PHOTOTOXICITÉ DES DIODES ELECTROLUMINESCENTES (LED)

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L'auteur déclare qu'elle n'a pas de conflit d'intérêts

Lumière et altérations de la rétine chez l'Homme

- Aigüe
  - scotome
- Chronique: DMLA et lumière
  - Sui GY, Liu GC, Liu GY, Gao YY, Deng Y, Wang WY, et al. 2013. Is sunlight exposure a risk factor for age-related macular degeneration? A systematic review and meta-analysis. Br J Ophthalmol 97(4): 389-394.
  - Schick T, Ersoy L, Lechanteur YT, Saksens NT, Hoyng CB, den Hollander AI, et al. 2016. History of Sunlight Exposure Is a Risk Factor for Age-Related Macular Degeneration. Retina 36(4): 787-790.

Dans les modèles animaux

- Lésions photorécepteurs
- Lésions EPR

Table 2

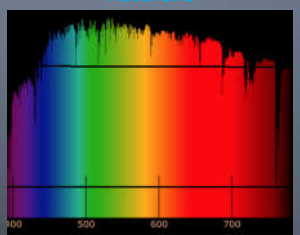
Traditional experimental paradigms for studying the two subtypes of photochemical damage from visible light (Ham et al. 1979, Kremers and van Norren. 1988, Noell et al. 1966, Thumann et al. 1999, van Norren and Gorgels. 2011, Williams and Howell. 1983)

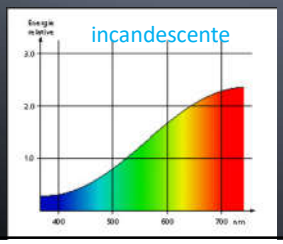
Property	Noell Damage	Ham Damage
Class	I	II
Exposure duration	> 1.5 hours	< 5 hours
Source spectrum	green-filtered fluorescent & incandescent white	white & laser lines
Primary animal species	rats	primates
Exposure Size	large	small
Site of major impact	Photoreceptors, occasionally RPE	RPE
Action spectrum	resembles visual pigment absorption	peaks in UV

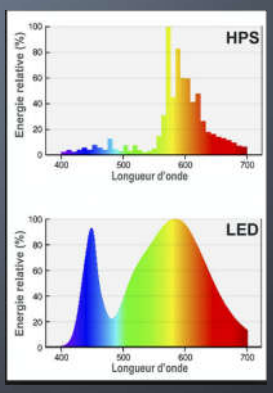
Hunter et al 2013

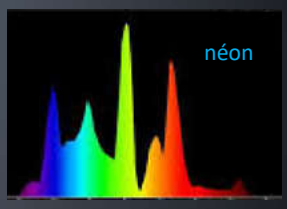
Comparaison de différents spectres d'émission

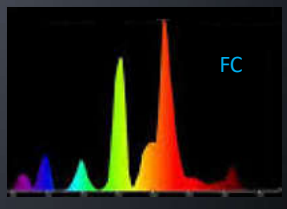
naturelle



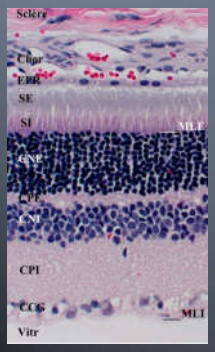


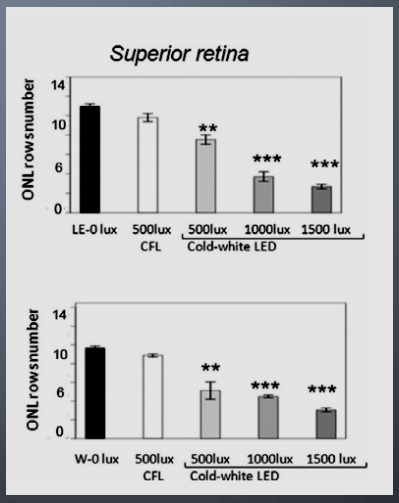






Comparaison de différentes sources lumineuses chez le rat

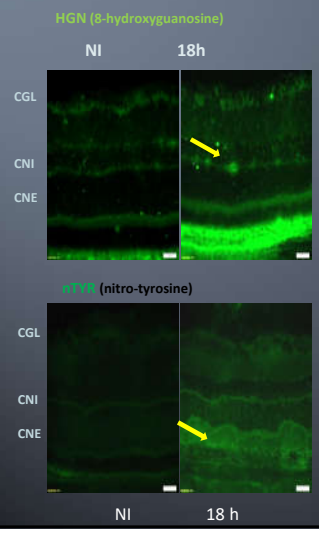


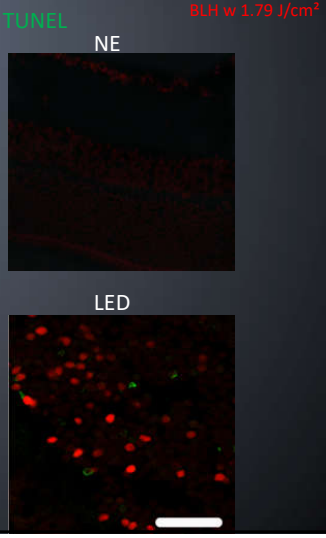


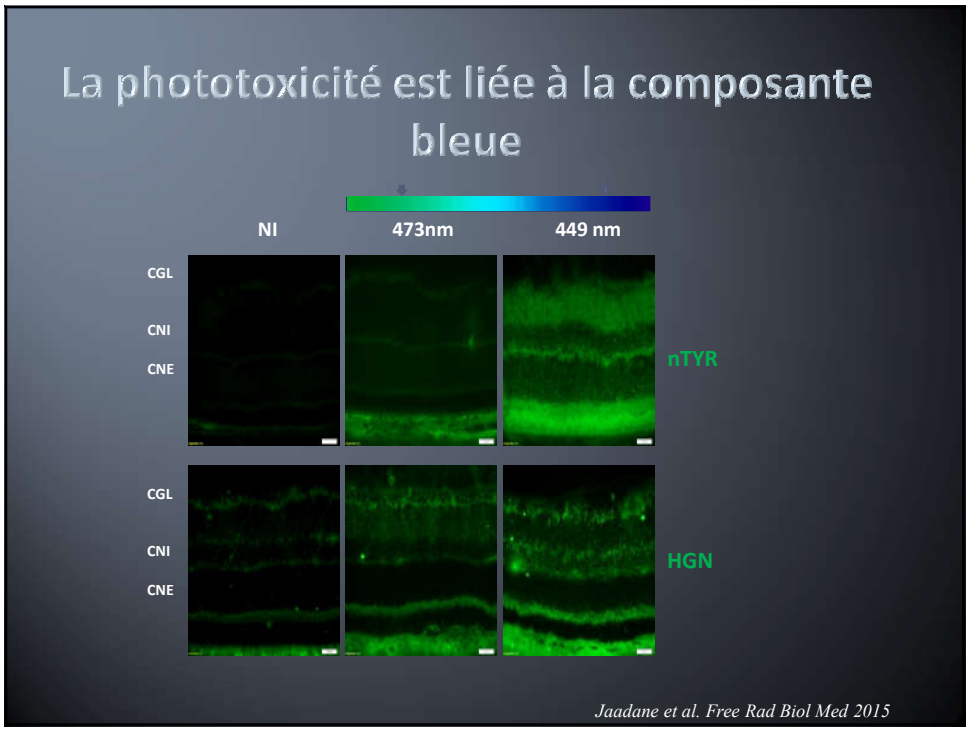
Krigel et al, Neuroscience 2016

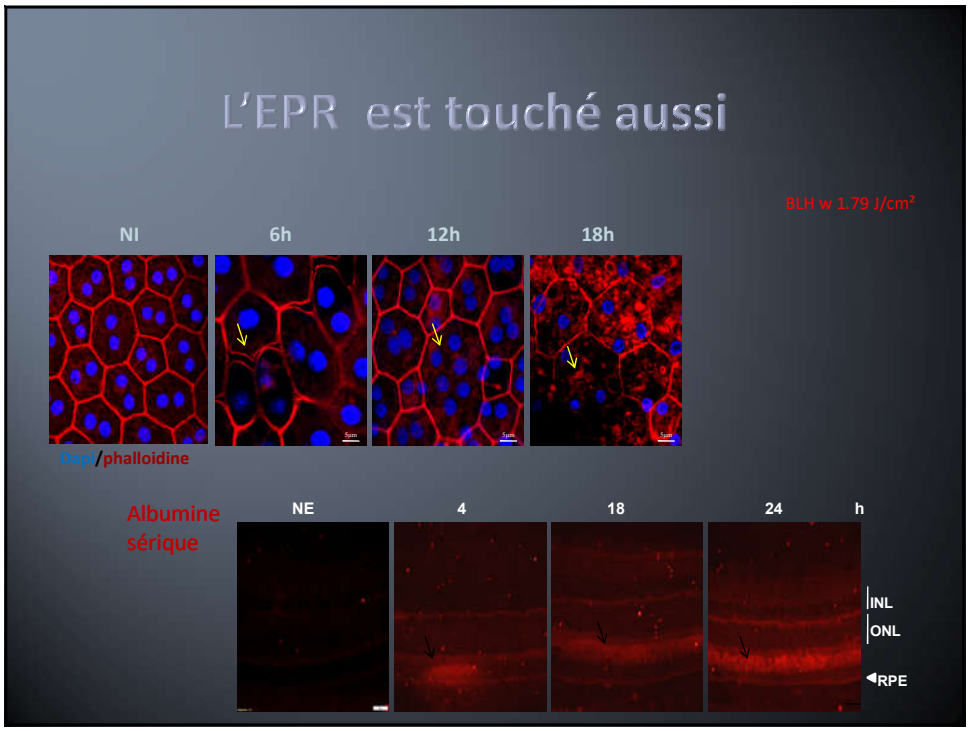
Les photorécepteurs sont affectés

Jaadane et al. Free Rad Biol Med 2015

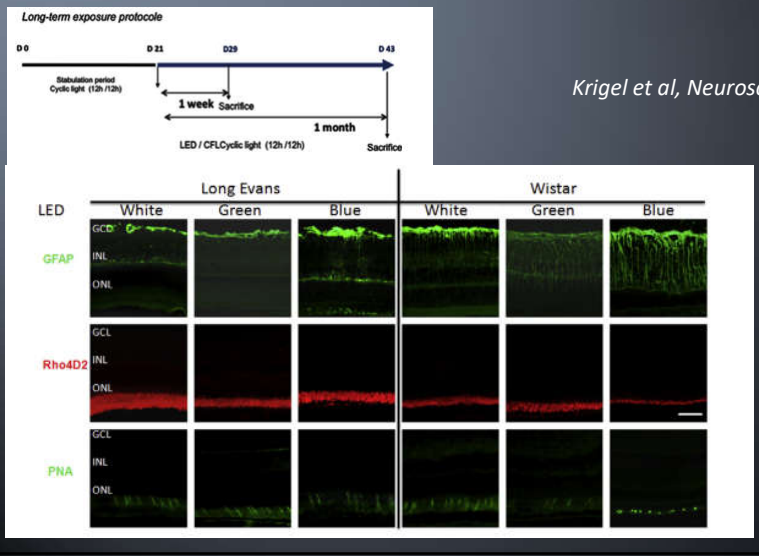





La phototoxicité est liée à la composante bleue
NI
473nm
449 nm
CGL
CNI
CNE
nTYR
CGL
CNI
CNE
HGN
Jaadane et al. Free Rad Biol Med 2015

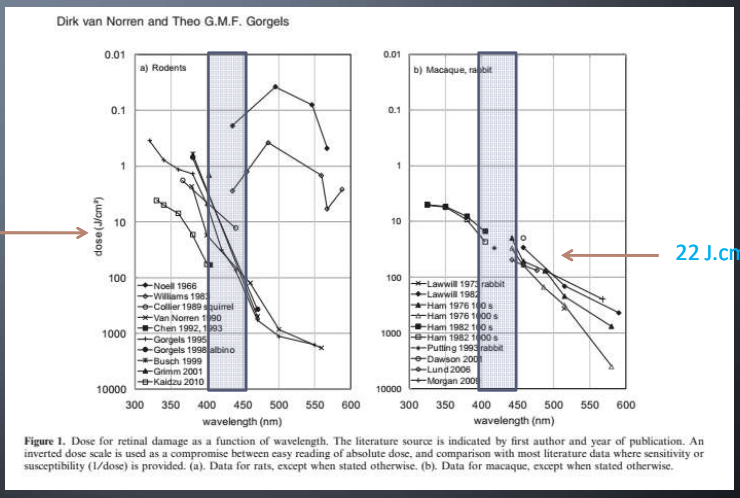

L'EPR est touché aussi
BLH w 1.79 J/cm²
NI
6h
12h
18h
Dapi/phalloidine
Albumine sérique
NE
4
18
24
h
INL
ONL
RPE

L'exposition chronique



Krigel et al, Neuroscience 2016

phototoxicité

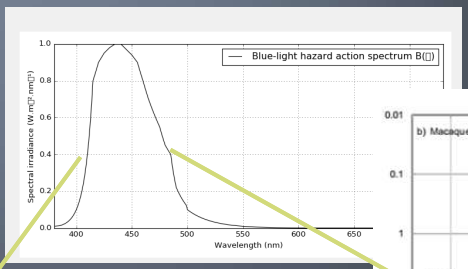


11 J.cm^{-2}

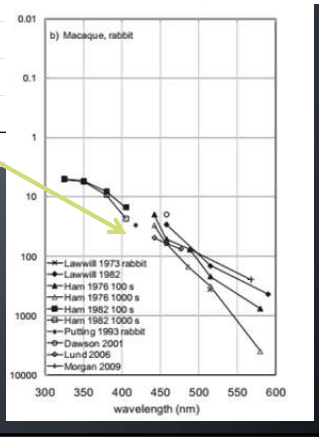
22 J.cm^{-2}

Figure 1. Dose for retinal damage as a function of wavelength. The literature source is indicated by first author and year of publication. An inverted dose scale is used as a compromise between easy reading of absolute dose, and comparison with most literature data where sensitivity or susceptibility (1/dose) is provided. (a). Data for rats, except when stated otherwise. (b). Data for macaque, except when stated otherwise.

Ponderation BLH

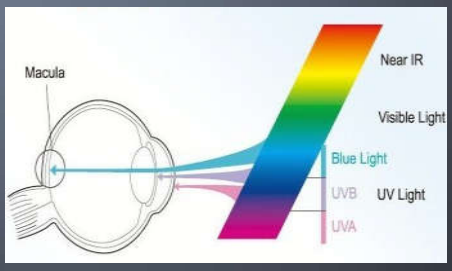


Dirk van Norren and Theo G.M.F. Gorgels

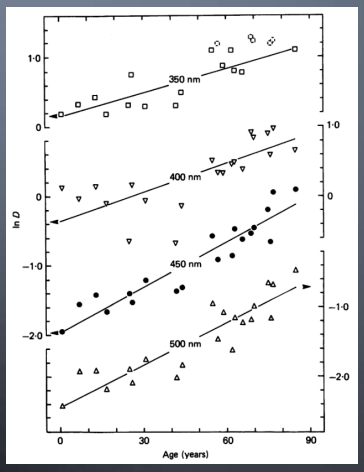


Absorption des milieux oculaires

L'absorbance des milieux oculaires



L'absorbance du cristallin change avec l'âge



Journal of Physiology (1988), **395**, *pp.* 577–587 577
With 6 *text-figures*
Printed in Great Britain

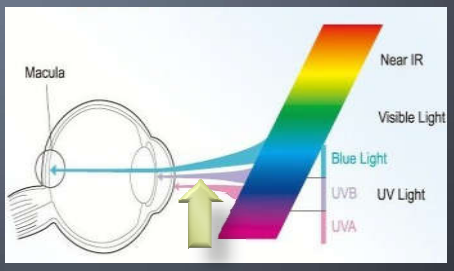
AGE AND THE TRANSMITTANCE OF THE HUMAN CRYSTALLINE LENS

By R. A. WEALE

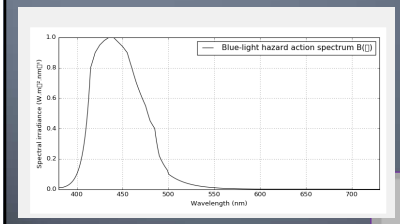
From the Department of Visual Science, Institute of Ophthalmology, University of London, Judd Street, London WC1H 9QS

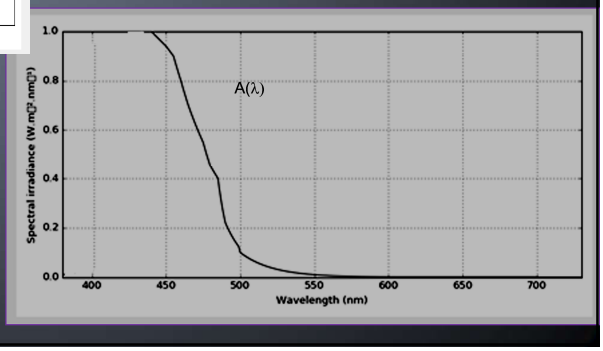
(*Received 24 April 1987*)

Chez l'enfant le cristallin protège peu



Alpha de lambda en pondération





La concentration de lipofucsine augmente avec l'âge

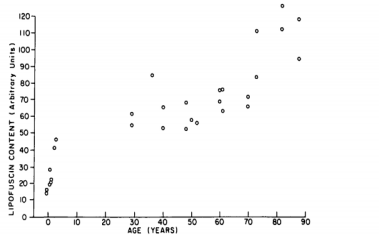


Fig. 4. Lipofuscin content in the total RPE plotted as a function of age ($p < 0.001$).

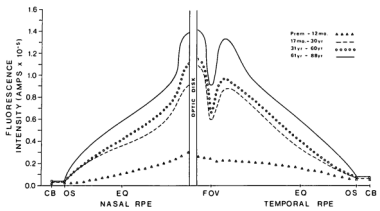


Fig. 2. Topographic distribution of lipofuscin in the RPE of 44 eyes, divided into age groups. *CB*, Ciliary body; *OS*, ora serrata; *EQ*, equator; *FOV*, fovea; *Prem.*, premature newborn.

The topography and age relationship of lipofuscin concentration in the retinal pigment epithelium

Glenn L. Wing, Gordon C. Blanchard, and John J. Weiter

Invest. Ophthalmol. Visual Sci.
July 1978

Lipofucsine est photo-sensibilisante

1) Favorise la production de ROS

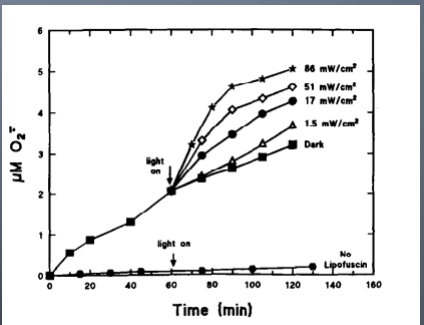


Fig. 1. Superoxide anion production as a function of light intensity.

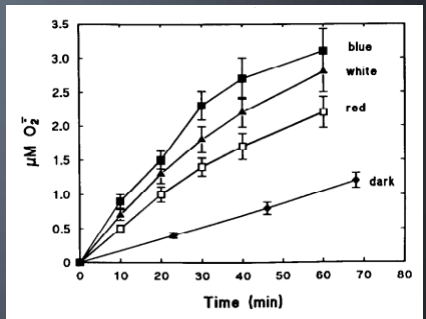


Fig. 3. Superoxide anion production as a function of wavelength at a constant light intensity (17 mW cm^{-2}).

Lipofuscin is a photoinducible free radical generator

Mike Boulton†, Alexander Dontsov††, John Jarvis-Evans, Mikhail Ostrovsky†† and Dimitri Svistunenko††

J. Photochem. Photobiol. B: Biol., 19 (1993) 201–204

Lipofucsine est photo-sensibilisante

2) Sa composante A2E a un pic d'absortion à 435 nm

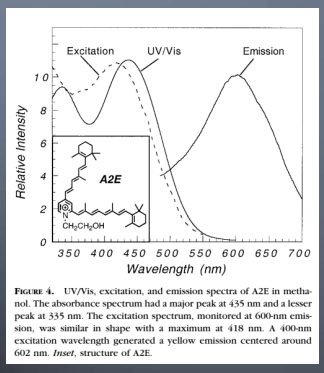
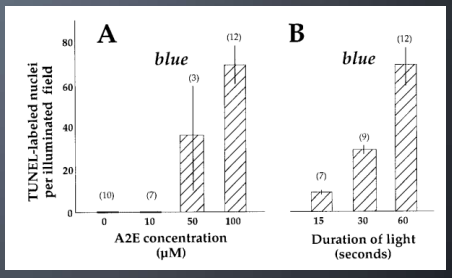


FIGURE 4. UV/Vis, excitation, and emission spectra of A2E in methanol. The absorbance spectrum had a major peak at 435 nm and a lesser peak at 335 nm. The excitation spectrum, monitored at 600-nm emission, was similar in shape with a maximum at 418 nm. A 400-nm excitation wavelength generated a yellow emission centered around 602 nm. *Inset*, structure of A2E.



The Lipofuscin Fluorophore A2E Mediates Blue Light–Induced Damage to Retinal Pigmented Epithelial Cells

Janet R. Sparrow,[1] Koji Nakanishi,[2] and Craig A. Parish[2]

IOVS, June 2000, Vol. 41, No. 7

resumé

- LED plus toxiques chez le rat que d'autres sources d'illumination
- Les VLE sont à regarder de plus près
- L'exposition chronique produit des effets dont on ne tient pas compte
- Les efforts réglementaires ne tiennent pas en compte la situation particulière des enfants ni des personnes âges

Merci à

- Labo F. Behar-Cohen INSERM U1138
- Imène Jaadane
- Gloria Villalapando
- Cécile Lebon
- Laurent Jonet
- Michelle Savoldelli
- Arthur Krigel
- Marianne Berdugo
- Irène Dasseni
- Marion Bolzoni
- Emilie Picard
- Julia Pardo
- Sara Seddou
- Frédéric Mascarelli
- Anaïs Françon
- Francine Behar-Cohen

- CSTB
- Christophe Martinsons
- Samuel Carré
- Pierre Boulenguez

- ENVA
- Sabine Chahory
- Cathy Claramonte
- Gaëlle Choumager
- Thomas Lilin

INSERM, ADEME, ANSES, Retina France, Association des aveugles et handicapés visuels, CRO, CSTB, ENVA