

Prevención Visual: Medidas para el uso de pantallas de dispositivos

Celia Sánchez-Ramos

Dra. en Medicina Preventiva y Salud Pública

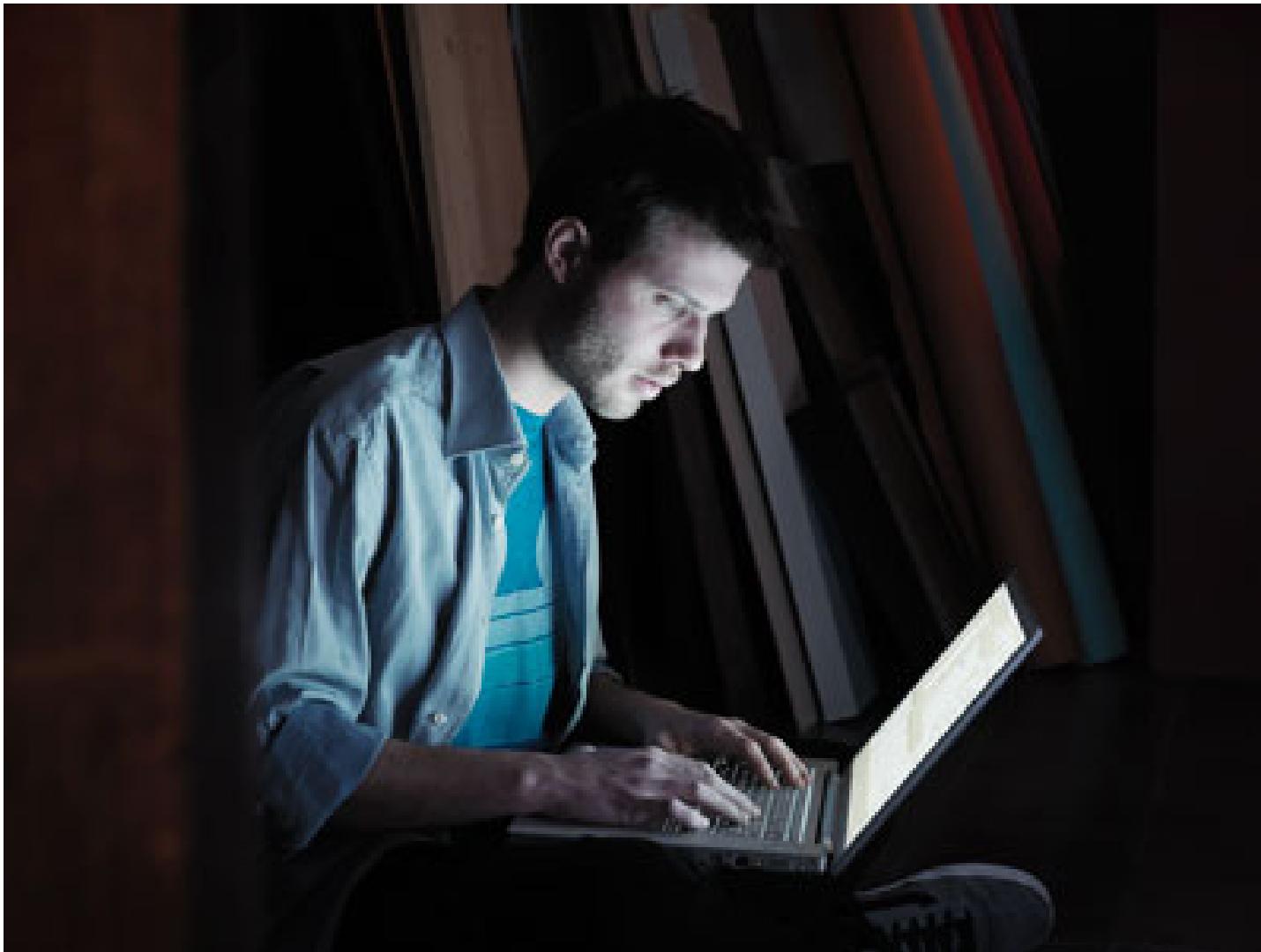
Dra. en Ciencias de la Visión







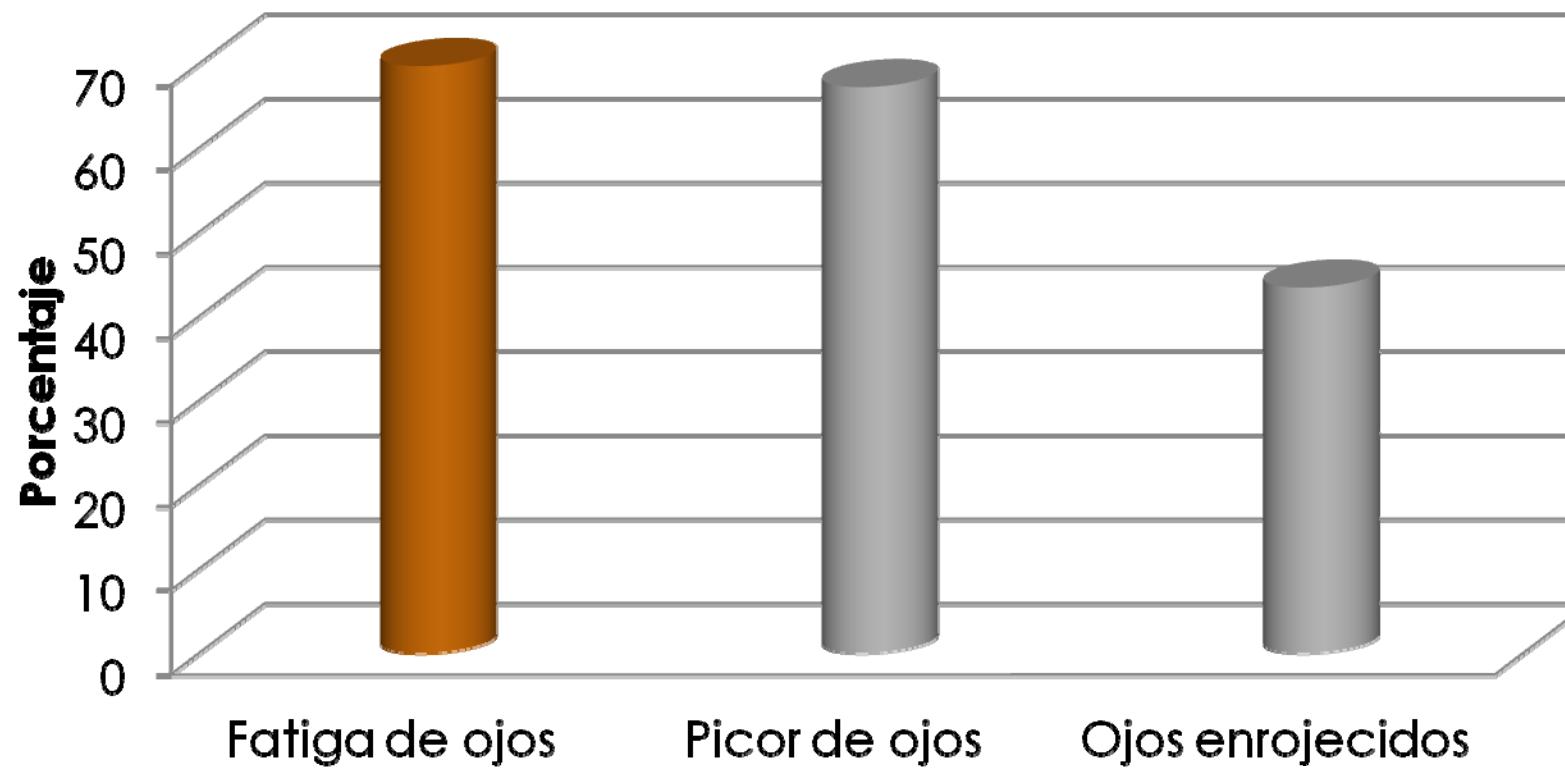






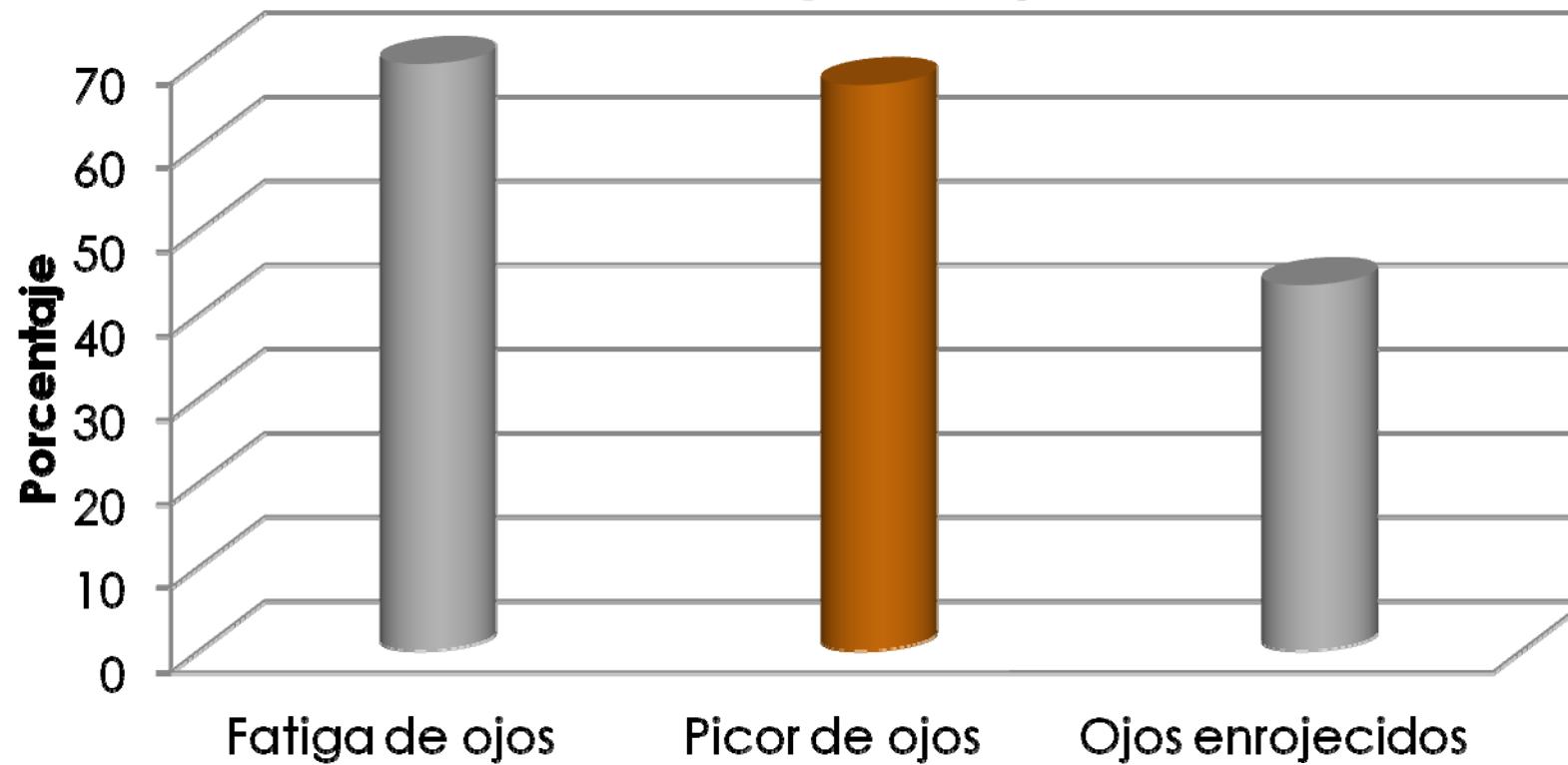
Signos/síntomas por uso de pantallas

69%

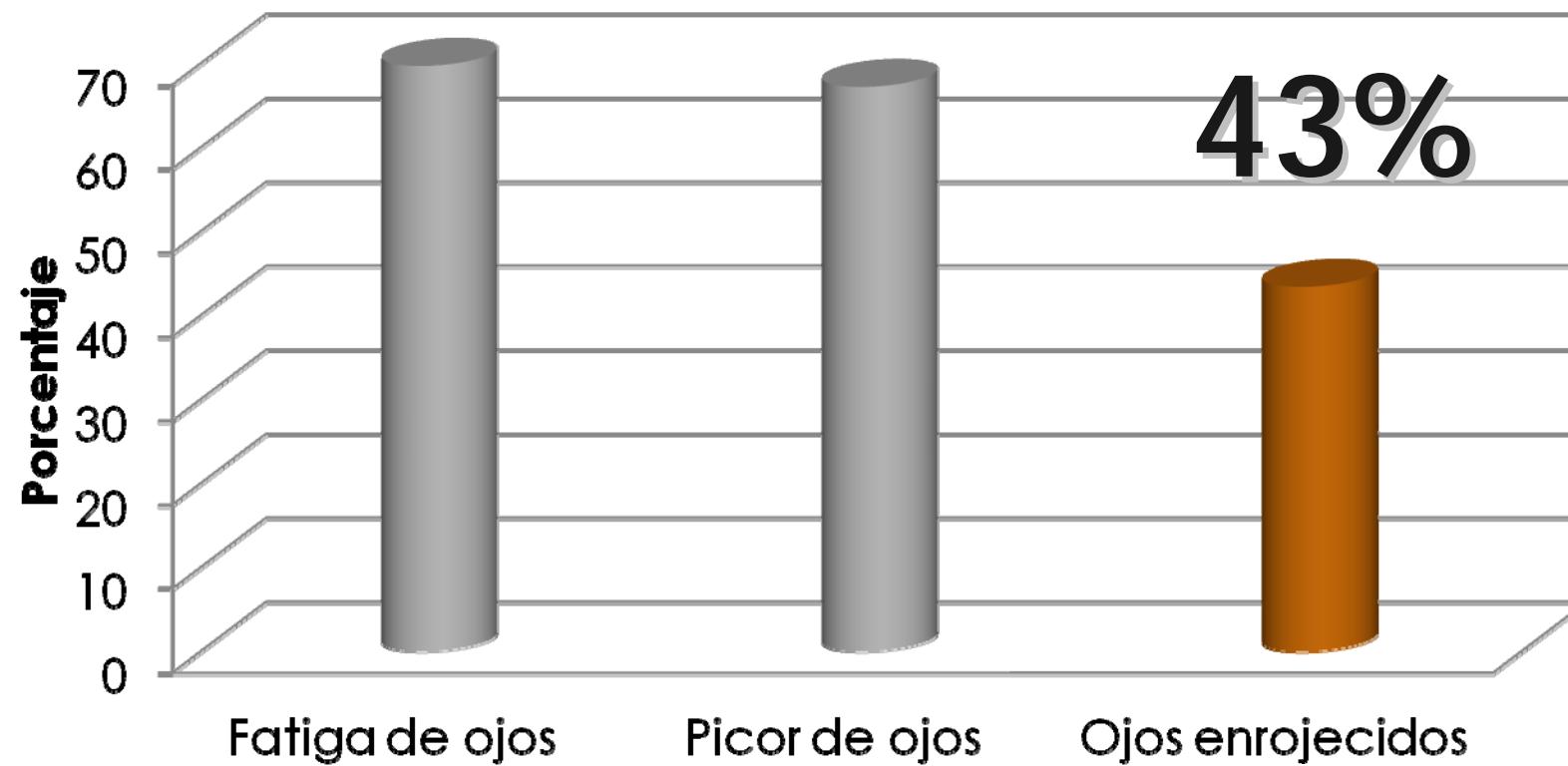


Signos/síntomas por uso de pantallas

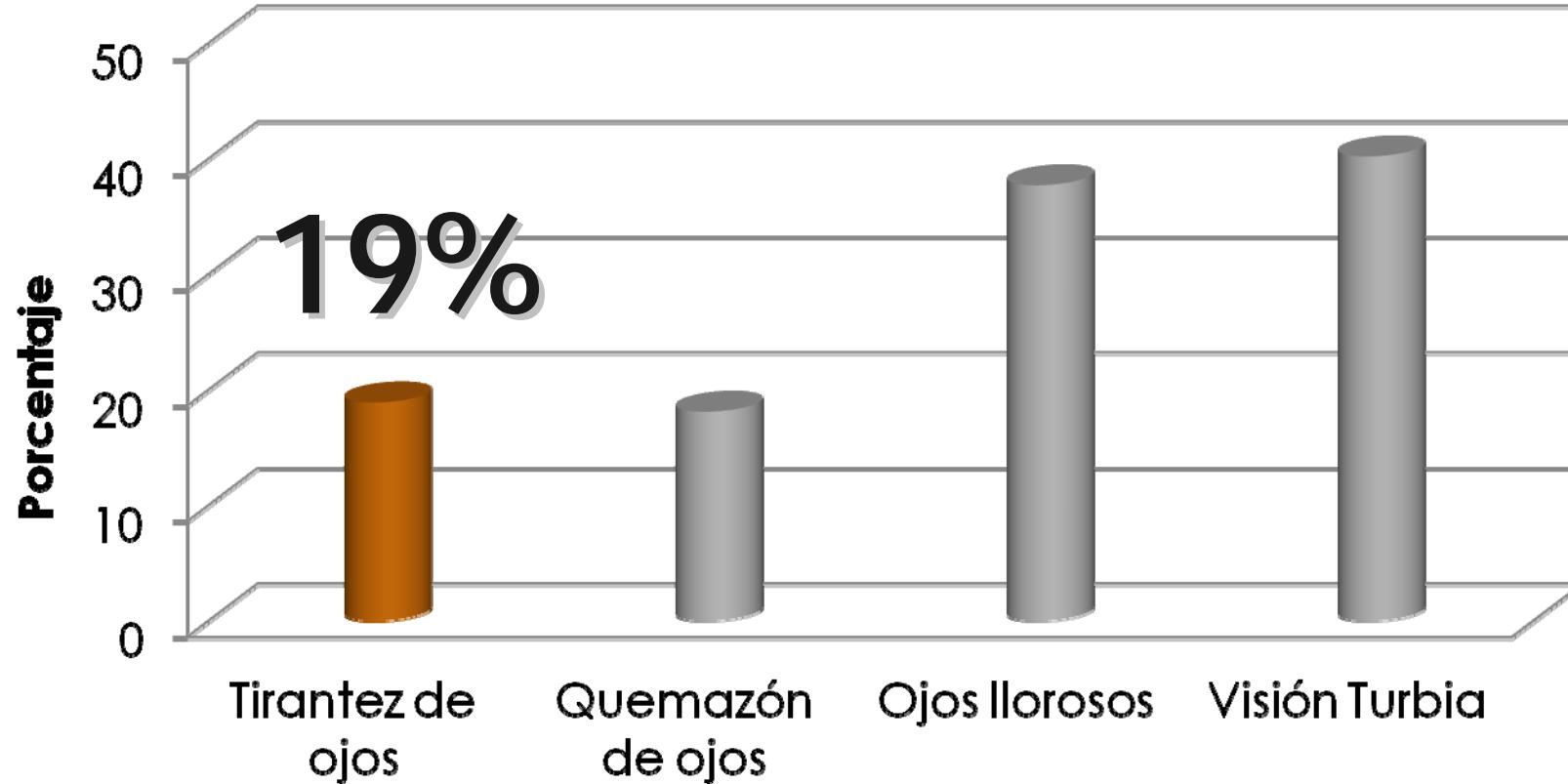
67%



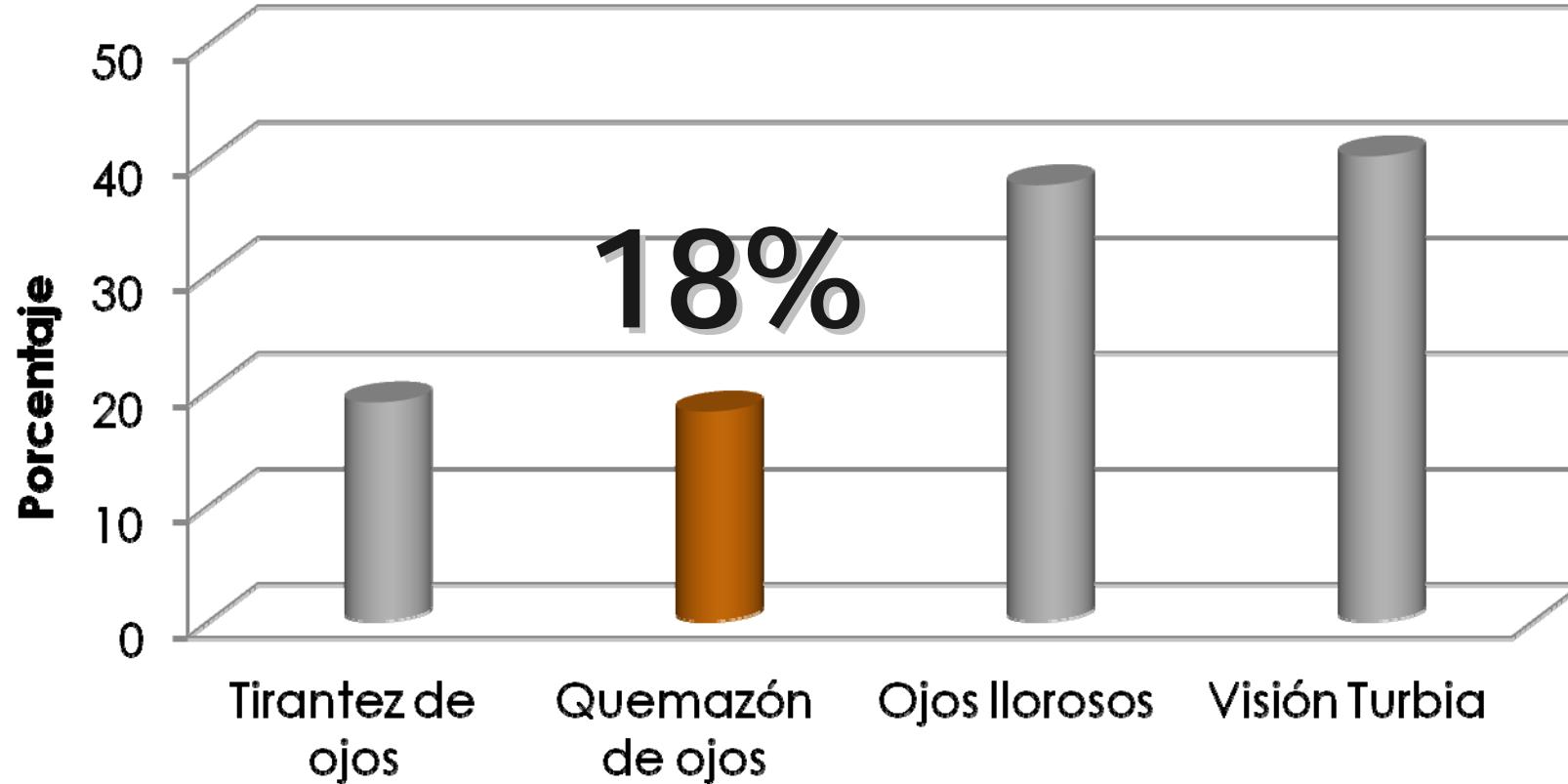
Signos/síntomas por uso de pantallas



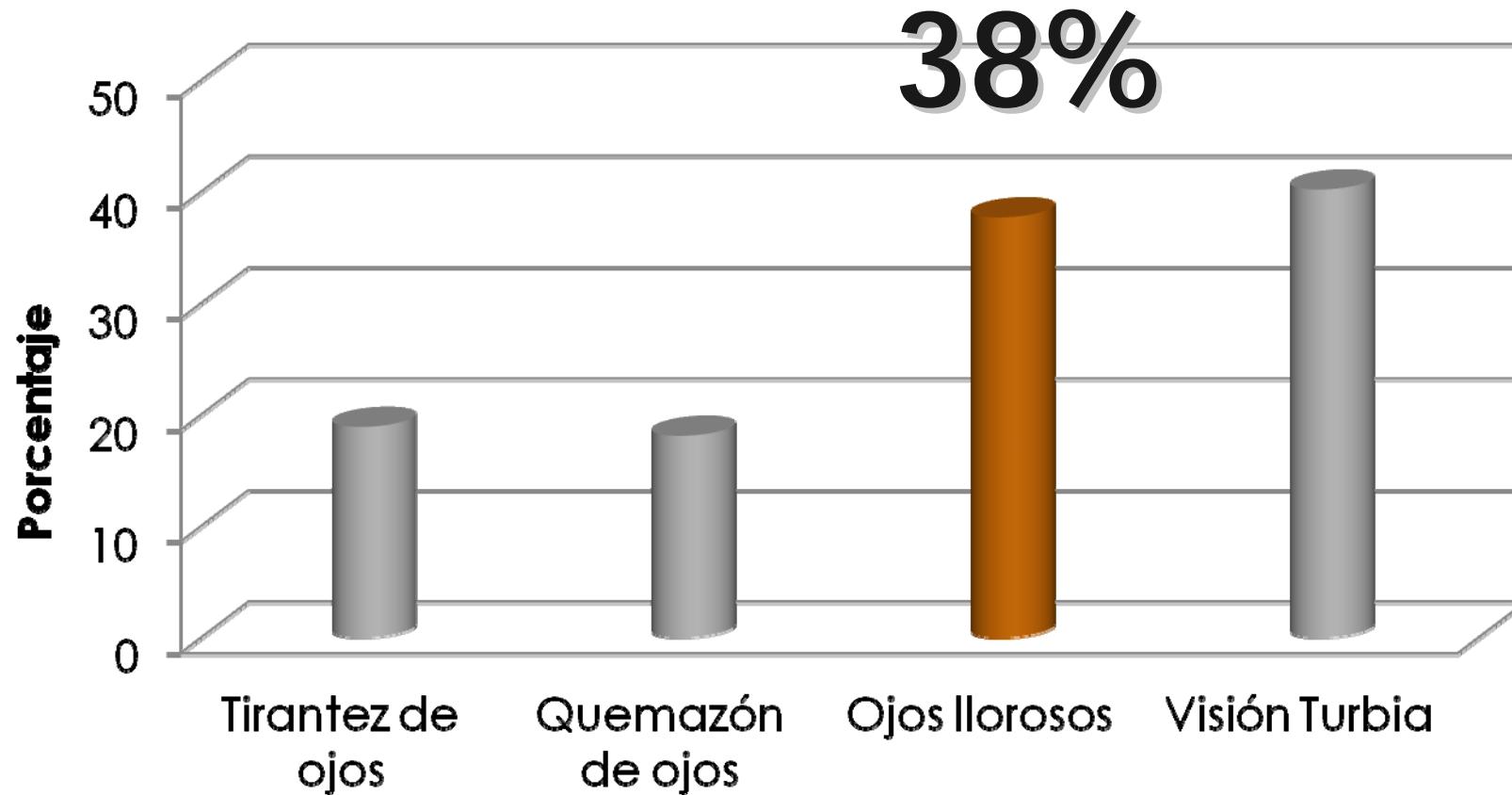
Signos/síntomas por uso de pantallas



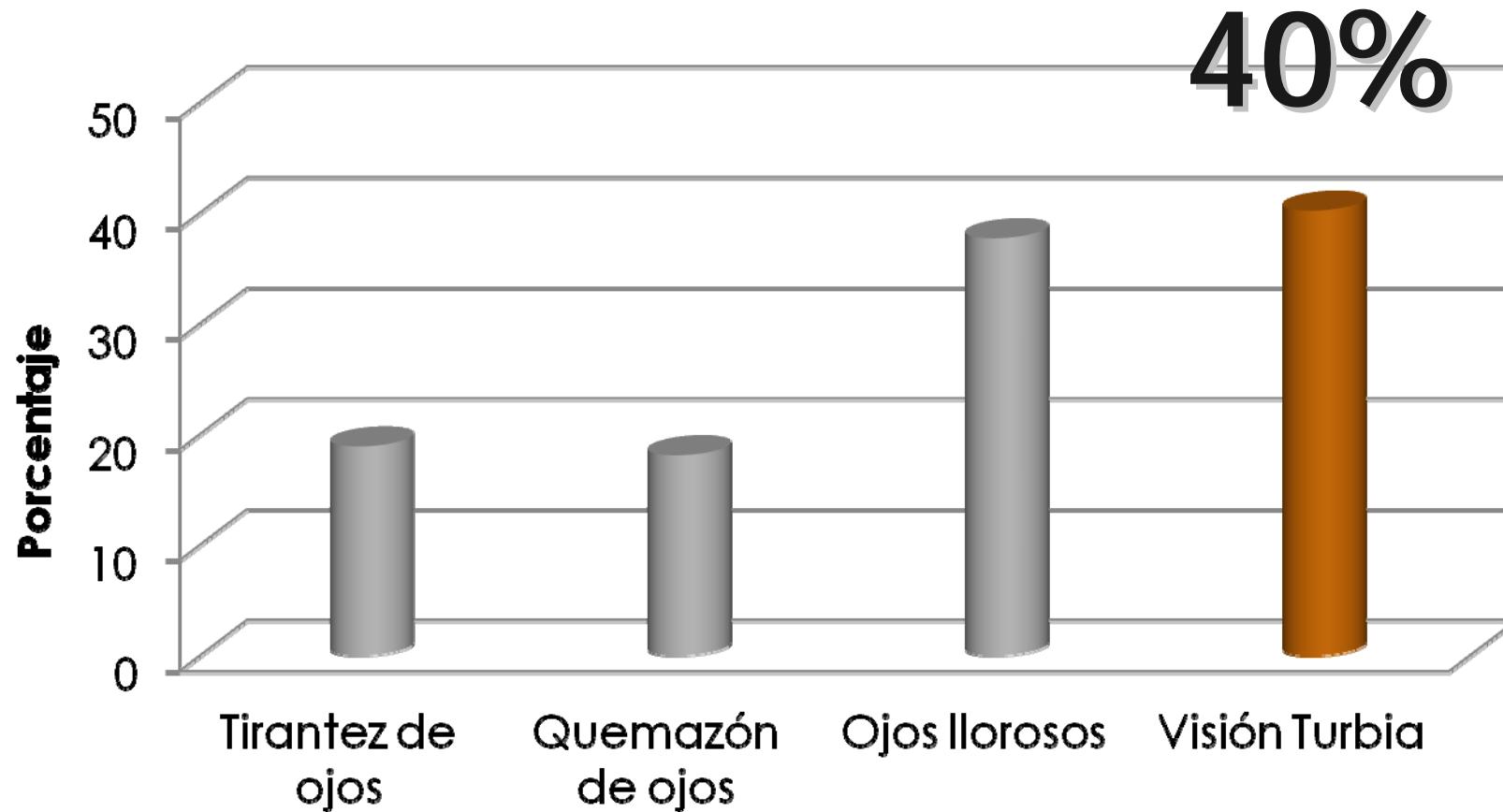
Signos/síntomas por uso de pantallas



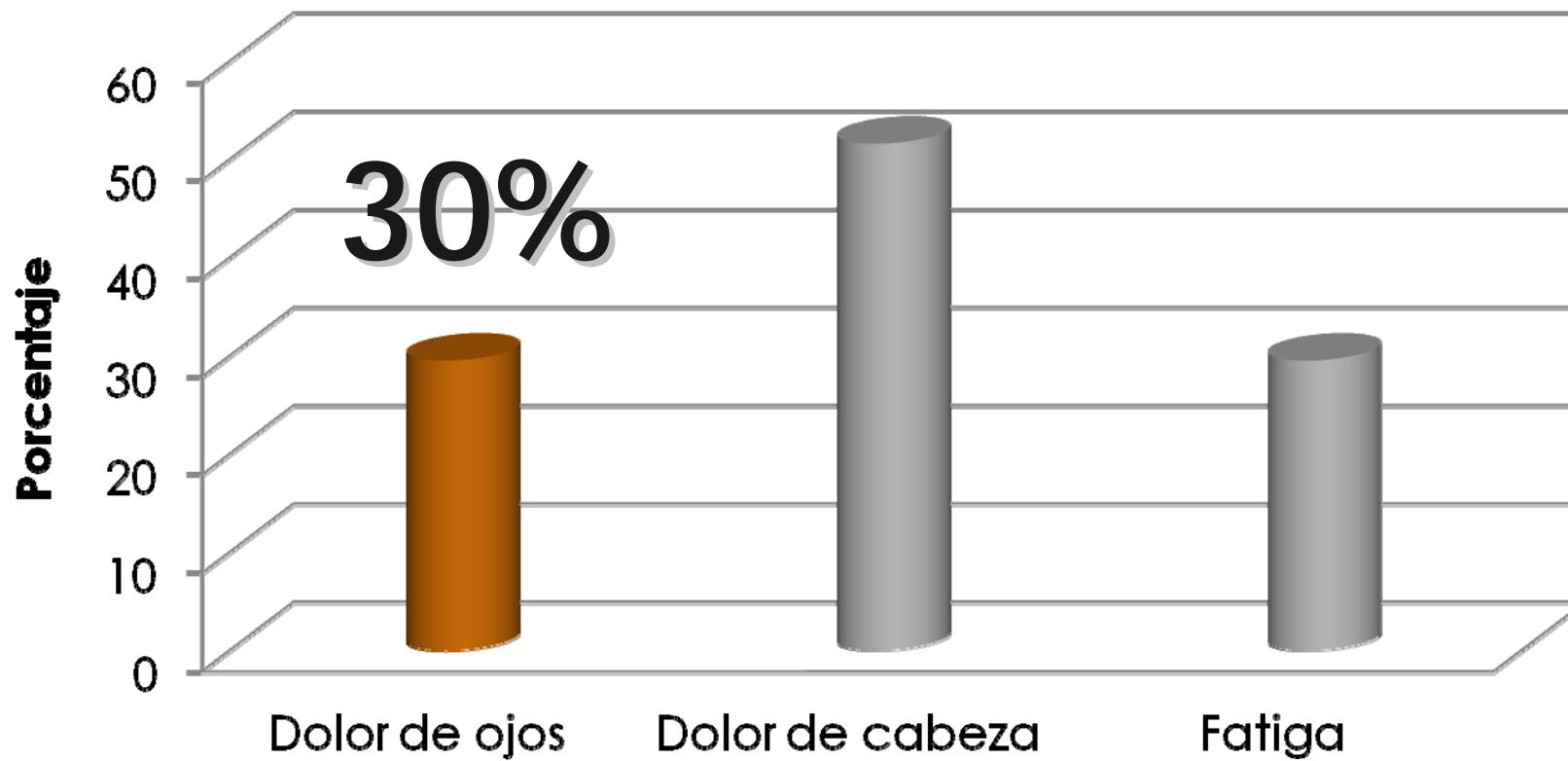
Signos/síntomas por uso de pantallas



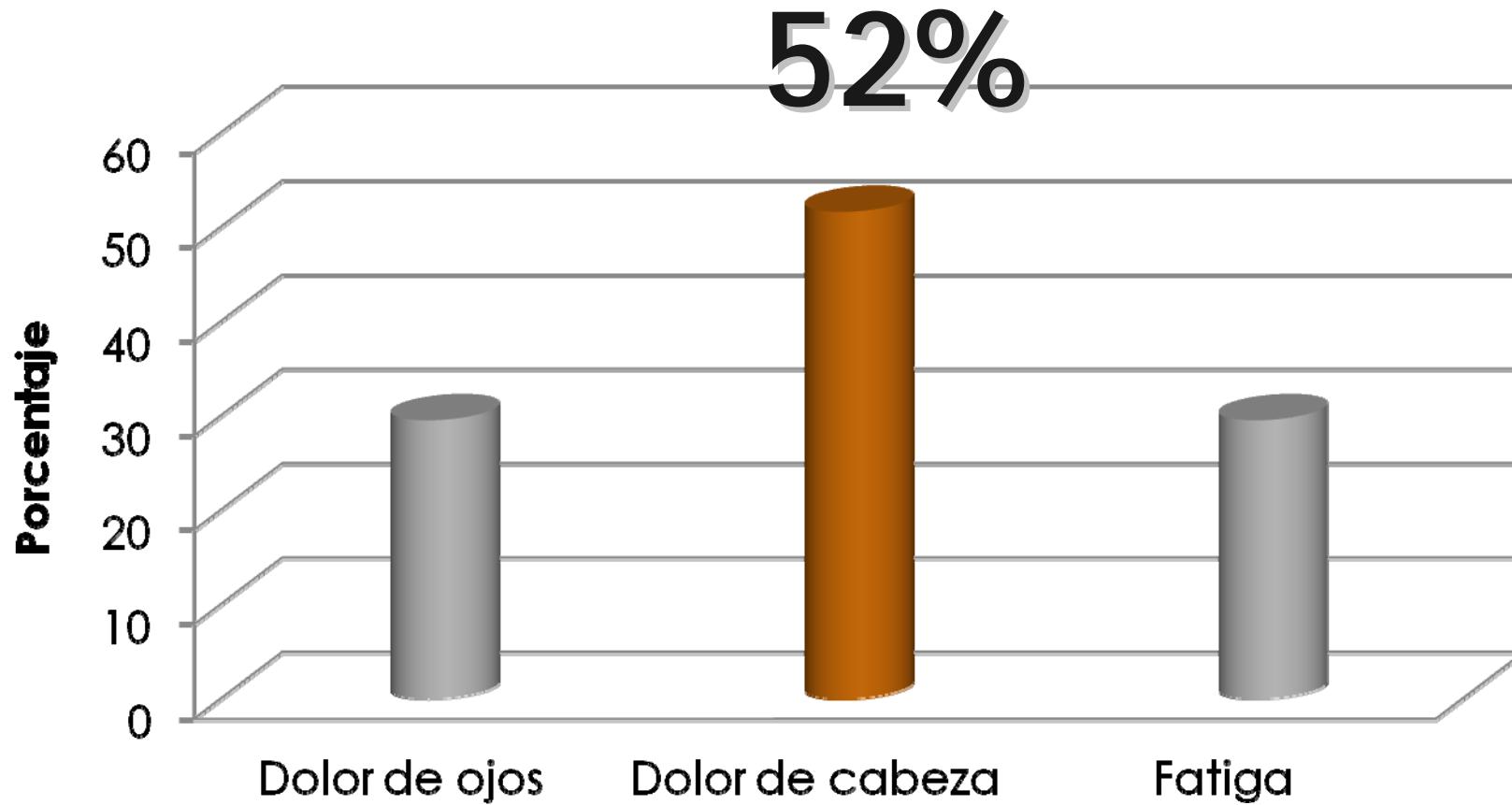
Signos/síntomas por uso de pantallas



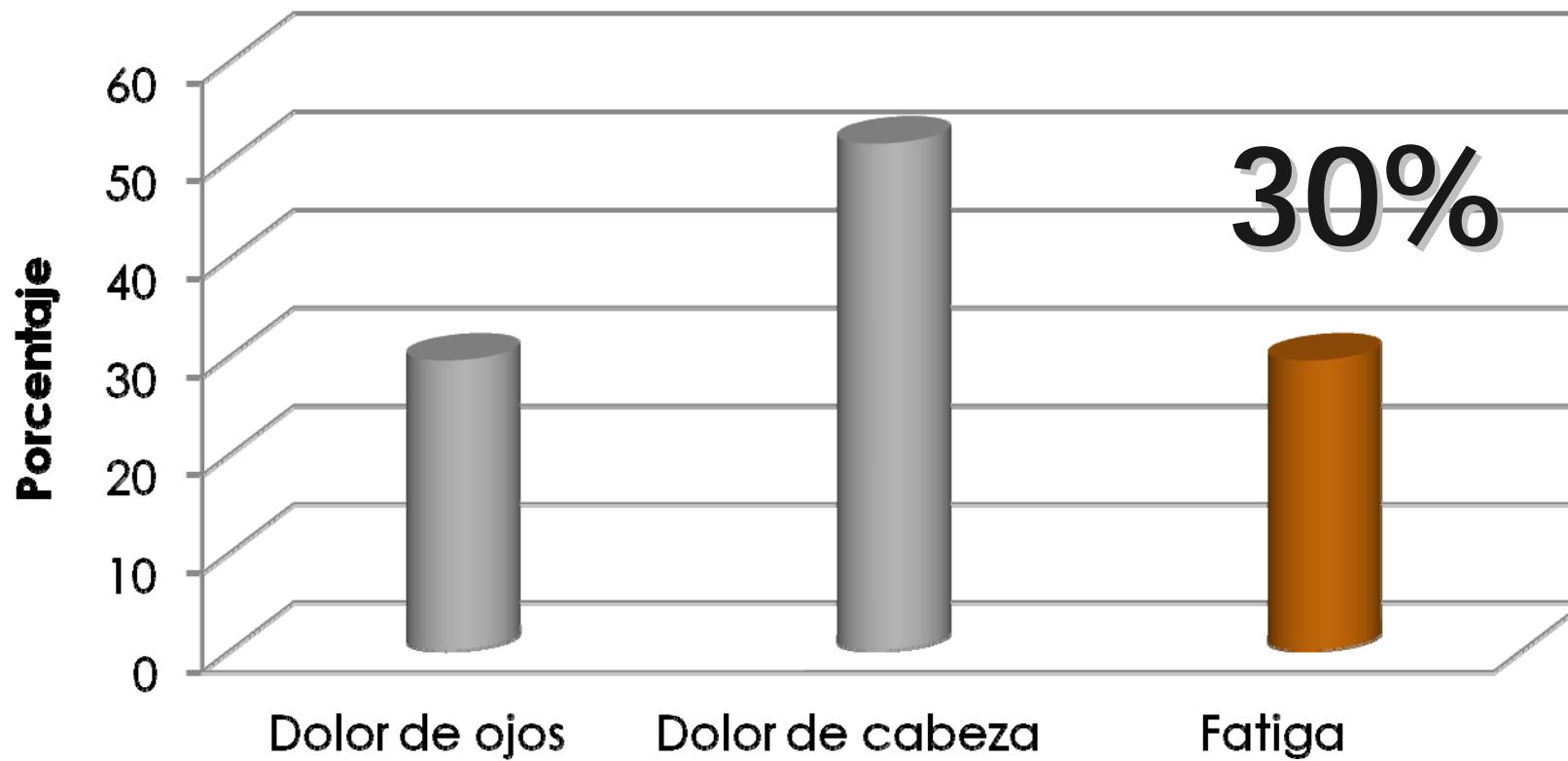
Signos/síntomas por uso de pantallas



Signos/síntomas por uso de pantallas



Signos/síntomas por uso de pantallas



Ratio de parpadeo espontáneo durante...

- ✓ Una conversación → 24 parpadeos/minuto
- ✓ Actividad frente a pantallas digitales:
 - Baja concentración → 12 parpadeos/minuto
 - Alta concentración → 9 parpadeos/minuto

Blink Rate, Blink Amplitude, and Tear Film Integrity during Dynamic Visual Display Terminal Tasks

Genís Cardona¹, Carles García¹, Carme Serés¹, Meritxell Vilaseca², and Joan Gispets¹

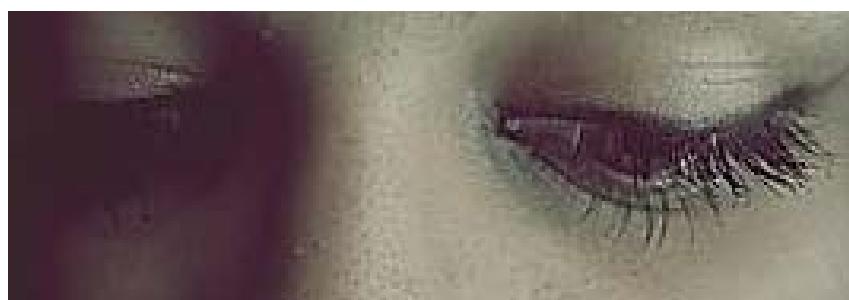
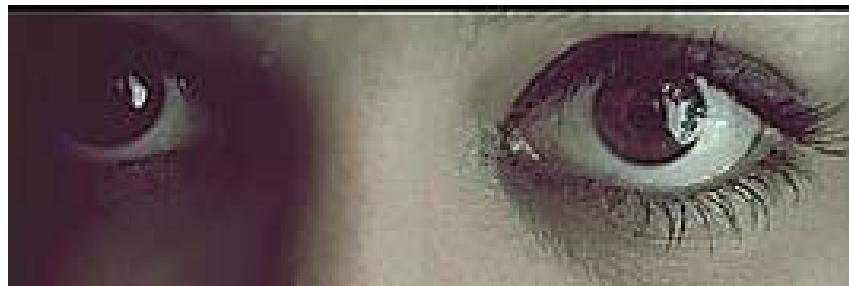
TABLE 1 Summary of results for spontaneous blink rate, meniscus height, NIBUT, phenol red thread test, and BUT corresponding to baseline conditions (BL) and to computer games with high (G1) and low (G2) rates of visual information presentation

		Mean	SD	F	p (repeated measures)	p (pair-wise comparisons)
Spontaneous blink rate (blinks/min)	BL	24.36	4.06	595.85	< 0.001*	BL/G1 (< 0.001)*
	G1	8.96	3.62			BL/G2 (< 0.001)*
	G2	12.44	4.32			G1/G2 (< 0.001)*
Meniscus height (mm)	BL	0.334	0.085	27.71	< 0.001*	BL/G1 (< 0.001)*
	G1	0.274	0.060			BL/G2 (< 0.001)*
	G2	0.278	0.061			G1/G2 (0.982)
NIBUT (s)	BL	26.88	2.13	163.49	< 0.001*	BL/G1 (< 0.001)*
	G1	19.34	2.86			BL/G2 (< 0.001)*
	G2	22.78	2.71			G1/G2 (< 0.001)*
Phenol red thread test (mm)	BL	23.88	4.08	2.56	0.087	BL/G1 (0.204)
	G1	24.96	4.28			BL/G2 (1.000)
	G2	24.32	3.89			G1/G2 (0.207)
BUT (s)	BL	16.20	3.25	408.42	< 0.001*	BL/G1 (< 0.001)*
	G1	11.53	2.92			BL/G2 (< 0.001)*
	G2	13.13	3.06			G1/G2 (< 0.001)*

Results are displayed as mean ± SD. *Denotes a statistically significant difference.

Blink Rate, Blink Amplitude, and Tear Film Integrity during Dynamic Visual Display Terminal Tasks

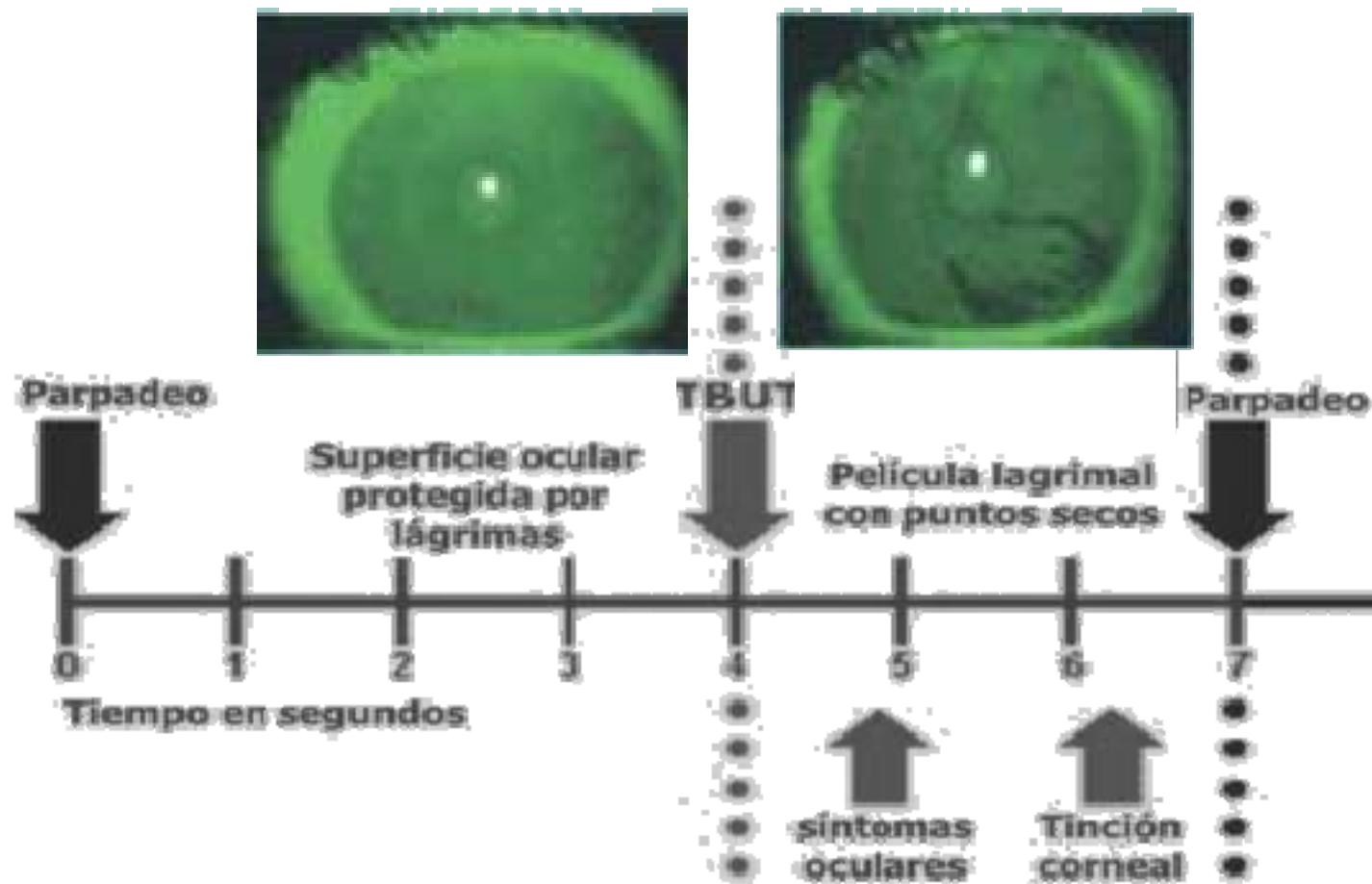
Genís Cardona¹, Carles García¹, Carme Serés¹, Meritxell Vilaseca², and Joan Gispets¹



Amplitud de
parpadeo
50%

Blink Rate, Blink Amplitude, and Tear Film Integrity during Dynamic Visual Display Terminal Tasks

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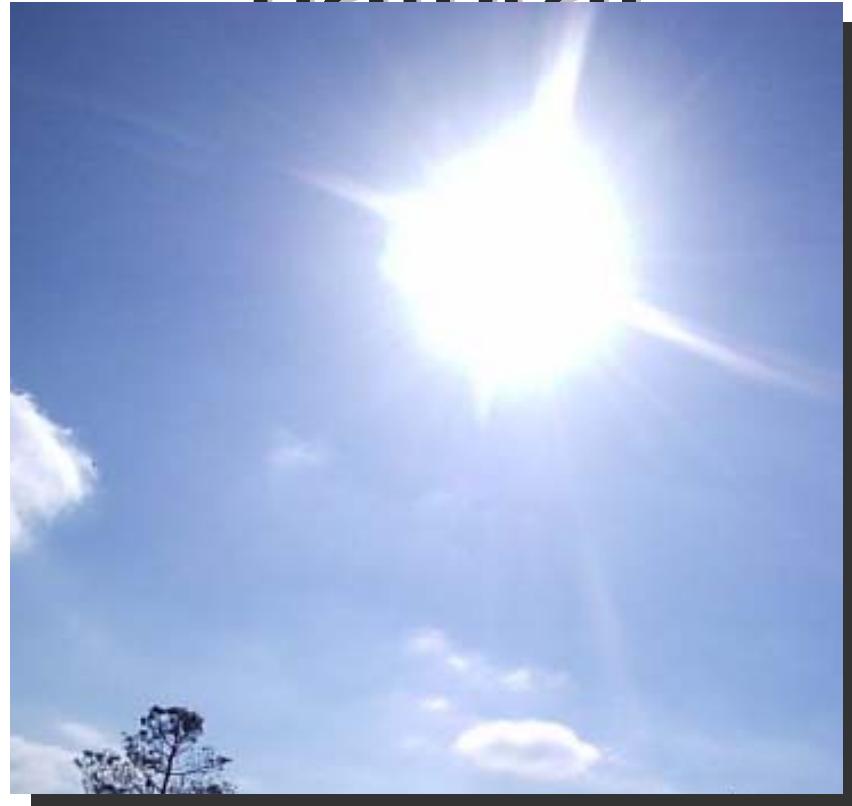


Luz blanca Natural y Artificial

6.000 horas/año

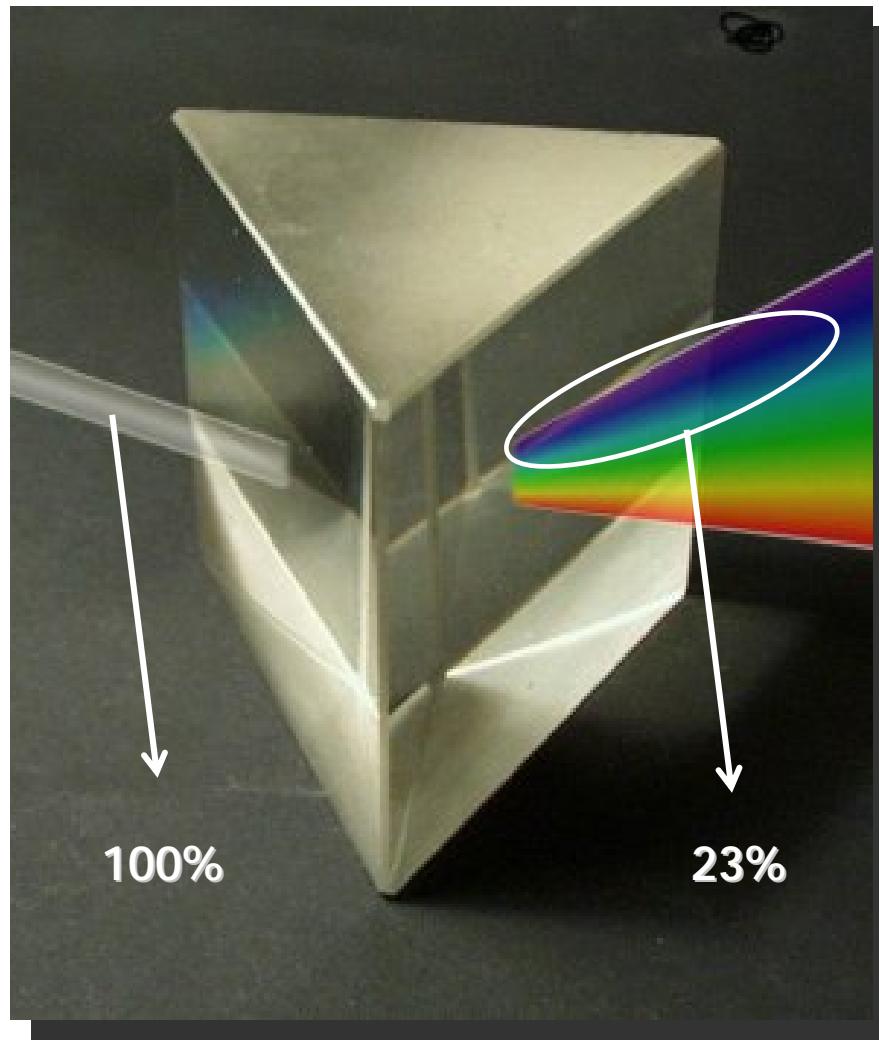
23%

Luz
natural



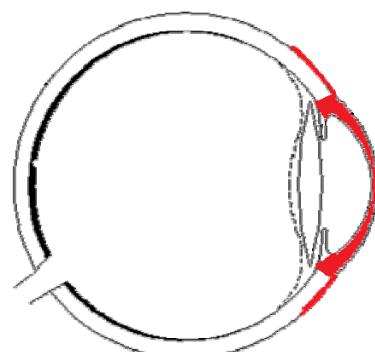
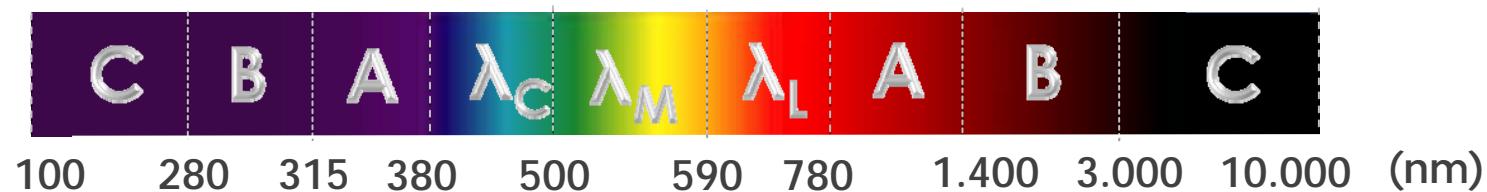
Luz artificial





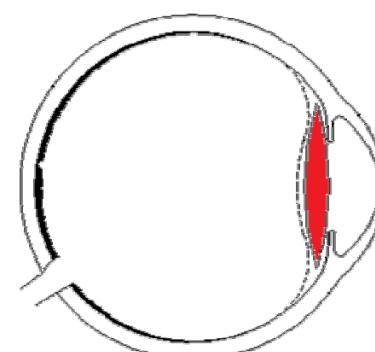
Absorción de Radiación

UV **VIS** **IR**



UV (B y C)

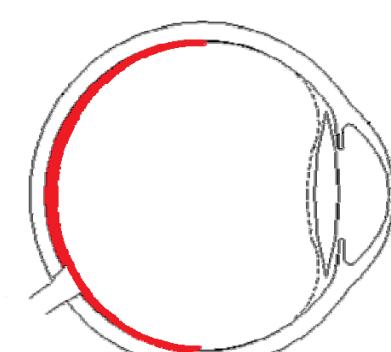
IR (B y C)



UV (A)

IR (A)

VIS (λ_C)

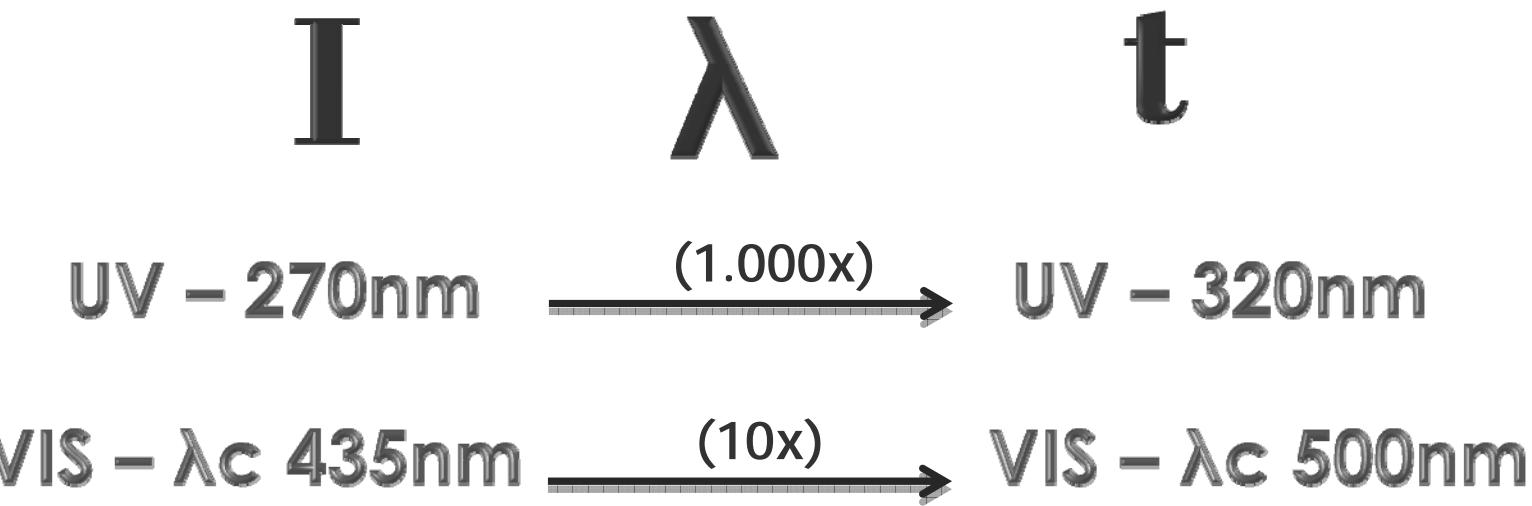
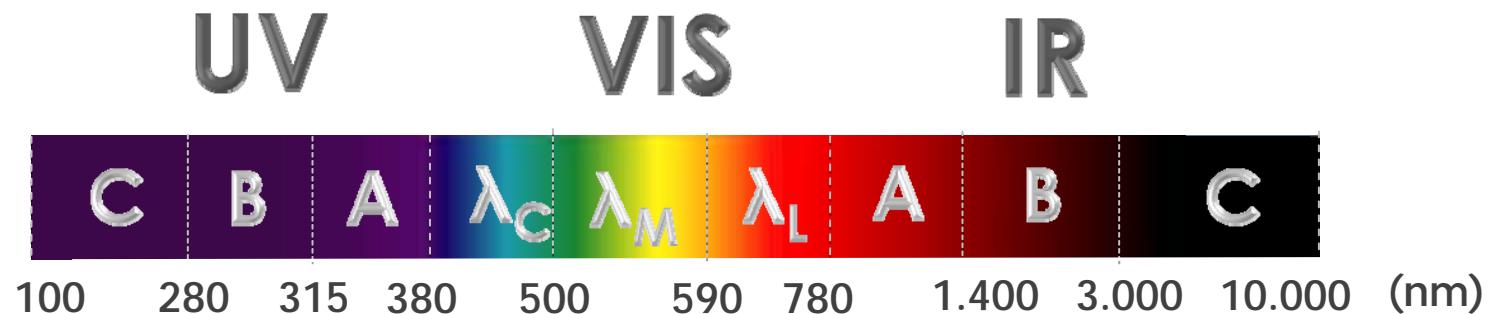


UV (A)

IR (A)

VIS (λ_C)

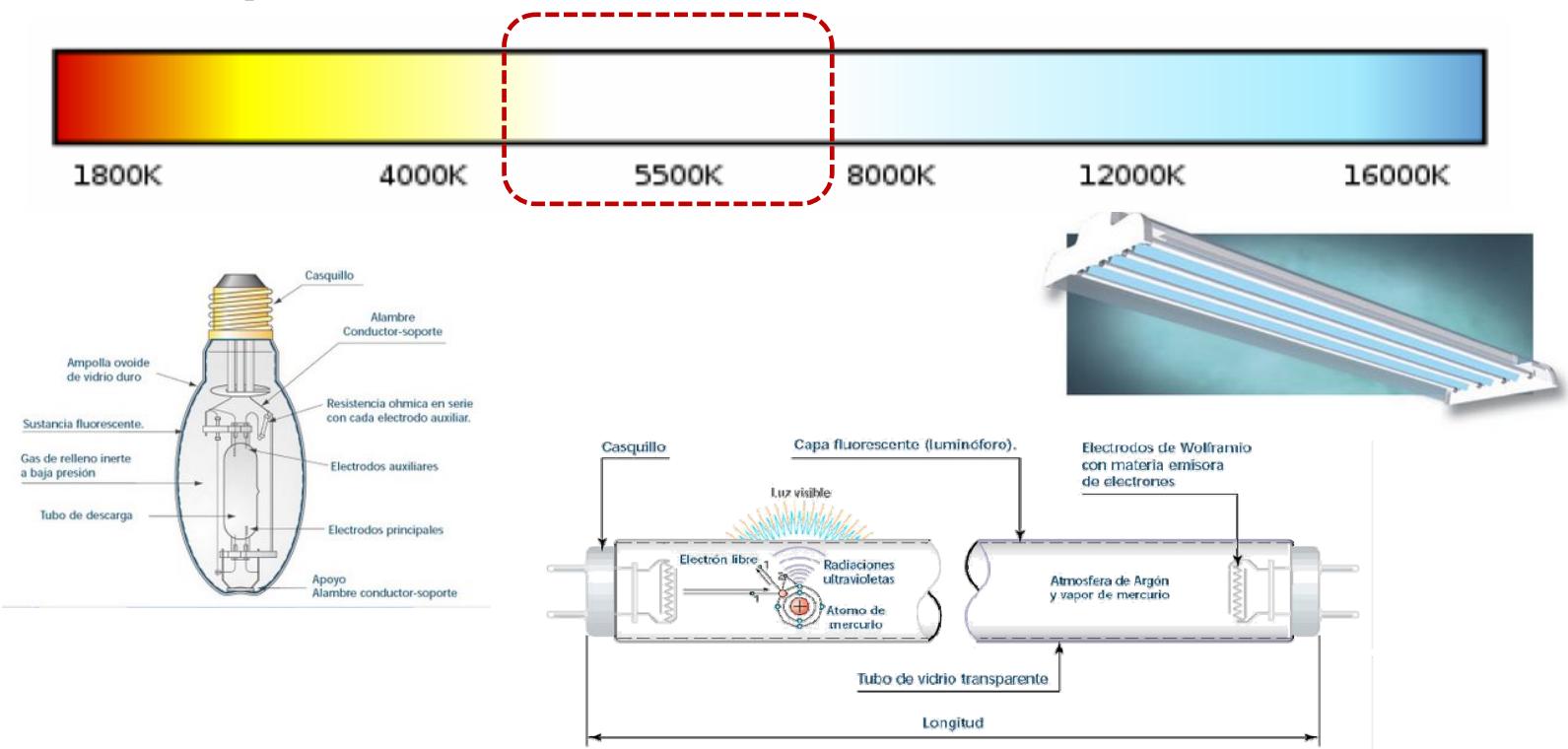
Absorción de Radiación



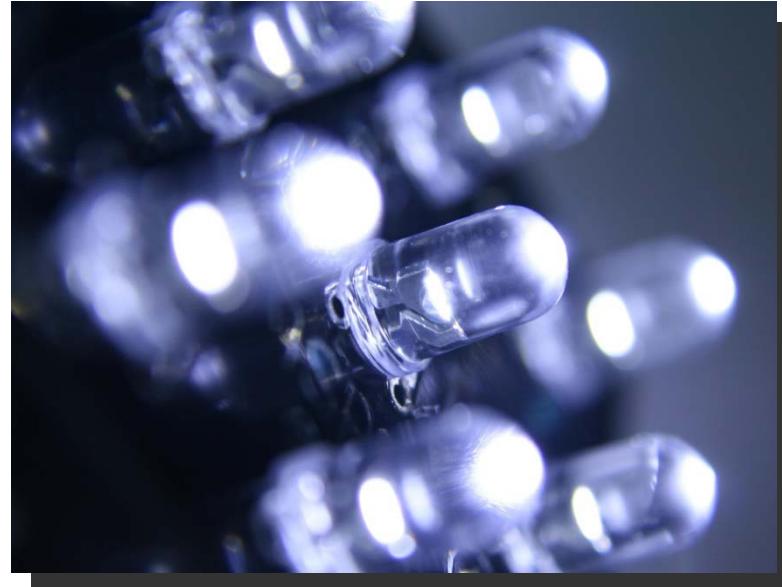
Luz artificial

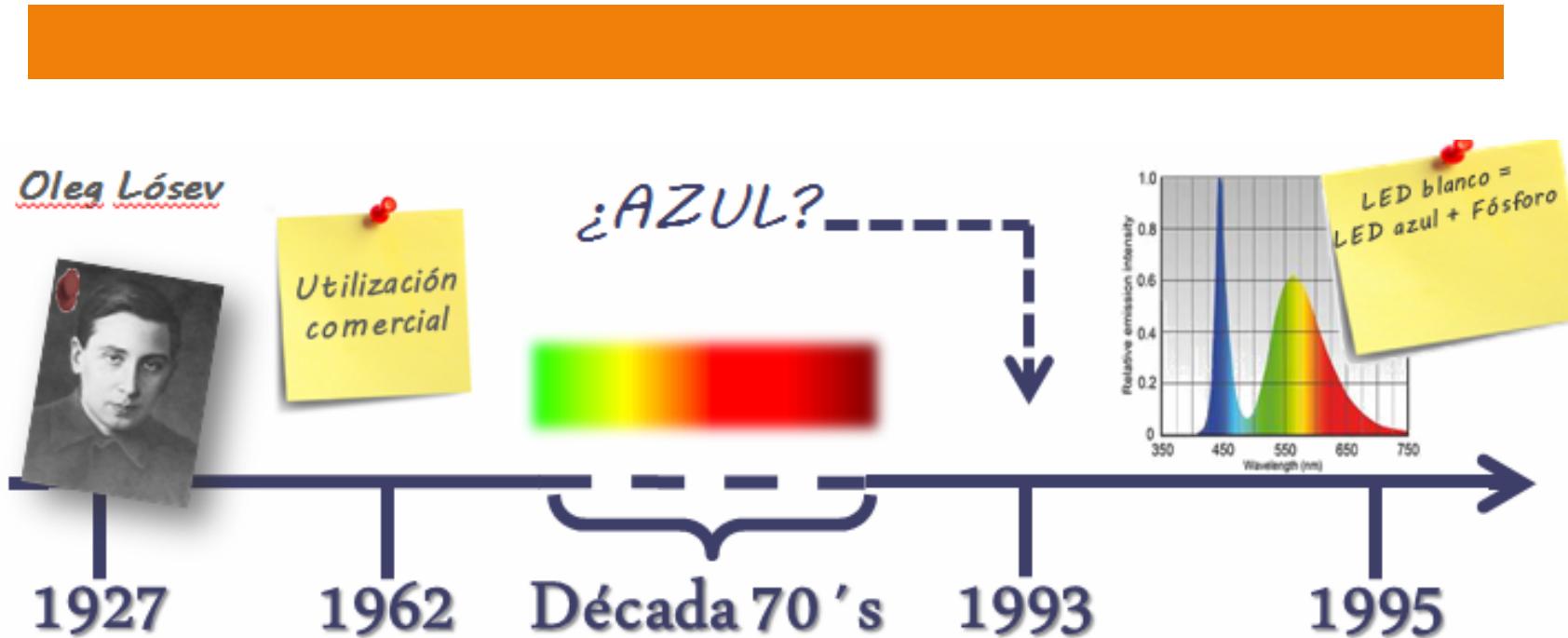
El tiempo de exposición a luz artificial oscila entre el **20%** y el **80%**

La Temperatura de color



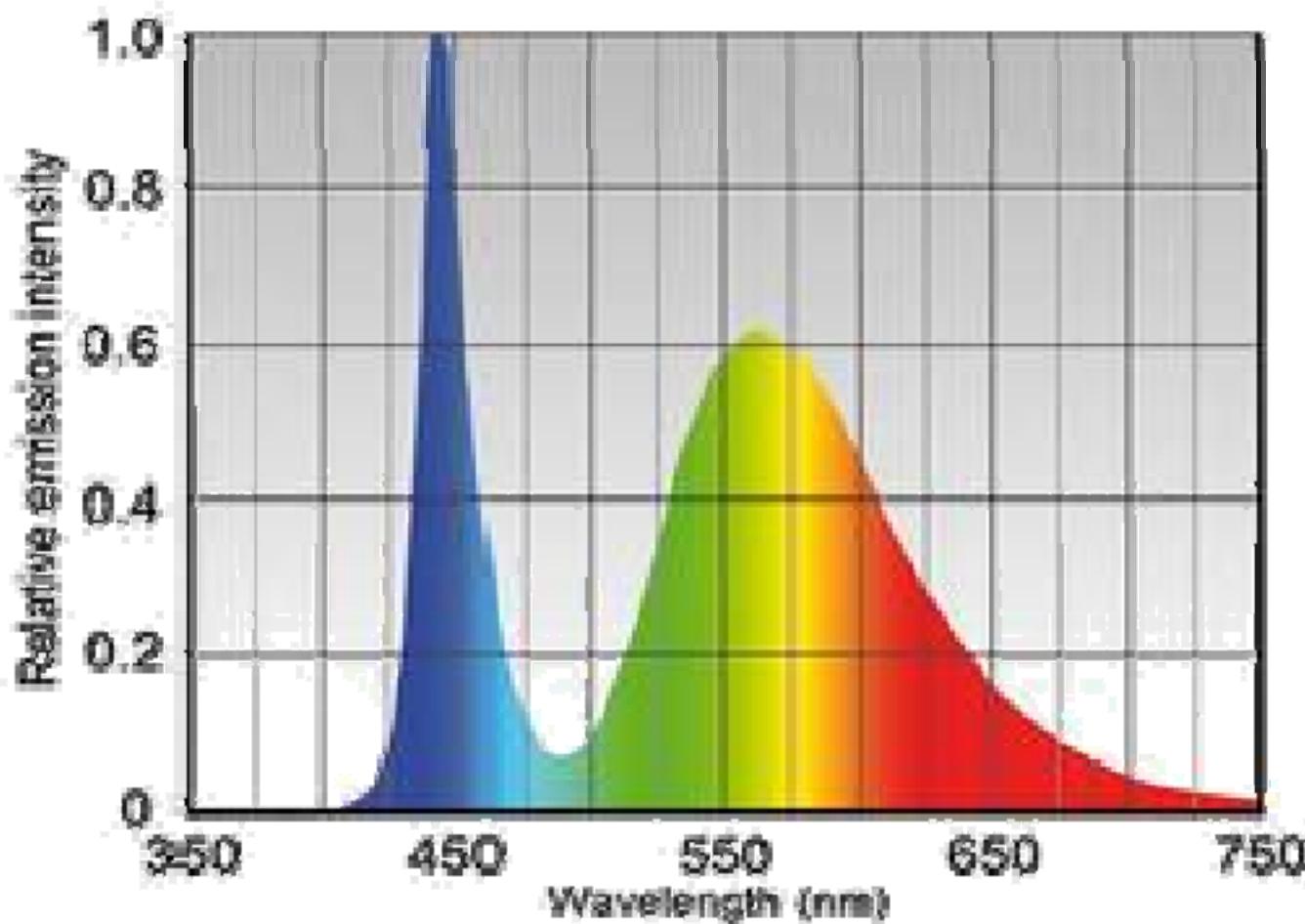
Iluminación LEDs



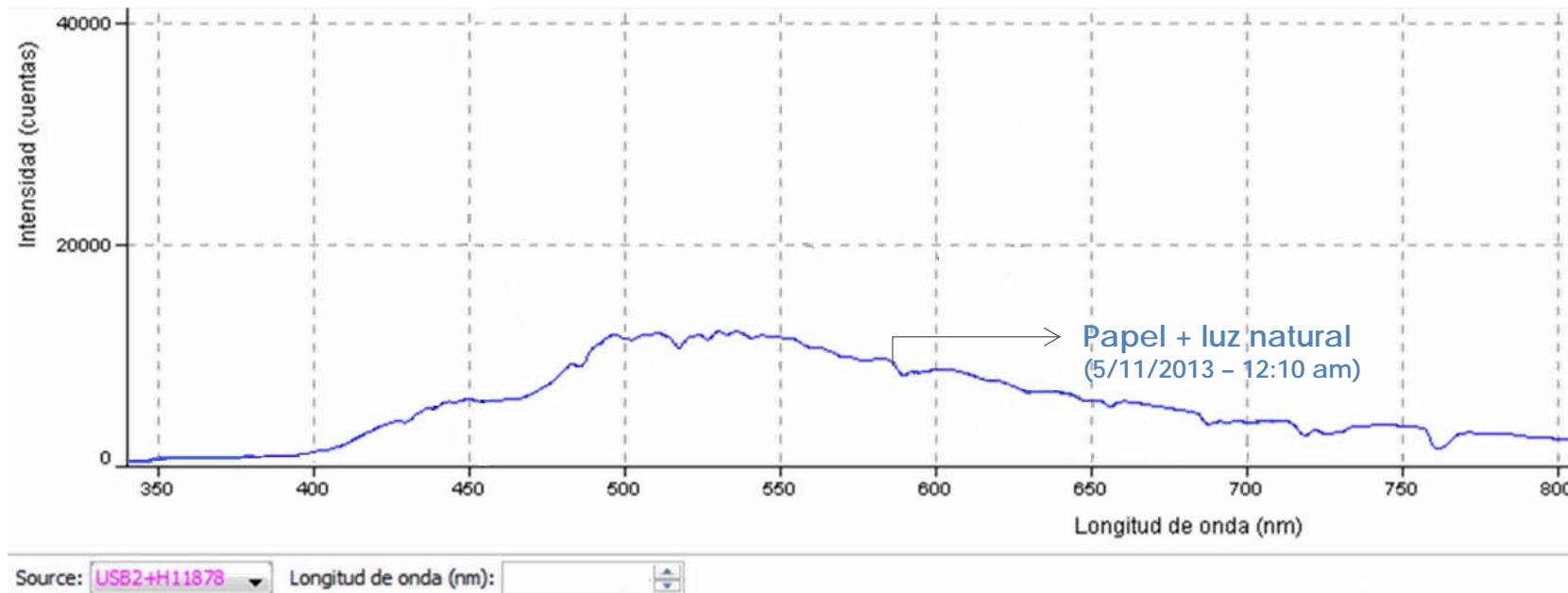


Light-emitting diodes (LED) for domestic lighting: Any risks for the eye?

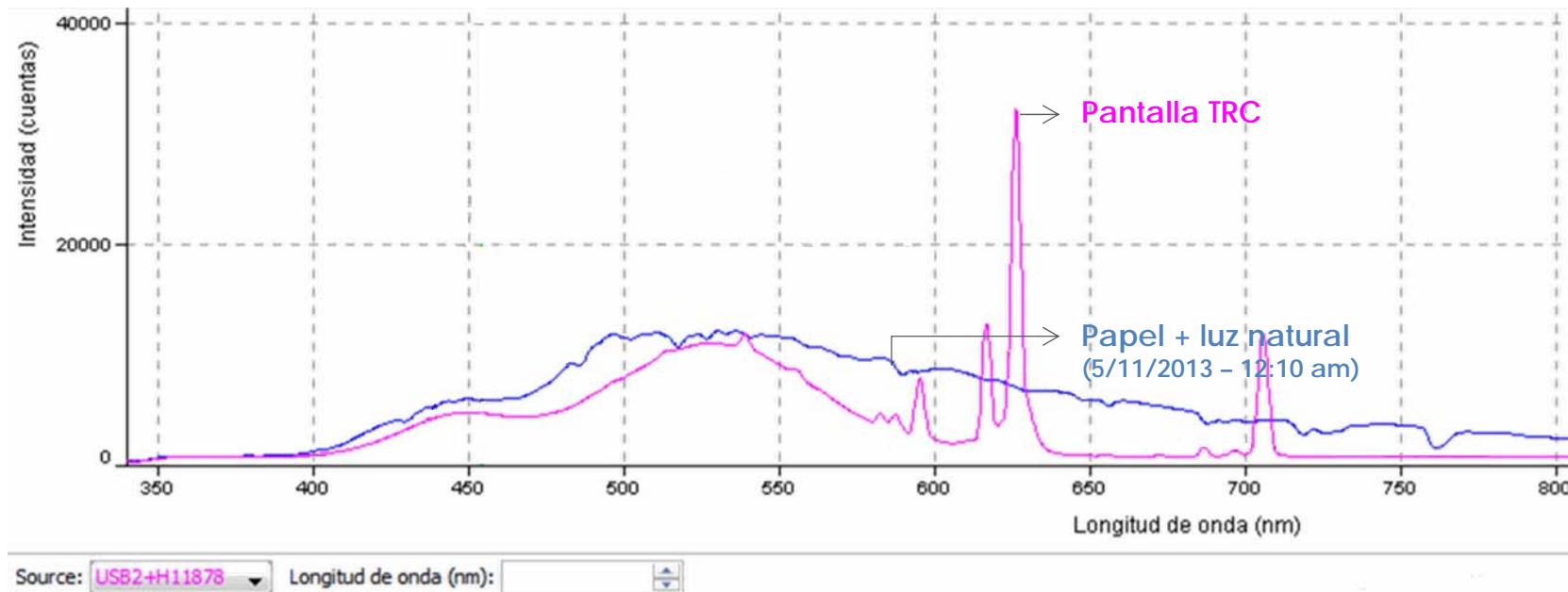
F. Behar-Cohen^{a,b,c,*}, C. Martinsons^d, F. Viénot^e, G. Zissis^f, A. Barlier-Salsi^g, J.P. Cesarini^h, O. Enoufⁱ, M. Garcia^d, S. Picaud^{j,k}, D. Attia^h



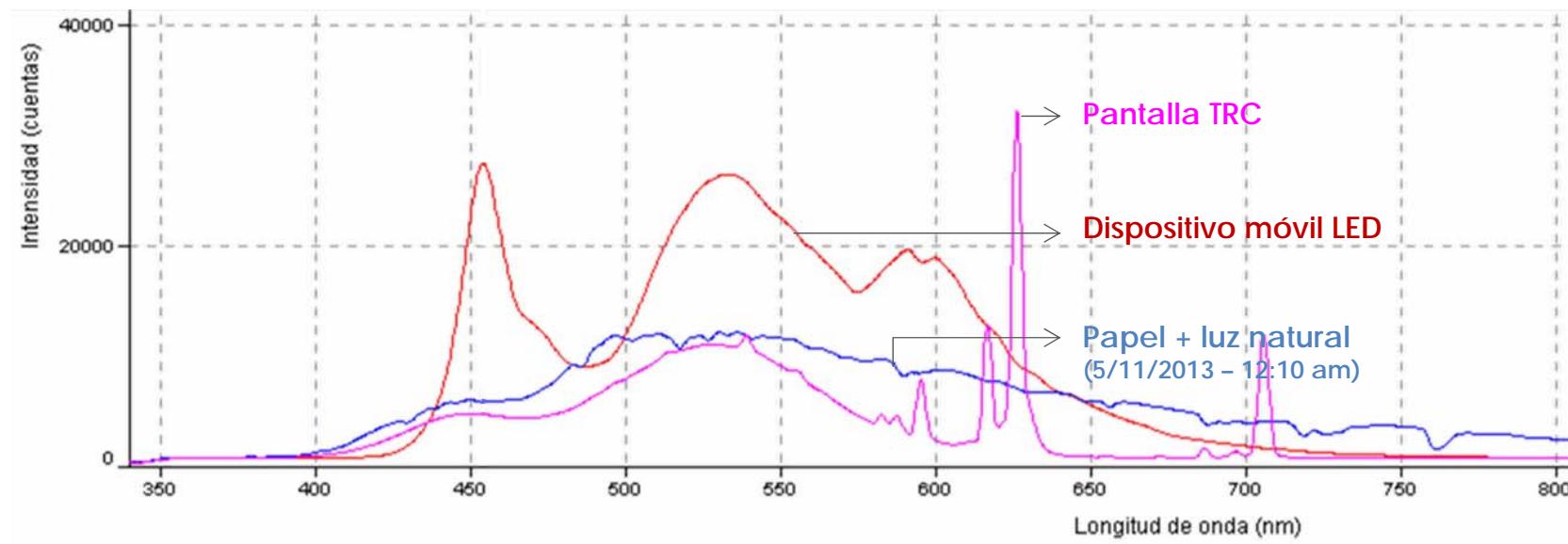
Comparación Papel + luz natural



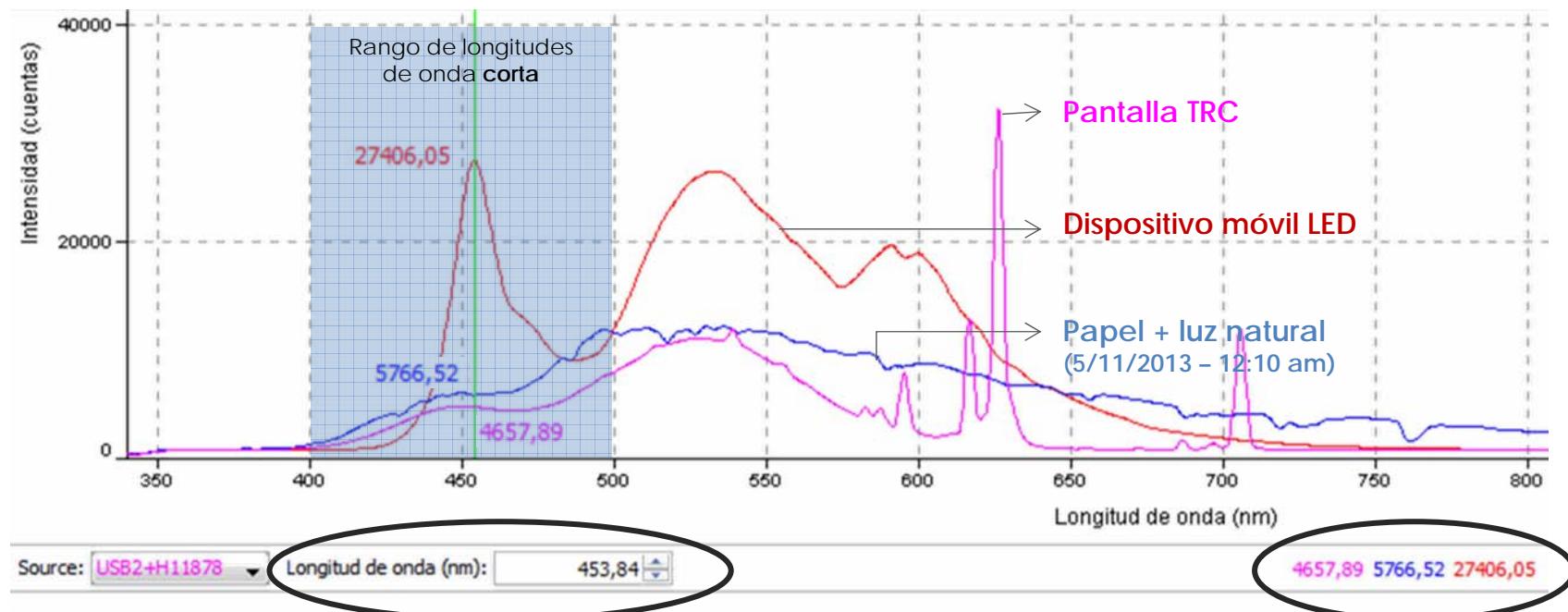
Comparación Papel + luz natural, Pantalla TRC



Comparación Papel + luz natural, Pantalla TRC y Pantalla LED



Comparación Papel + luz natural, Pantalla TRC y Pantalla LED



CC
Pc

Intensidad (cuentas) :uentas)

Sour-

400

Rango de longitudes
de onda **corta**

27406,05

5766,52

4657,89



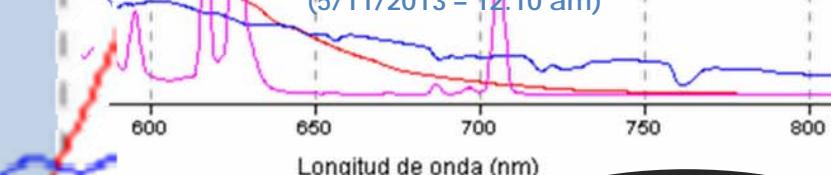
la TRC y Pantalla

Luz tóxica a
eliminar
parcialmente

→ Pantalla TRC

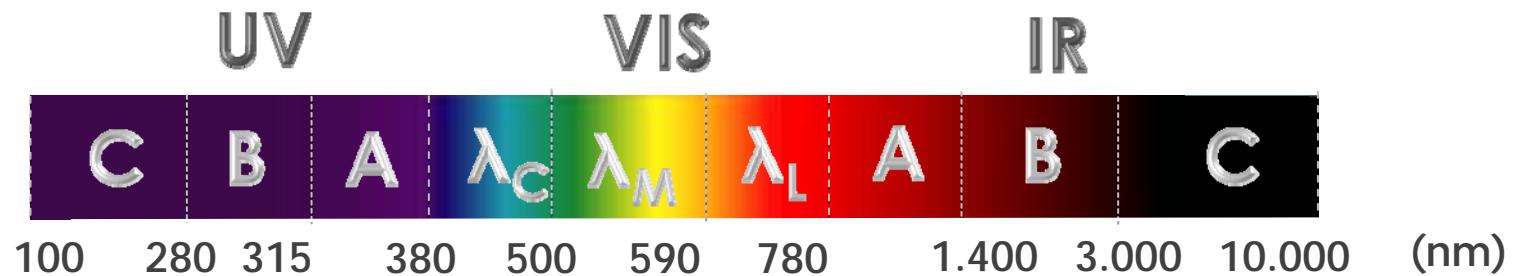
→ Dispositivo móvil LED

Papel + luz natural
(5/11/2013 - 12:10 am)



4657,89 5766,52 27406,05

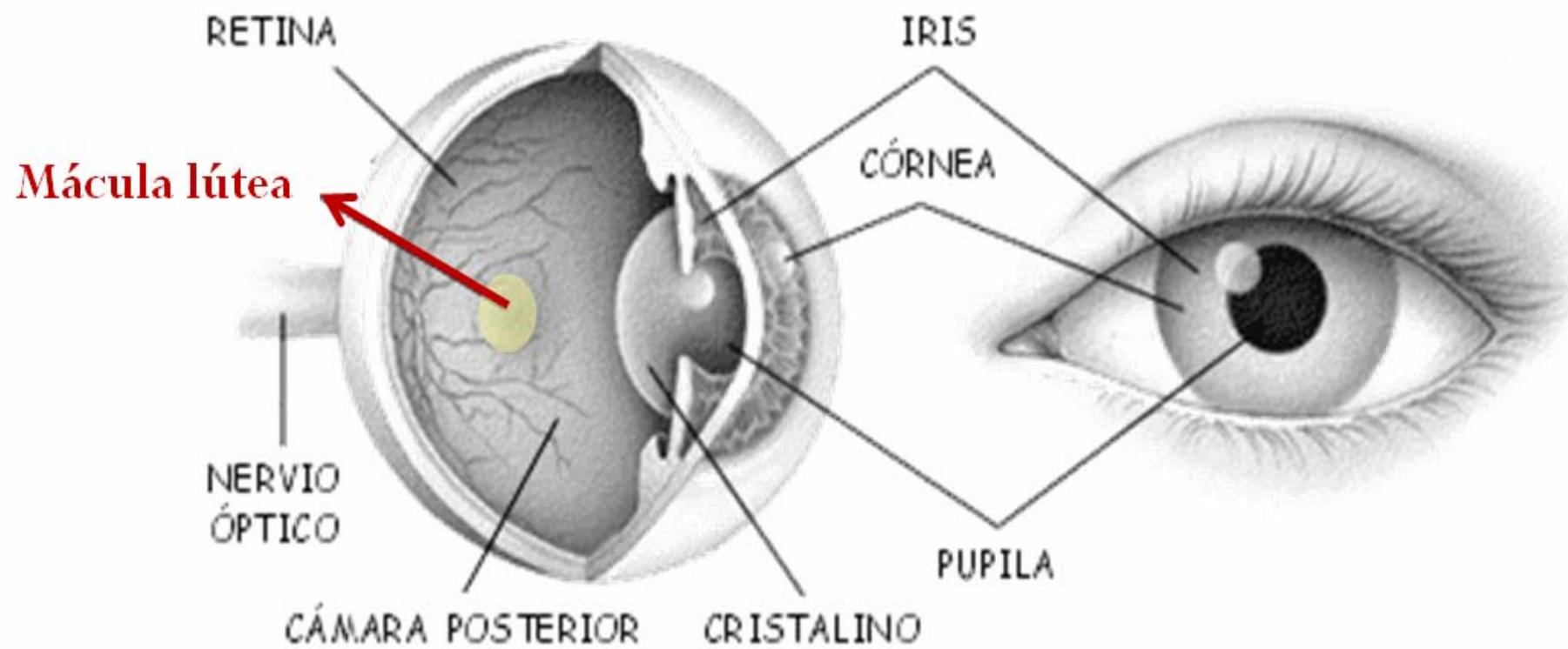
Absorción de la Radiación



Tiempo de exposición (t)

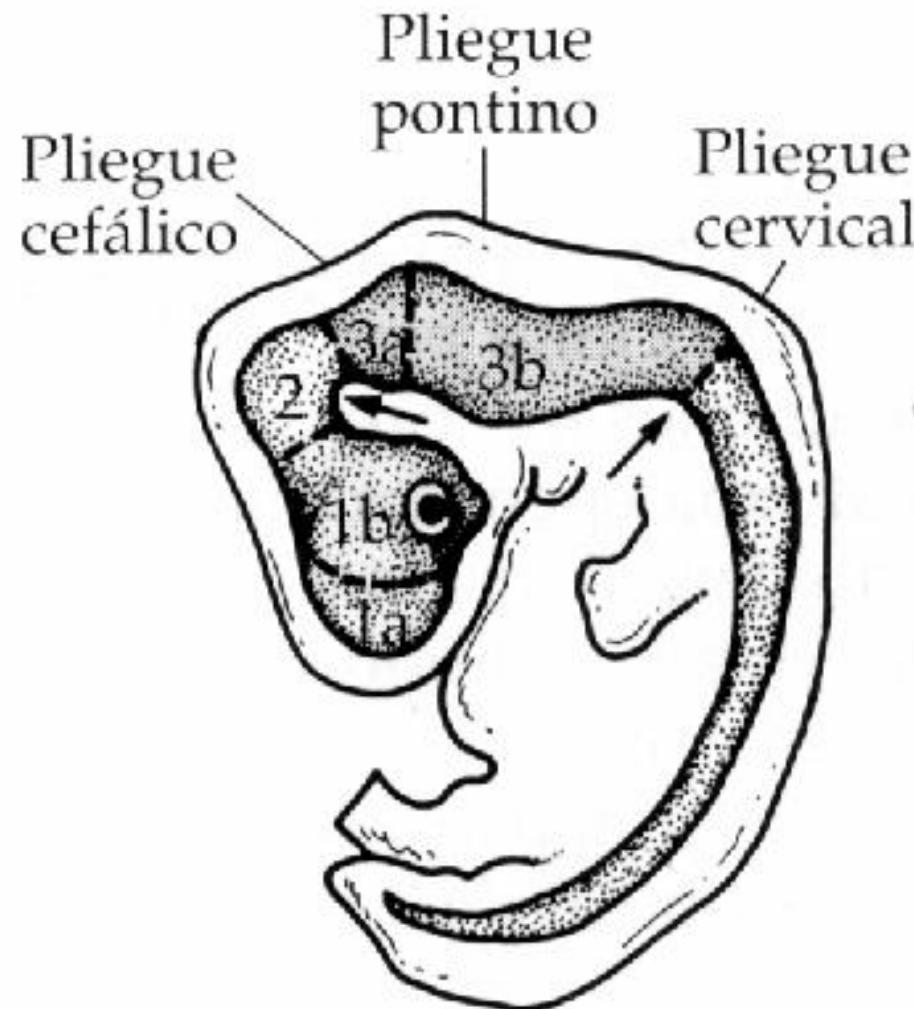
Intensidad de la luz (I)

Composición espectral (λ)



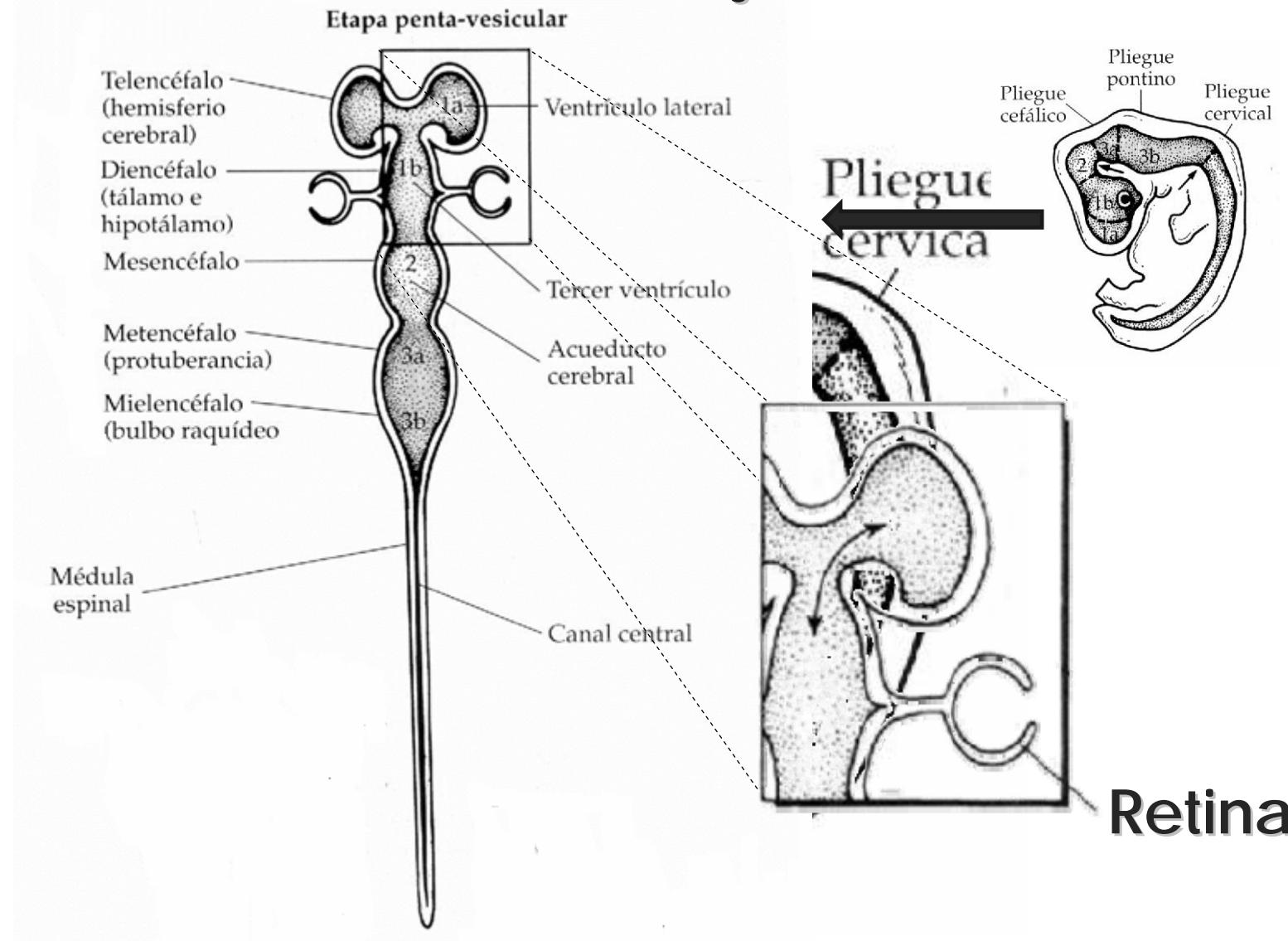
Retina: Embriología

Desarrollo del ojo humano



Retina: Embriología

Desarrollo del ojo humano



PROBLEMA:

FOTOTOXICIDAD

DAÑOS FOTOTÓXICOS

Fototérmicos

$$\uparrow E_c \uparrow \circ T$$

Fotomecánicos

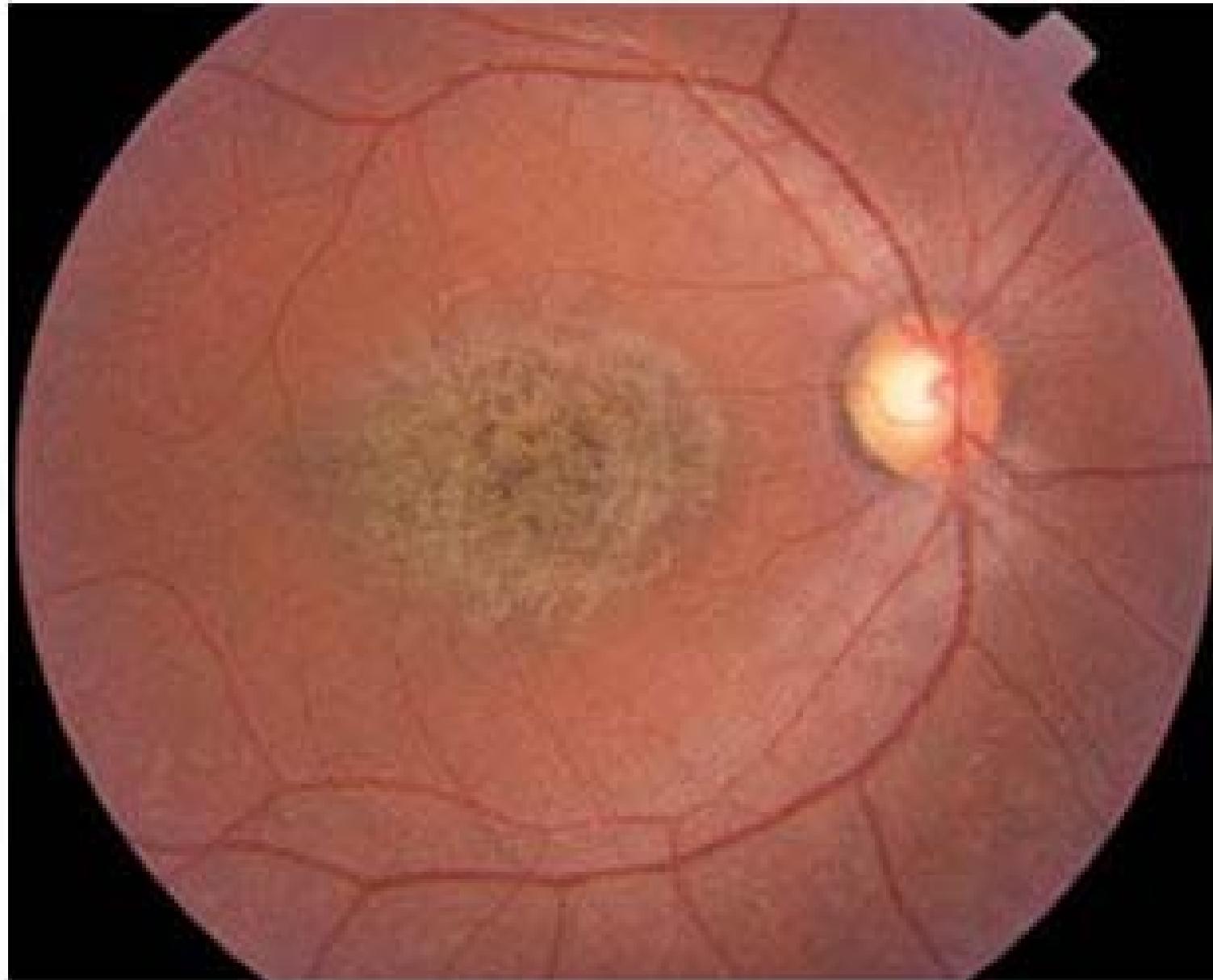
Ondas de choque

Fotoquímicos

Ruptura de enlaces
ROS









Eyes are one of the first things we notice about a person. They can tell us a lot about what is going on inside a person's head. For example, if a person is lying, their eyes will often look away from the person they are speaking to. This is because they are trying to avoid eye contact, which can be a sign of dishonesty. Eyes are also important for reading emotions. For example, if a person is angry, their eyes will be wide and their pupils will be dilated. This is because the brain is sending signals to the eyes to increase the amount of light that enters them, so that they can better detect the anger in the person's face. Eyes are also important for social interaction. For example, when we make eye contact with someone, it can help us to build a connection with them. It can also help us to understand what they are thinking and feeling. Eyes are one of the most important parts of our body, and they can tell us a lot about what is going on inside a person's head.

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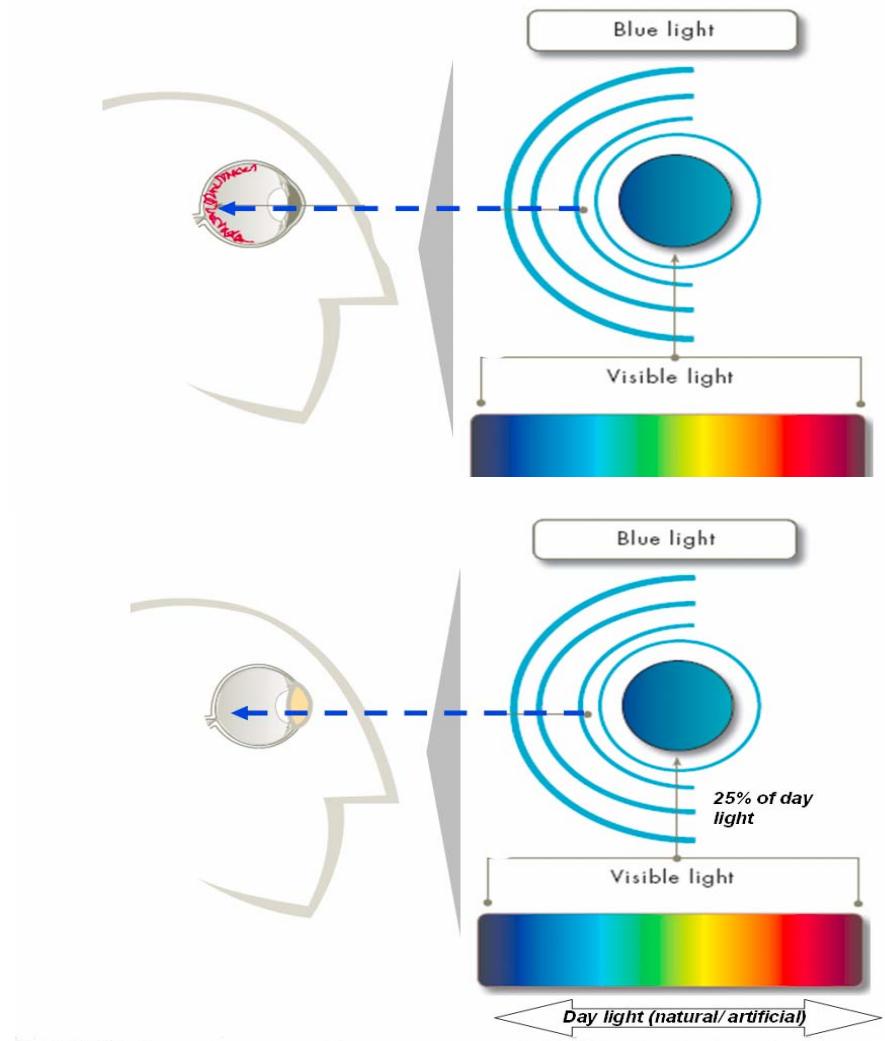


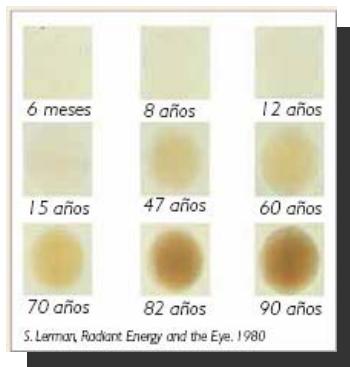


OBSERVACIÓN: **FOTOPROTECCIÓN NATURAL**

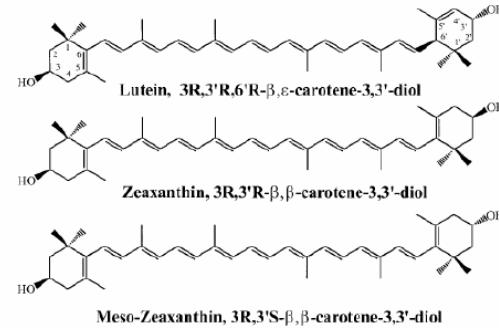


Protección fisiológica contra fototoxicidad

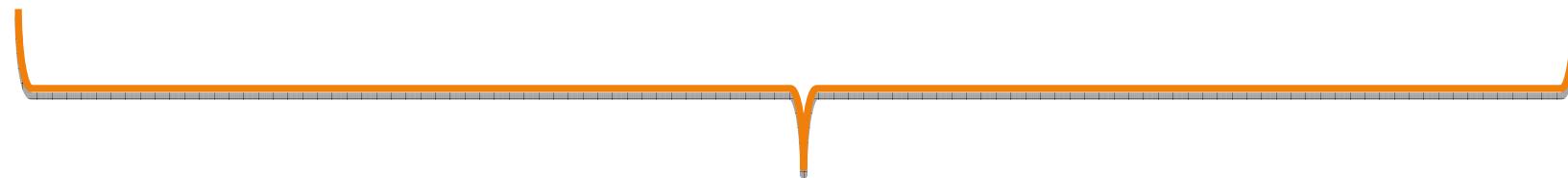
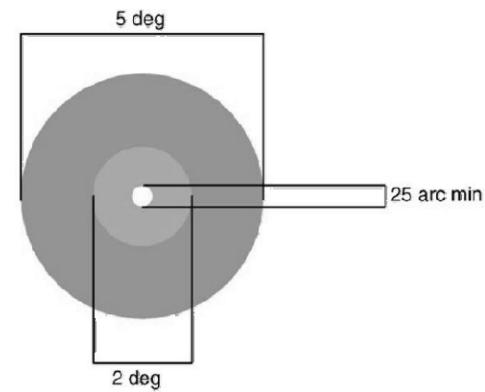




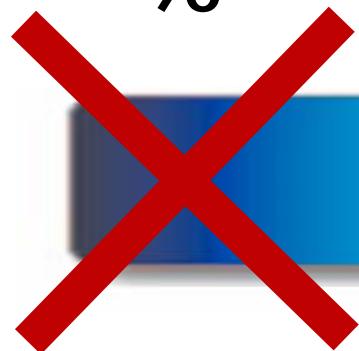
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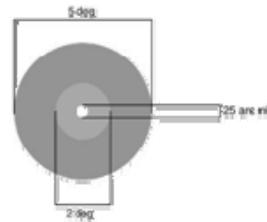
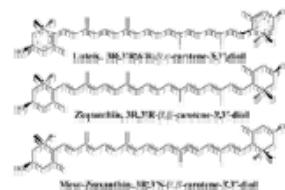
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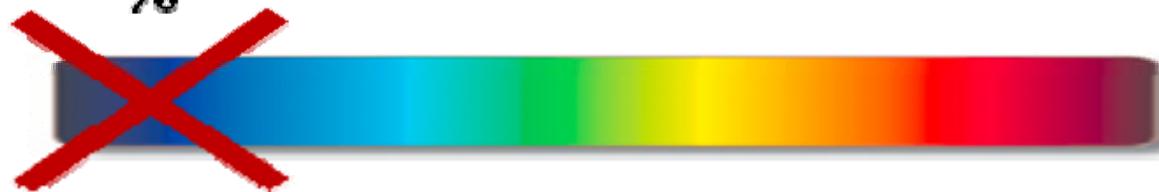


REPLICAR LA FOTOPROTECCIÓN NATURAL

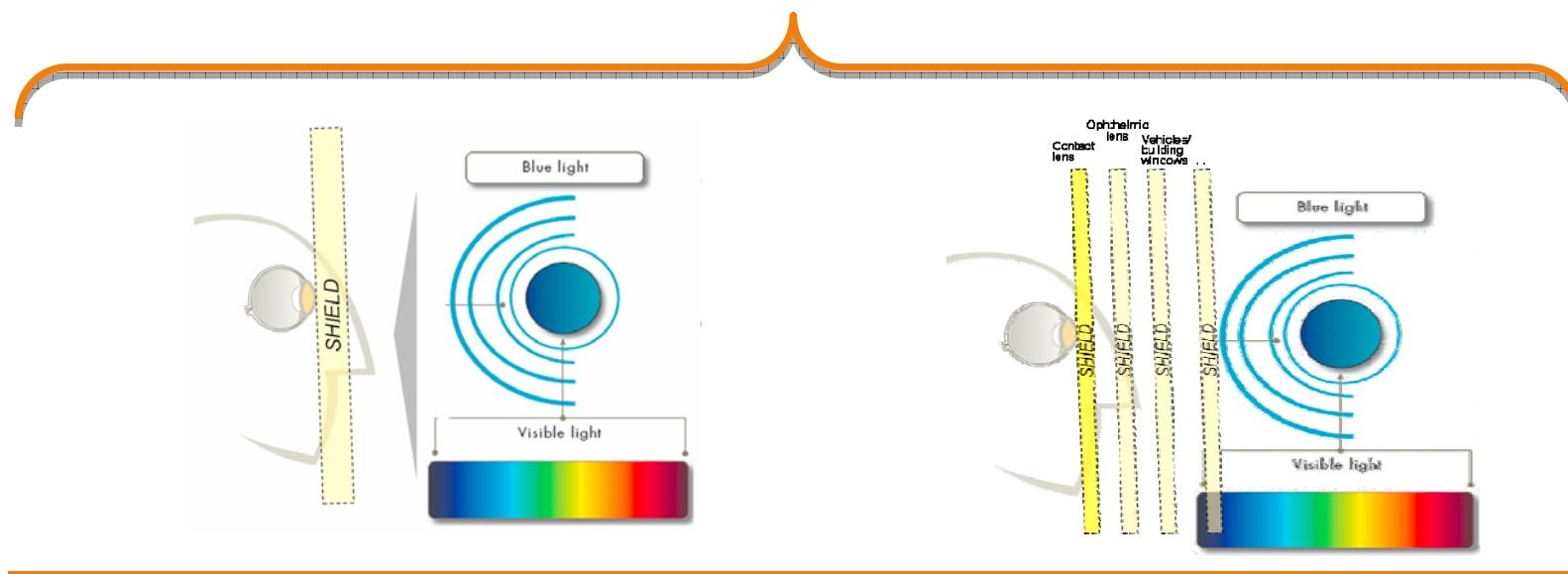




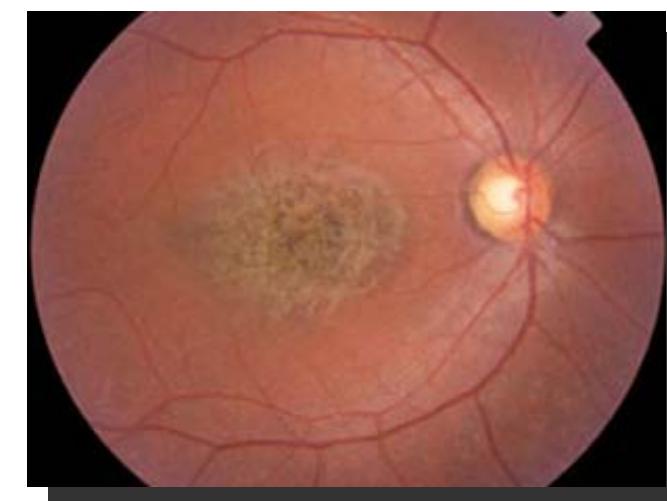
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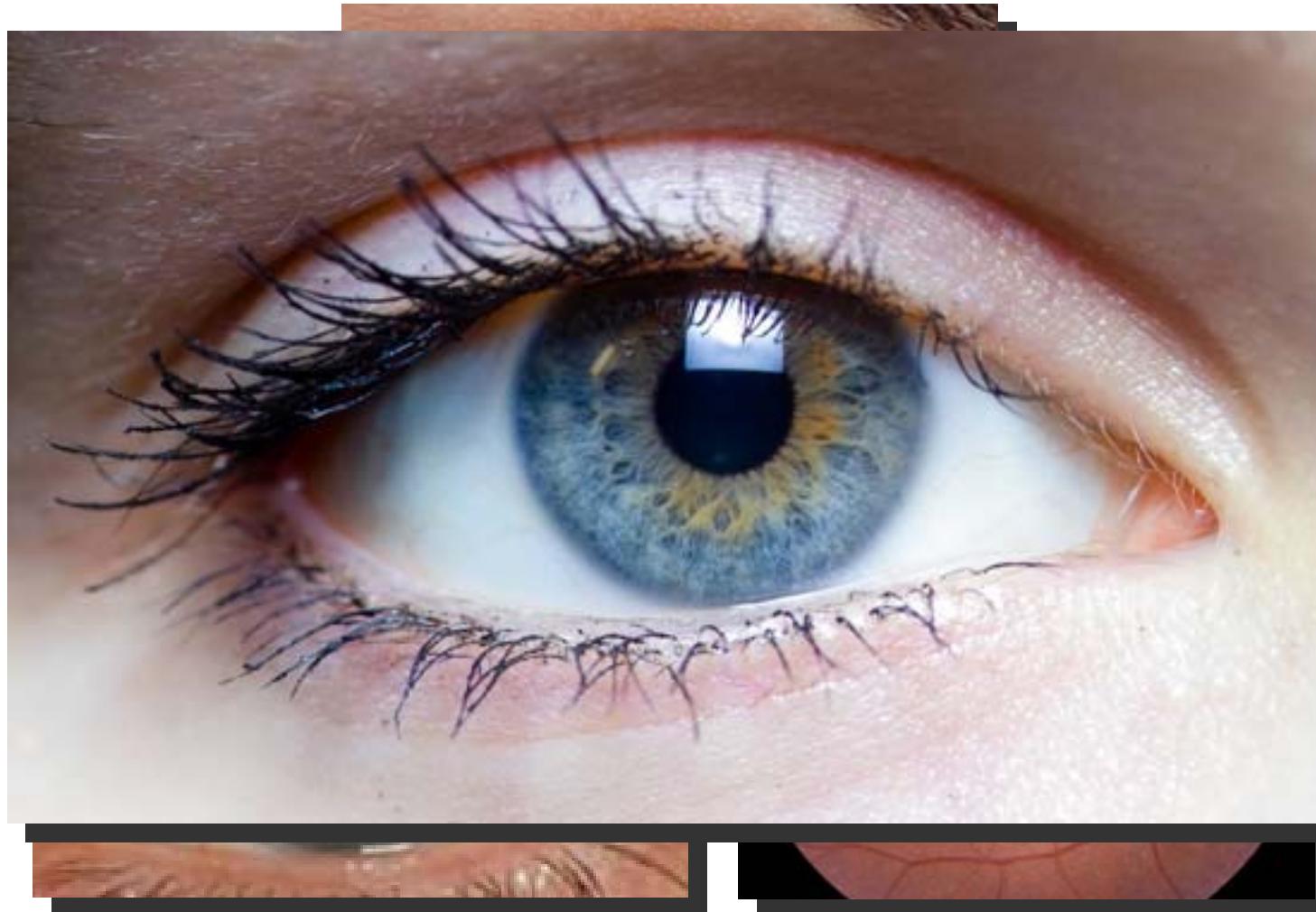
Replicar el proceso natural de forma artificial



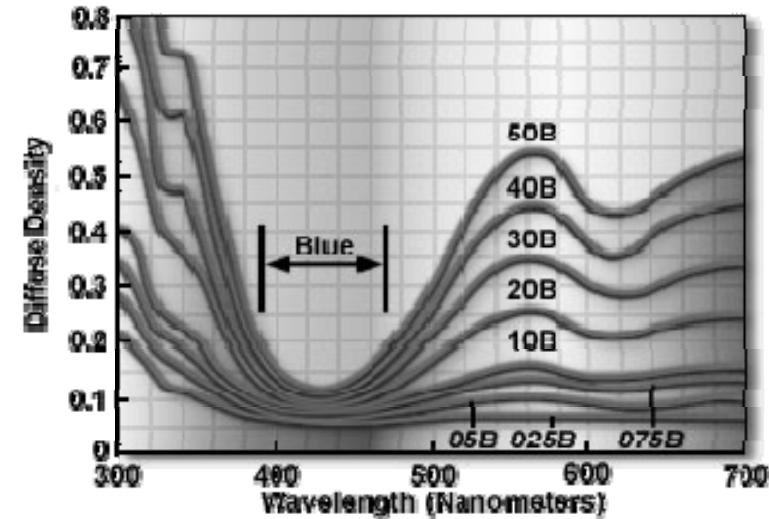
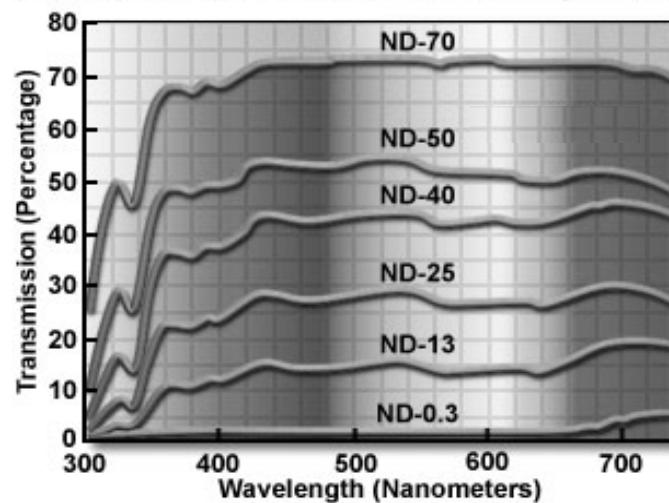
FOTOTOXICIDAD



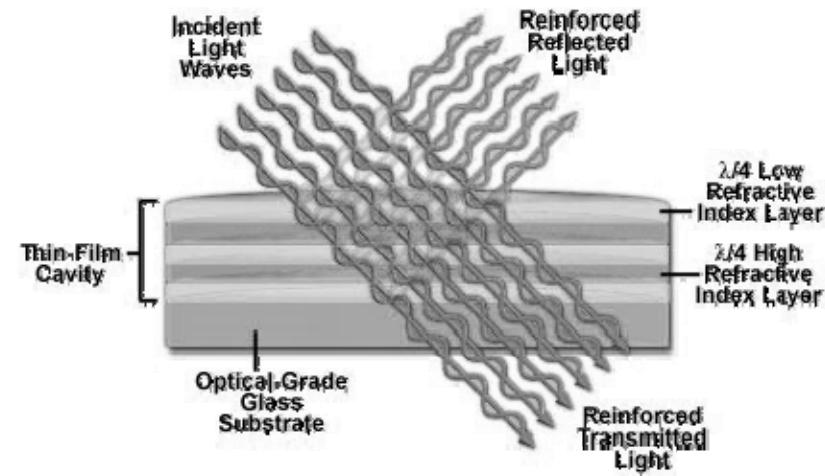
FOTOPROTECCIÓN



Absorption Spectra of Neutral Density Filters

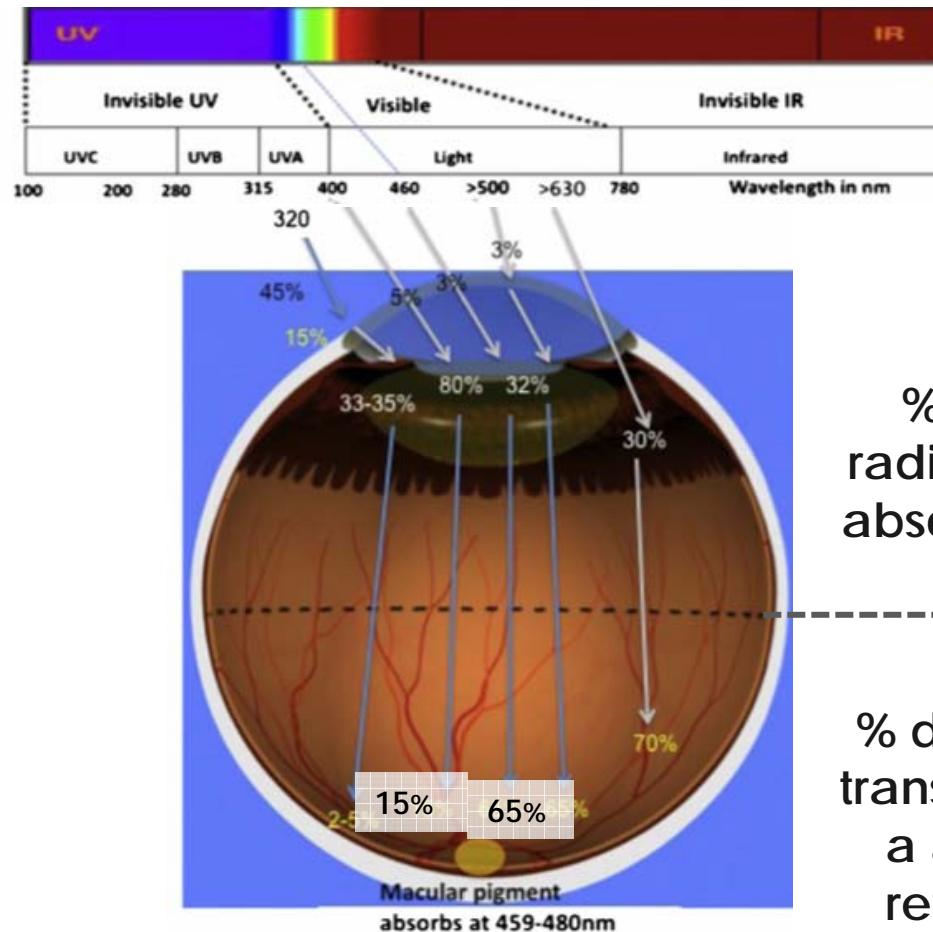


Reflection and Transmission by Interference Filters

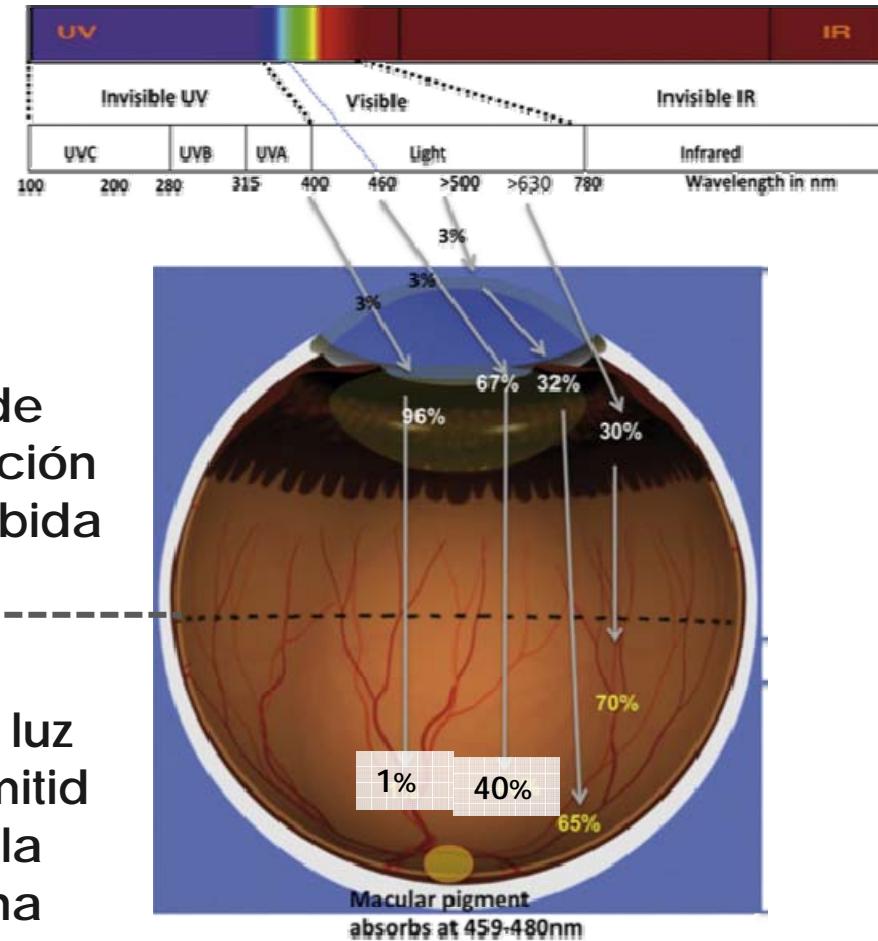


COMPROBACIÓN CIENTÍFICA: PRUEBAS EXPERIMENTALES

Cristalino joven: < 9 años



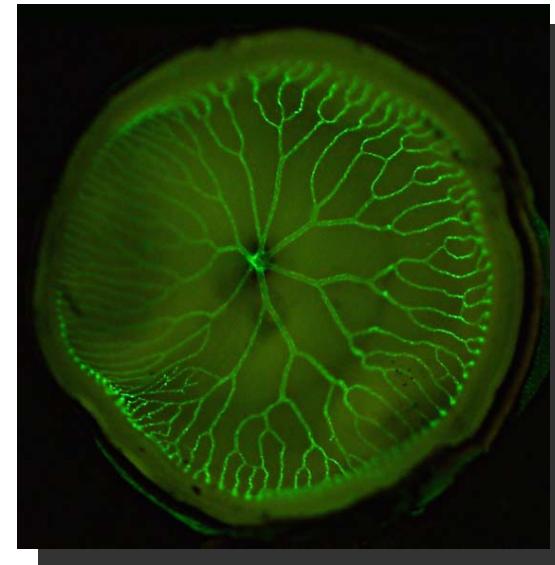
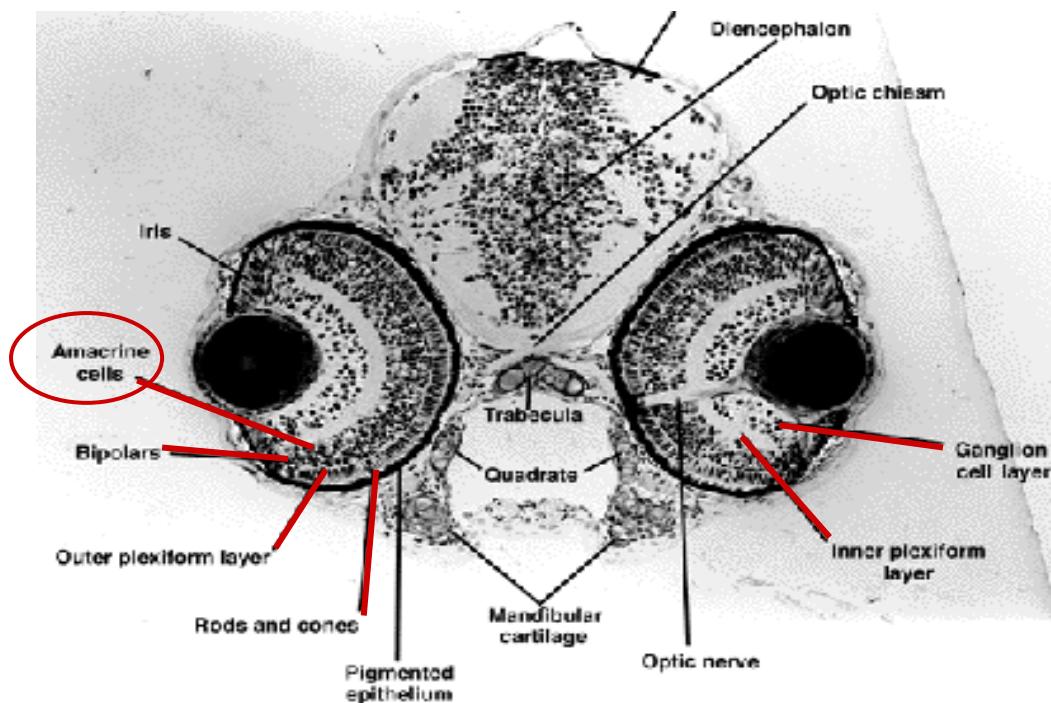
Cristalino maduro: 60-70 años



% de radiación absorbida

% de luz transmitida a la retina

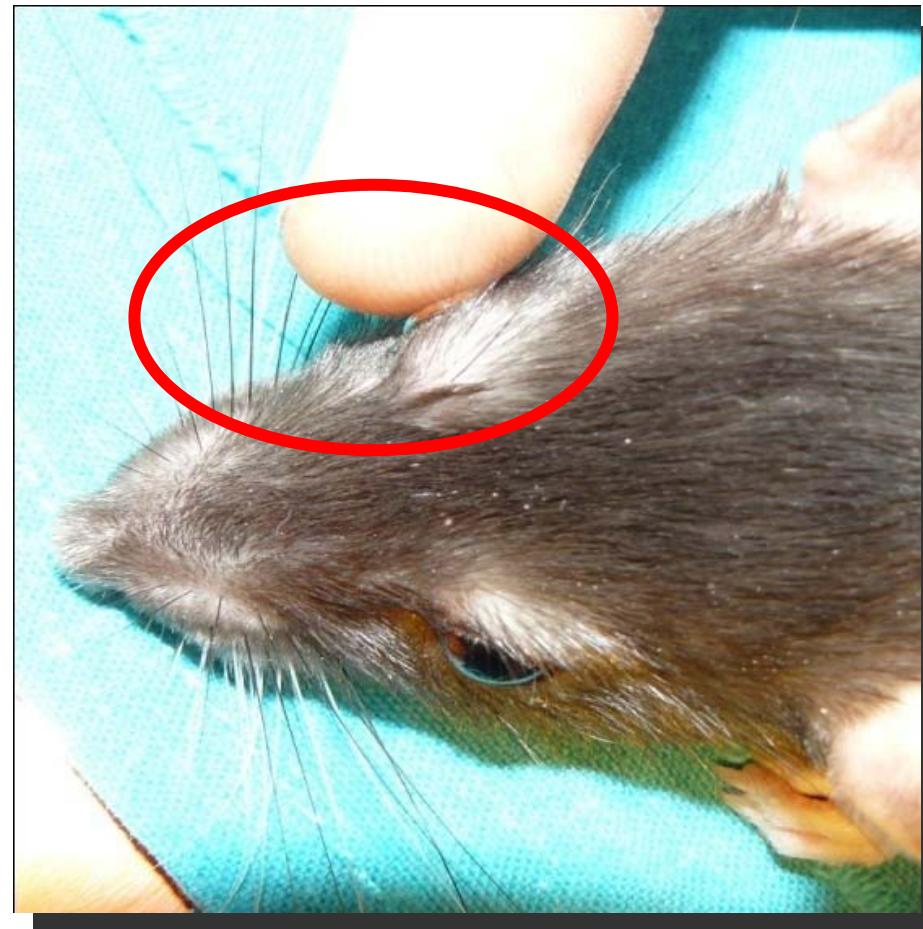
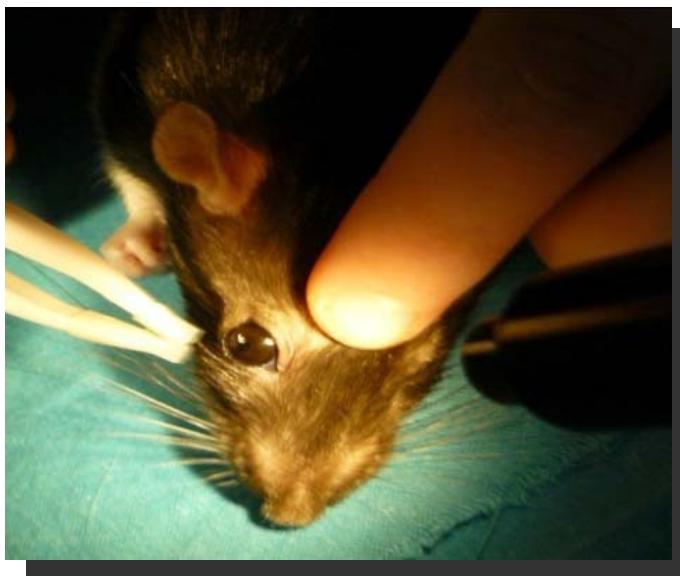
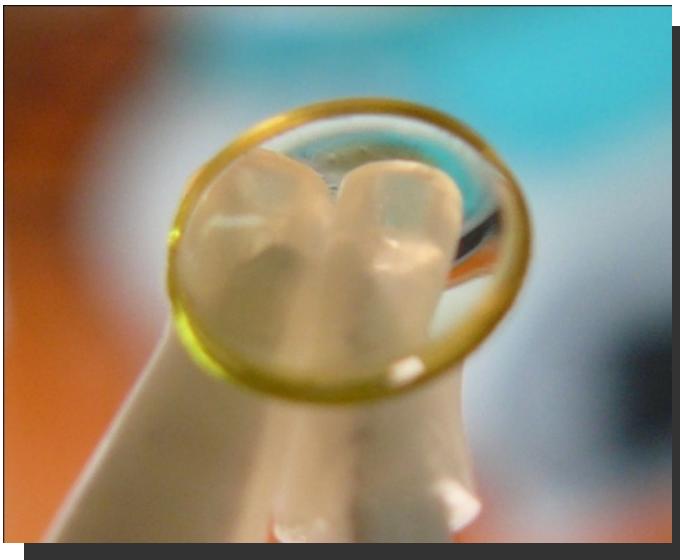
Retina del pez cebra

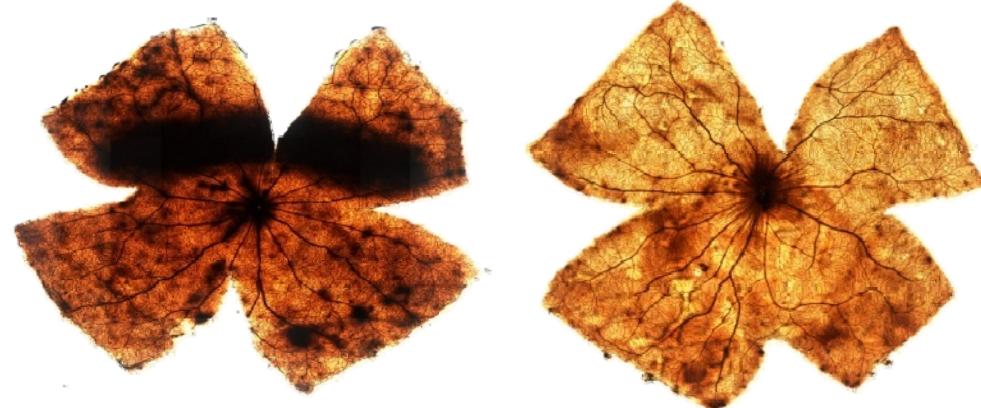
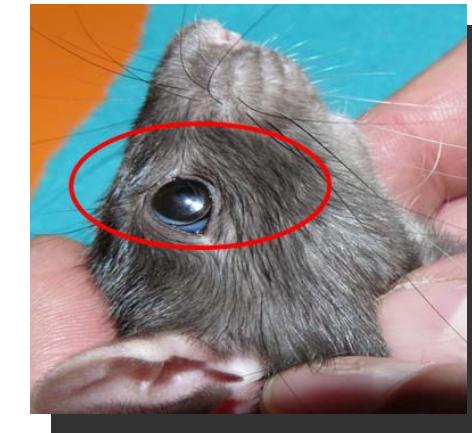


Álvarez Y, 2007
University College Dublin

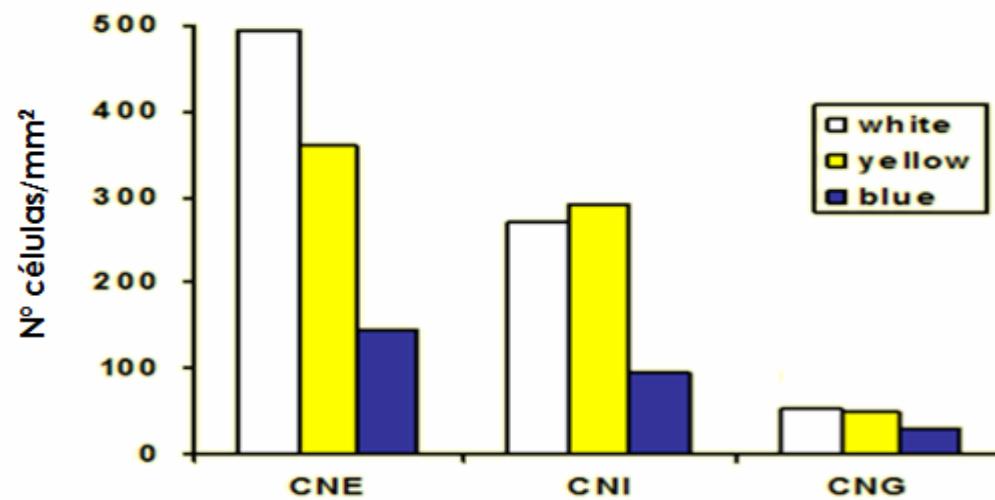


Experimento: 1 año



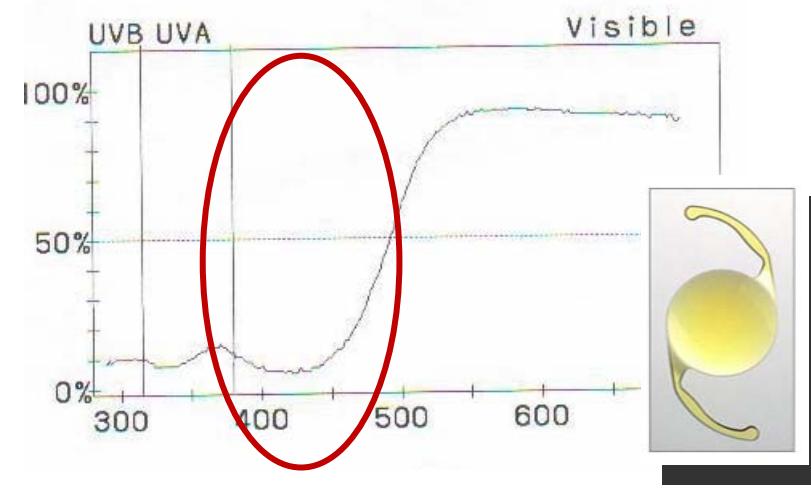
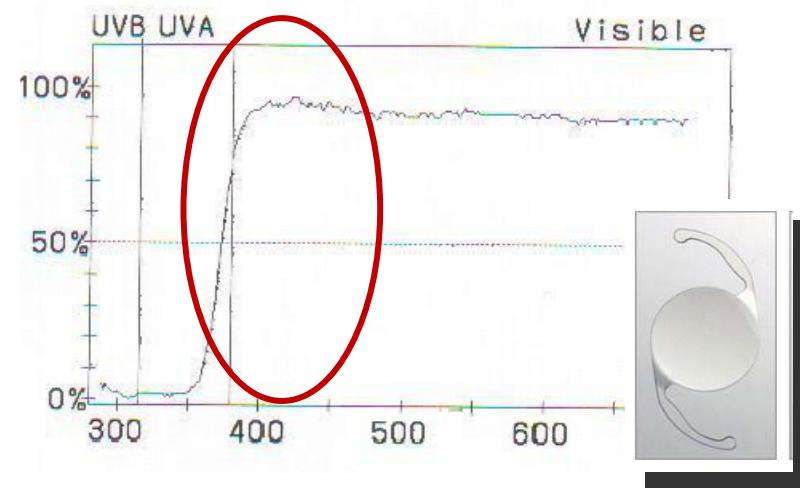


Células supervivientes

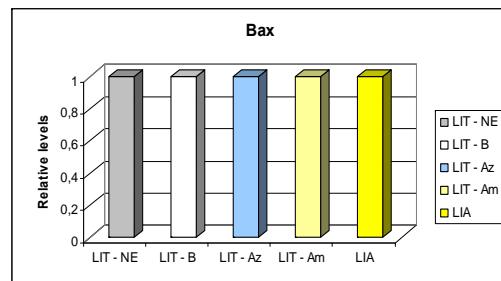
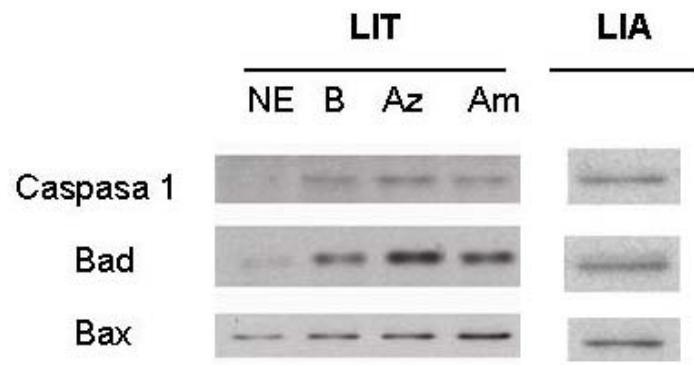




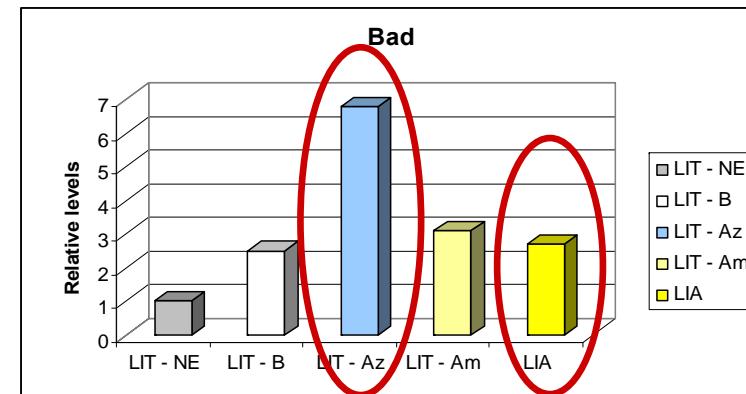
Longitudinal y transversal: 2 años



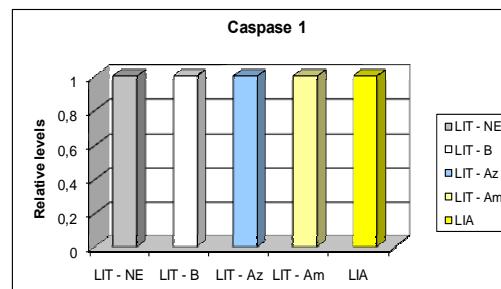
Expresión de genes Pro-apoptóticos



Bax No se modifica



Bad  2.5 veces LIT-B
6.8 veces LIT-Az
Con Luz azul con LIA = Luz blanca



Caspasa-1

No se modifica

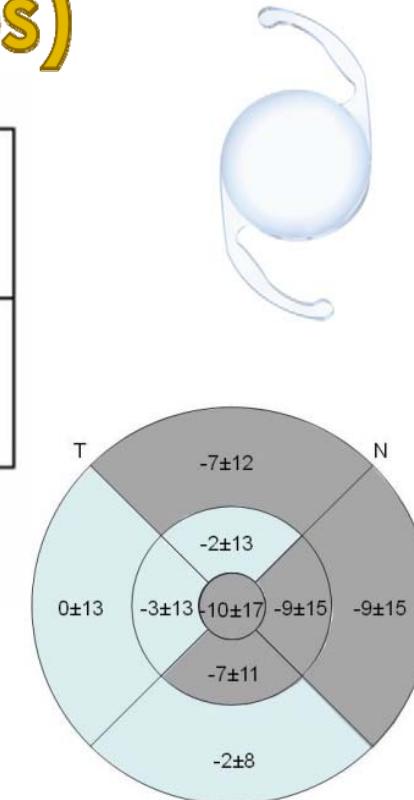
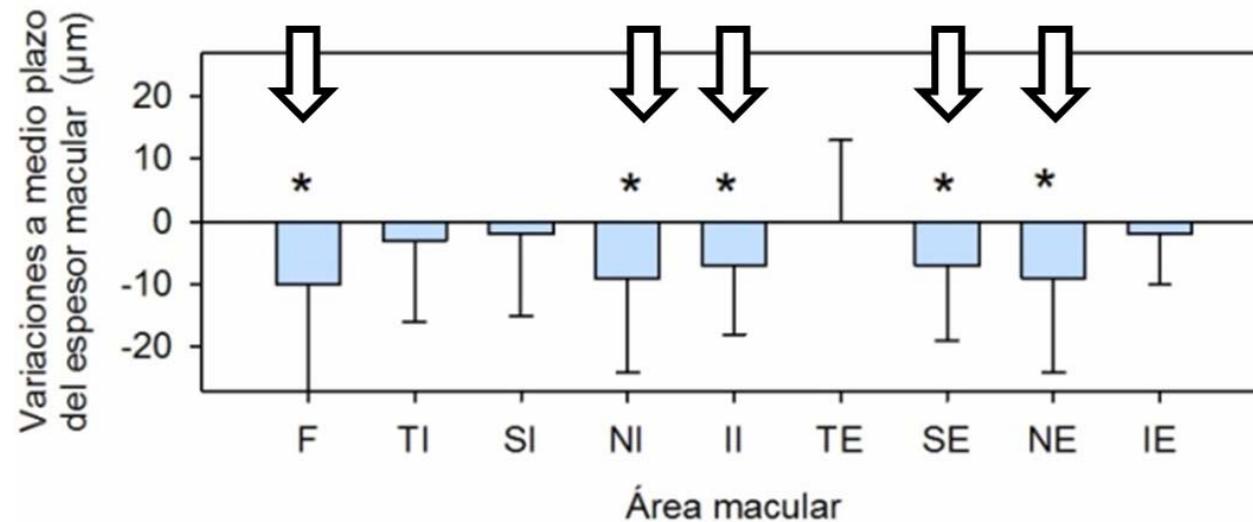
Exposición aguda: Grimm 2000. Chen, 2004

Ensayo en HUMANOS: 5 años

Cataratas



Evolución del espesor macular a medio plazo (5 años)



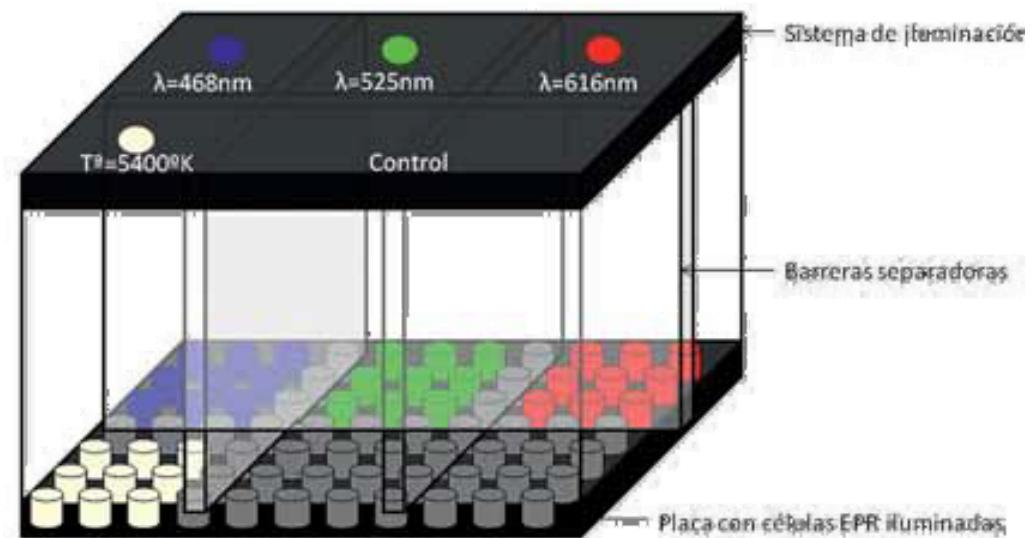
EFFECTO DE LA EDAD EN EL ESPESOR MACULAR:
Disminución de $0,25 - 0,50 \mu\text{m/año}$.

Alamouti, 2003. Eriksson, 2008. Sung, 2009.

Epitelio pigmentario de la retina. Experimentación in-vitro

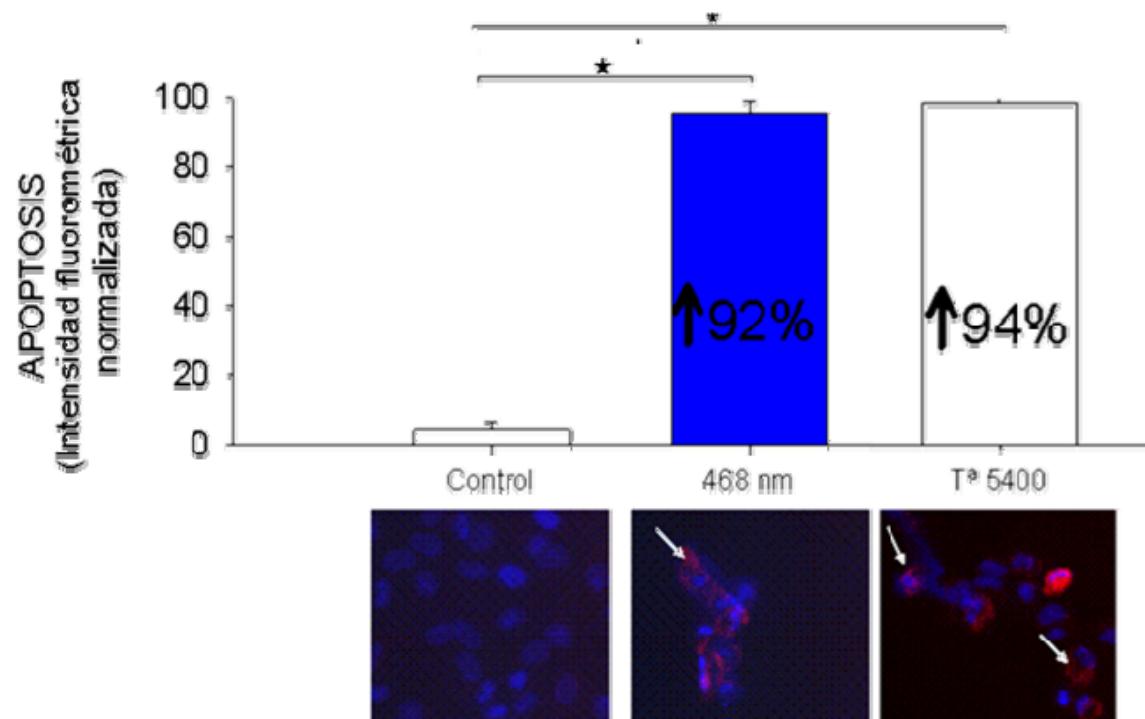


Esquema del sistema de iluminación LED



Experimentación in-vitro.

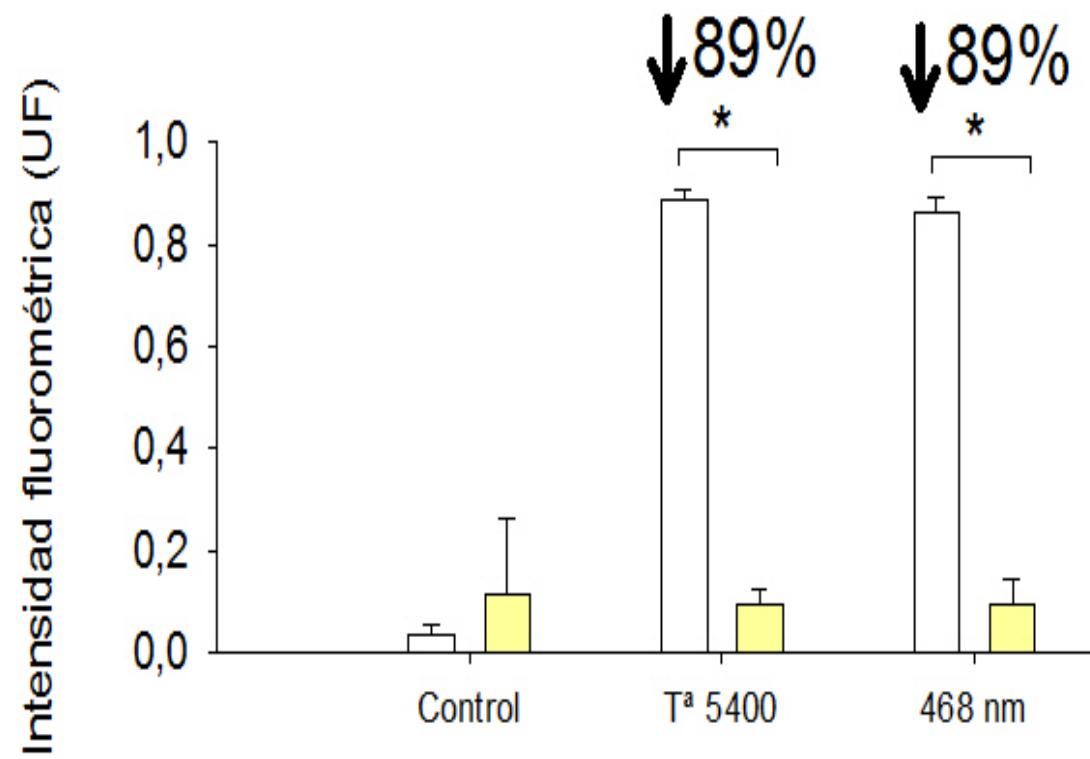
Apoptosis en célula de epitelio pigmentario de la retina expuestas sin filtro



Sin filtro
Muerte celular > 90%

Experimentación in-vitro.

Apoptosis en célula de epitelio pigmentario de la retina expuestas sin y con filtro



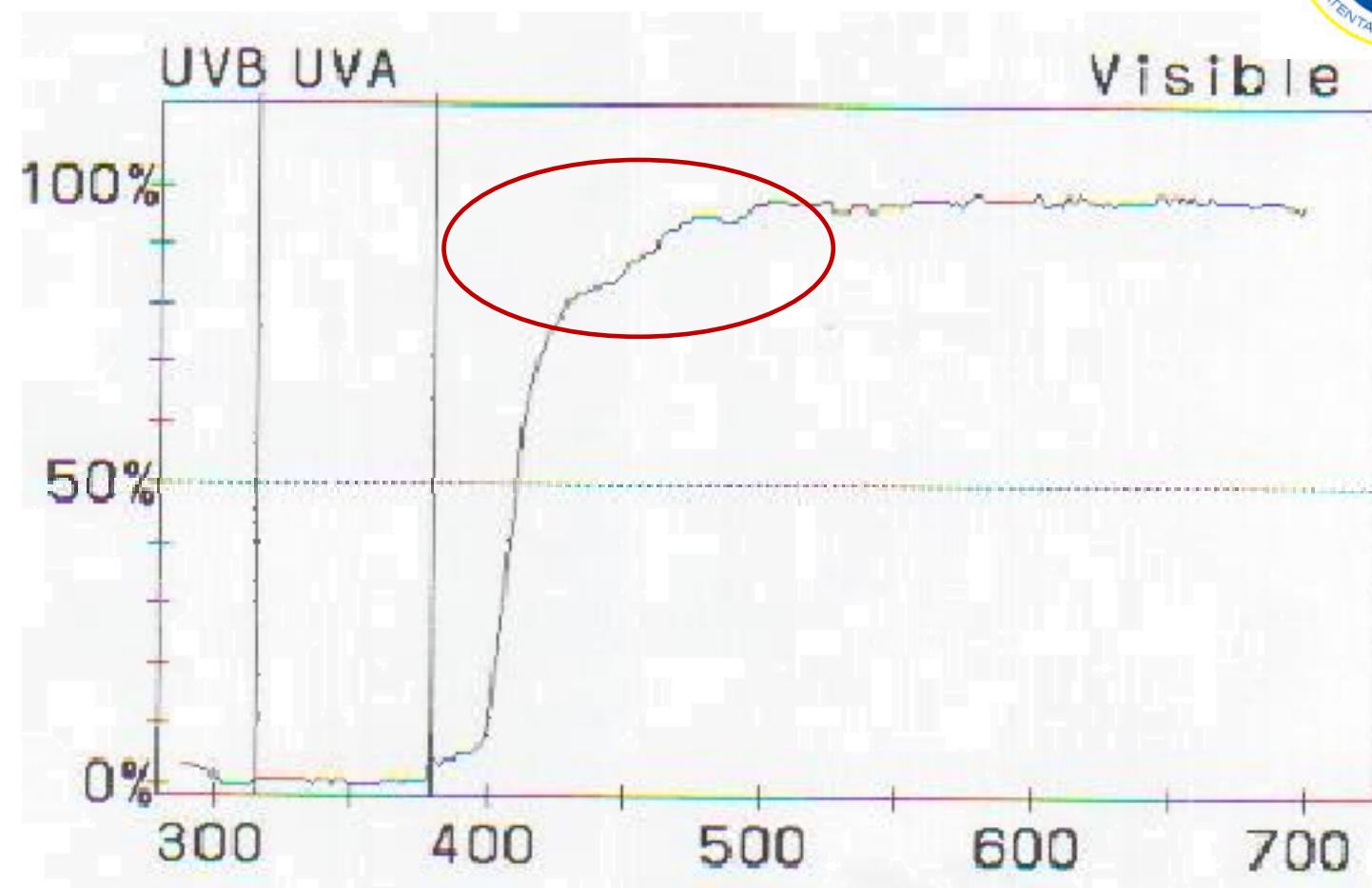
Con filtro

Disminución de muerte celular en 89%

SOLUCIÓN: **FOTOPROTECCIÓN**

Creación de un ambiente fotosaludable mediante
productos
con fundamento probado científicamente.

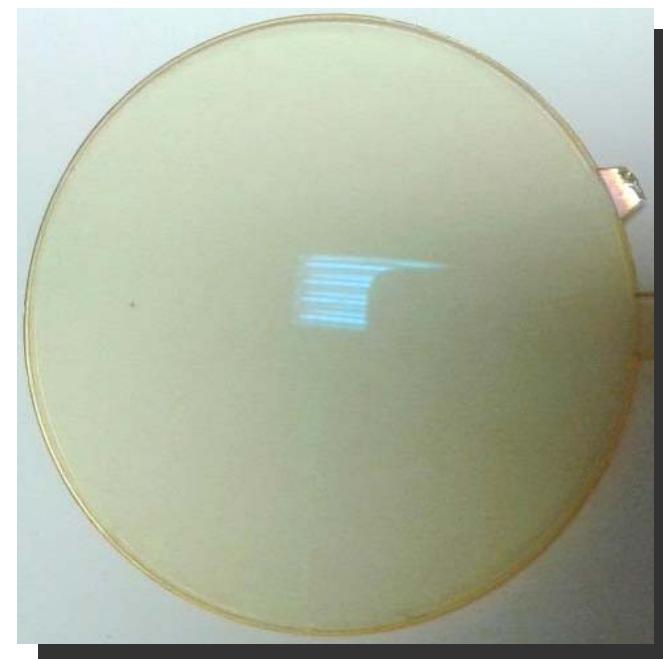
Fotoprotección



Aquí, hoy y ahora... nuestra propuesta:

Lentes con CSR

Las lentes con CSR protegen tu retina.





OFICINA ESPAÑOLA DE
PATENTES Y MARCAS
ESPAÑA



④ Número de publicación: 2 257 976
④ Número de solicitud: 2006000052
④ Int. Cl.:
A61F 9/00 MM
G02C 7/10 MM



PATENTE DE INVENCION CON EXAMEN PREVIO

B2

④ Fecha de presentación: 15.01.2006

④ Fecha de publicación de la solicitud: 01.09.2006

Fecha de la concesión: 05.02.2007

④ Fecha de anuncio de la concesión: 16.03.2007

④ Fecha de publicación definitiva de la patente: 16.03.2007

④ Titular/es: Universidad Complutense de Madrid;
Reservando - Avda. de Somosaguas, 3
28049 Madrid, ES

④ Inventor/es: Sánchez-Ramos, Celia

④ Agencia: No consta

④ Título: Lente oftalmológica terapéutica y profiláctica para ojos: pseudo-afácticos y/o en proceso de neurodegeneración.

④ Resumen

Lente oftalmológica terapéutica y profiláctica para ojos pseudo-afácticos y/o en proceso de neurodegeneración. El objeto de la invención es una lente oftalmológica para ojos pseudo-afácticos y/o con degeneración macular y retiniana, caracterizada por ser resultante de la aplicación de un filtro con pigmentación amarilla sobre una lente oftalmológica común, con el fin de trabajarlos de los ojos humanos en vista contra del efectivo efecto de filtración a 550 nm. Esta invención evita las limitaciones y riesgos de las técnicas existentes para dotar de este protección a los ojos operados de cataratas y mejorar la de aquellos en procesos neurodegenerativos, lográndolo con la misma aplicación de una lente oftalmática.

La invención consiste en la confección de una lente oftalmica con una tinta de pigmentación amarilla que absorbe las longitudes de onda corta de 350-550nm, ambos adecuados para su utilización en humanos.

ES 2 257 976 B2

Aviso: Se permite realizar consulta prevista por el art. 27.3.2 LP.

Ver más documentos - Oficina Española de Patentes y Marcas, 30 de la Zarzuela, 74 - 28049 Madrid



Lente Oftálmica CSR

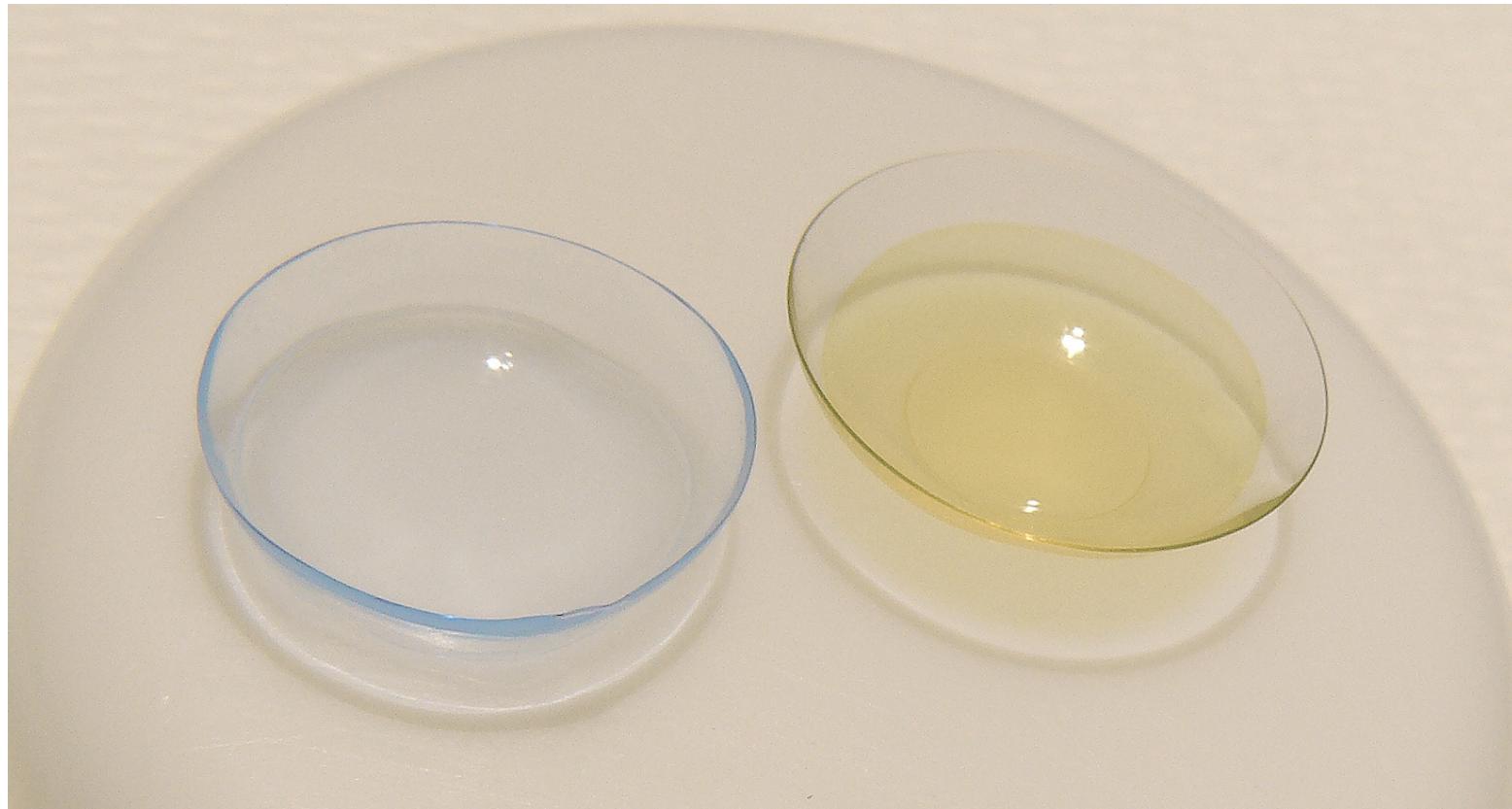
Lente con Certificado de Seguridad Retiniana para la protección frente a la luz.



BENEFICIOS DEL CSR

Las lentes que has adquirido llevan aplicada la protección CSR, la única patentada por la Universidad Complutense para proteger tu retina.

- A corto plazo **FUNCIONAL**, proporcionando inmediatamente una mejora del contraste, menos fatiga visual y una mejora de la profundidad espacial. Además de reducir la sensibilidad al deslumbramiento.
- A largo plazo **ESTRUCTURAL** porque absorbe la luz dañina para la retina, reduce el proceso neuro-degenerativo en el sistema visual y protege la retina de la CEGUERA EVITABLE.



Fotoprotección



DNV BUSINESS ASSURANCE

EC CERTIFICATE - PRODUCTION QUALITY ASSURANCE

Certificate No. 13881-2007-CE-NOR Rev. 7.0
This Certificate consists of 4 pages

This is to certify that the Quality Management System of

FIT AND COVER SERVILENS, S.L.

Parque Tecnológico de la Salud, Av. Ilustración, 112, 18007 - Granada, Spain

for production and final product inspection/testing of
Contact Lenses

has been assessed with respect to
the conformity assessment procedure described in Article 11.2.b and Annex V (Module D1) of Council Directive 93/42/EEC on Medical Devices, as amended, and found to comply

Further details are given overleaf

Place and date:
Hovik, 04 February 2014

This Certificate is valid until:
12 December 2017

For DET NORSKE VERITAS CERTIFICATION
AS
Norway




Jenny Helen Nytn
Certification Manager

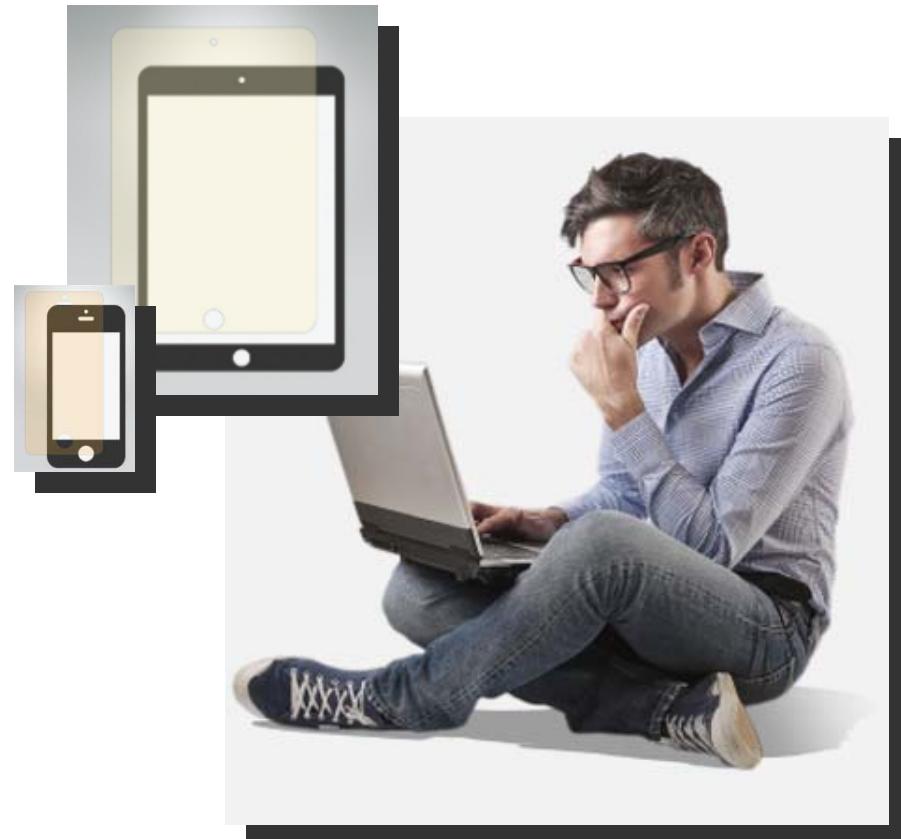
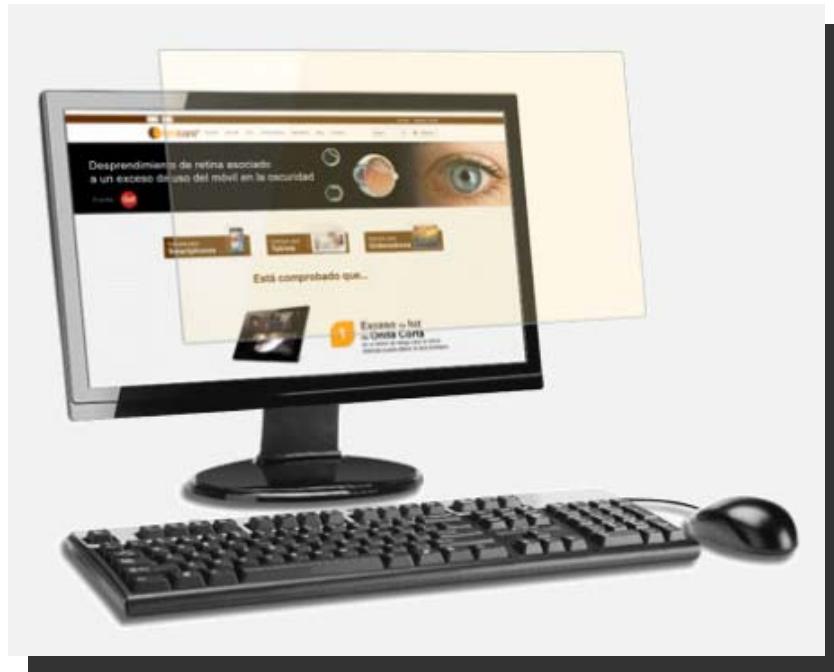
Notified Body No.:
0434

Atul Anand
Technical Reviewer



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Protector ocular de absorción de λ corta para pantallas LEDs



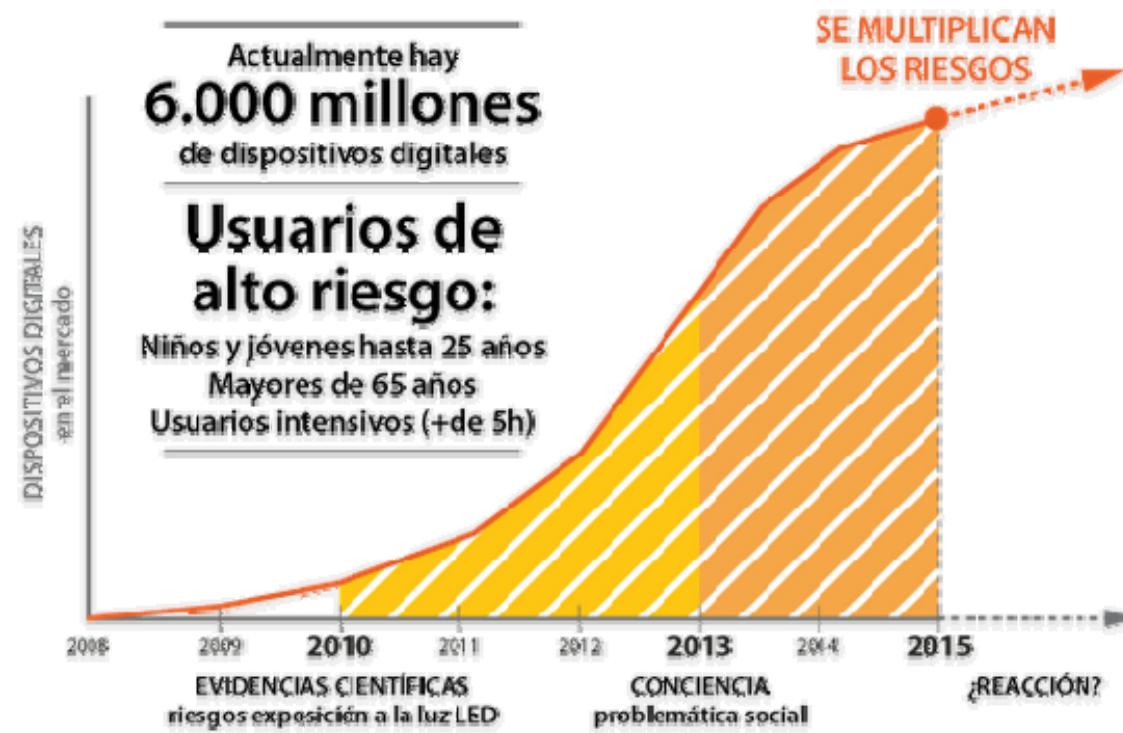


En conclusión...



Un gran problema de salud pública global en la Era Digital

★ OPINIONES / REVIEWS



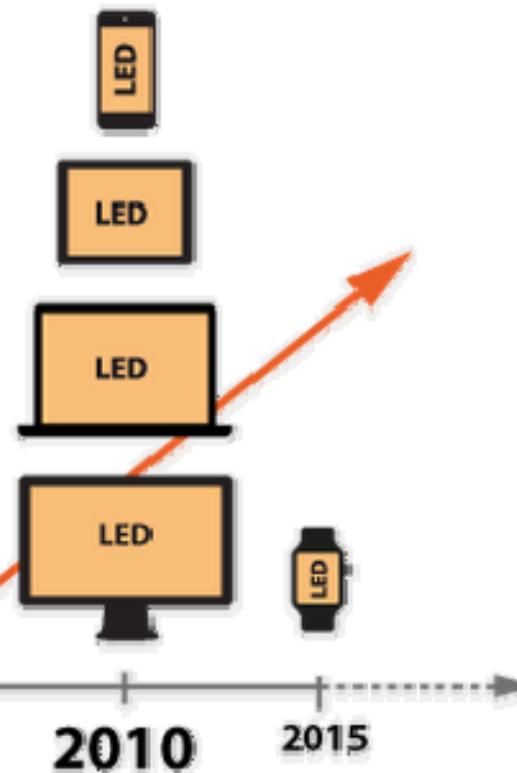
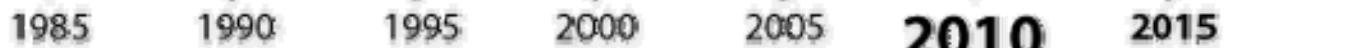


EMISIONES de longitud de onda corta

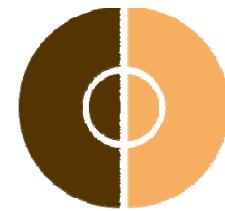
Desde 2010 las pantallas emiten
5 veces más
luz de onda corta (alta energía)

Pasamos una media de
8,4 horas/día
delante de dispositivos digitales

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