS represents a comprehensive applied methodology focusing on the different aspects of individual assessment of exposure to conventional and emerging environmental stressors and on the prediction of the associated health outcomes. For the first time, HEALS will try to reverse the paradigm of "nature versus nurture" and adopt one defined by complex and dynamic interactions between [...]



Sample Collection and Sample Preparation

UPLC-MS analysis



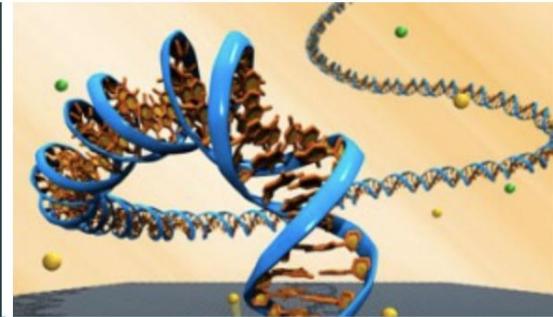
Publications



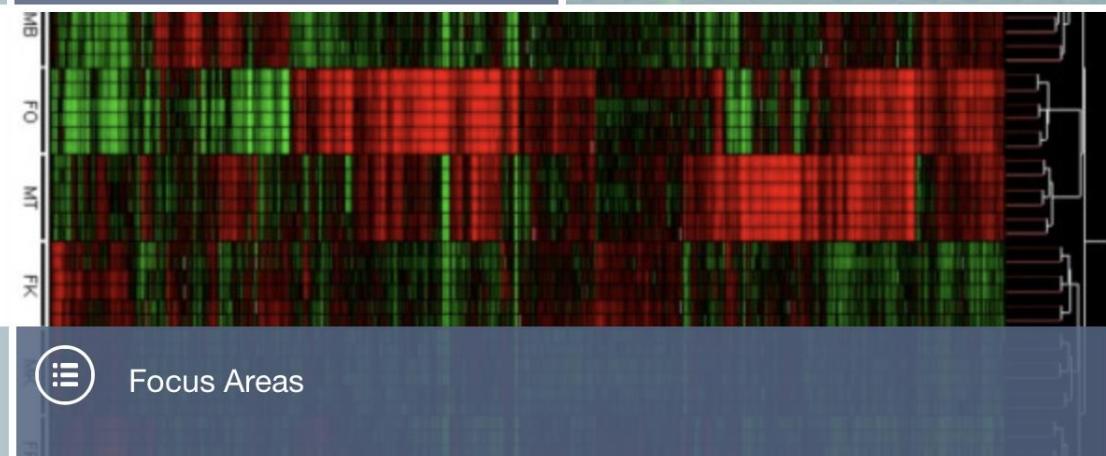
Participants List



News



Deliverables



Focus Areas



HEALS is a Project, funded by the **7th Framework Programme** of the European Commission

ASSESSING INDIVIDUAL EXPOSURE TO ENVIRONMENTAL STRESSORS AND PREDICTING HEALTH OUTCOMES - PAVING THE WAY FOR AN EU-WIDE ASSESSMENT



#exosome

EN | LT | ES | FR |



INICIO

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FOCUS

Early-life and pregnancy

Multiple exposures and child health

Development of innovative, integrative tools & methods

Strengthening knowledge base for European Policy



A close-up photograph of a woman's face. Her eyes are looking directly at the camera. A hand is positioned over her nose and mouth, obscuring those features. The background is plain white.

EXPOSOMA Y PIEL

Format: Summary ▾ Sort by: Best Match ▾ Per page: 20 ▾

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 [The skin aging exposome.](#)

1. Krutmann J, Bouloc A, Sore G, Bernard BA, Passeron T.
J Dermatol Sci. 2017 Mar;85(3):152-161. doi: 10.1016/j.jdermsci.2016.09.015. Epub 2016 Sep 28.
Review.

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2. Cecchi L, D'Amato G, Annesi-Maesano I.
J Allergy Clin Immunol. 2018 Mar;141(3):846-857. doi: 10.1016/j.jaci.2018.01.016. Review.

PMID: 29519451

[Similar articles](#) [The influence of exposome on acne.](#)

3. Dréno B, Bettoli V, Araviiskaia E, Sanchez Viera M, Bouloc A.
J Eur Acad Dermatol Venereol. 2018 May;32(5):812-819. doi: 10.1111/jdv.14820. Epub 2018 Feb 15.
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Review article

The skin aging exposome



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Bruno A. Bernard, Ph.D.^d, Thierry Passeron, M.D., Ph.D.^{e,f}

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^b Vichy Laboratoires Asnières, France

^c L'Oréal Research and Innovation, Chevilly Larue, France

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^e Department of Dermatology, University Hospital Center of Nice, France

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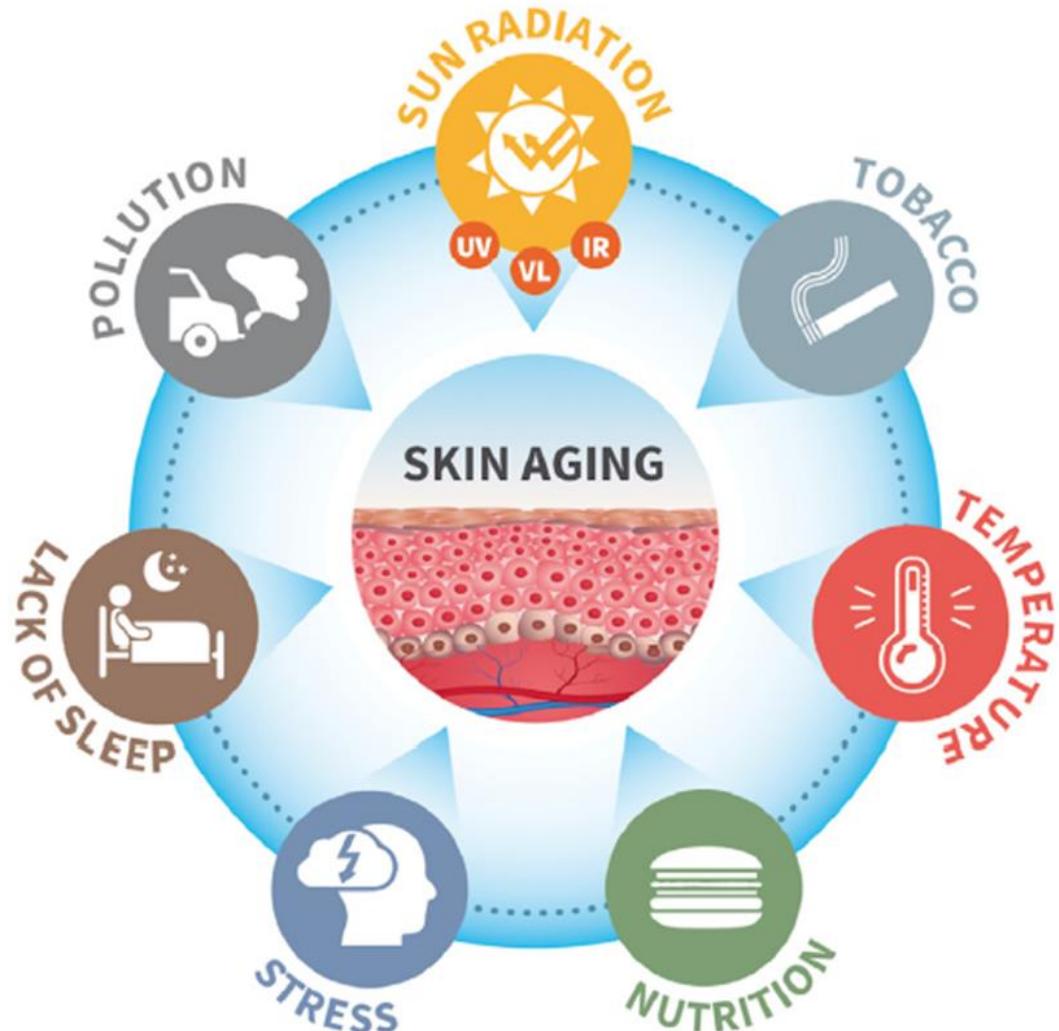
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ABSTRACT

The term "exposome" describes the totality of exposures to which an individual is subjected from conception to death. It includes both external and internal factors as well as the human body's response to these factors. Current exposome research aims to understand the effects all factors have on specific organs, yet today, the exposome of human skin has not received major attention and a corresponding definition is lacking. This review was compiled with the collaboration of European scientists, specialized in either environmental medicine or skin biology. A comprehensive review of the existing literature was performed using PubMed. The search was restricted to exposome factors and skin aging. Key review papers and all relevant, epidemiological, *in vitro*, *ex vivo* and clinical studies were analyzed to determine the key elements of the exposome influencing skin aging. Here we propose a definition of the skin aging exposome. It is based on a summary of the existing scientific evidence for the role of exposome factors in skin aging. We also identify future research needs, which concern knowledge about the interaction of distinct exposomal factors with each other and the resulting net effects on skin aging and suggest some protective measures.

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DERMATOLÓGICA
INTERNACIONAL



VICHY
LABORATOIRES

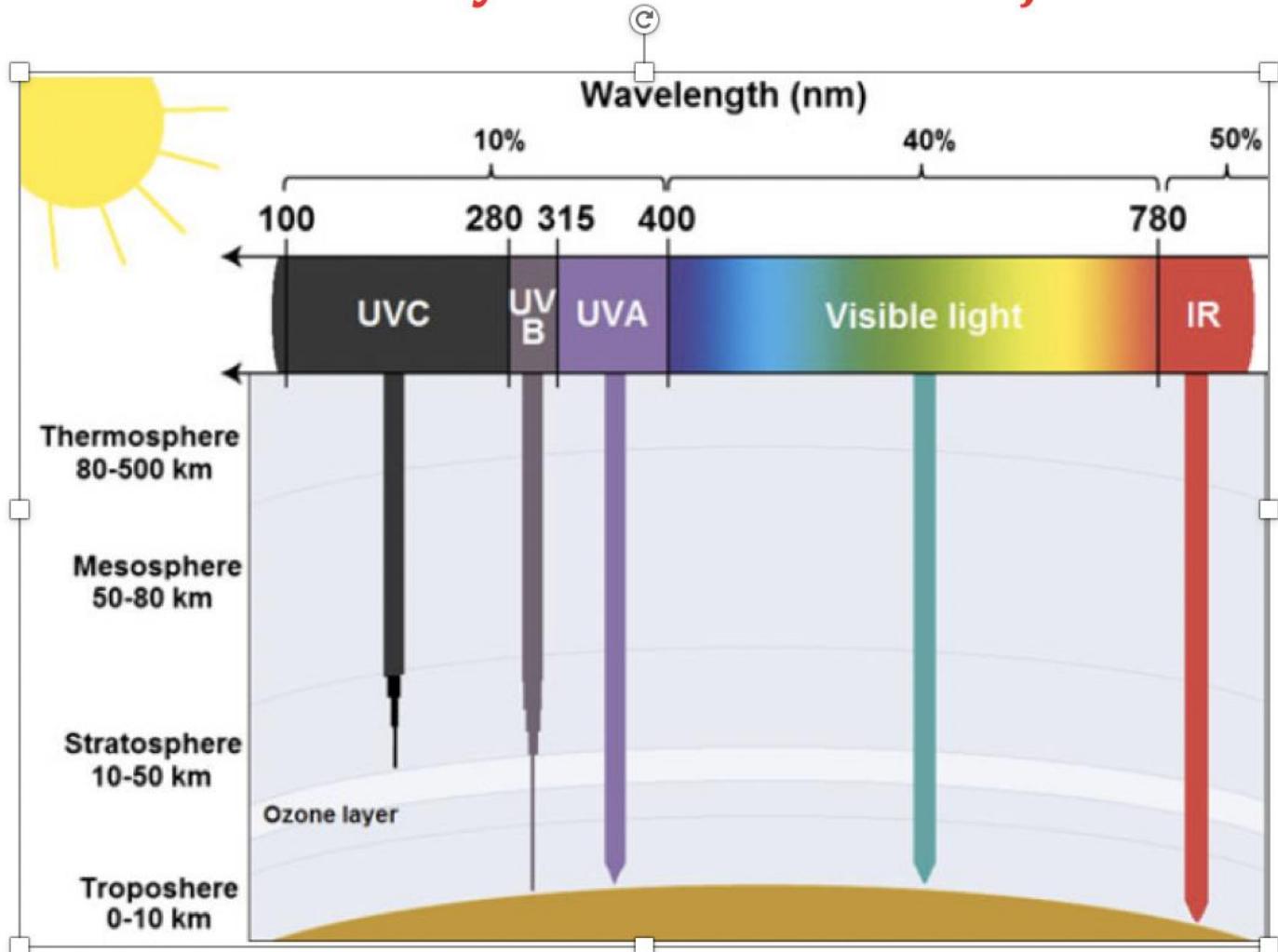
¿SABES CÓMO LA
POLUCIÓN AFECTA
TU PIEL?

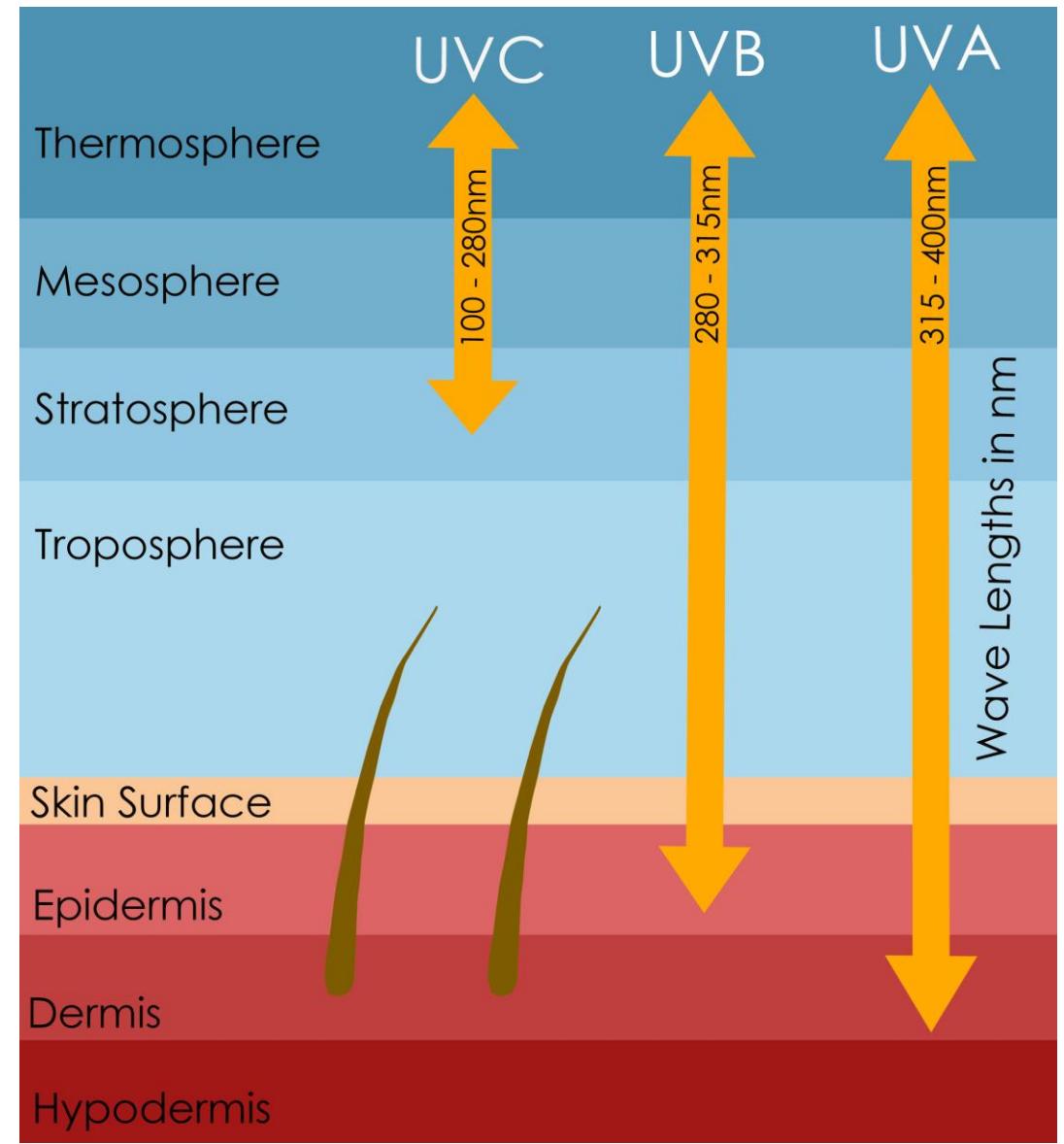
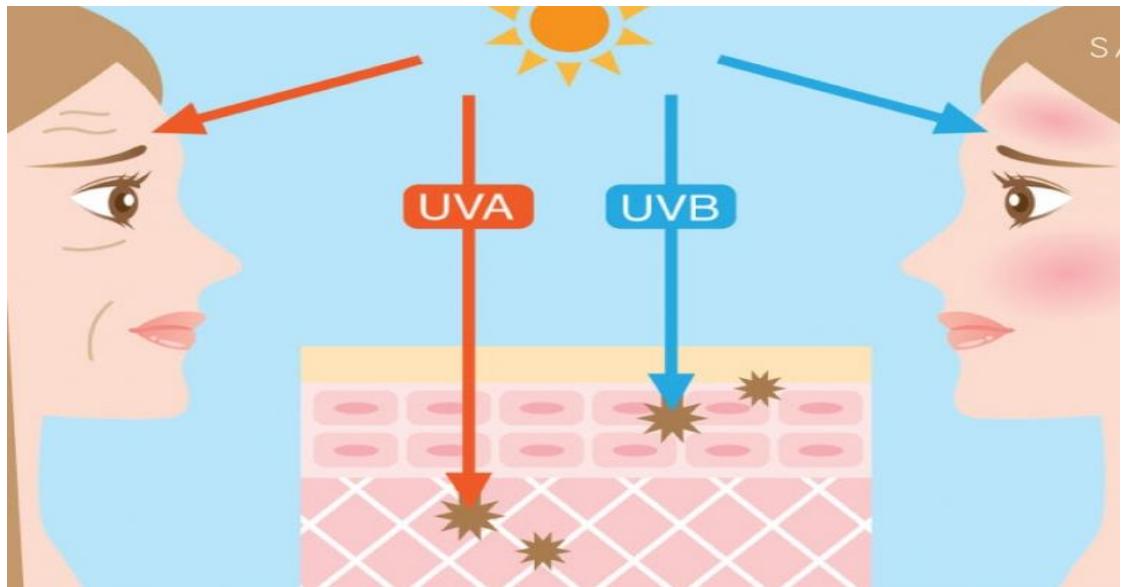
Radiación Solar



- Sol → luz visible, radiación ultravioleta y radiación infrarroja.

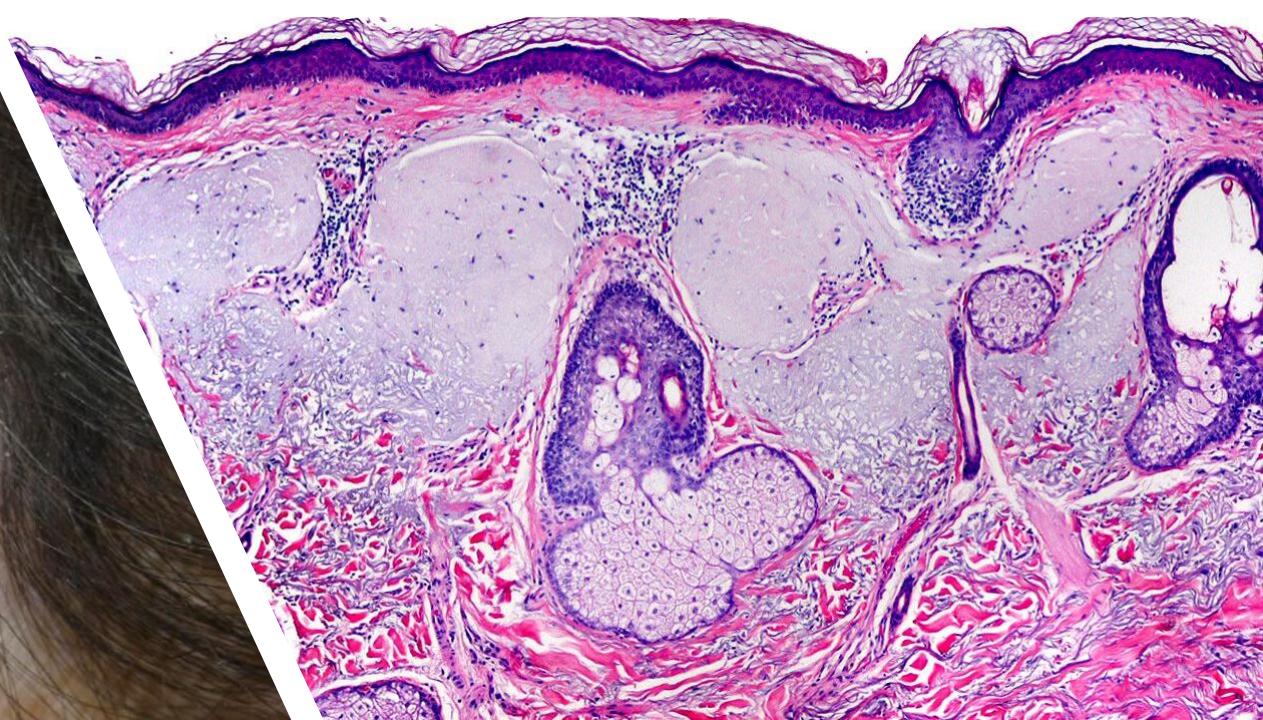
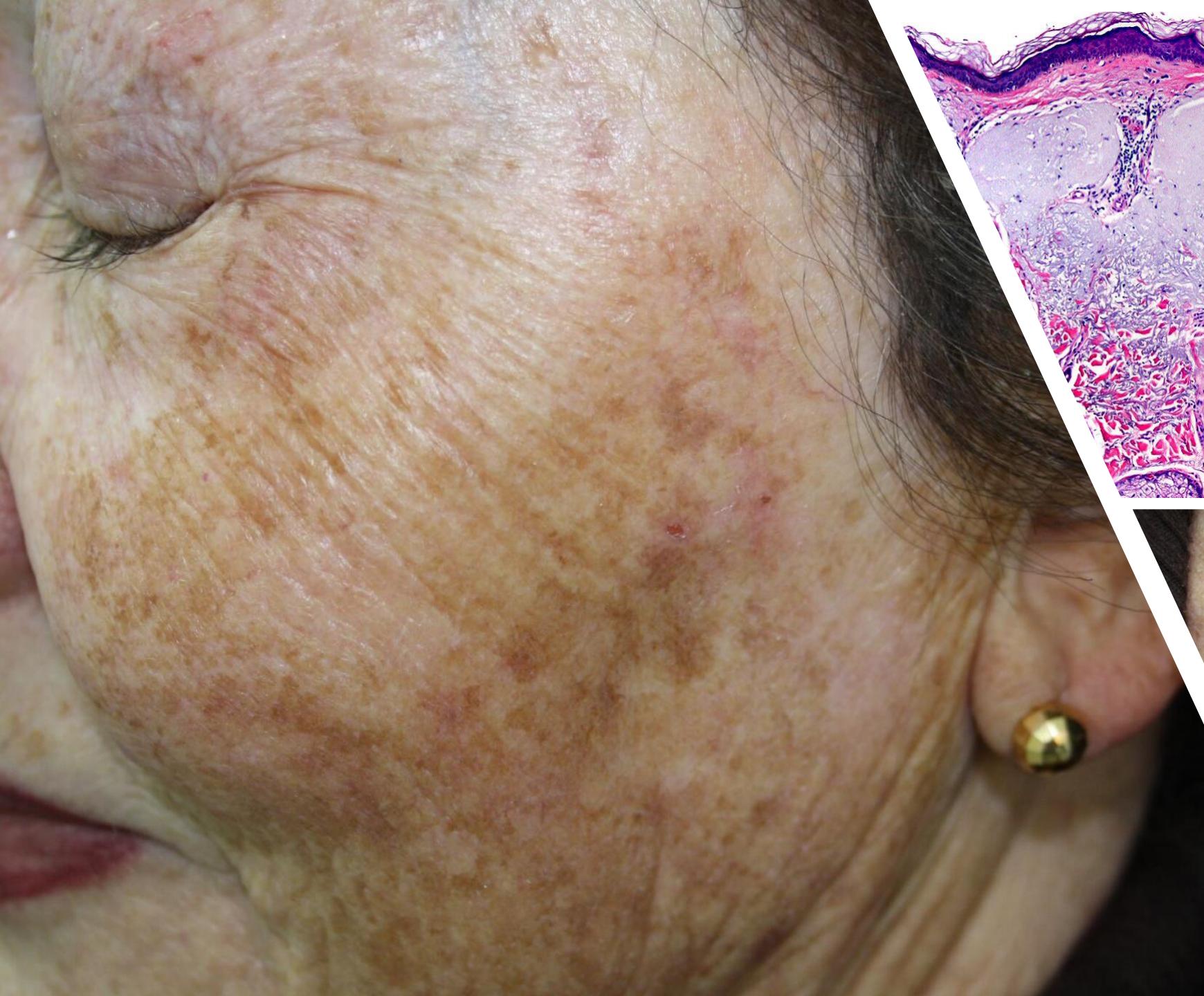
- Radiación UV:
 - UVA (320- 400 nm).
 - UVB (280-320 nm).
 - UVC (200- 280 nm).
- Radiación IR:
 - IRA (760-1440 nm).
 - IRB (1440-3000 nm).
 - IRC (3000 nm-1 mm).





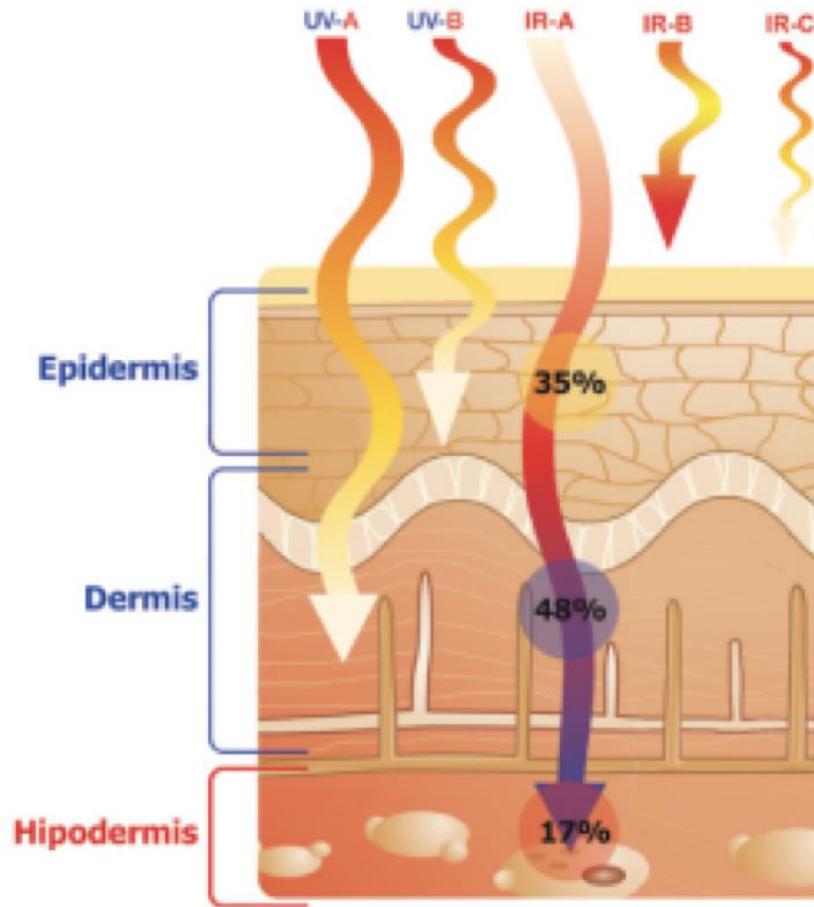


FOTOENVEJECIMIENTO



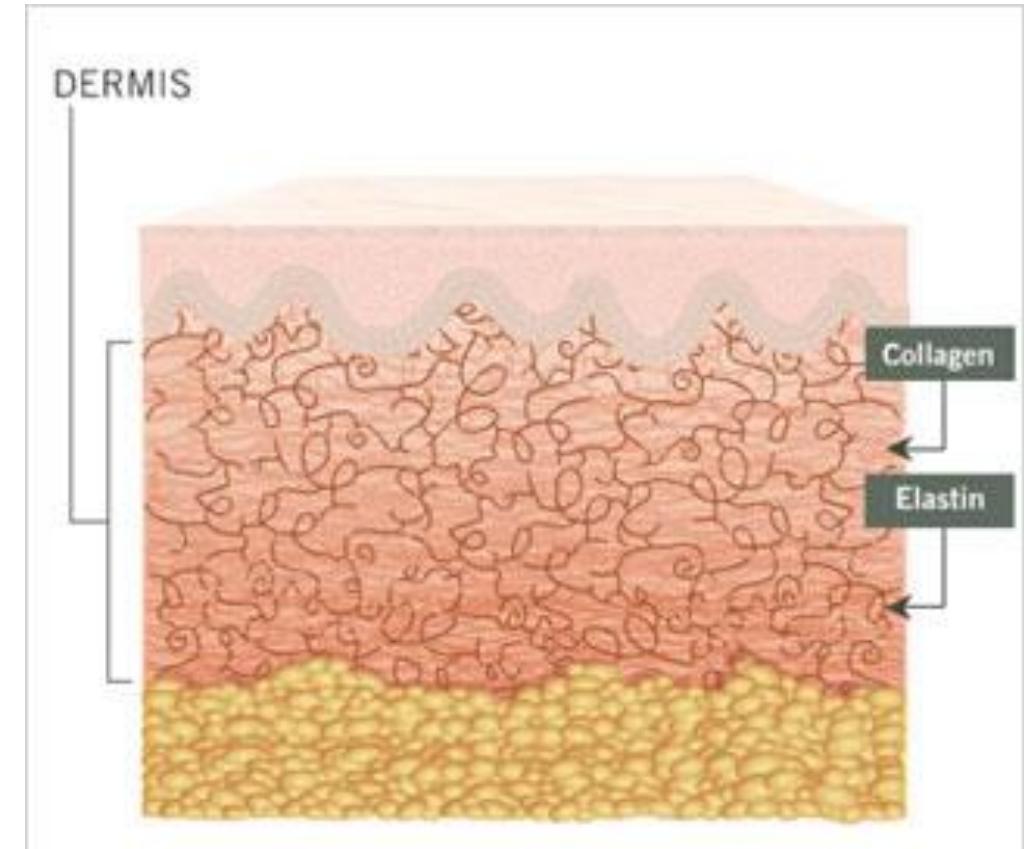
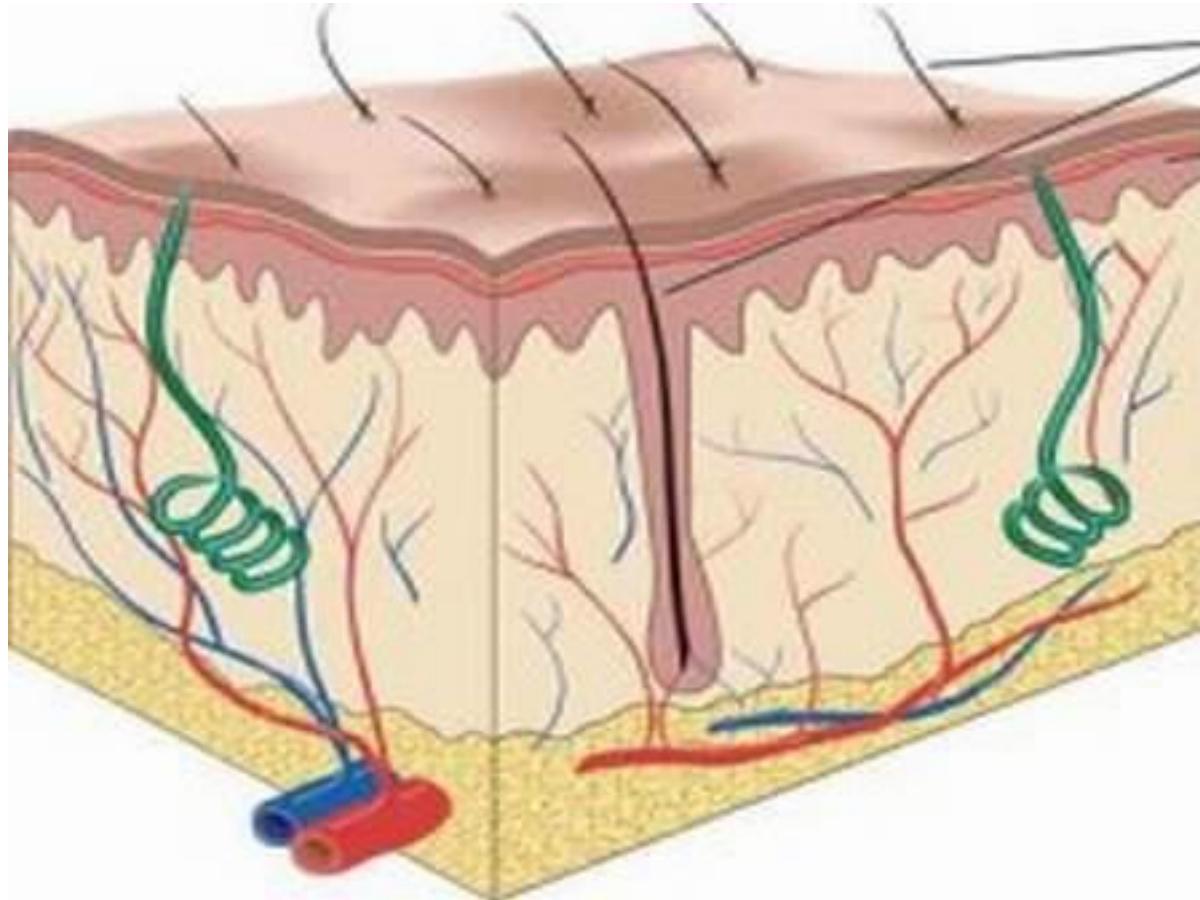
Radiación infrarroja

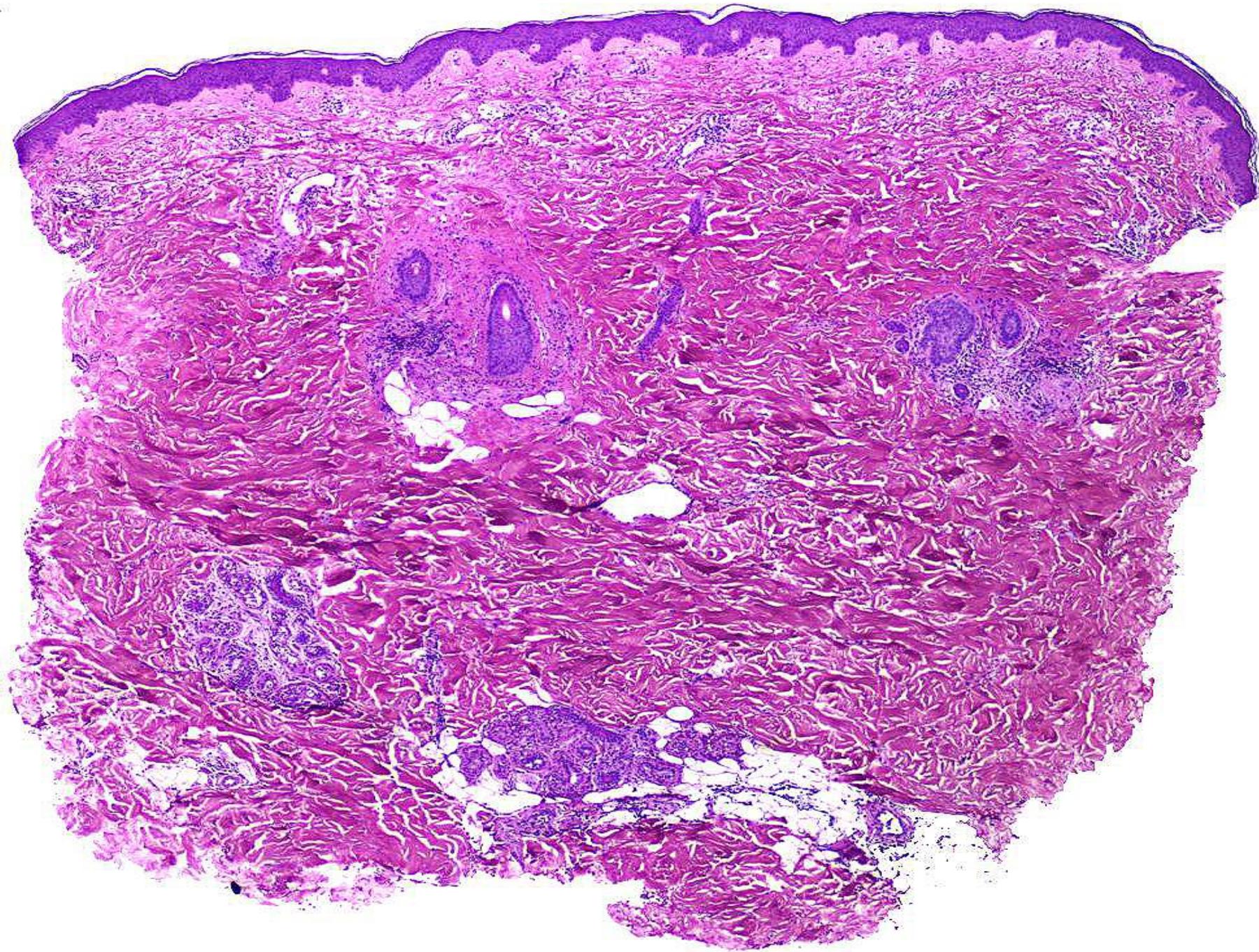
- Trasmite energía en forma de **calor** → aumento T^a de la piel.
- 50% energía solar que alcanza piel.
- Se divide en **IRA, IRB, IRC**.
- Cambios piel → eritema, hiperpigmentación, elastosis y telangiectasias.
- Fotoprotección frente IR mediante antioxidantes.
- **Tests estandarizados** para medir índice de protección IR (controversia) → medición calor.



40 veces más gruesa que la epidermis:

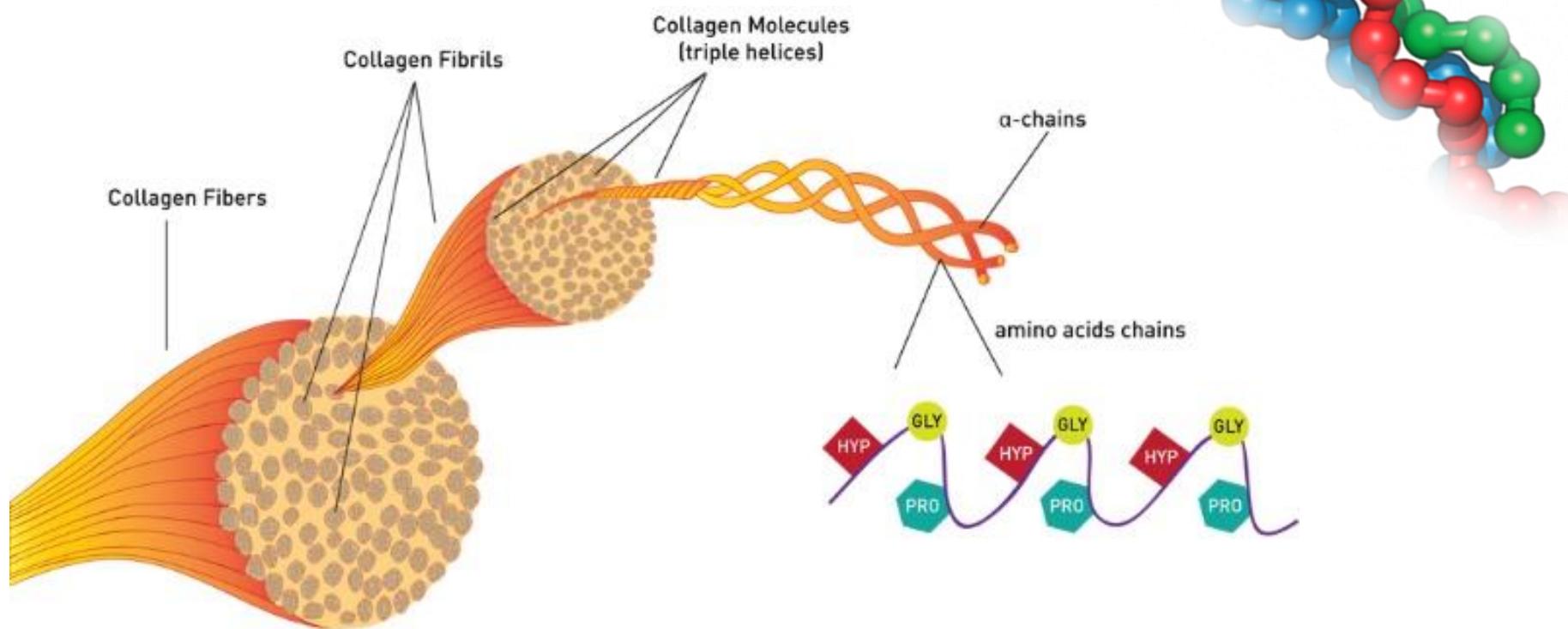
- Colágeno
- Fibras elásticas: elastina
- Matriz de GAGS

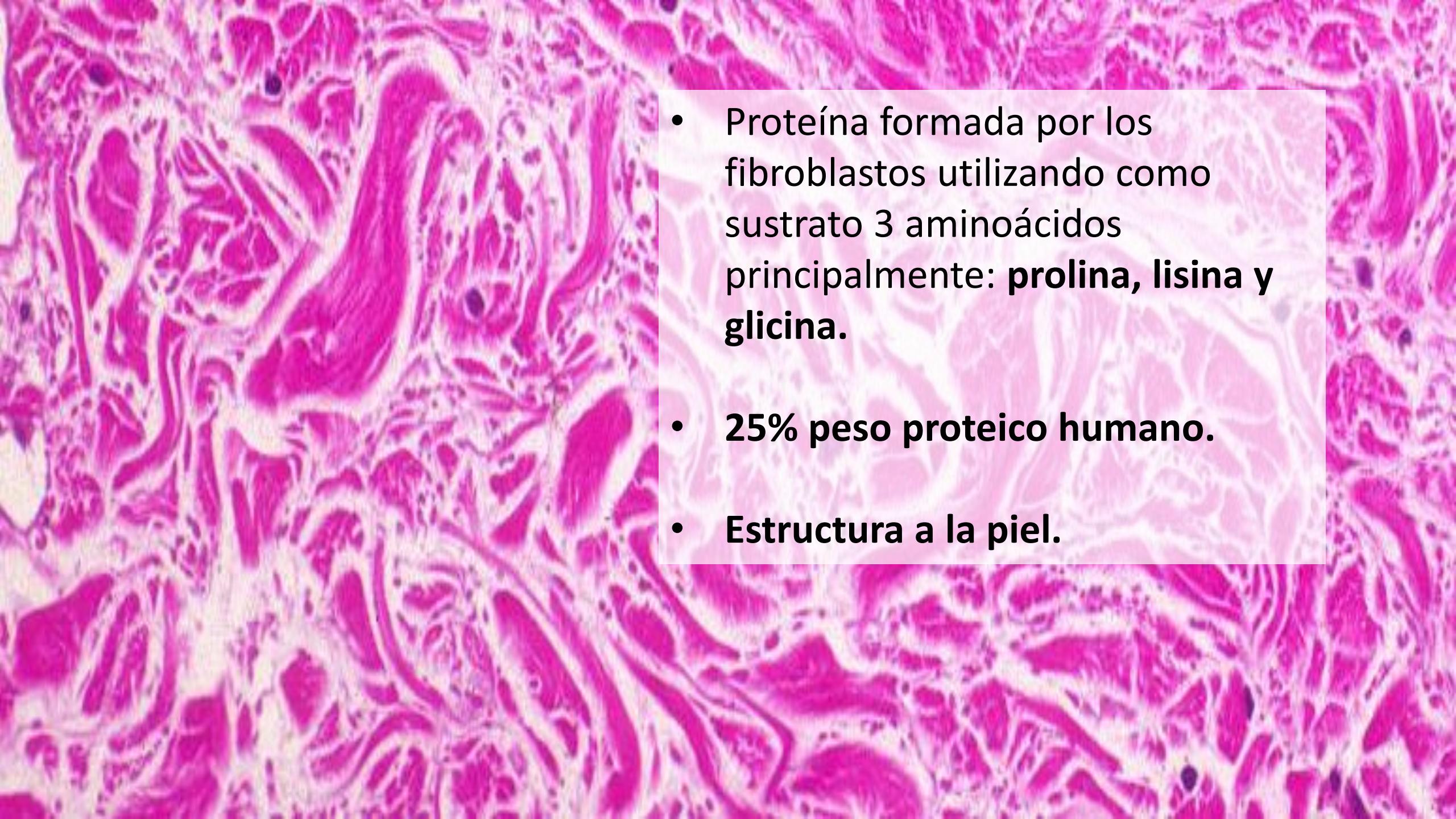


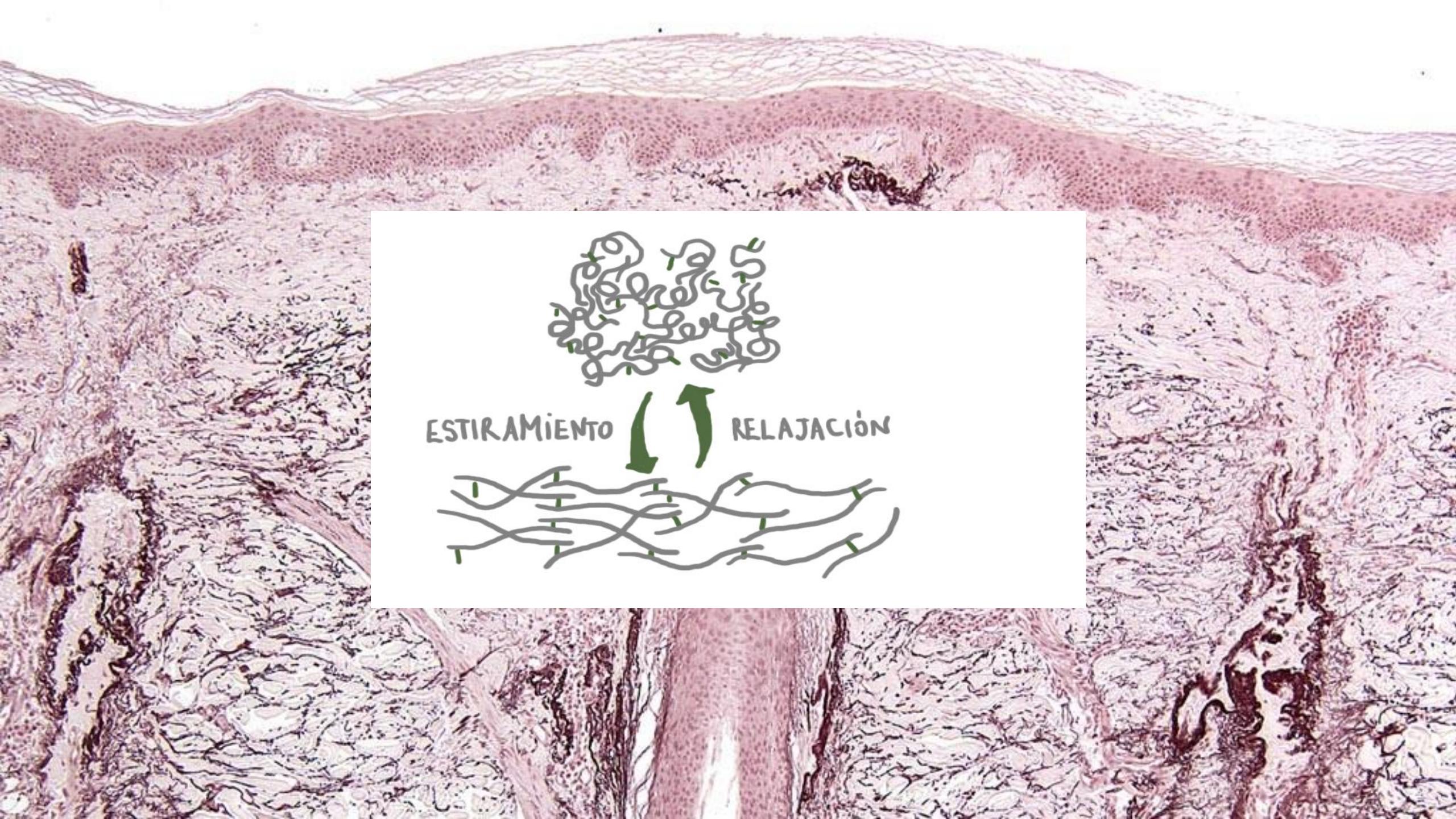


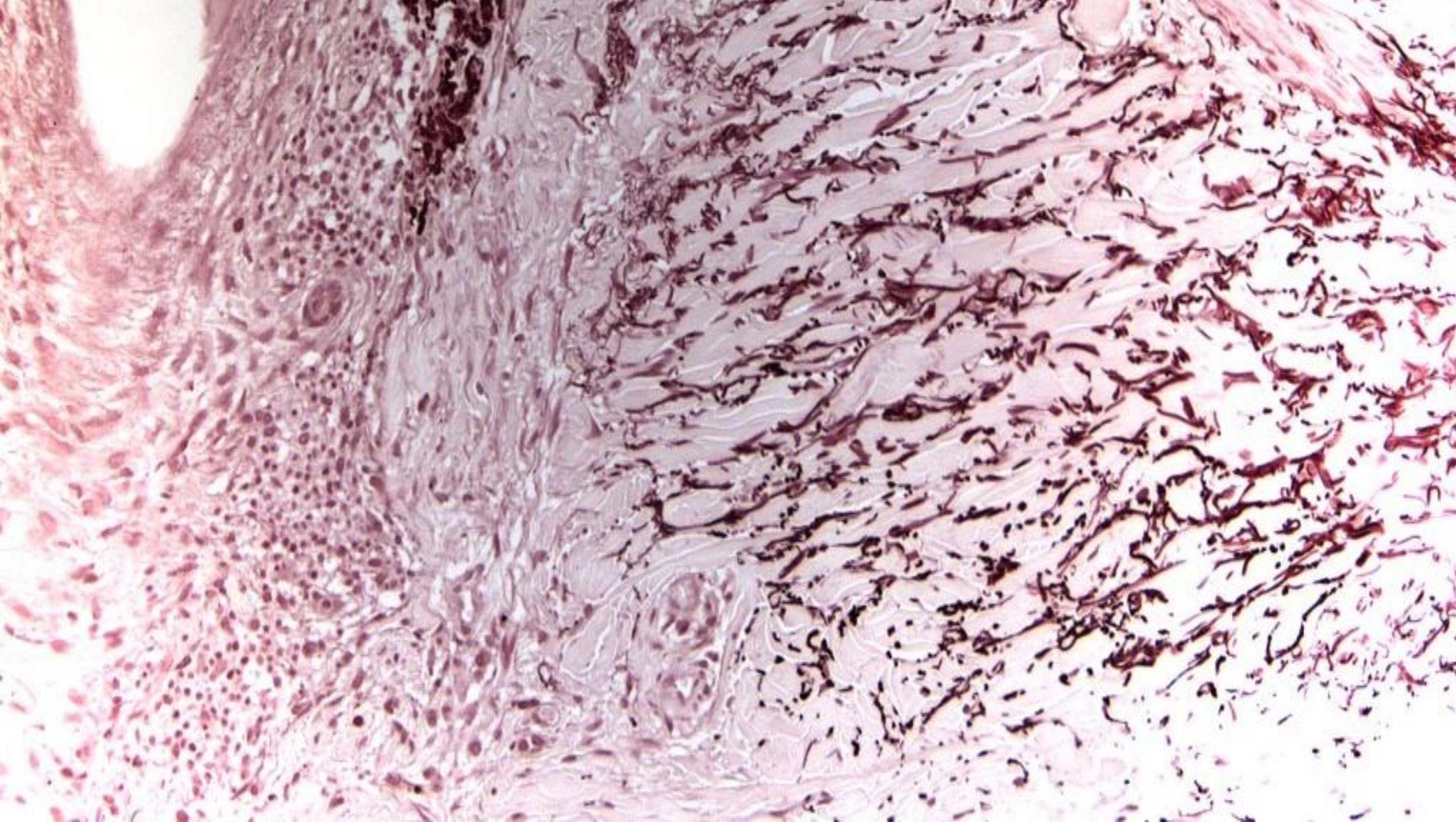
COLÁGENO

- 23 tipos de tipos de colágeno
- Los más importantes **Tipo I y tipo III.**



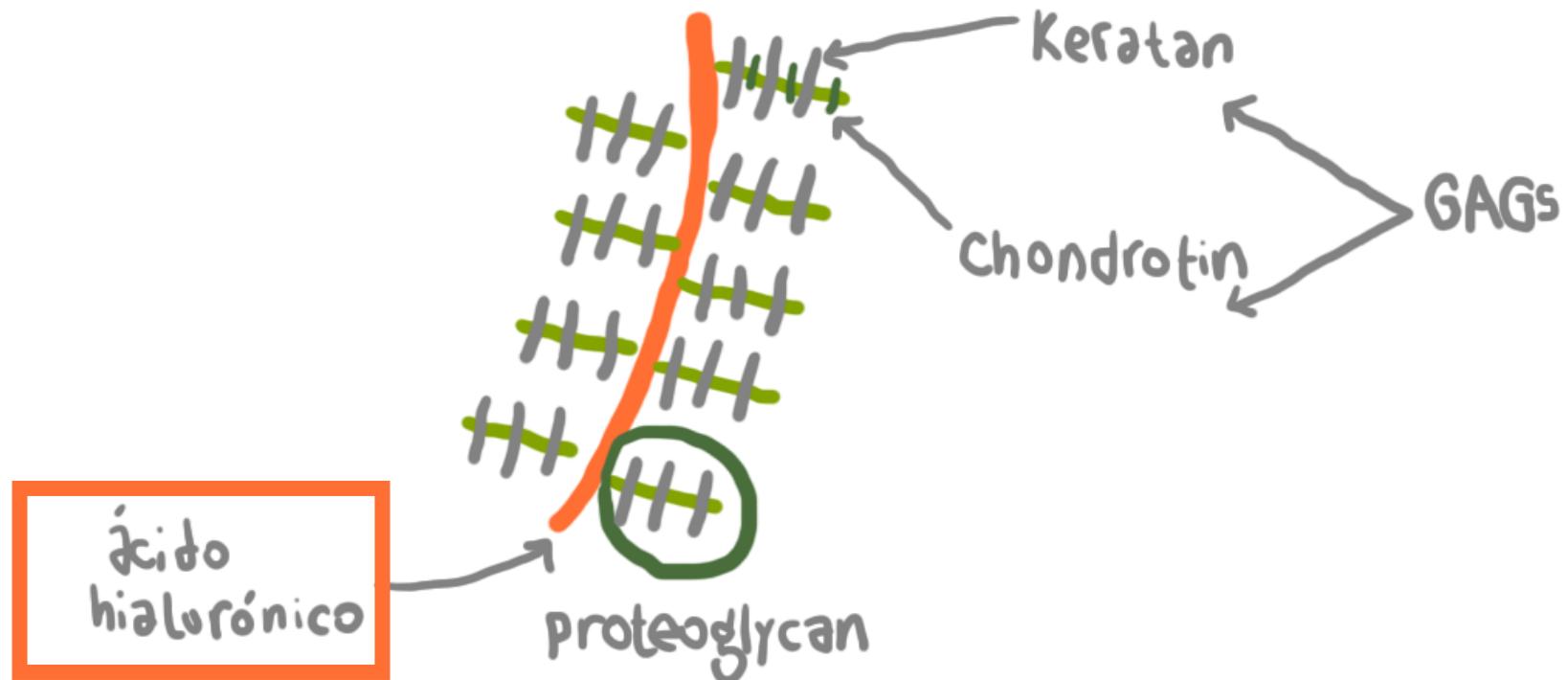
- 
- A high-magnification light micrograph showing a dense network of pink-stained collagen fibers. These fibers are organized into parallel bundles and form a complex, interconnected matrix. The surrounding tissue consists of pink-stained cells, likely fibroblasts, which appear more densely packed than the loose connective tissue seen in other areas of the slide.
- Proteína formada por los fibroblastos utilizando como sustrato 3 aminoácidos principalmente: **prolina, lisina y glicina.**
 - **25% peso proteico humano.**
 - **Estructura a la piel.**



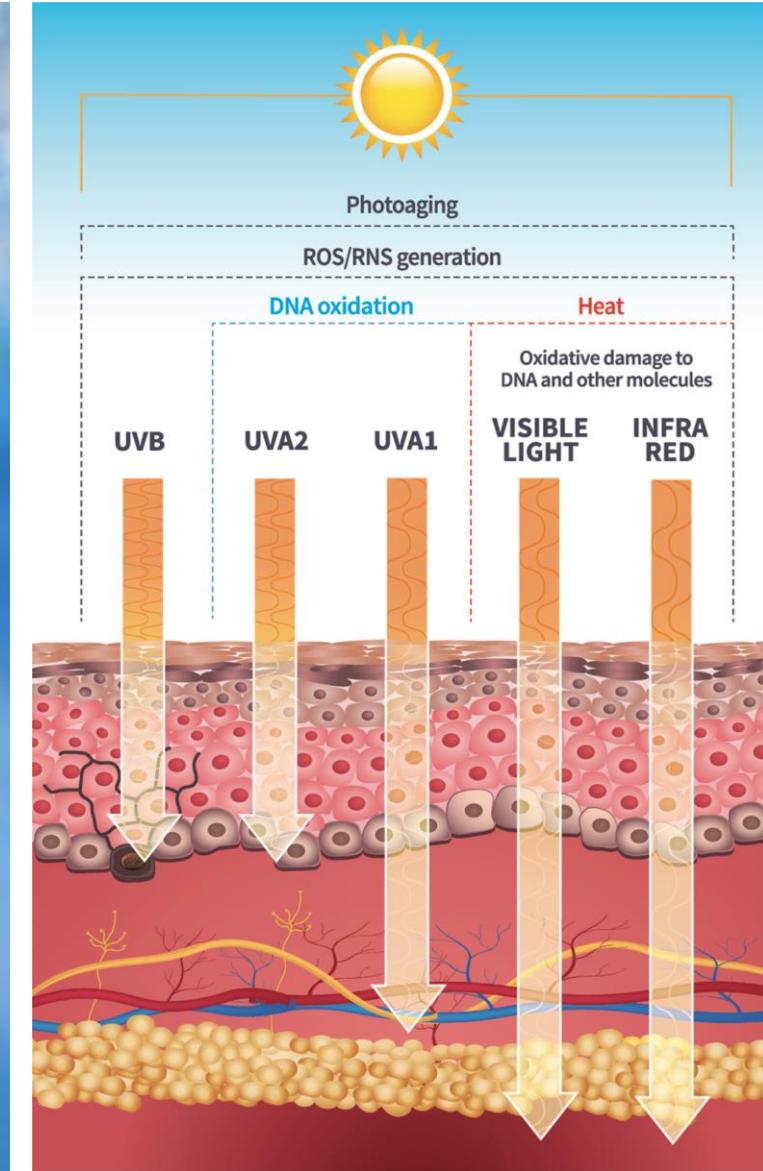


MATRIZ: GLICOSAMINOGLICANOS

- Homeostasis y humectación
- Mantenimiento del colágeno y elastina



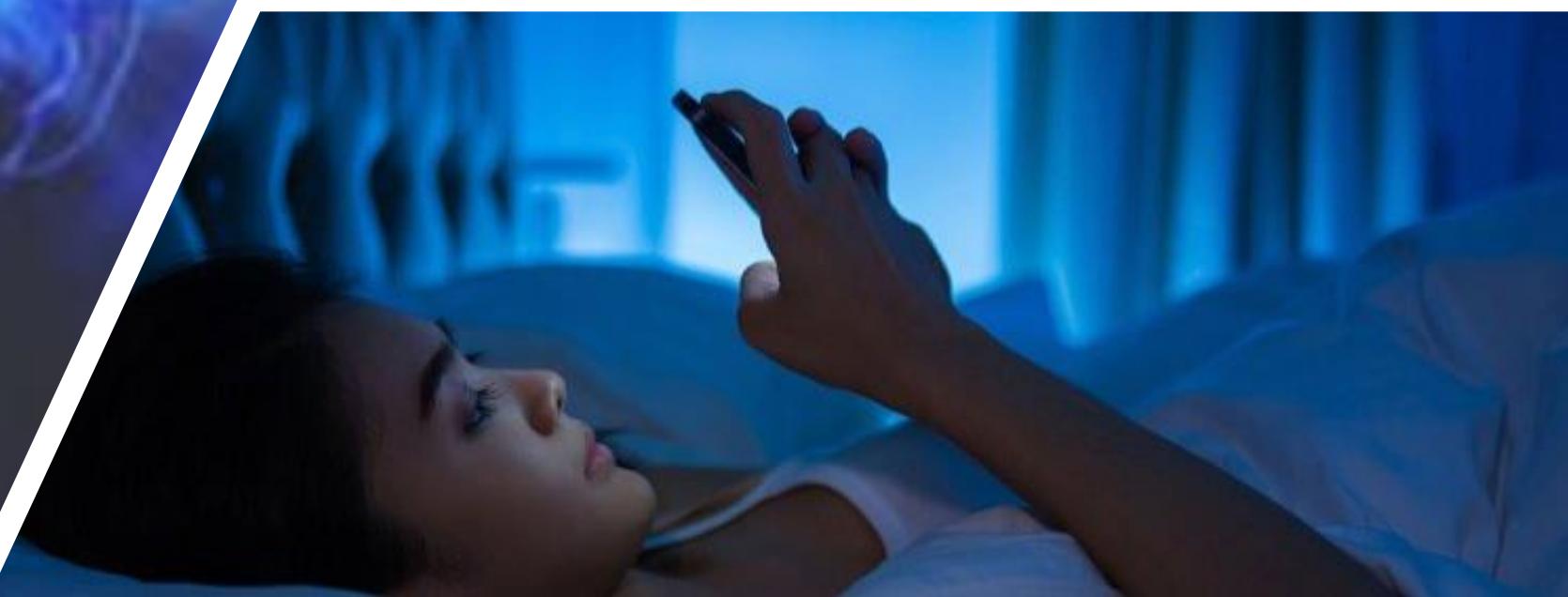
Luz visible



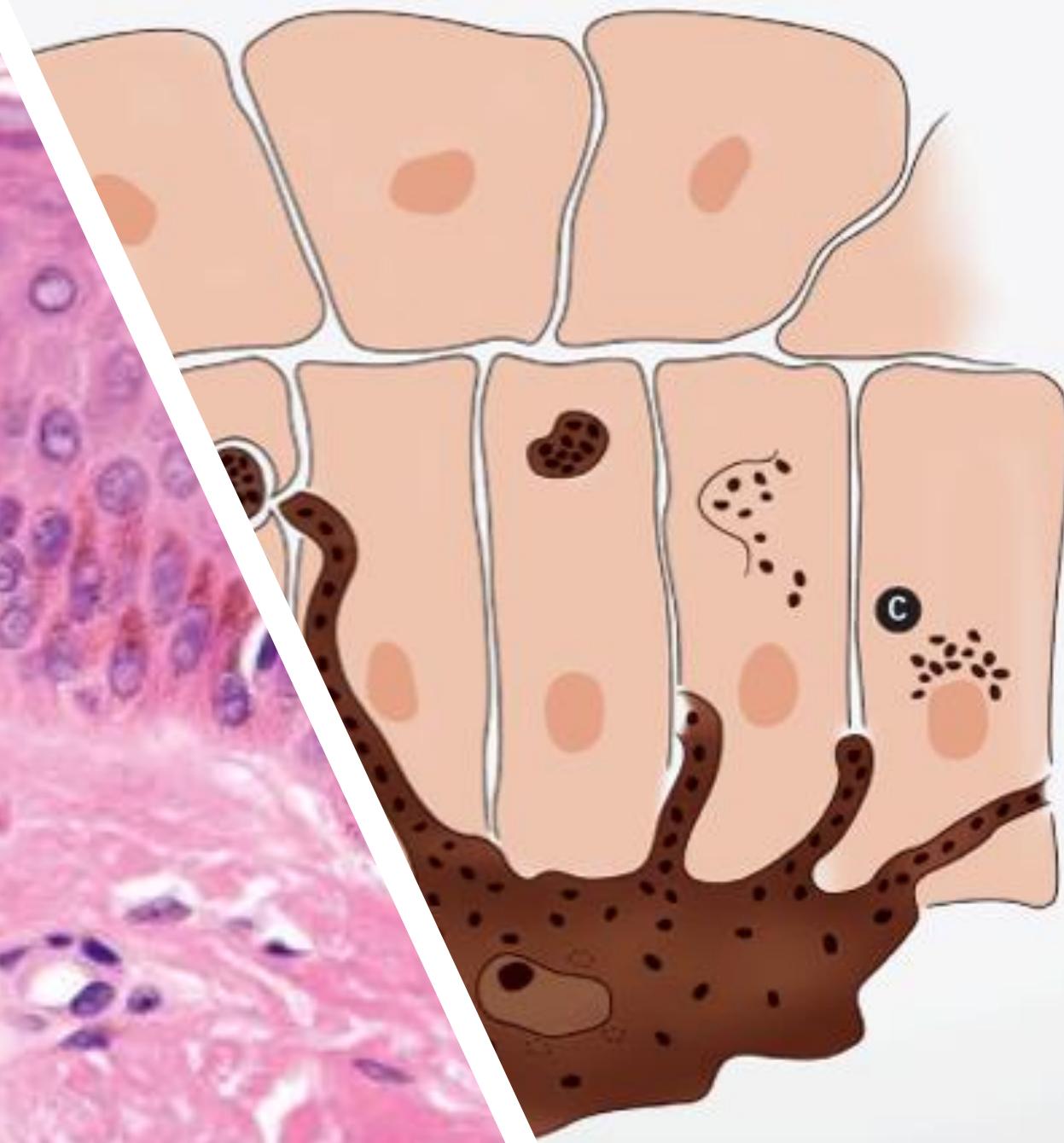
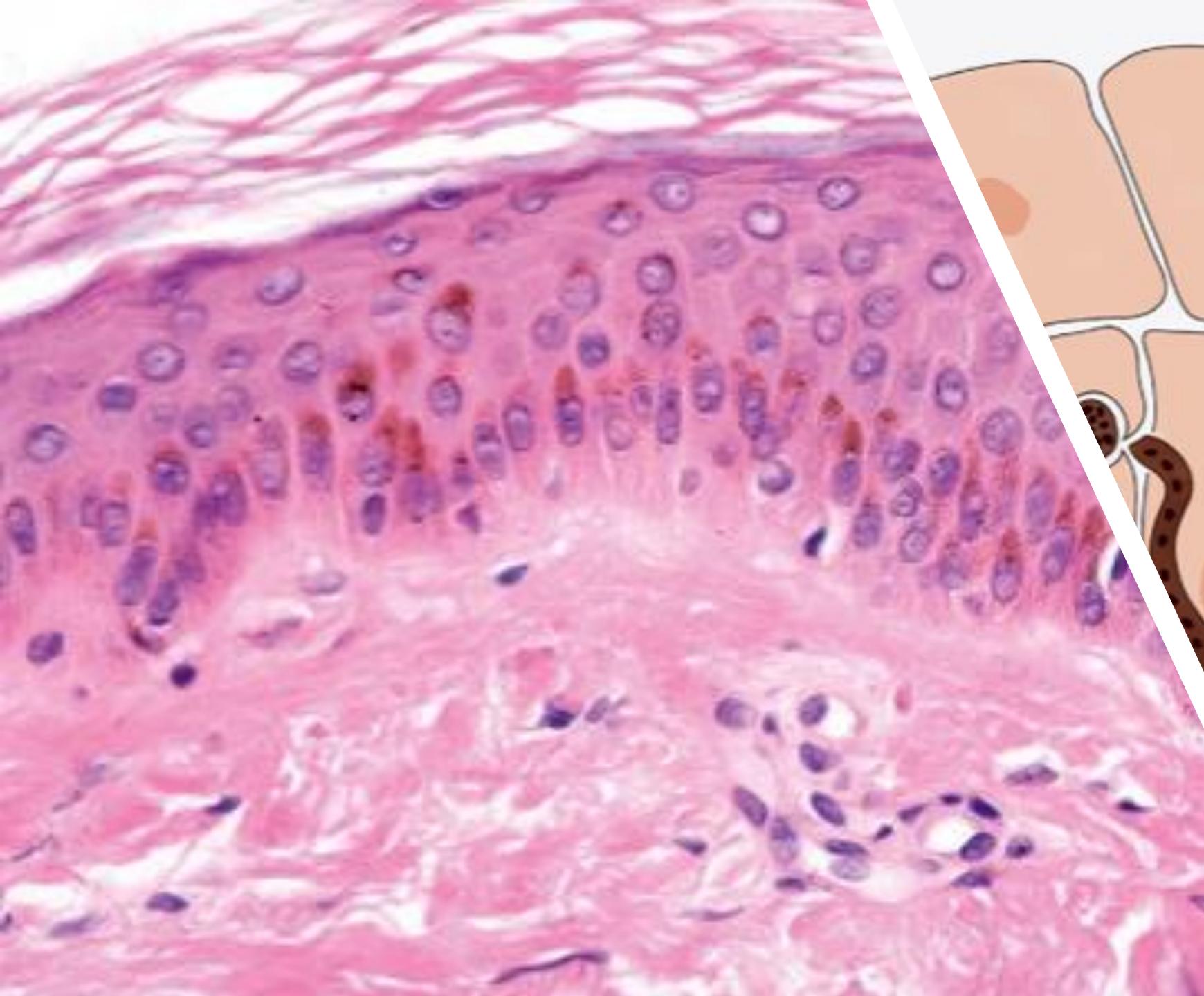
LUZ AZUL

- Natural
- Artificial









FR- Exposición solar insuficiente y mortalidad global: ¿debemos recomendar o desaconsejar la exposición solar a nuestros pacientes?

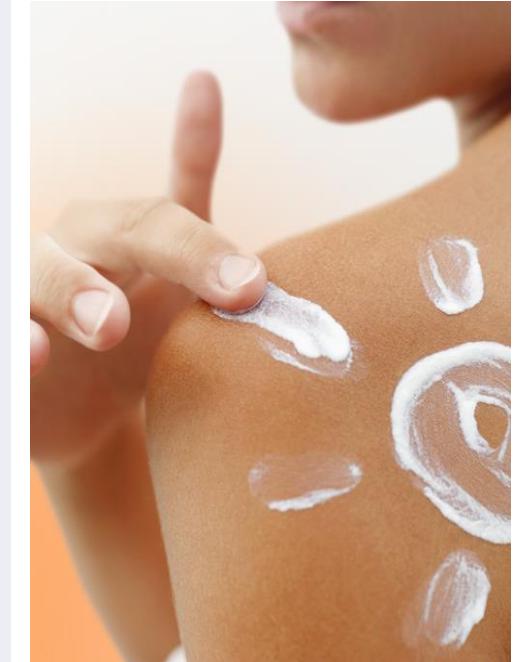


RF- Insufficient Exposure to Sunlight and Global Mortality: Should We Advise Against or Recommend Sun Exposure?

M.T. Monserrat-García*, A. Ortíz-Prieto, P. Martín-Carrasco y J. Conejo-Mir-Sánchez

Actas Dermosifiliogr. 2017;108(3):257-258

- **Estudio con 20.000 mujeres suecas → doble de mortalidad en las que evitaban exposición solar por patología cardiovascular y otras causas.**
- **Falta exposición solar → factor de riesgo en expectativa vida igual a tabaquismo.**
- **Dermatólogo → visión integral del paciente → valorar beneficio exposición en enfermedades alta mortalidad (HTA, DM, ECV, fractura osteoporótica cadera) versus cancer cutáneo (alta prevalencia, menor impacto mortalidad).**



Piel	Esquelético	Endocrino	Estado de ánimo	Cardiovascular	Autoinmunidad	Enfermedades infecciosas	Cáncer
Daño en el ADN Melanogénesis Síntesis de vitamina D Estrés oxidativo Elastosis Inmunotolerancia	Homeostasis Ca/P en sangre Mineralización ósea	Melatonina	↑ POMC, betaendorfinas	Vasodilatador directo ↑ niveles de óxido nítrico	Inmunomodulador	Alteración en quimiotaxis, fagocitosis ↑ Catelicidina, defensina β 4 Especies reactivas de oxígeno IL-1 VDR, CYP27B1, CYP24A1 Diferenciación macrofágica	
Fotoenvejecimiento cáncer cutáneo	↓ Raquitismo osteomalacia osteoporosis	Regulación del ritmo circadiano	Sensación de bienestar antidepresivo	Antihipertensivo ↓ Enfermedad CV ↓ Mortalidad CV	↓ Riesgo de esclerosis múltiple ↓ Riesgo de DM tipo 1	Tuberculostático ↓ Infecciones Respiratorias	↓ Varios tipos de CA(mama, colon, próstata) ↓ Mortalidad por CA

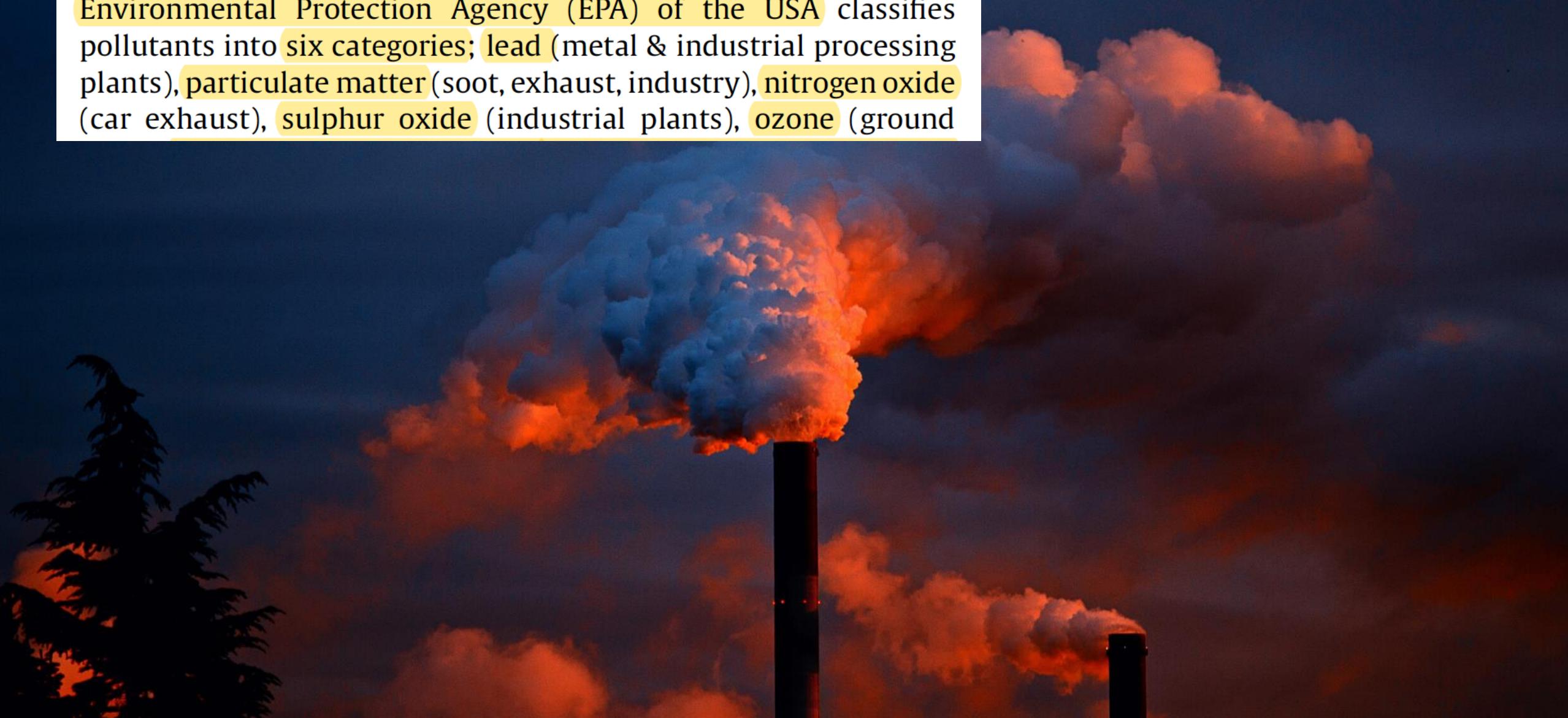




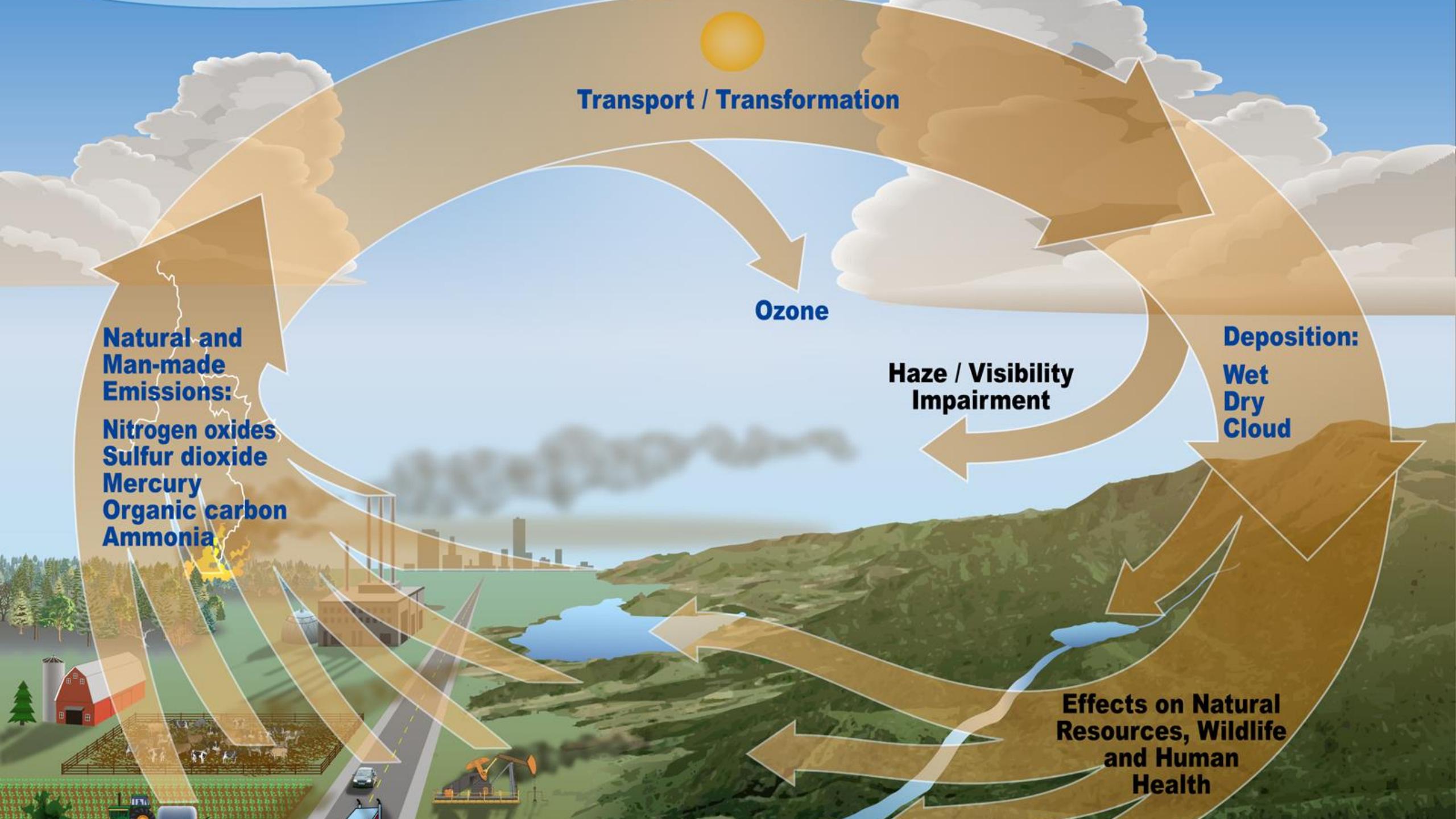




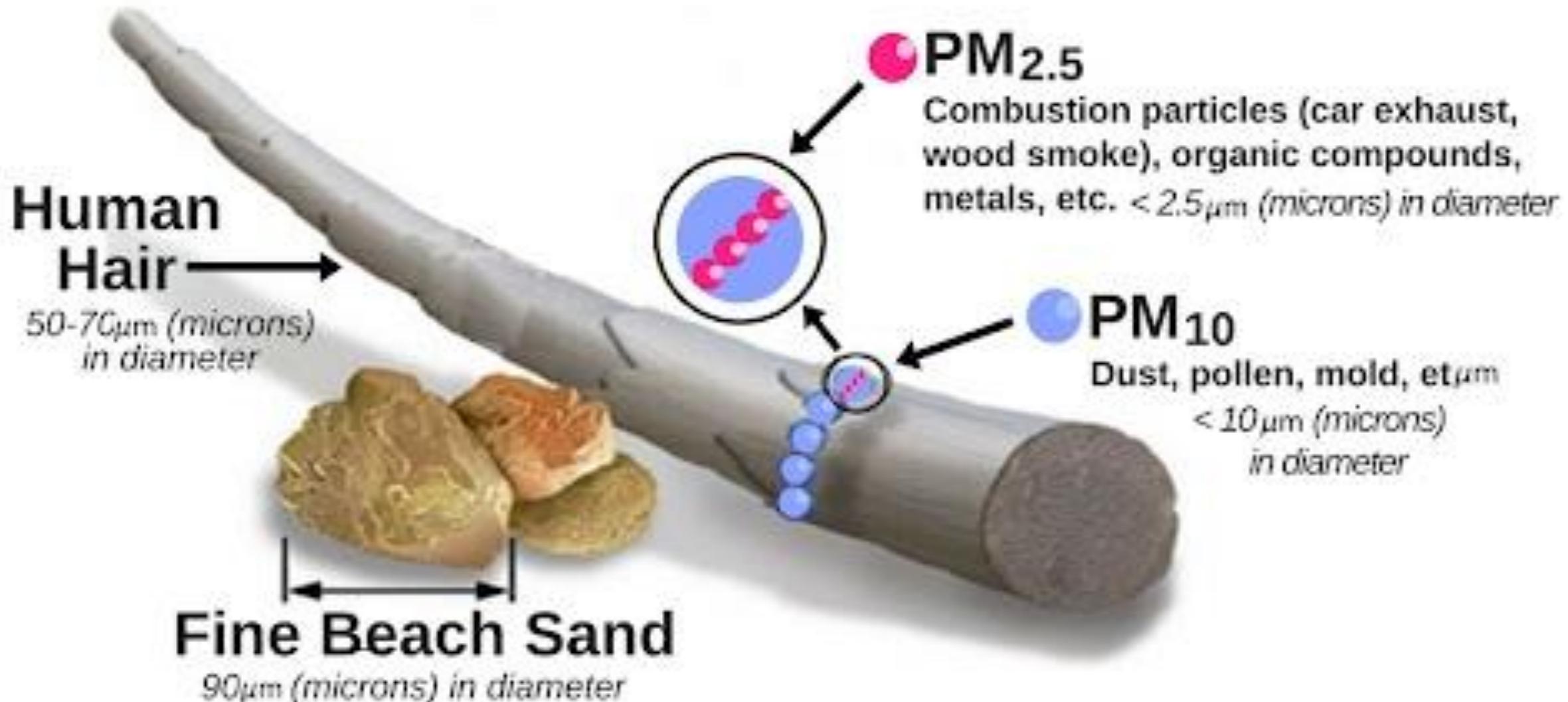
Pollution is a contamination of either the indoor or outdoor environment by any chemical, physical or biological agent. The Environmental Protection Agency (EPA) of the USA classifies pollutants into six categories; lead (metal & industrial processing plants), particulate matter (soot, exhaust, industry), nitrogen oxide (car exhaust), sulphur oxide (industrial plants), ozone (ground

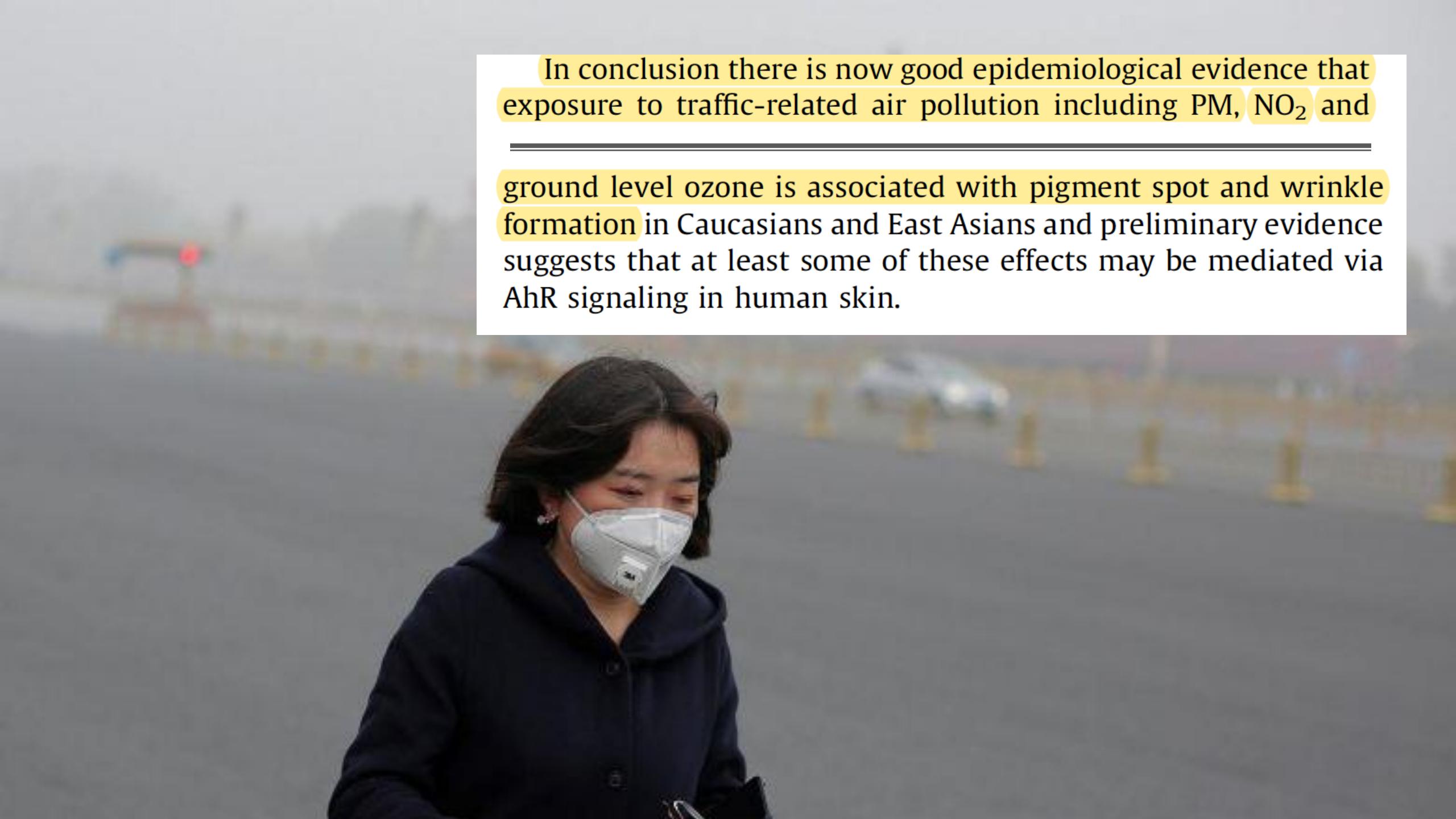






Relative Size of Particulate Matter

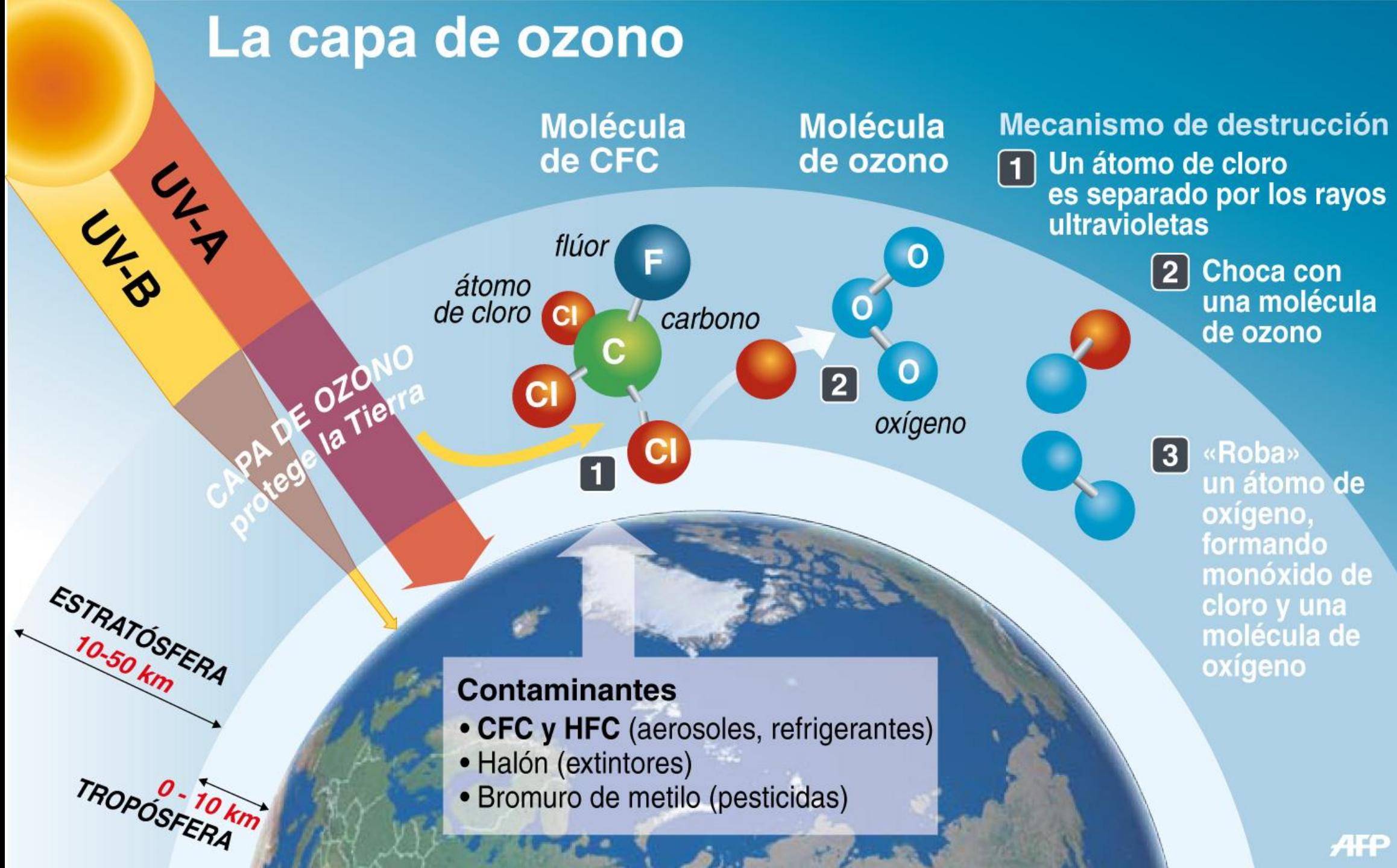


A photograph of a woman with long dark hair, wearing a white face mask and a dark blue coat, walking away from the camera on a city street. The background is blurred, showing other people and city infrastructure.

In conclusion there is now good epidemiological evidence that exposure to traffic-related air pollution including PM, NO₂ and

ground level ozone is associated with pigment spot and wrinkle formation in Caucasians and East Asians and preliminary evidence suggests that at least some of these effects may be mediated via AhR signaling in human skin.

La capa de ozono



A photograph of a person from the waist down, wearing a light purple long-sleeved shirt and dark leggings, walking a brown dog on a blue leash in a lush green forest. The dog is a brown pit bull mix, wearing a black harness and looking towards the camera with its tongue slightly out. The background is filled with dense green foliage.

*Relación con
esperanza de
vida*



SHINRIN
YOKU



Tabaquismo

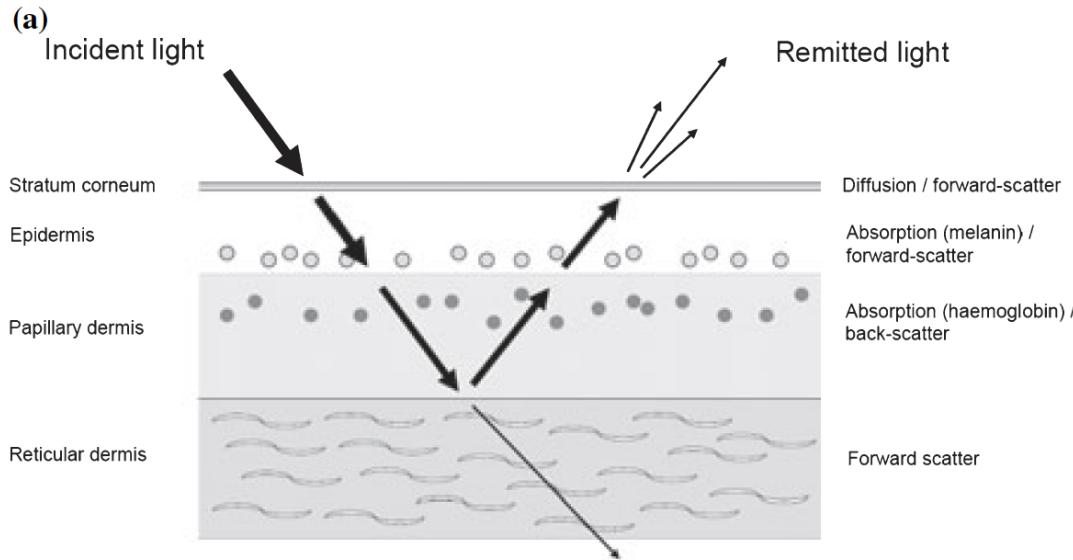






LUMINOSIDAD

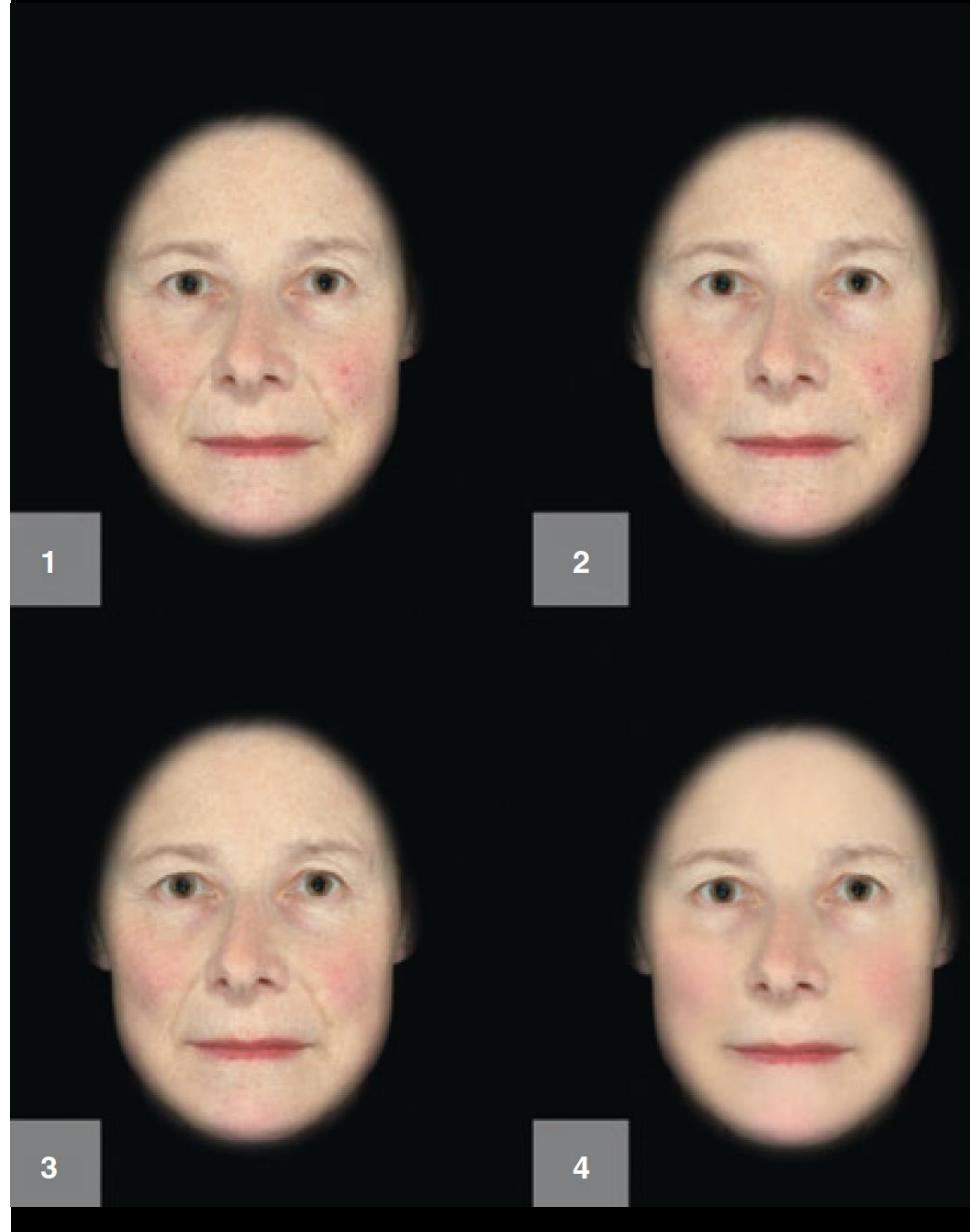
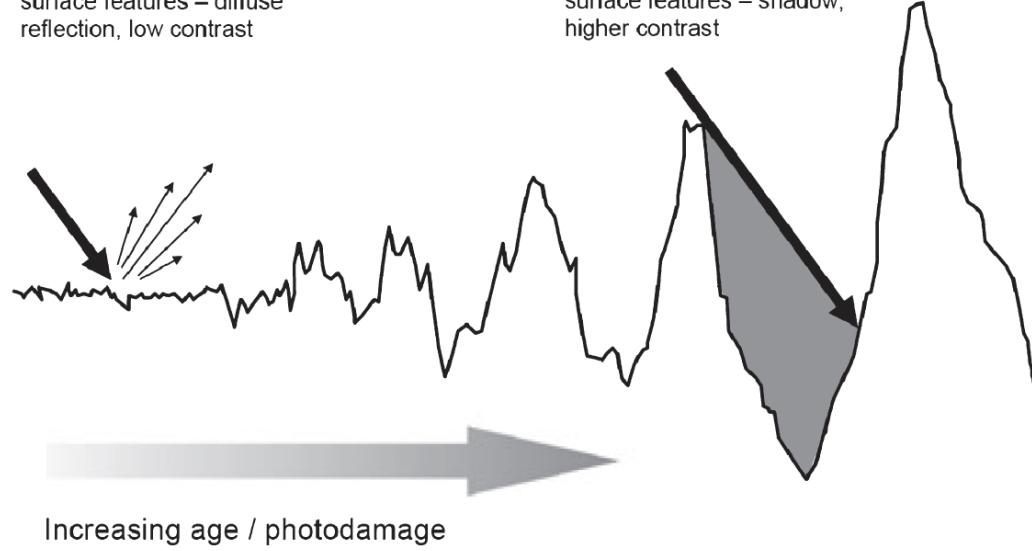
- Color
- Superficie
- Hidratación
- Firmeza
- Elasticidad



(b)

Young skin: high frequency / low amplitude surface features – diffuse reflection, low contrast

Older skin: low frequency / high amplitude surface features – shadow, higher contrast





Nonsmoker



Smoker



© American Society of Plastic Surgeons



Smoked 14 years
longer than his twin



© AMERICAN SOCIETY OF PLASTIC SURGEONS

© AMERICAN SOCIETY OF PLASTIC SURGEONS



Smoked 17 years
longer than her twin



Nonsmoker



29-year smoker



© AMERICAN SOCIETY OF PLASTIC SURGEONS

Nutrición



ORIGINAL ARTICLE

The influence of exposome on acne

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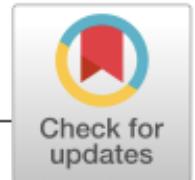
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REVIEW



WILEY

The exposome in atopic dermatitis

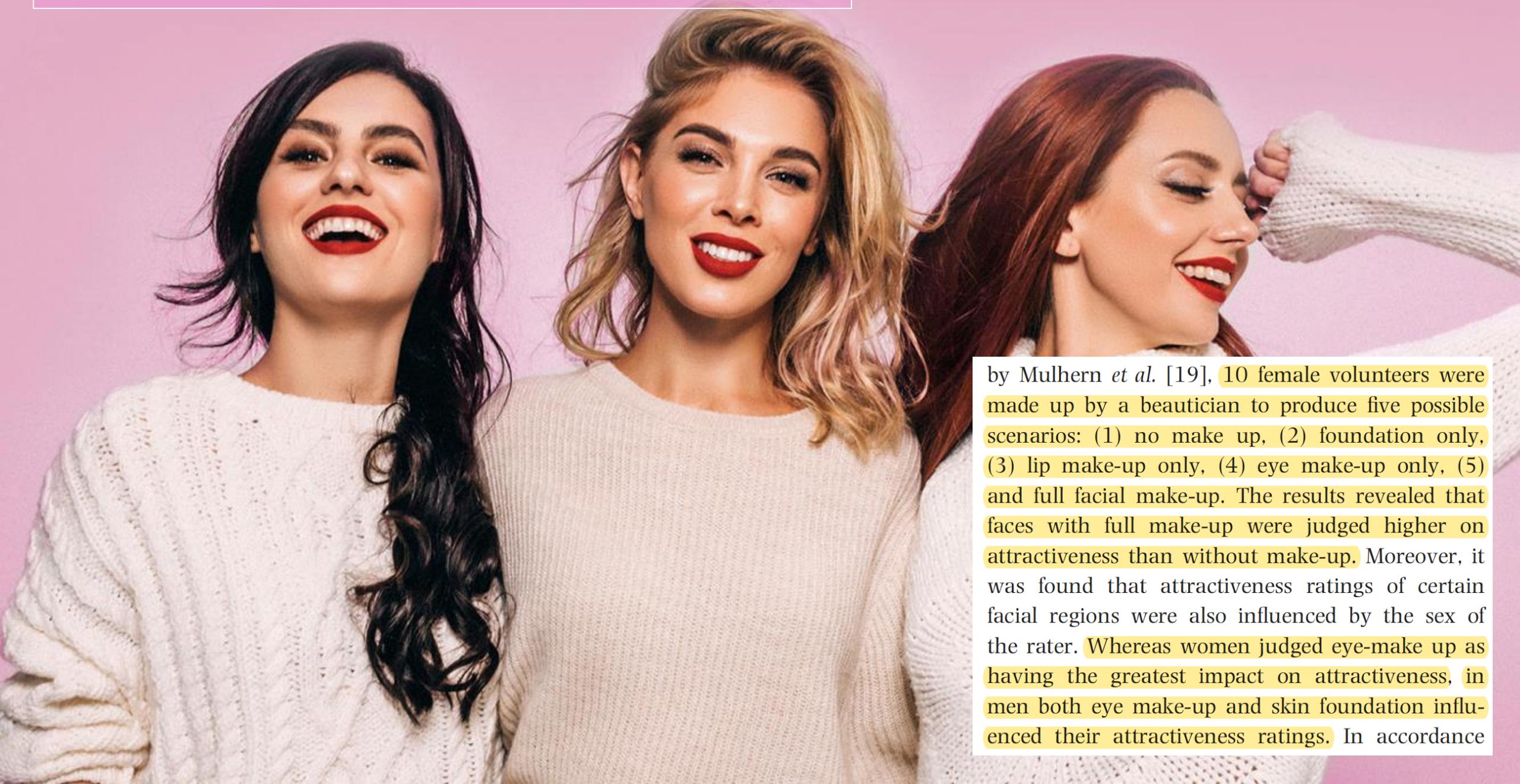
Nicholas Stefanovic¹ | Carsten Flohr² | Alan D. Irvine^{3,4} 





Azucar
glicación

“Men seem to prefer women with facial make-up”



by Mulhern *et al.* [19], 10 female volunteers were made up by a beautician to produce five possible scenarios: (1) no make up, (2) foundation only, (3) lip make-up only, (4) eye make-up only, (5) and full facial make-up. The results revealed that faces with full make-up were judged higher on attractiveness than without make-up. Moreover, it was found that attractiveness ratings of certain facial regions were also influenced by the sex of the rater. Whereas women judged eye-make up as having the greatest impact on attractiveness, in men both eye make-up and skin foundation influenced their attractiveness ratings. In accordance



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doi: 10.1111/j.1468-2494.2009.00535.x

Review Article

Visible skin condition and perception of human facial appearance

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[45–48]. The colouration of human skin is determined by only four major pigments: carotenoids of exogenous origin (yellow) and endogenously produced melanin (brown) in the epidermis, oxygenated haemoglobin (red) and reduced haemoglobin (red-blue) in the capillaries and the venules of the dermis [49–51]. Of these, the chromophores melanin and haemoglobin are the major determinants of differences in skin colour between individuals, with melanin playing the primary role [48, 52, 53].

MELANINA

HEMOGLOBINA

CAROTENOIDEOS



MELANINA

Tonos de piel según Fototipos

Fototipo I



Fototipo II



Fototipo III



Fototipo IV



Fototipo V



Fototipo VI

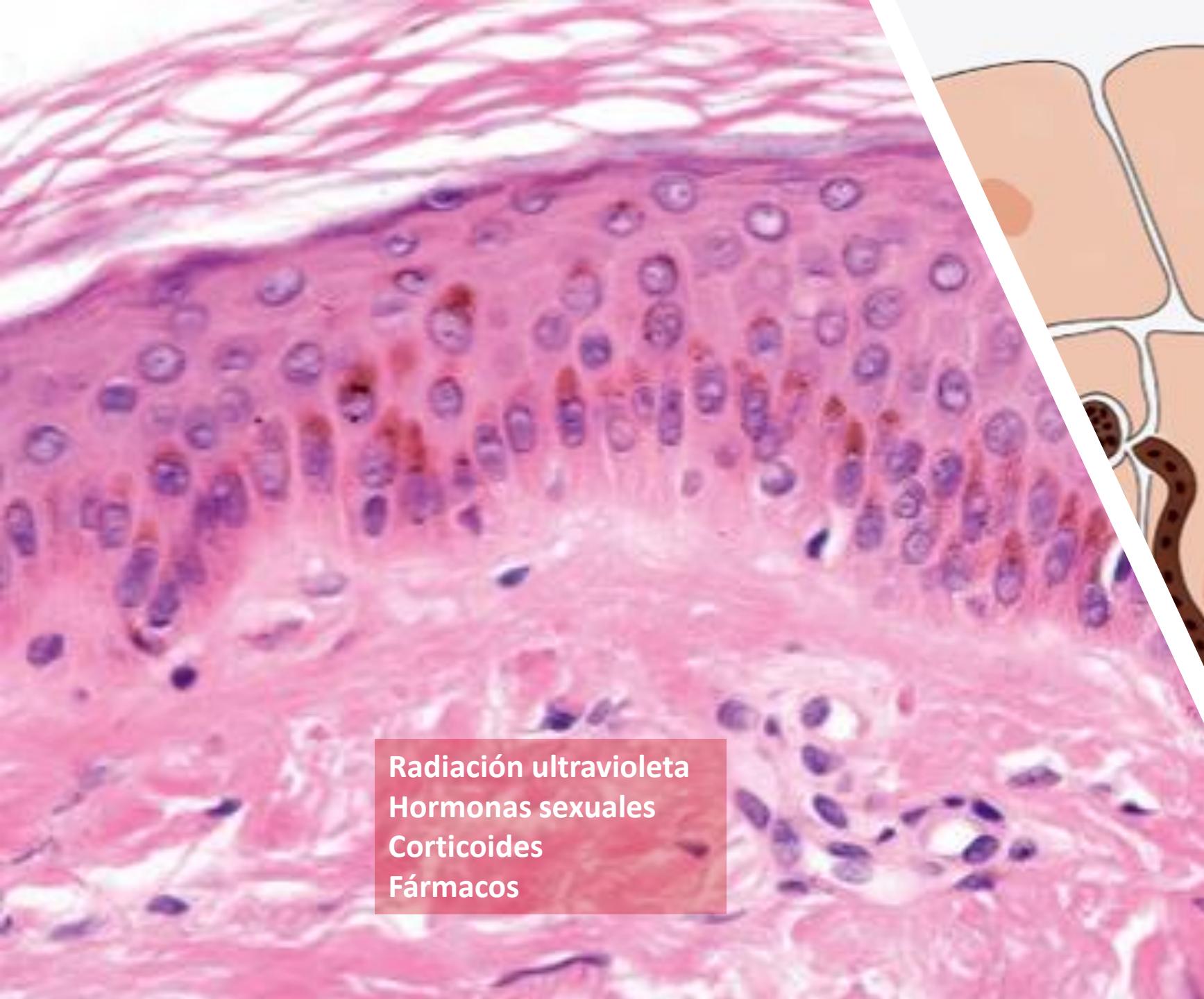


Tono claro

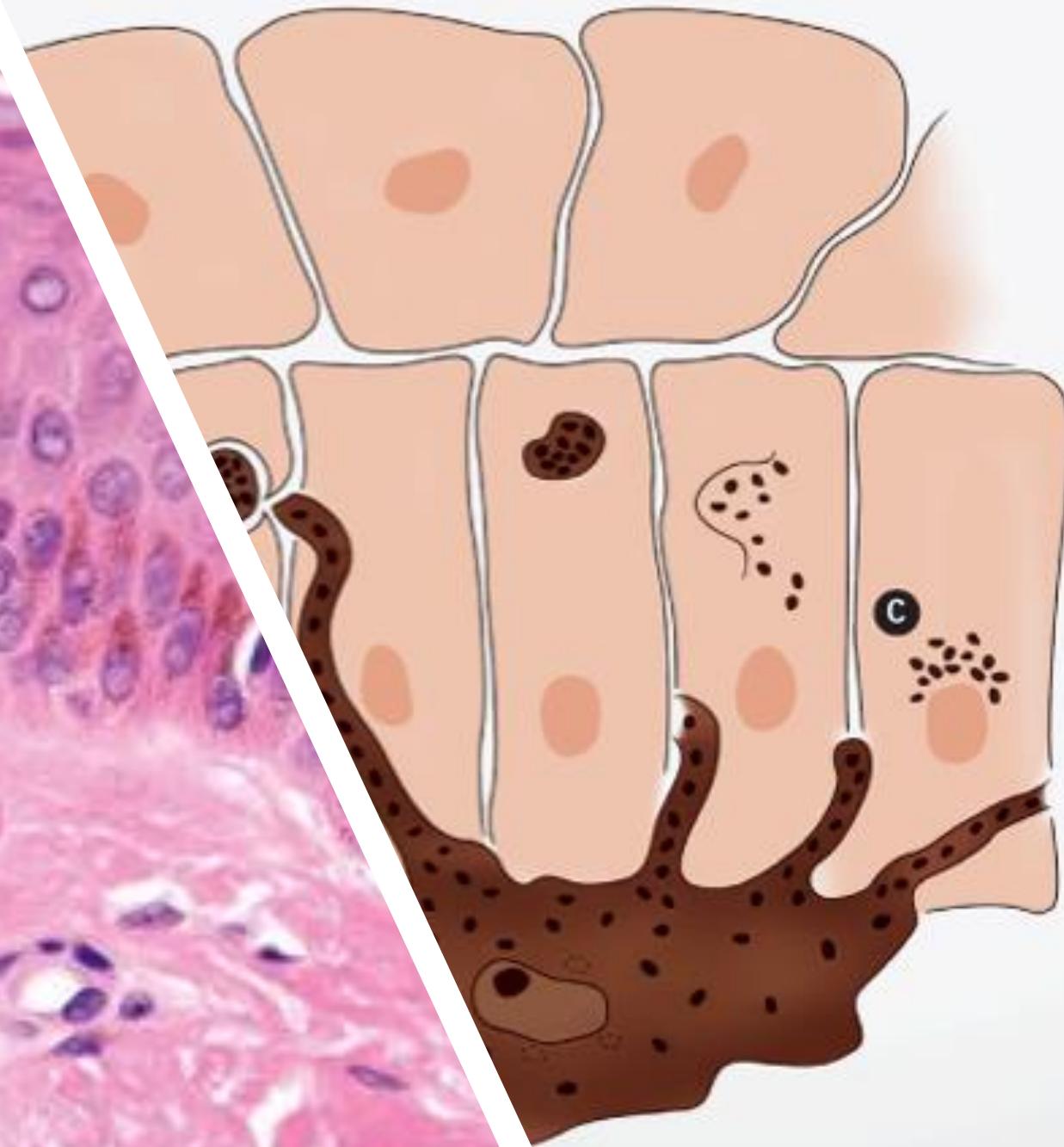
Tono medio

Tono oscuro

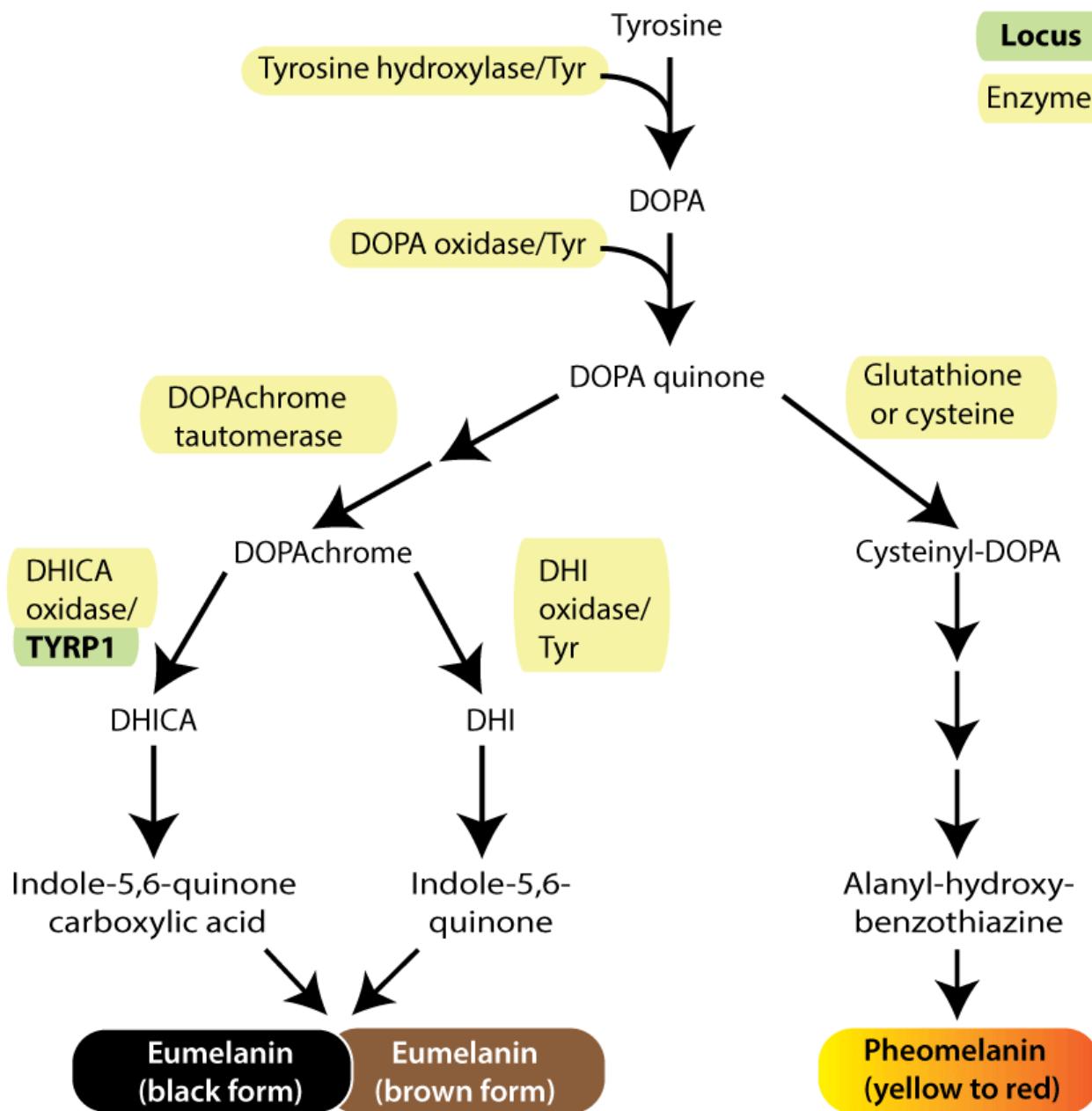
Próximamente
Tono Étnico



Radiación ultravioleta
Hormonas sexuales
Corticoides
Fármacos







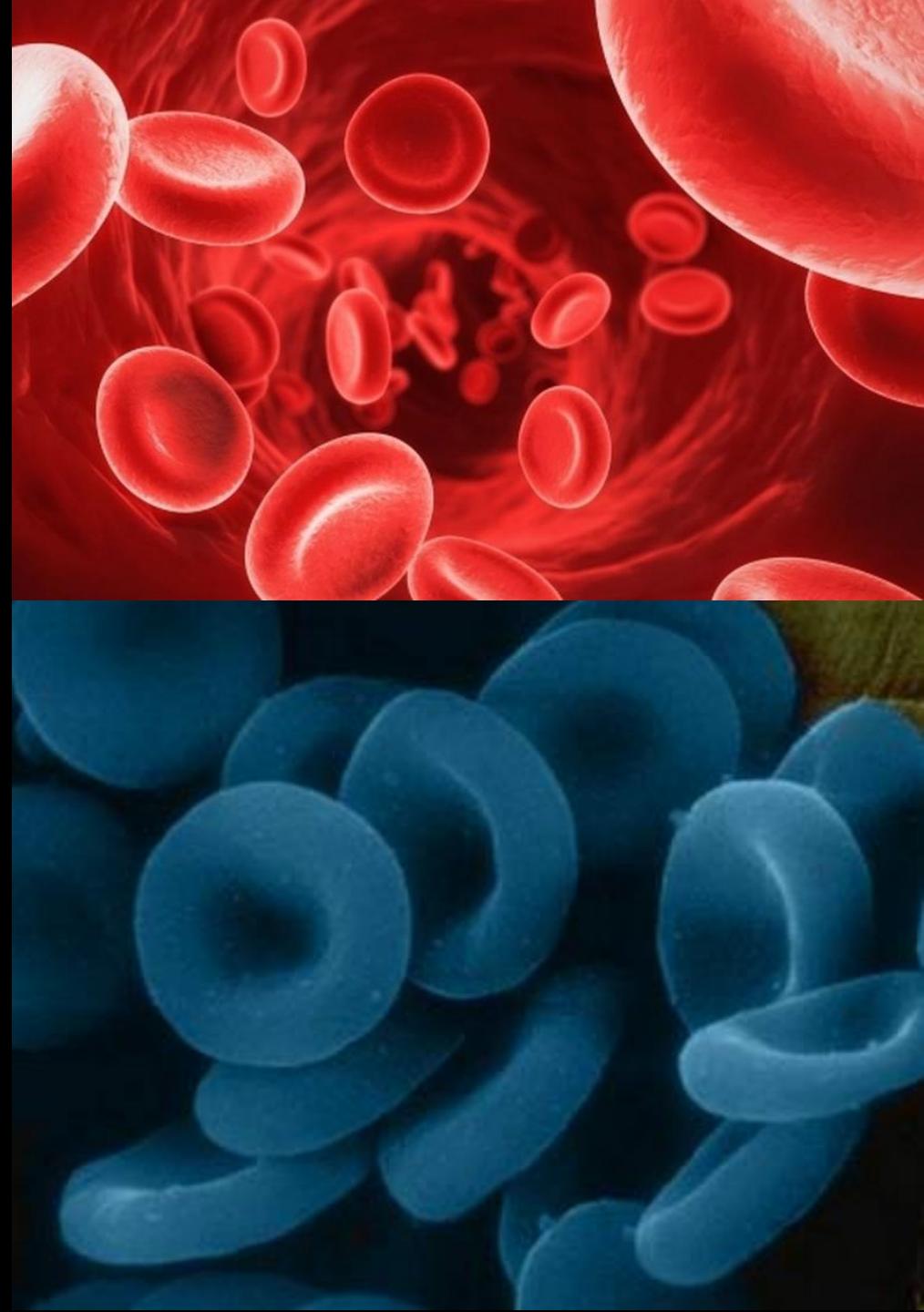
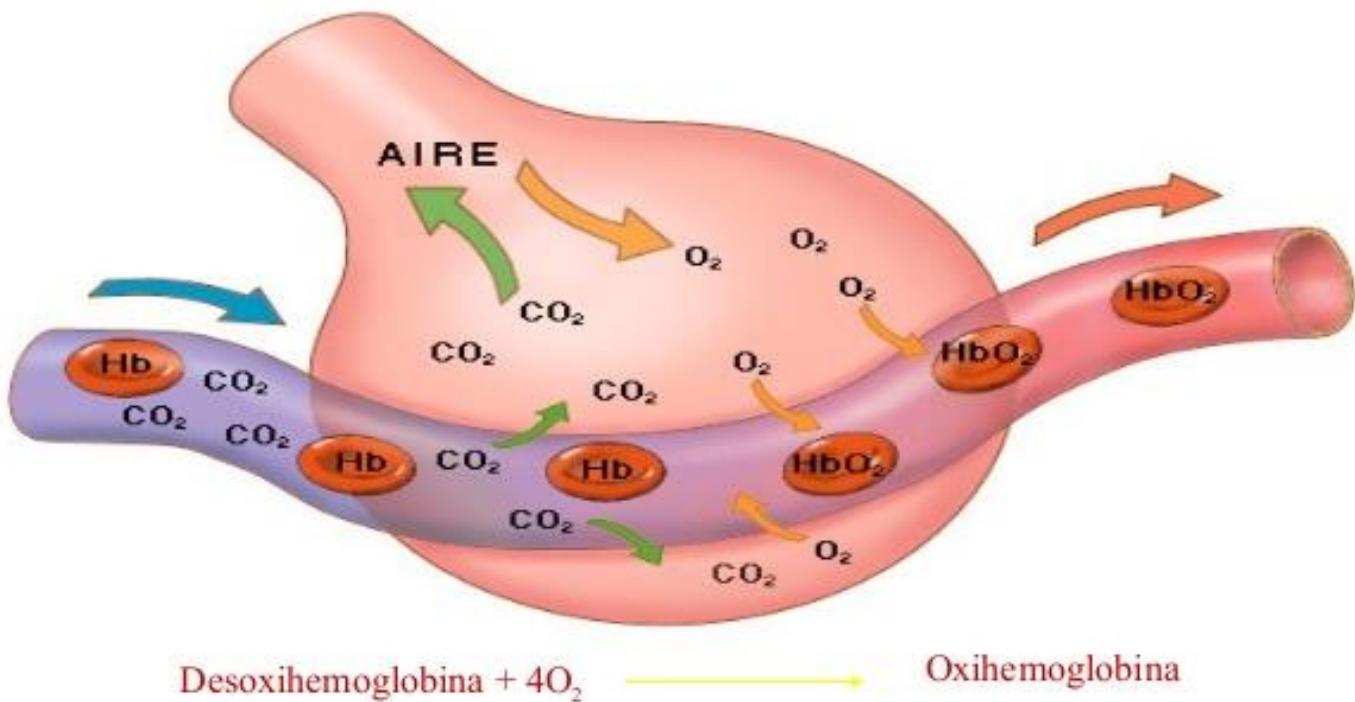


HEMOGLOBINA

La hemoglobina se encuentra en dos estados :

Estado T (desoxihemoglobina)

Estado R (oxihemoglobina)





CAROTENOÏDES



OPEN  ACCESS Freely available online

PLOS one

You Are What You Eat: Within-Subject Increases in Fruit and Vegetable Consumption Confer Beneficial Skin-Color Changes

Ross D. Whitehead^{1*}, Daniel Re¹, Dengke Xiao¹, Gozde Ozakinci², David I. Perrett^{1*}

¹ School of Psychology, Perception Lab, University of St Andrews, St Andrews, Fife, Scotland, ² School of Medicine, University of St Andrews, St Andrews, Fife, Scotland

**color difference between these 2 images
thus represents a difference in daily
consumption of 13 portions of fruit and
vegetables.**

- Cambio de bajo consumo a alto consumo de frutas y verduras (<2 a 8 porciones/día).
- Piel más amarilla, más roja y menos oscura.
- Cambios estables con el tiempo (menos perceptibles).
- Cambios indirectos en la percepción belleza (atractivas).



- Intervención en Salud Pública bien ideada. Belleza +++ motivación.
- Efectos leves/variables no suficientes para generar adherencia primer mes.

RESEARCH ARTICLE

Open Access



The value of facial attractiveness for encouraging fruit and vegetable consumption: analyses from a randomized controlled trial

Katherine M. Appleton^{1*} Alanna J. McGrath², Michelle C. McKinley², Claire R. Draffin², Lesley L. Hamill², Ian S. Young² and Jayne V. Woodside²

Abstract

Background: An effect of increased fruit and vegetable (FV) consumption on facial attractiveness has been proposed and recommended as a strategy to promote FV intakes, but no studies to date demonstrate a causal link between FV consumption and perceived attractiveness. This study investigated perceptions of attractiveness before and after the supervised consumption of 2, 5 or 8 FV portions/day for 4 weeks in 30 low FV consumers. Potential mechanisms for change via skin colour and perceived skin healthiness were also investigated.

Methods: Faces were photographed at the start and end of the 4 week intervention in controlled conditions. Seventy-three independent individuals subsequently rated all 60 photographs in a randomized order, for facial attractiveness, facial skin yellowness, redness, healthiness, clarity, and symmetry.

Results: Using clustered multiple regression, FV consumption over the previous 4 weeks had no direct effect on attractiveness, but, for female faces, some evidence was found for an indirect impact, via linear and non-linear changes in skin yellowness. Effect sizes, however, were small. No association between FV consumption and skin healthiness was found, but skin healthiness was associated with facial attractiveness.

Conclusions: Controlled and objectively measured increases in FV consumption for 4 weeks resulted indirectly in increased attractiveness in females via increases in skin yellowness, but effects are small and gradually taper as FV consumption increases. Based on the effect sizes from this study, we are hesitant to recommend the use of facial attractiveness to encourage increased FV consumption.

Trial registration: Clinical trial Registration Number NCT01591057 (www.clinicaltrials.gov). Registered: 27th April, 2012.

Keywords: Fruit and vegetables, Facial attractiveness, Skin colour, Public health, Effect sizes



DIETA DERMOSALUDABLE

DIETA SALUDABLE



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ERIC RIES, author of *The Lean Startup*

HOOKED



How to Build
Habit-Forming Products

NIR EYAL

WITH RYAN HOOVER



Relación estresores y piel



Falta de sueño



Temperatura

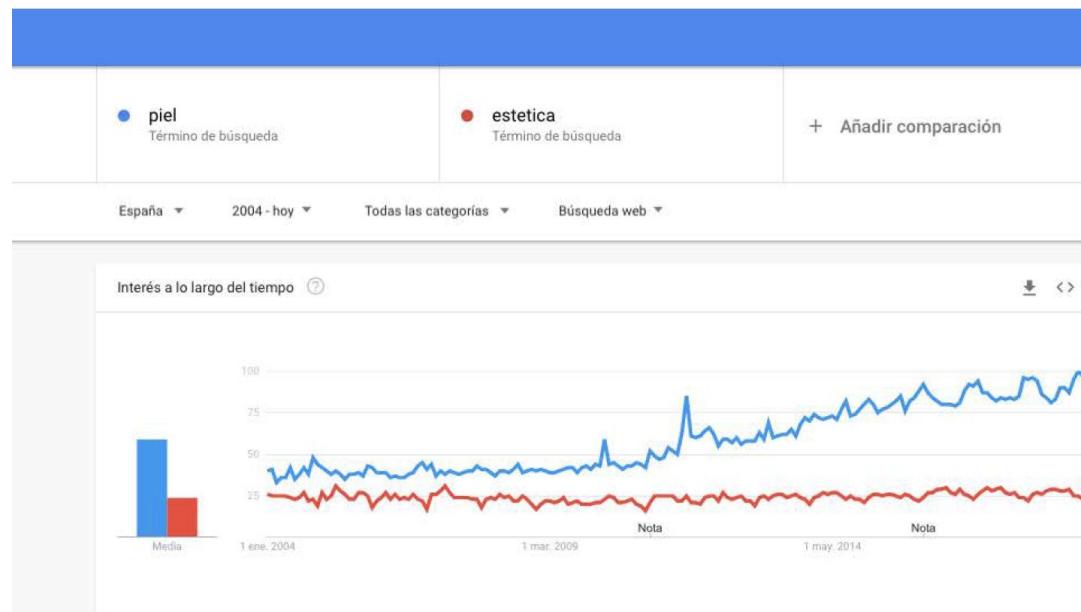




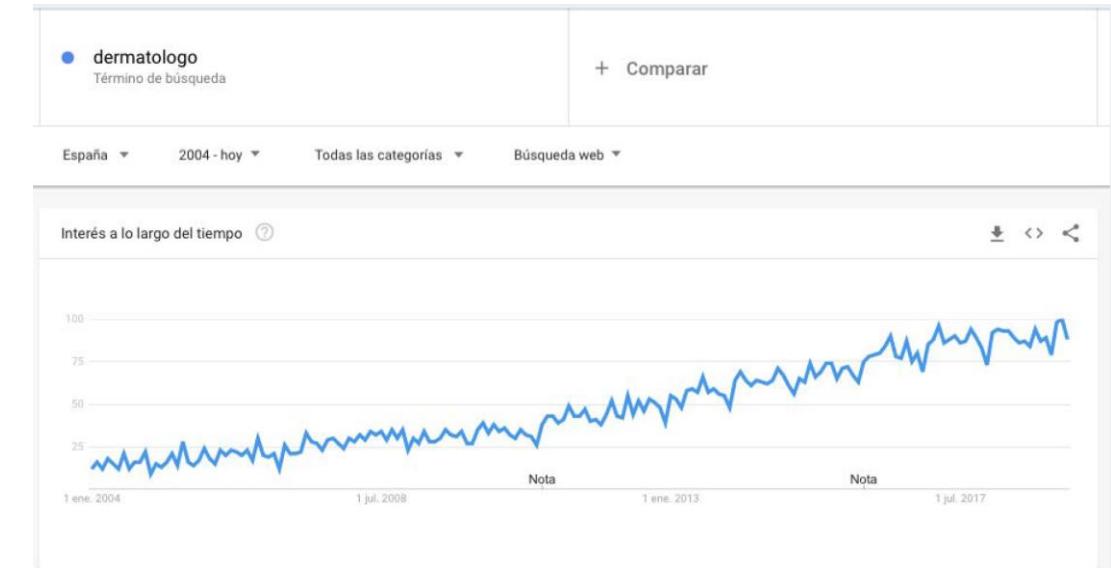


DERMOCOSMÉTICA

Google Trends



Google Alerts



ARTÍCULO DE OPINIÓN

Necesidades y demandas en dermocosmética

A. Buendía-Eisman

Área de Dermatología. Facultad de Medicina. Granada. España.

- Mercado millonario.
- Gran Demanda
- Formación Reglada.



- Cosmética personalizada.
- Cosmecéutica.
- Falsos Mitos.



elblogdepills

LIMPIEZA

- agua micelar
geles
aceites ...

Mañana y noche
1 semanal más profunda

HIDRATACIÓN

- con activos antiox como la vit c

En función de tus necesidades

PROTECCIÓN

- SPF 50 en textura adecuada

Diaría, todos los días del año

TRANSFORMACIÓN

- Alfa y beta hidroxiácidos y derivados Vit A

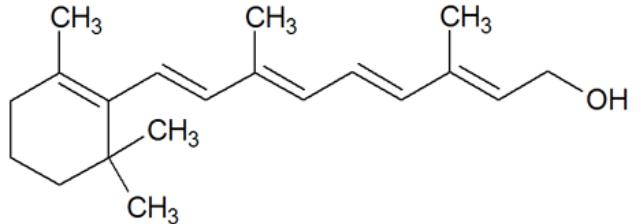
Con sustancias de probada eficacia

4
Pasos Básicos del Cuidado de la Piel

@elblogdepills

Fuente: Dra Ana Molina

#MENOSESMÁS







PIEL
ASFÍCTICA

A close-up photograph of a man with dark hair and a well-groomed beard and mustache. He is wearing a light-colored, possibly yellow or beige, robe. He is holding two thin, circular slices of cucumber, one in each hand, positioned in front of his eyes. The background is a plain, light color.

LIMPIEZA

A woman with long dark hair, wearing a red jacket and a gold cuff bracelet, resting her head on her hand.

HIDRATACIÓN



FOTOPROTECCIÓN

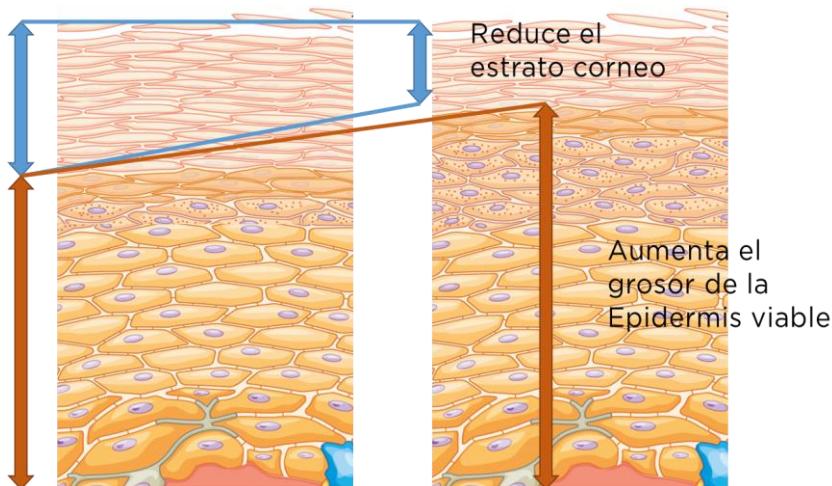
TRANSFORMACIÓN

α hidroxiácidos

Ácidos orgánicos con grupo hidroxilo en el C α

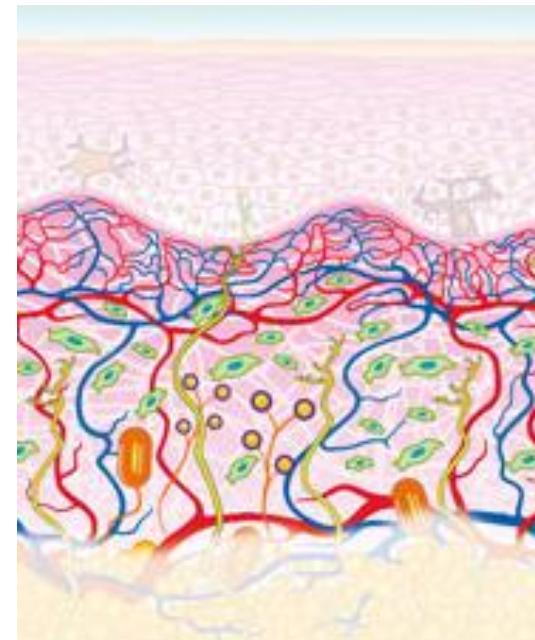
→ Ácido glicólico, cítrico, láctico, málico, tartárico

EPIDERMIS



- Normaliza la maduración de los queratinocitos
- Disminución de arrugas y cicatrices
- Mayor turgencia de la piel
- Estimula la descamación natural

DERMIS



- Aumenta funcionalidad fibroblastos dérmicos
 - ✓ Favorecen síntesis colágeno I y III
 - ✓ Mejora calidad fibras elásticas
- Aumenta síntesis sustancias intercelulares
 - ✓ Glicosaminoglicanos
 - ✓ Ácido hialurónico

Table 1

General recommendations.

1/General measures

- Avoid smoking.
- Avoid artificial UV exposures (indoor tanning).
- Avoid intentional UV exposure for cosmetic purposes. When outdoors, seek shade whenever possible. Use protective clothing in addition to skin photoprotective care.
- Maintain a healthy life-style, with a diet rich in fruits and vegetables, limited alcohol intake, and enough sleep.

2/Recommendations for daily skin care regimen**A/In the morning:**

- Avoid over washing the skin as it may damage the natural skin barrier function. Use a gentle cleanser, avoid soap.
- Use cosmetic products to improve skin barrier function and use cosmetics with topical antioxidants to reduce harmful effects of ozone and IRA on skin aging.
- Use photo protective measures: broad spectrum UVA-UVB sunscreen to block UV radiation and to prevent photo reactive compounds to being produced under UV exposure.
- For darker skinned individuals consider adapted sunscreen to protect the skin from shorter wavelength visible light in addition to well-balanced UVA/UVB protection.

B/In the evening:

- Use rinse-off products (gels, shampoos) to clean off pollution on the skin surface and to reduce particle load.
 - Use cosmetic products to improve skin barrier function and to repair aging signs.
-

Futuro del exposoma



**LOS CAMBIOS DEL
EXPOSOMA SON
A-DISCIPLINARIOS**





GREEN INDEX



¿BENEFICIO
LINEAL?





SALUD PLANETARIA

Jonas Salk

A dark, atmospheric landscape featuring a path through a dense forest. In the foreground, several large, mossy boulders are scattered across a dark, textured ground. The background is filled with tall, thin trees and dense foliage, creating a sense of depth and mystery.

NATURE EXTINTION EXPERIENCE

AMNESIA GENERACIONAL AMBIENTAL



**"PUT SIMPLY THERE IS NO HUMAN
HEALTH WITHOUT PLANETARY HEALTH"**



Vocalía Nacional
de **Dermofarmacia**



Farmacéuticos

Consejo General de Colegios Farmacéuticos