



Society of Light
and Lighting

Lighting for the eye and brain

Thursday 21st October 21



CIBSE
South West

www.sll.org.uk
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sll@cibse.org



SLL Rep: Matthew Walsh

Glamox Luxonic



Speaker: Dr Denize Atan

Bristol Eye Hospital & University of Bristol



Speaker: Dr Shelley James

Age of Light Innovations



Society of Light
and Lighting



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Upcoming Events

- 26 October 2021 - Back to School: Are we getting the most from lighting upgrades in existing schools? (Webinar)
- 27 October 2021 - SLL & Signify in conversation with Andrew Bissell FSL and Dr Christopher Kyba (Webinar)
- SLL South West Event – January 2022 TBC

Become a member? www.sll.org.uk

How does light influence the eye?

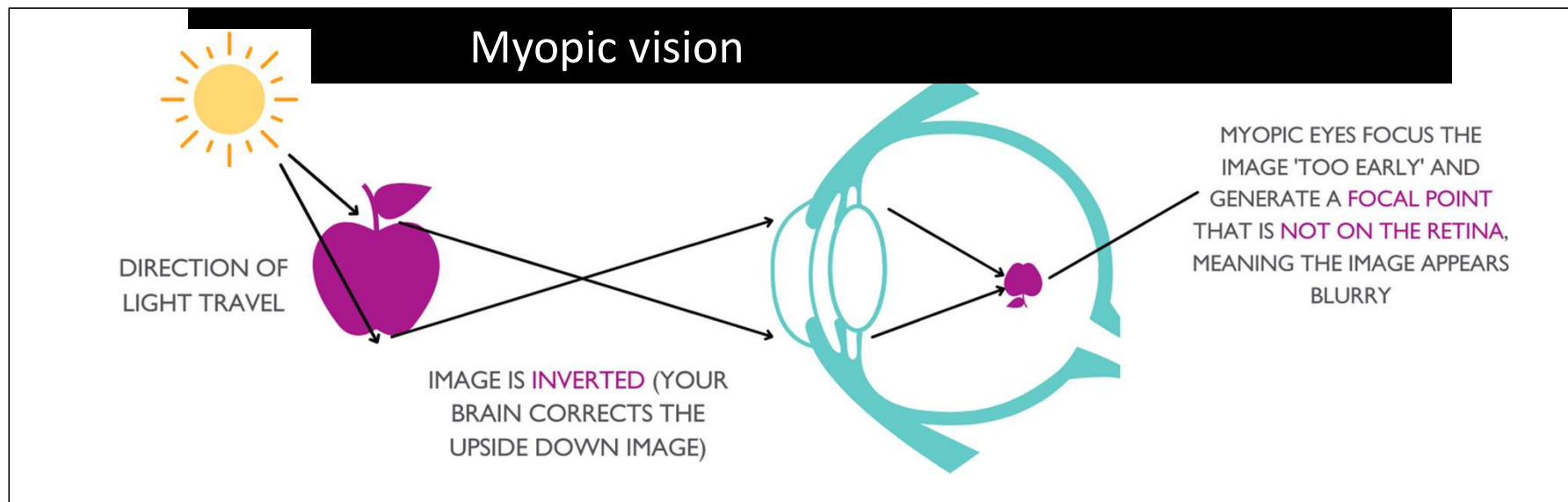
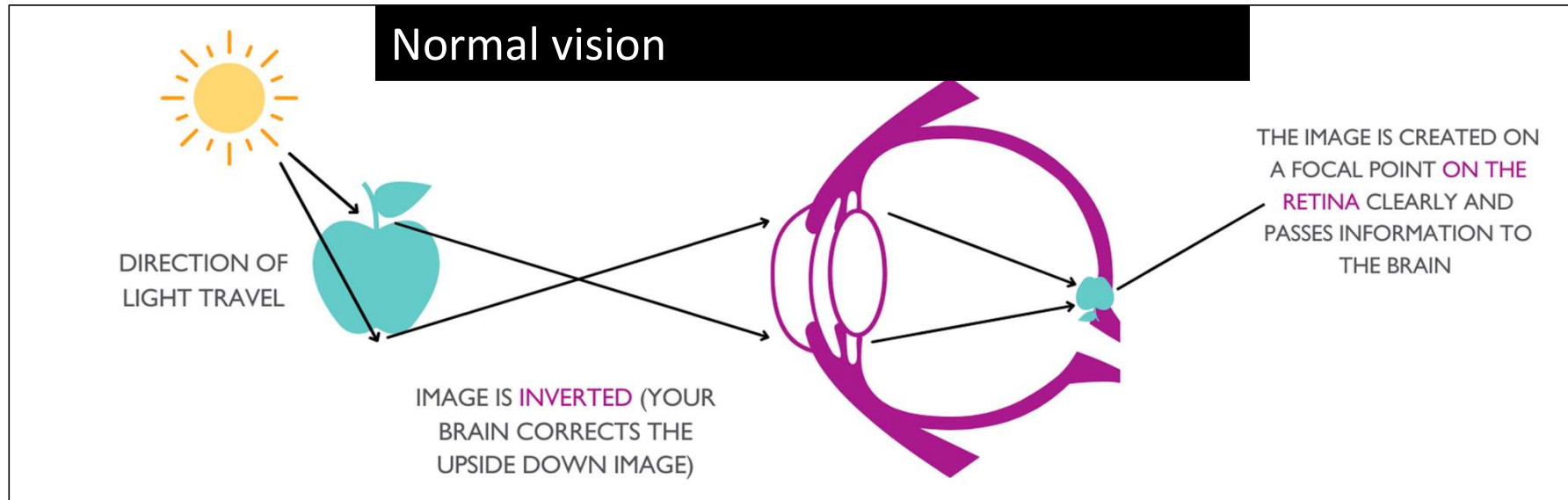


Dr Denize Atan

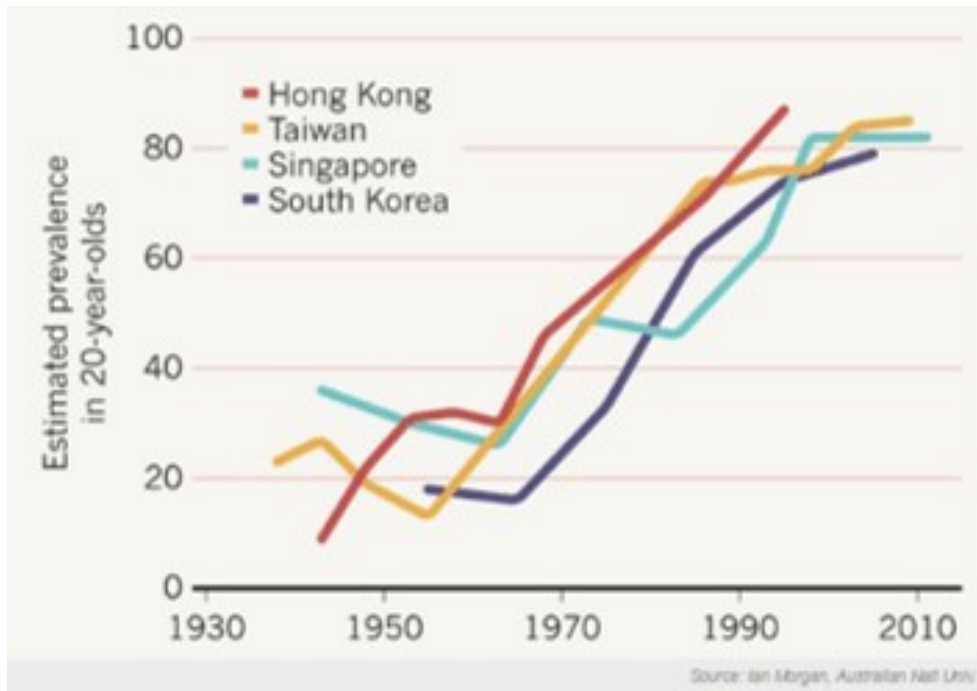
Consultant Neuro-ophthalmologist

University of Bristol & Bristol Eye Hospital

What is myopia?

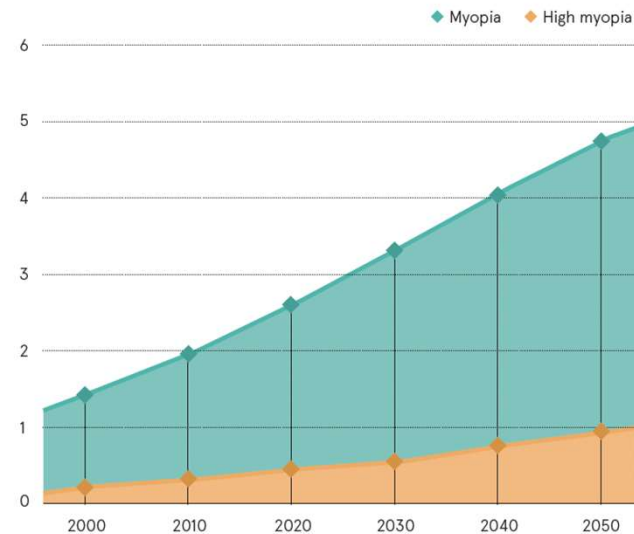


Why is myopia a big problem?



Growing prevalence of myopia worldwide

Number of people (bn)



Growing prevalence of myopia worldwide

28%

of the world's population suffered from myopia in 2010, equal to 1.95 billion people

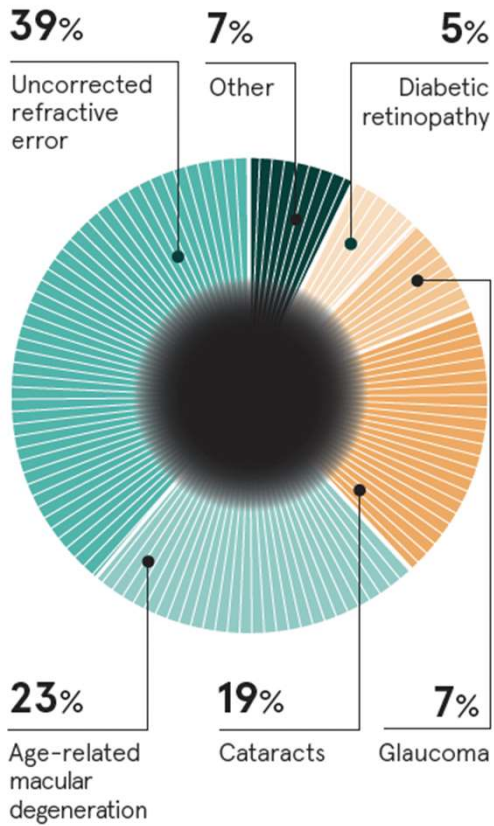
50%

are expected to be myopic by 2050, equal to 4.76 billion people

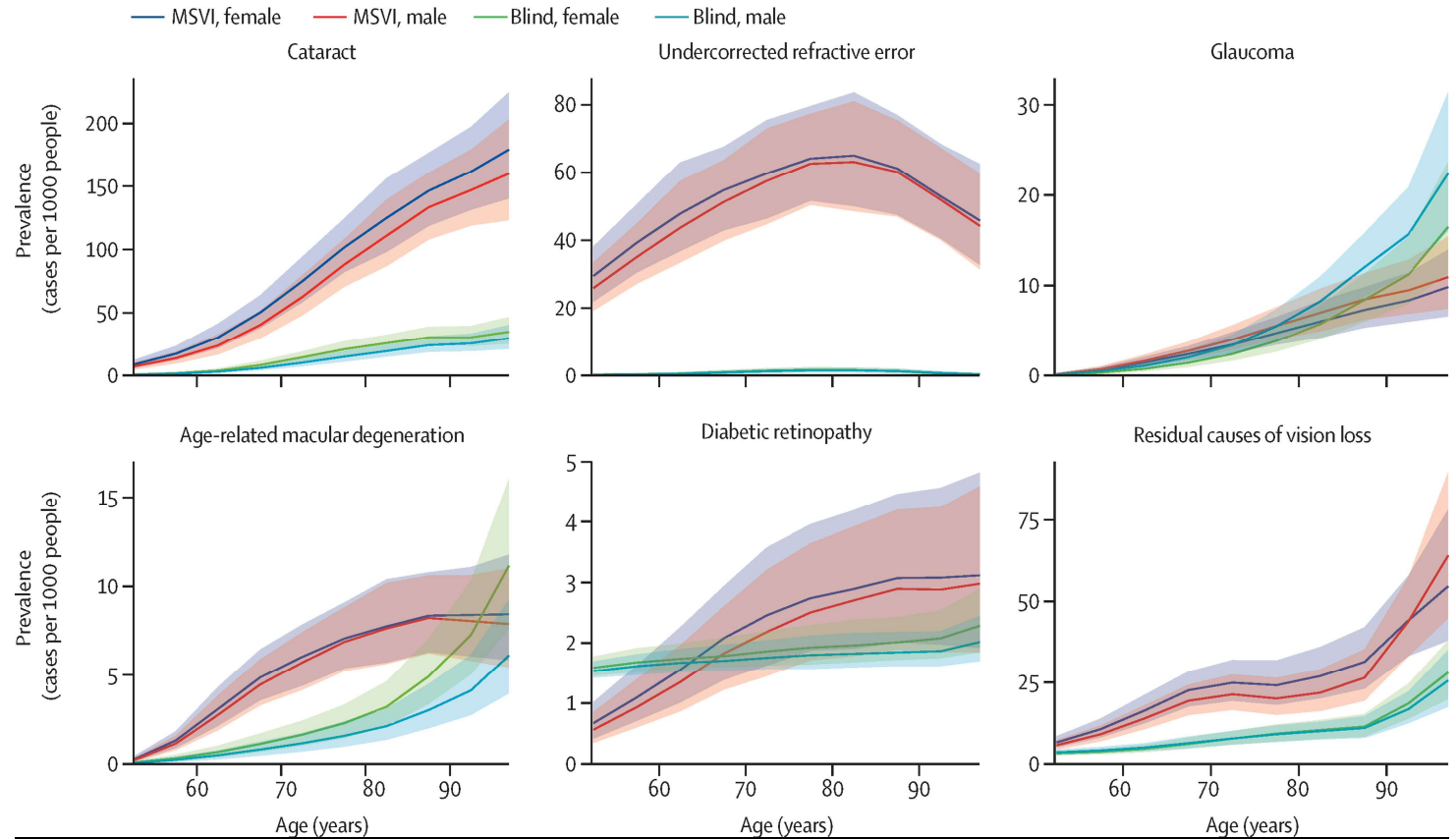
938m

people are predicted to suffer from high myopia by 2050, which puts them at risk of more serious eye conditions

Causes of sight loss in the UK



Royal National Institute of Blind People

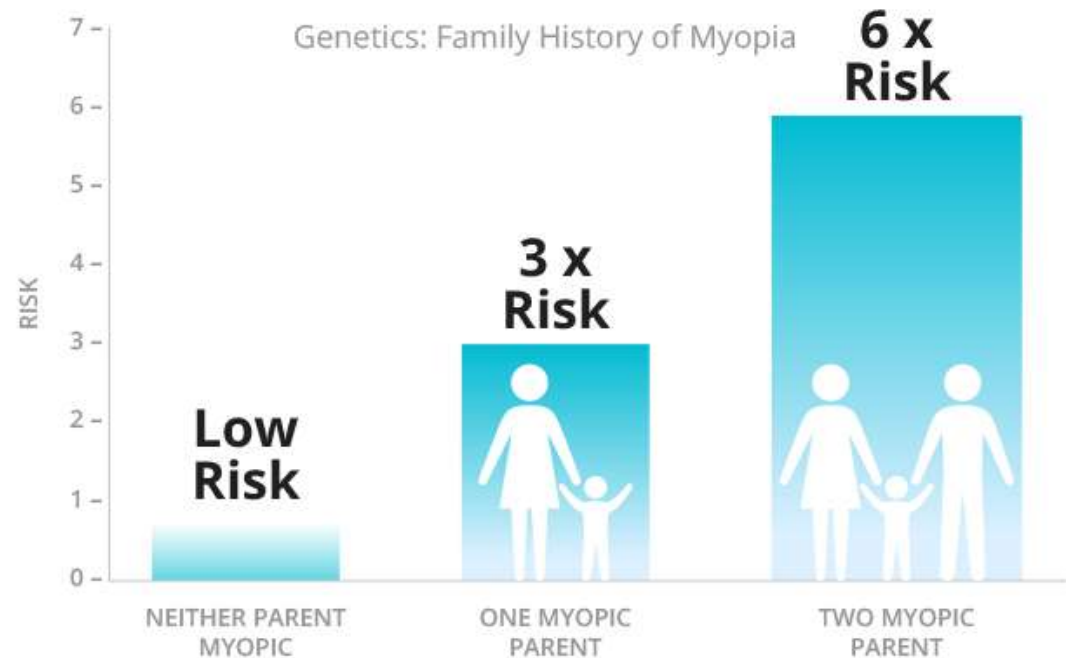


The Lancet Global Health 2021

Myopia is one of the most common causes of sight loss in the UK and the World

Why is this happening?

It's just
our
genetics,
isn't it?



Health

'Miss! Are your classes making me blind?'

By James Gallagher
Health and science correspondent, BBC News

7 June 2018

f t Share



Top Stories

Brexit bill finally gets through Parliament

After months of debate, the EU (Withdrawal) Bill clears Parliament and goes for Royal Assent.

1 hour ago

Hospital drugs left 456 patients dead

4 hours ago

Trump reverses migrant separation policy

3 hours ago

Features



9 June 2018
361:357-378 No 8156 | ISSN 1759-2151



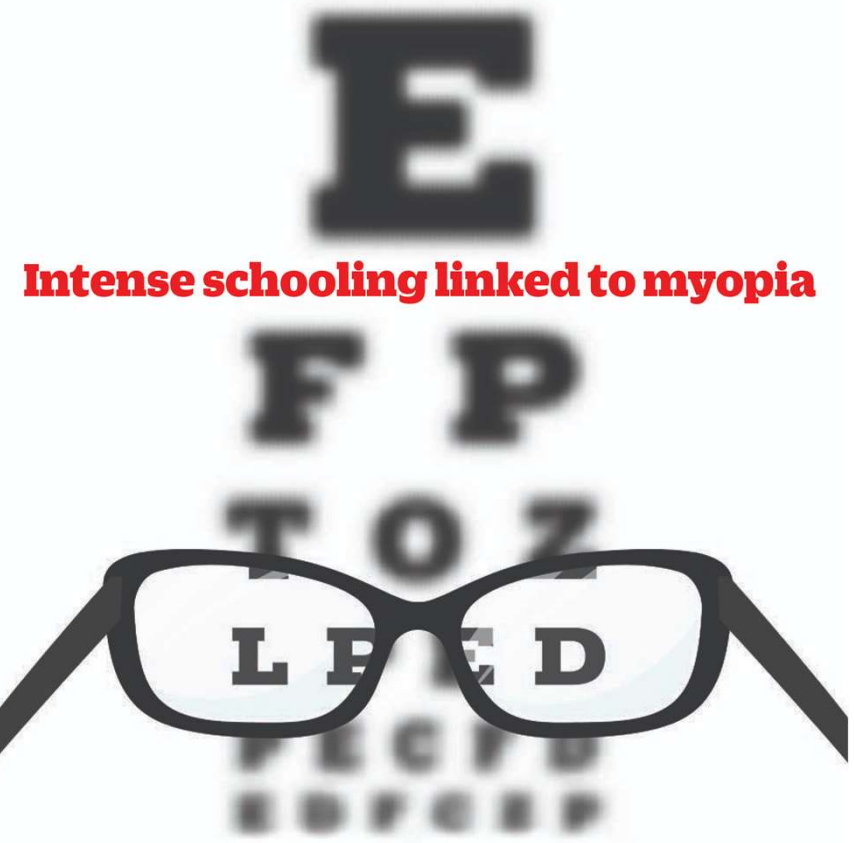
Join our Scrap the Cap campaign p 337

Legacy of pregabalin litigation p 338

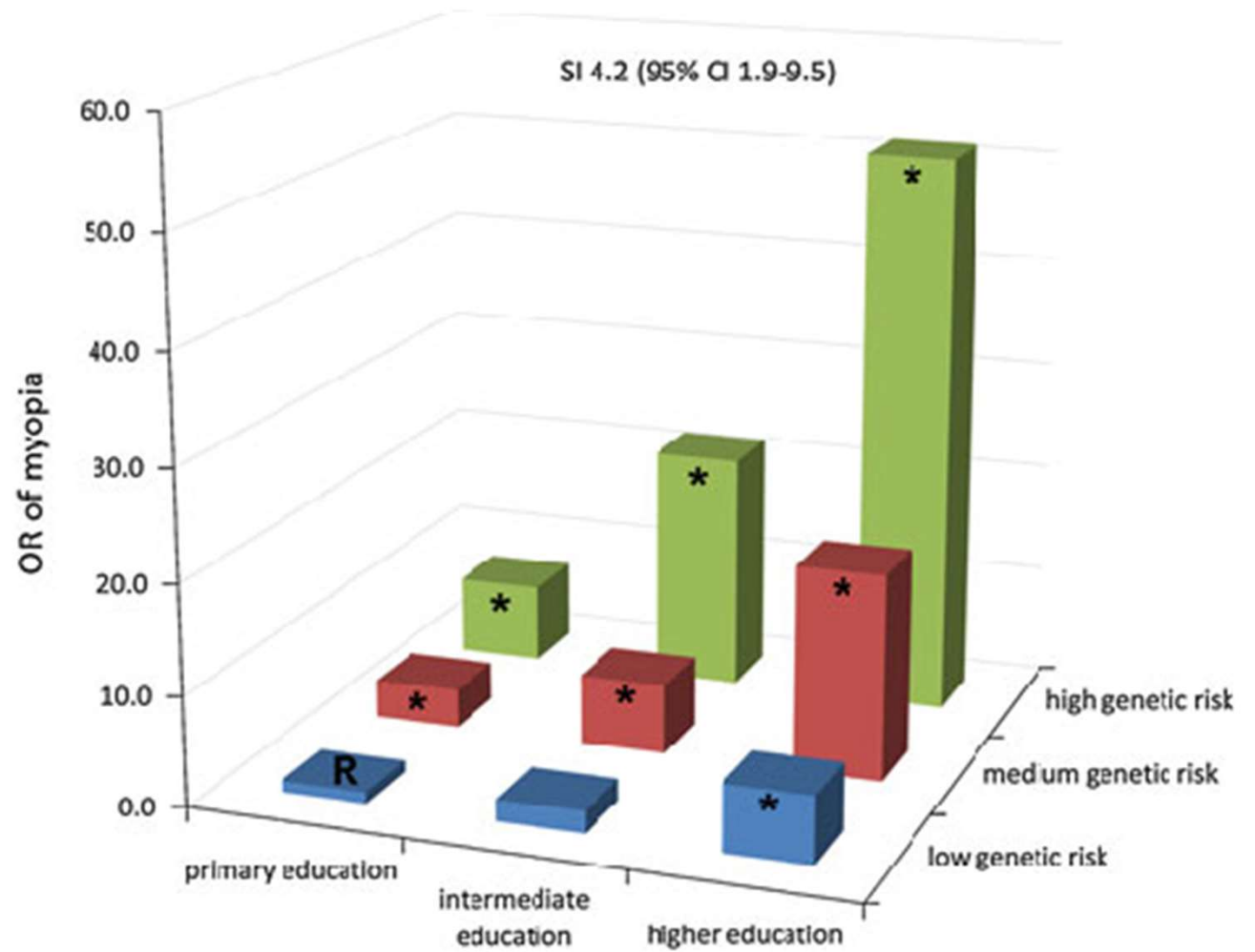
End outdated outpatient clinics p 362

Update on chronic pancreatitis p 368

1 CPD hour in the education section



Genes and environment are both important

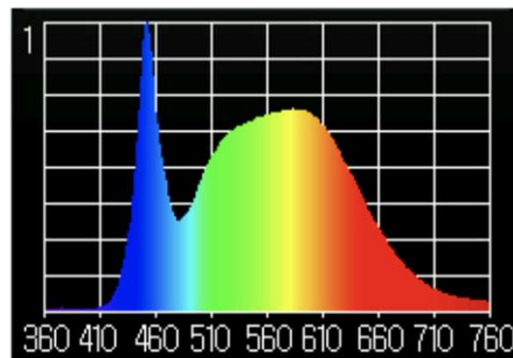
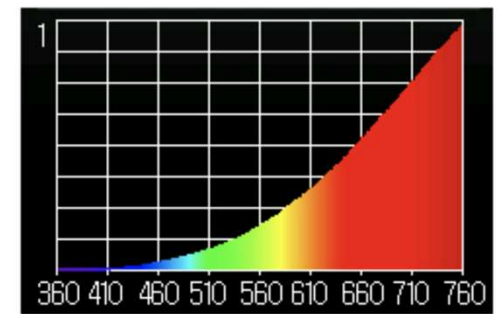
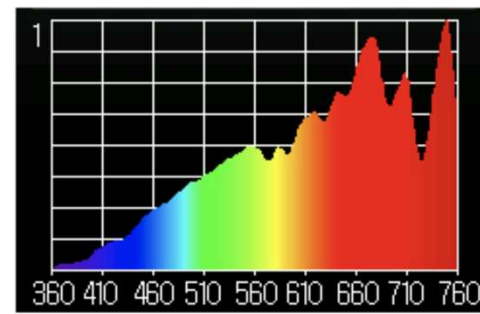
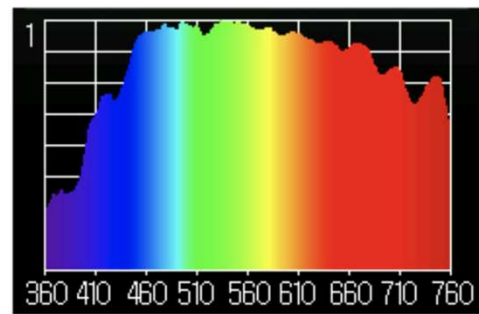
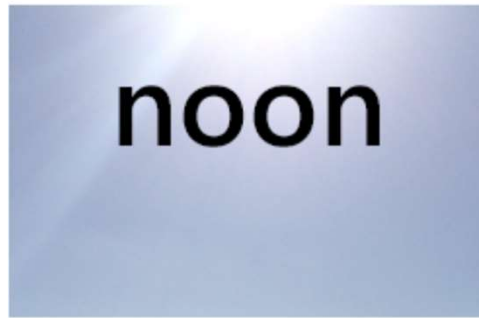


What has changed?

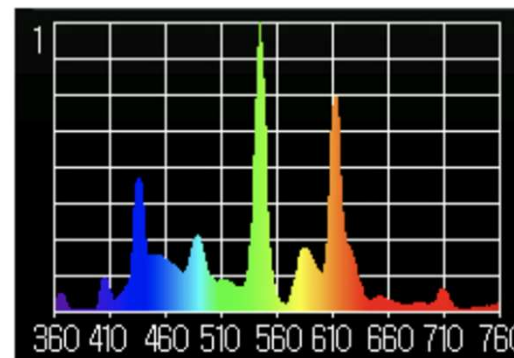
Typical illuminance for light sources used in human evolutionary timeline



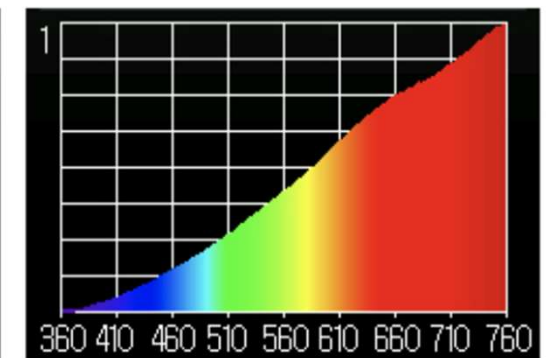
How is daylight different to artificial light?



LED



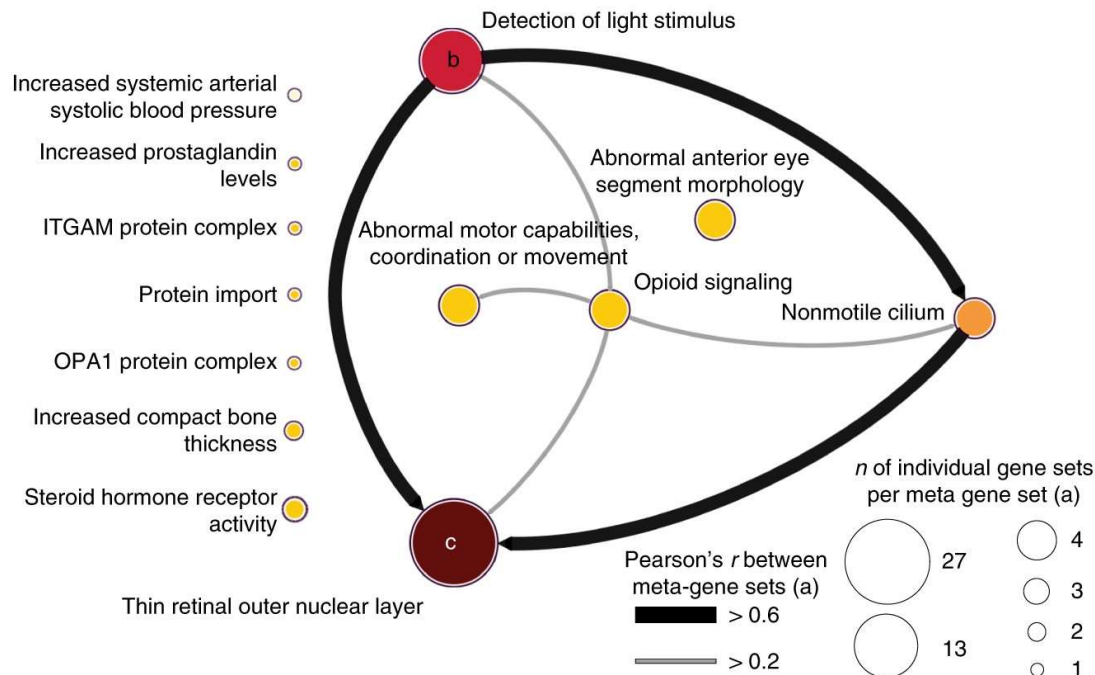
Fluorescent



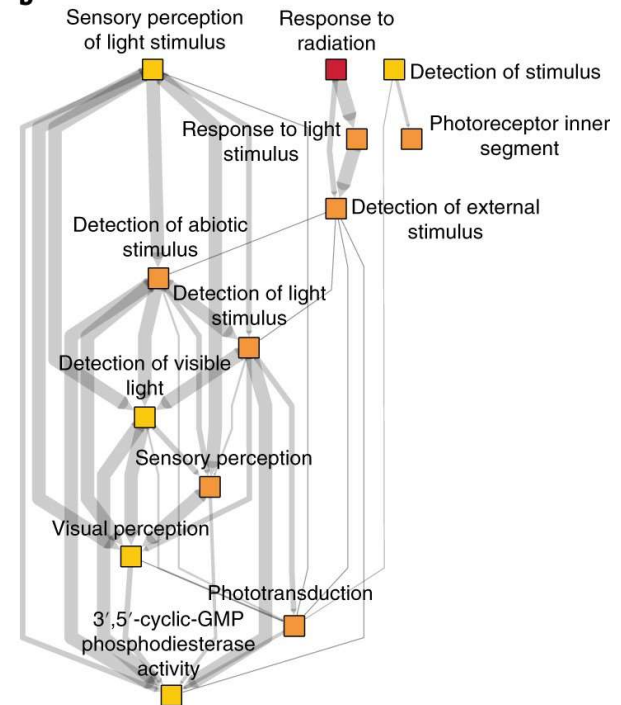
Incandescent

Genes linked to myopia are involved in the detection of light

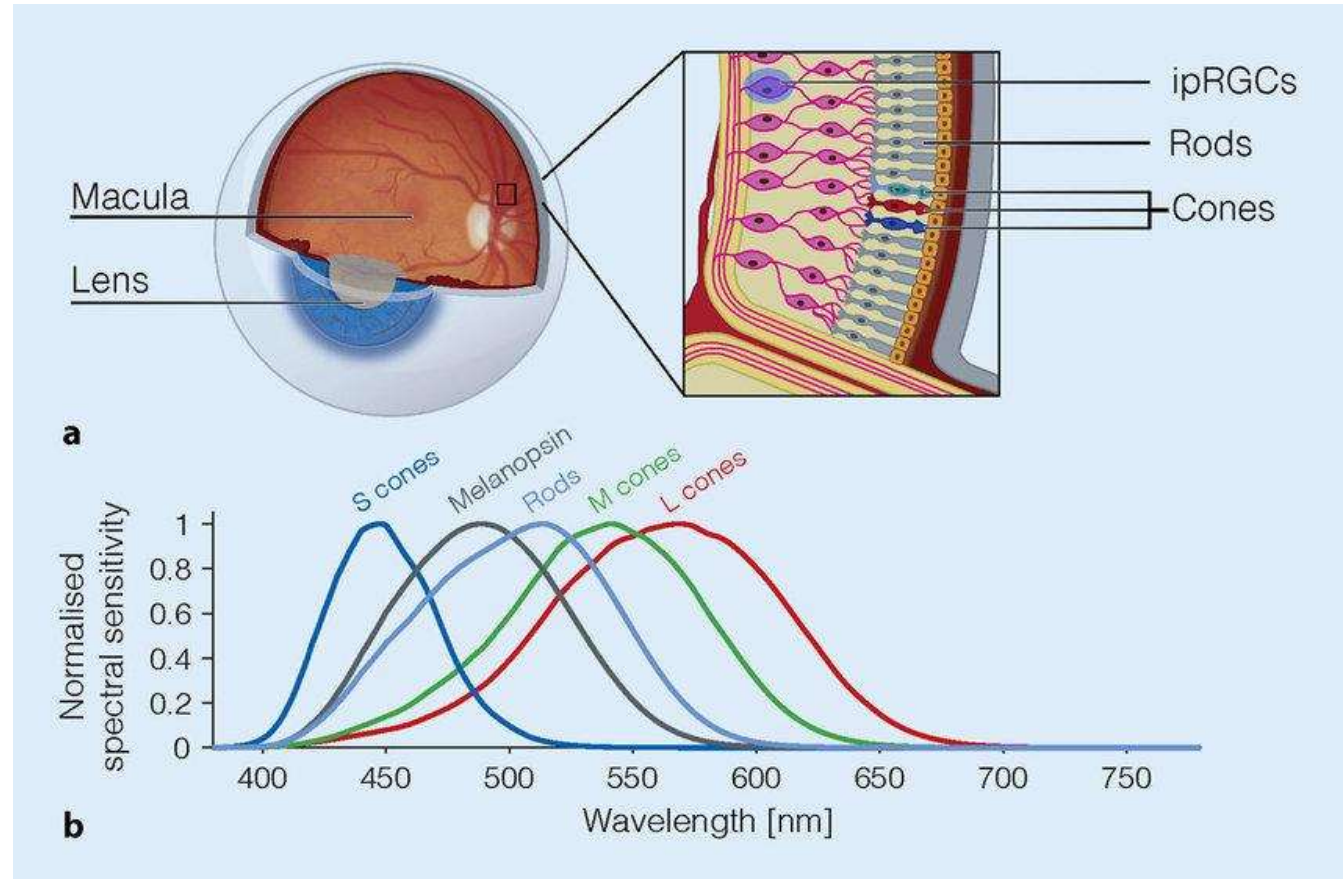
a



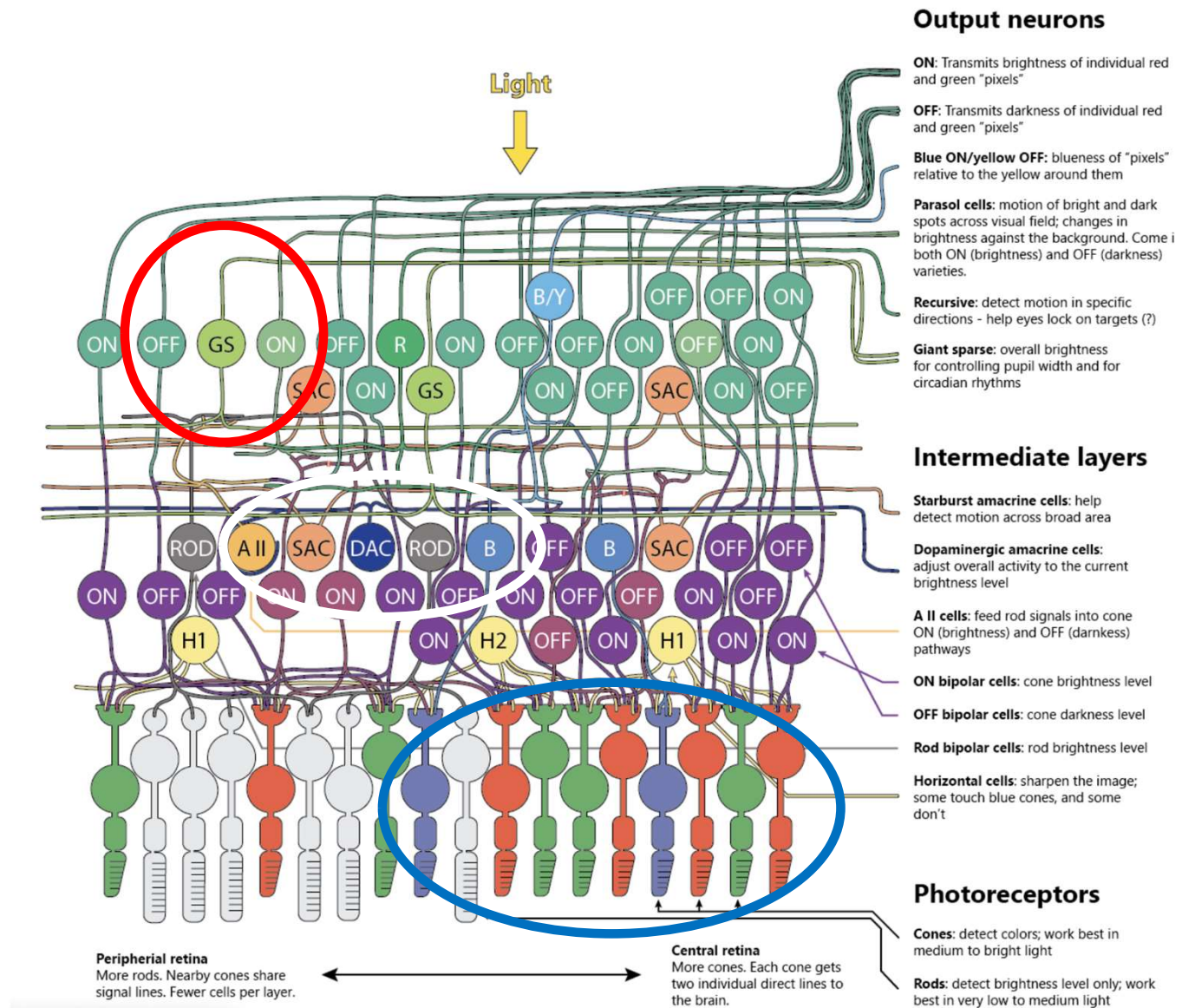
b



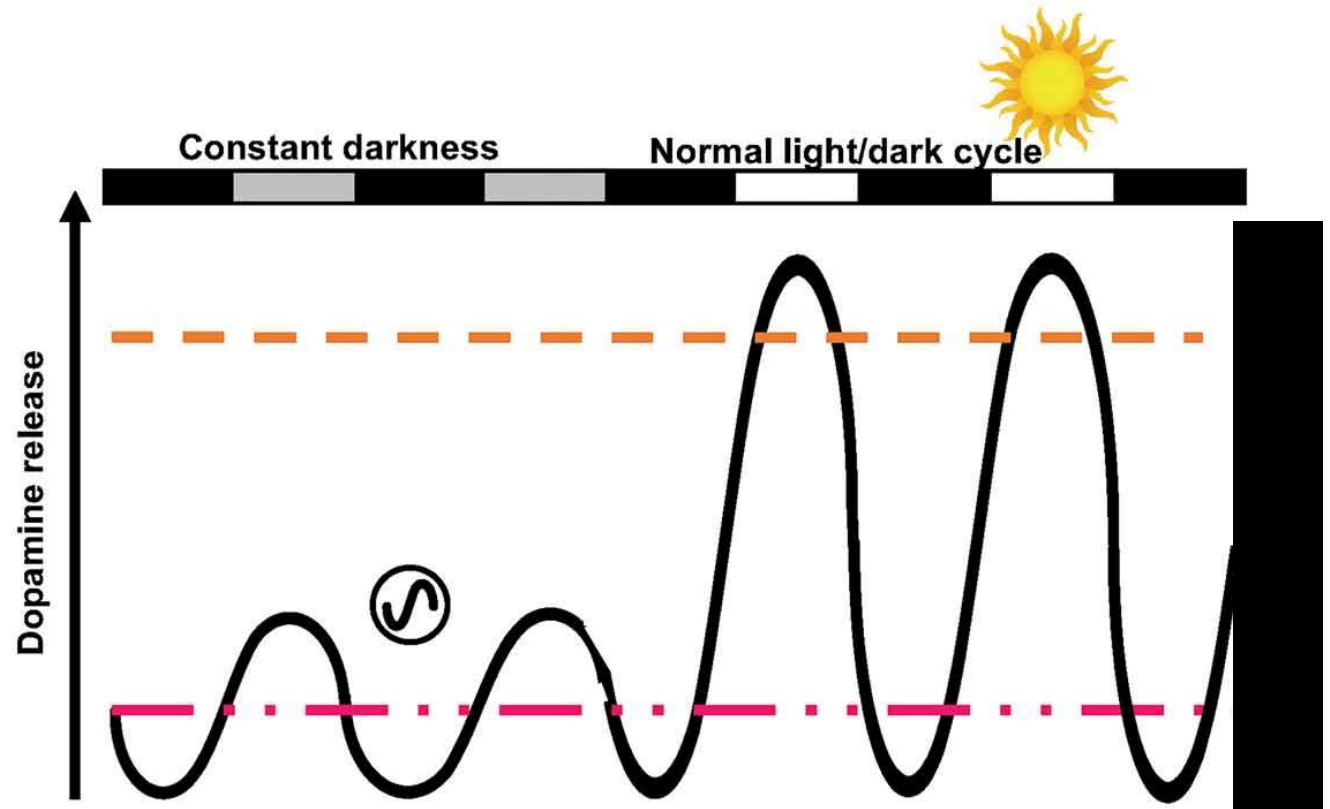
3 types of cell
in the retina
are directly
sensitive to
light



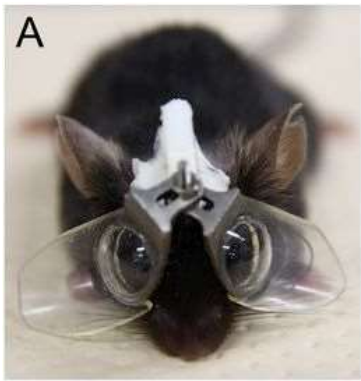
The retina is an electrical circuit



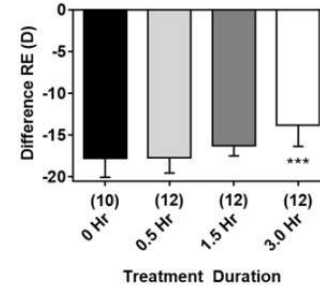
Retinal dopamine levels fluctuate in response to light exposure and circadian rhythms



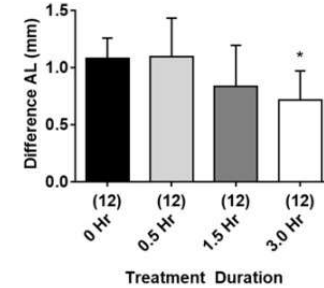
Light influences risk of myopia in animal models



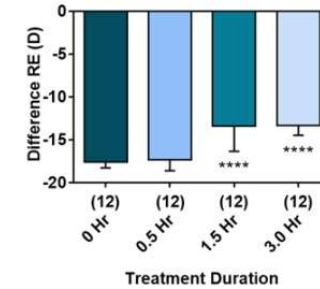
(a) White Light: Difference Refractive Error (RE) (Expr - Cntl)



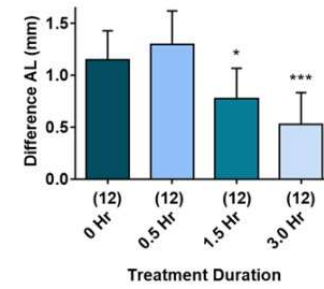
White Light: Difference Axial Length (AL) (Expr - Cntl)



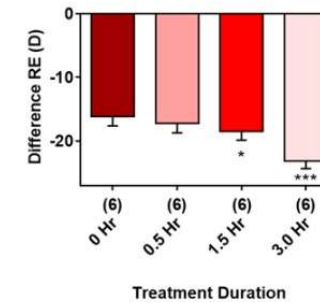
(b) Blue Light: Difference Refractive Error (RE) (Expr - Cntl)



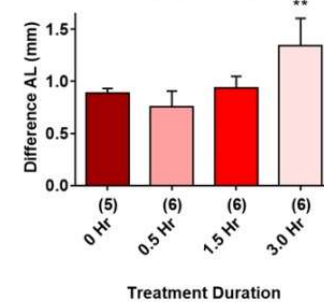
Blue Light: Difference Axial Length (AL) (Expr - Cntl)



(c) Red Light: Difference Refractive Error (RE) (Expr - Cntl)



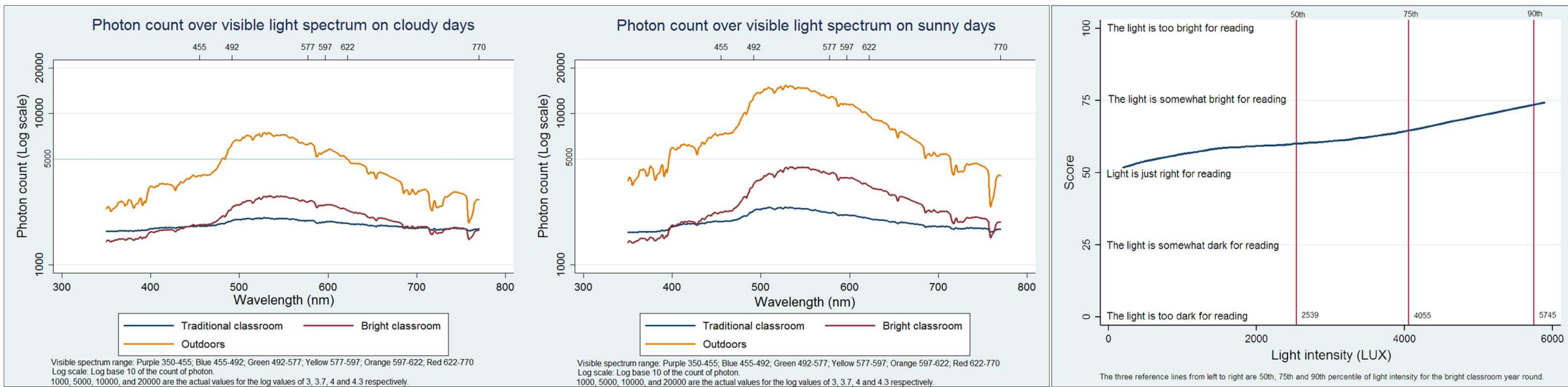
Red Light: Difference Axial Length (AL) (Expr - Cntl)



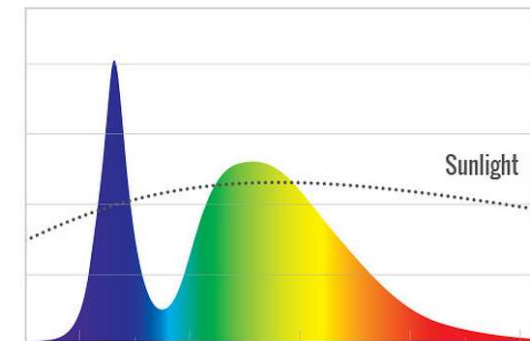
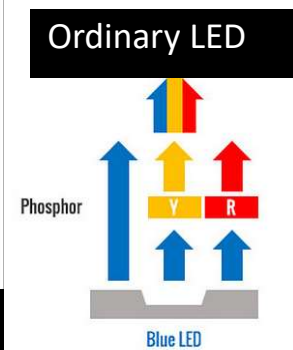
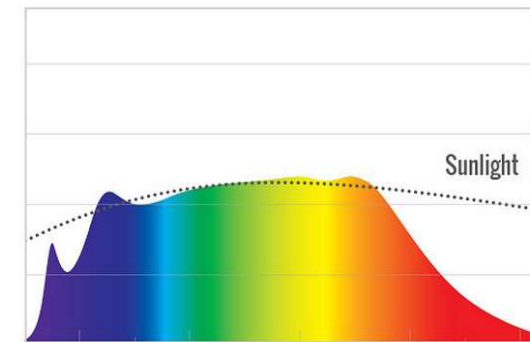
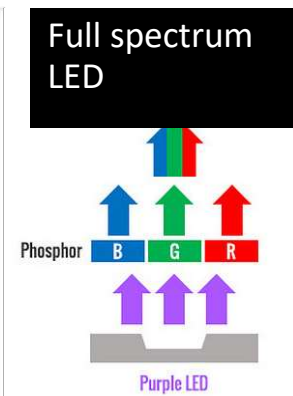
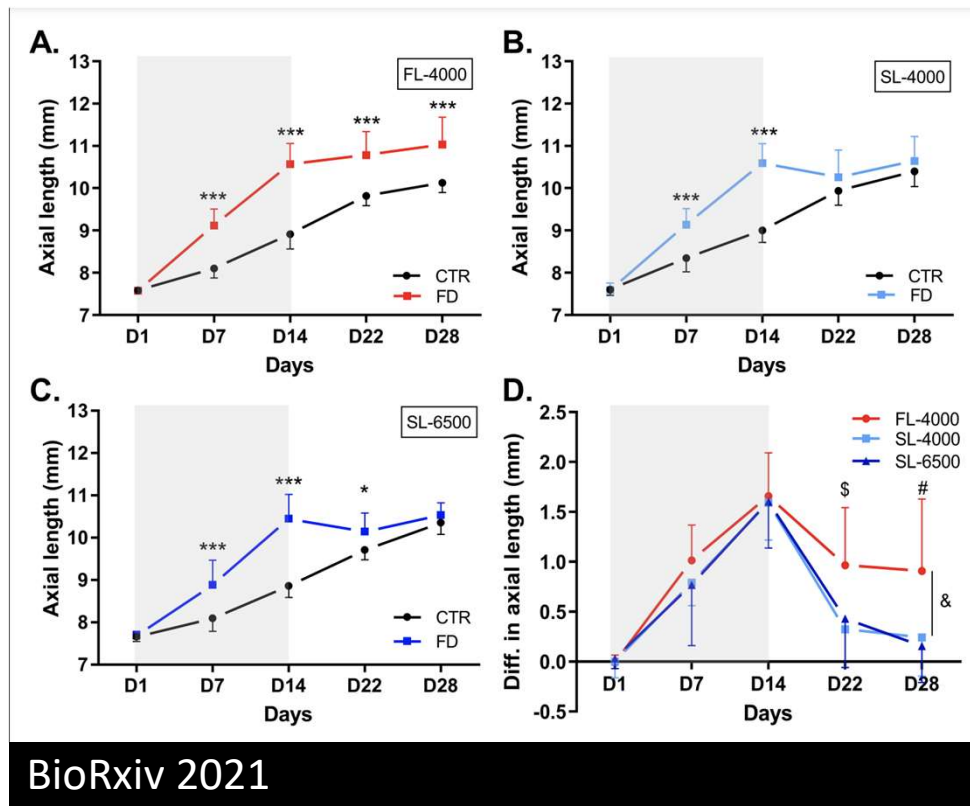
Bright Light Classrooms introduced in China



The brightness and colour spectrum of the BLC

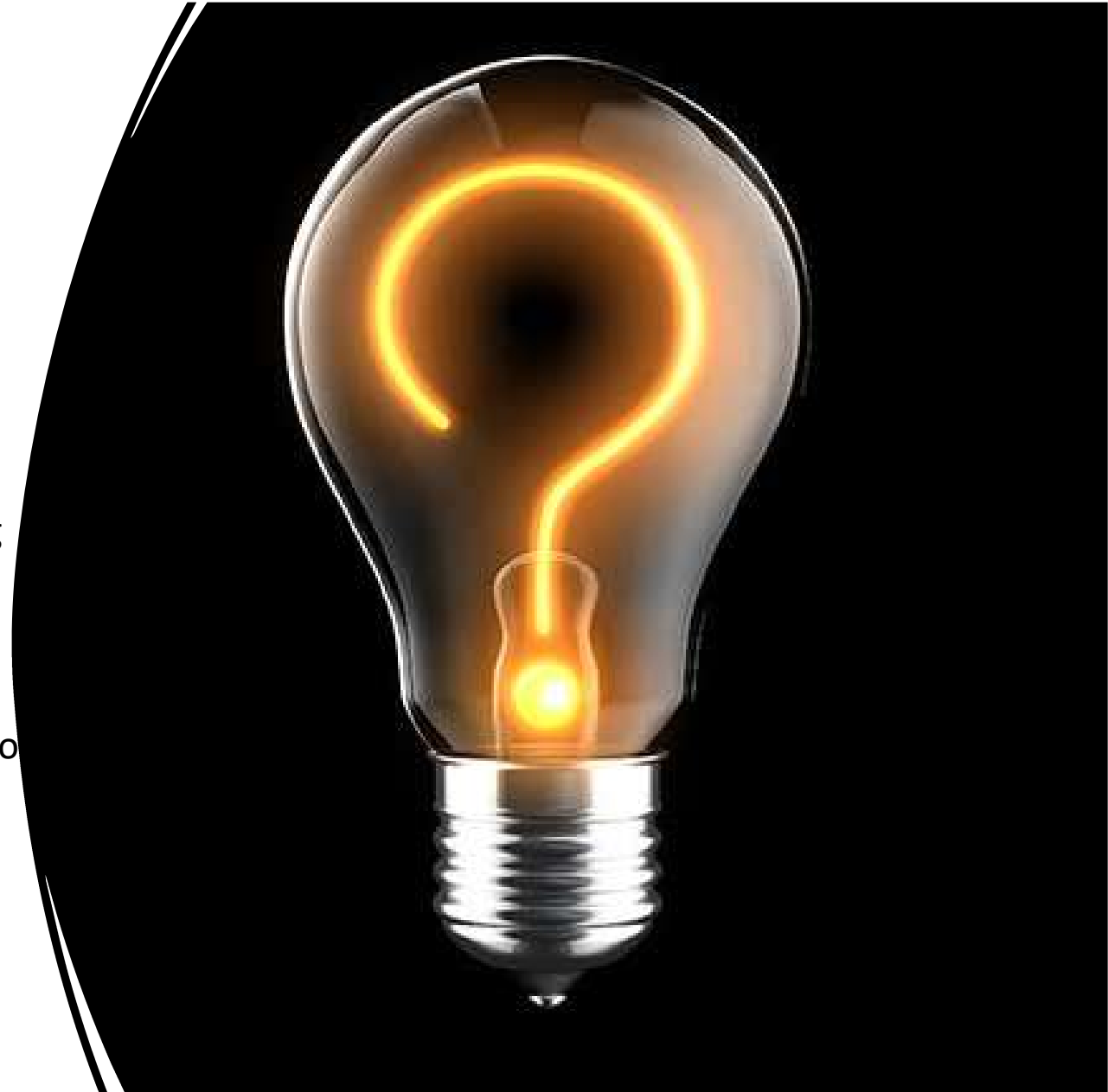


Can artificial light mitigate against the risk of myopia?



Unanswered questions...

- Can we simply need to increase the brightness? What about the effect on reading comfort?
- What about colour spectrum? Is a wider spectrum always better?
- Can we translate findings in chicks and mice to humans?
- What are “safe” levels of artificial light (wrt brightness, colour spectrum, flicker)



If you would like to help take this research into the classroom, please let us know....

Denize.Atan@bristol.ac.uk



Lighting for eye and brain

Dr Shelley James

Age of Light Innovations

Bristol

1 October 2021





<https://www.nypodiatry.net/blog/post/outfitting-your-child-with-proper-footwear.html>





99

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4

NOVA 7.11

S S F T





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COVID-19



**Luna™ makes 3,000,000
Teen Eyes Brighter**

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bios  **GLAMOX**  LUXONIC

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NORWICH UNIVERSITY™

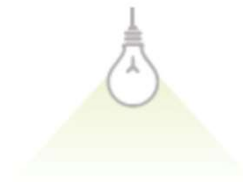


Finnish institute for health and welfare





- Brightness
- Timing
- Colour
- Flicker



Low light
50 lux



Living Room
200 lux



Office
500 lux



Supermarket
1000 lux



Rain
10,000 lux



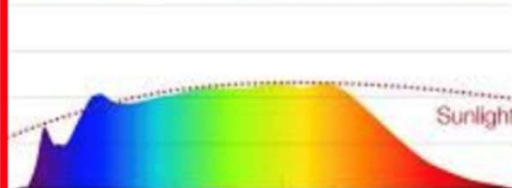
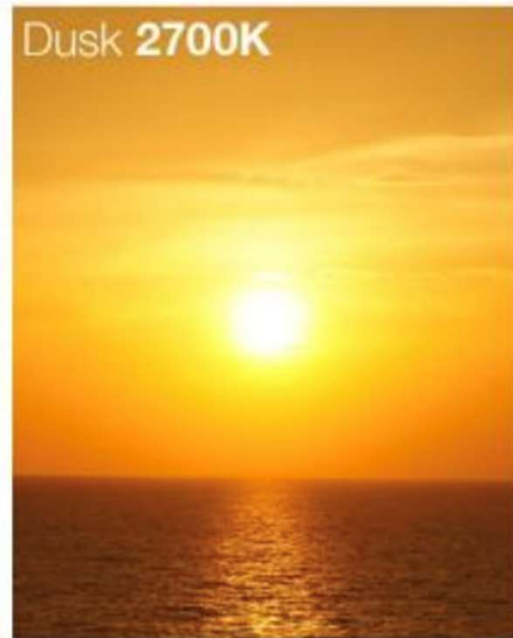
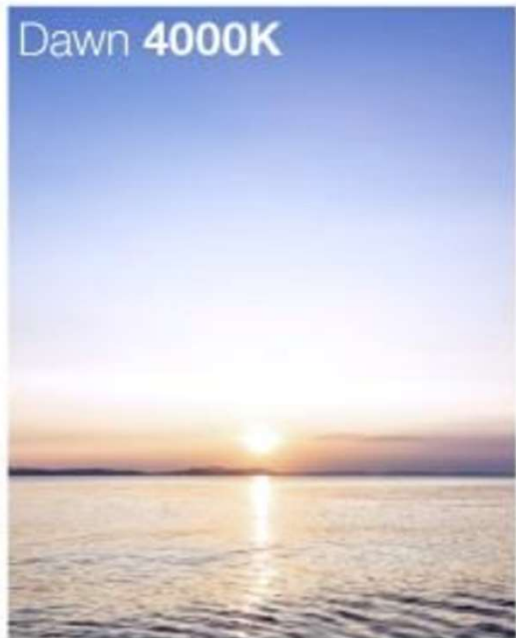
Cloudy
20,000 lux



Bright
50,000 lux



Direct Sun
100,000 lux





2700K
CRI 97



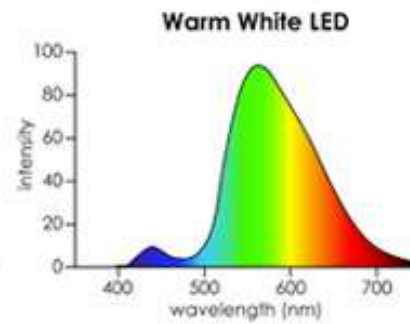
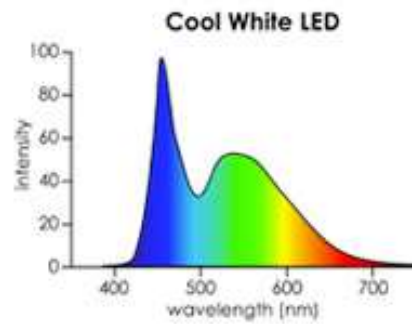
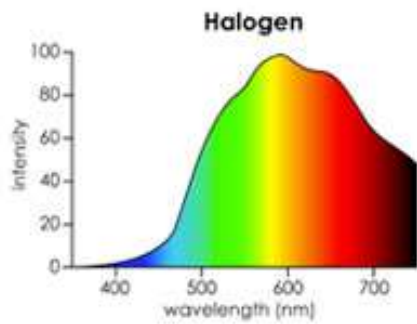
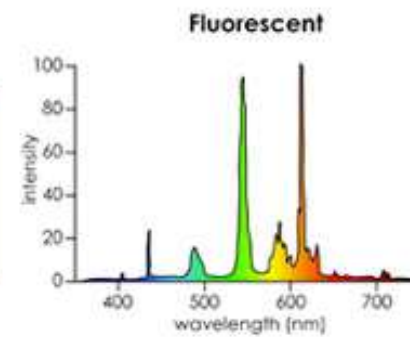
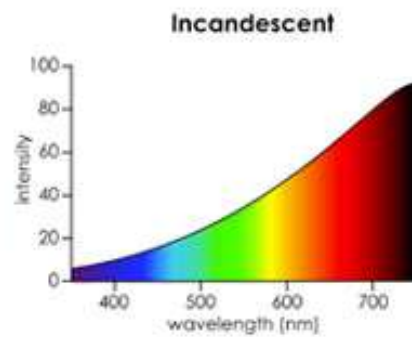
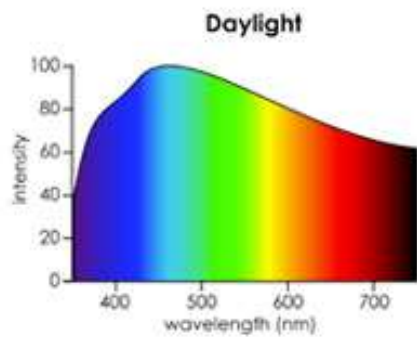
2700K
CRI 90

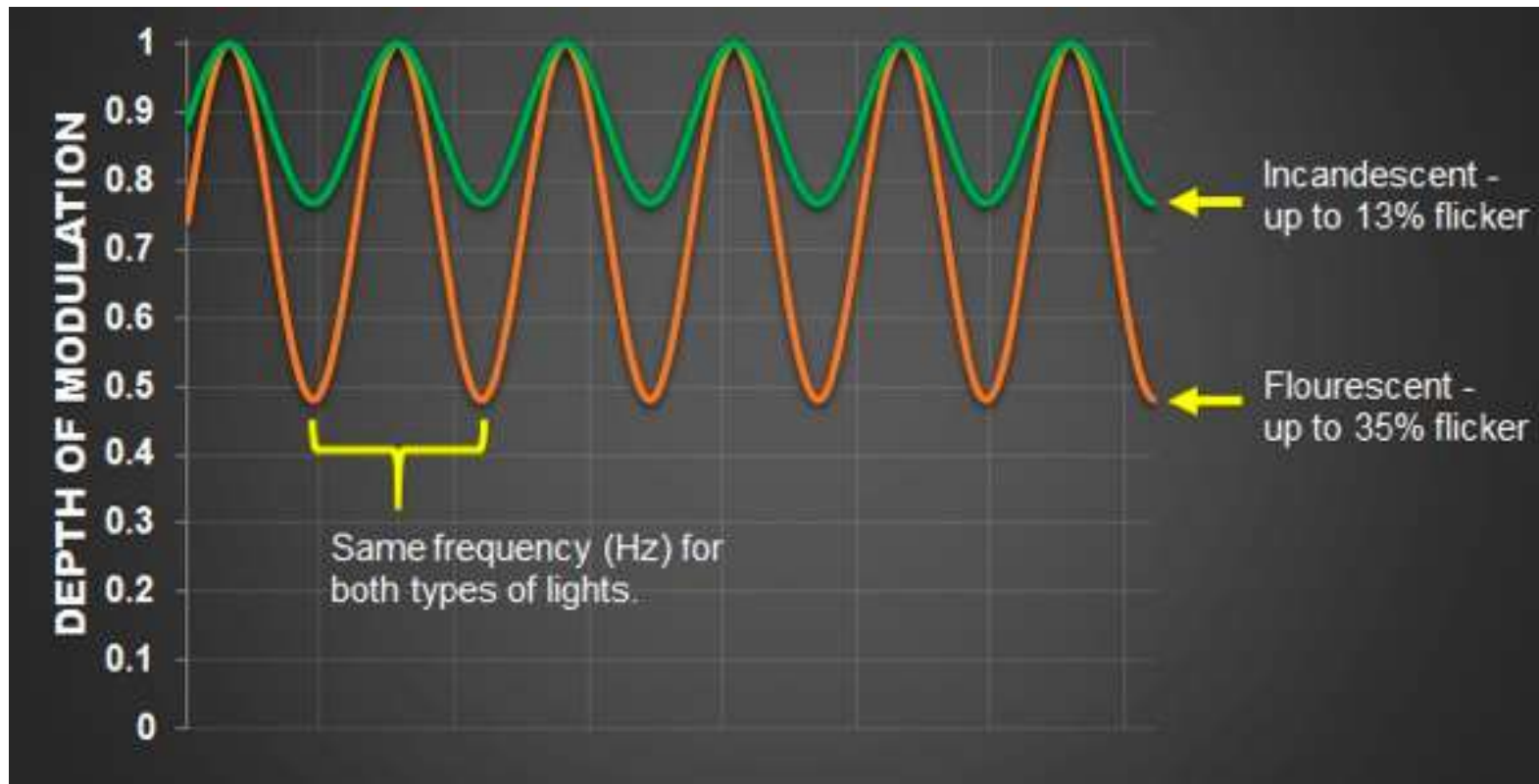


2700K
CRI 80

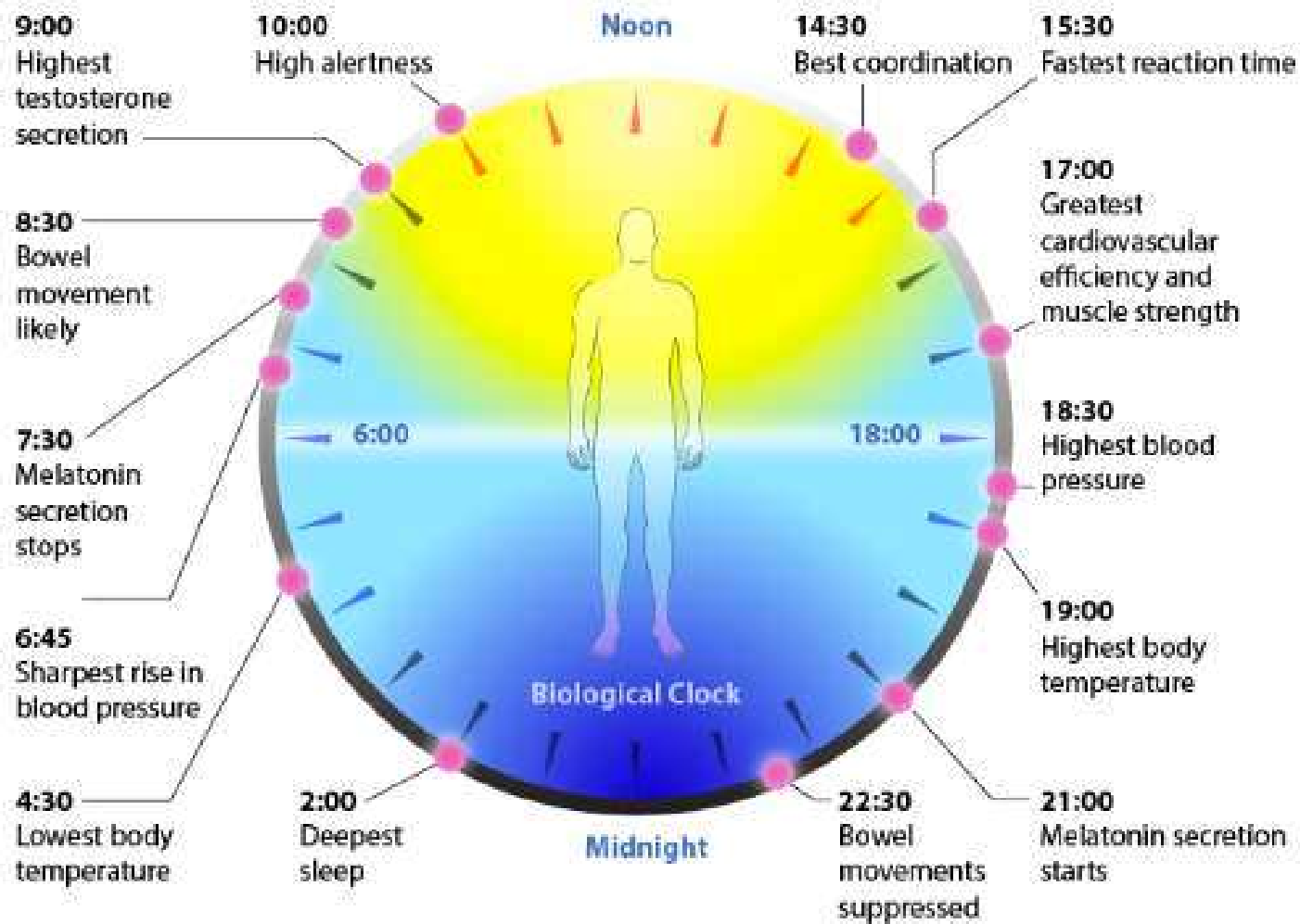


2700K
CRI 70





<https://www.alexfergus.com/blog/light-flicker-health>



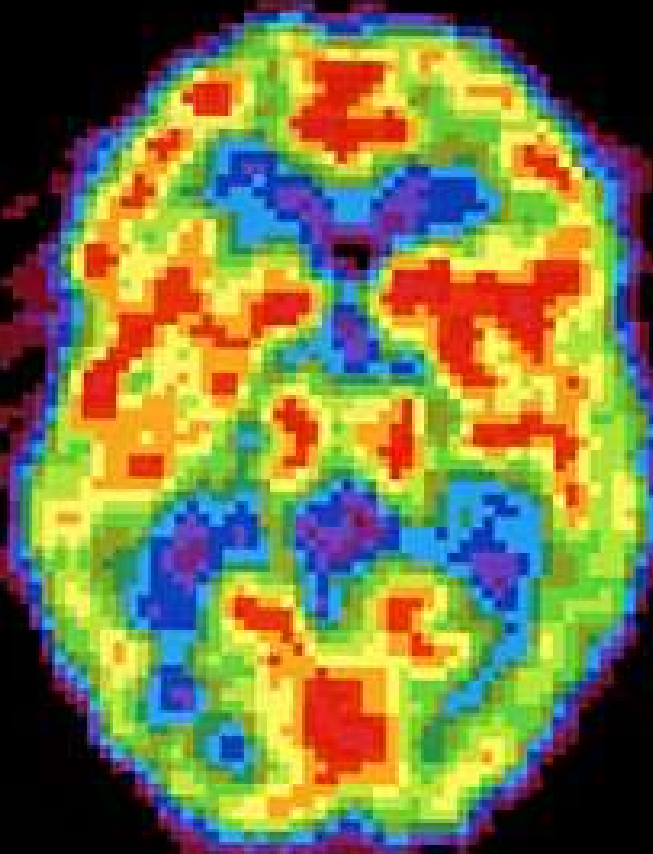
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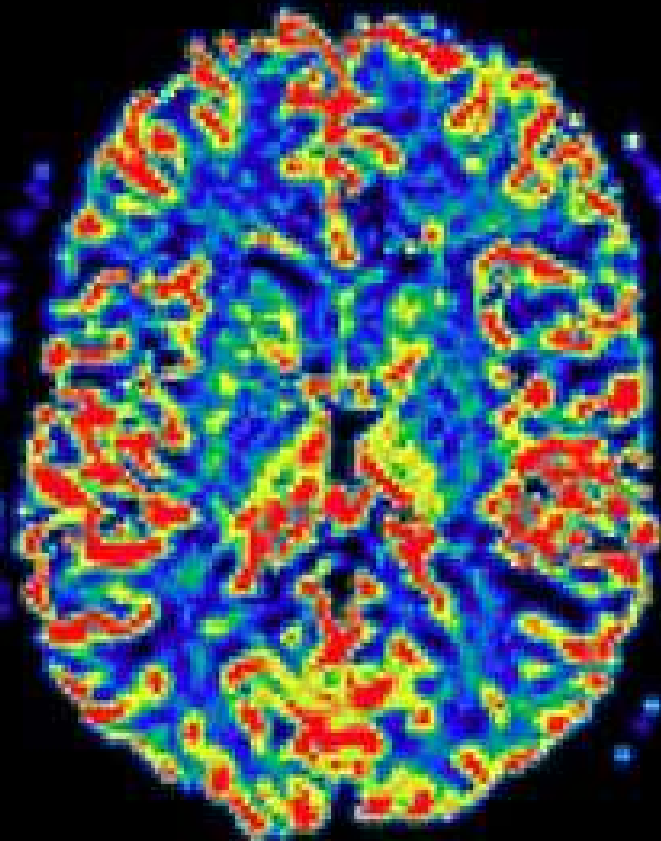
- 40% don't get enough sleep
- 50% homes disrupt 50% of sleep
- Depression obesity, behaviour...

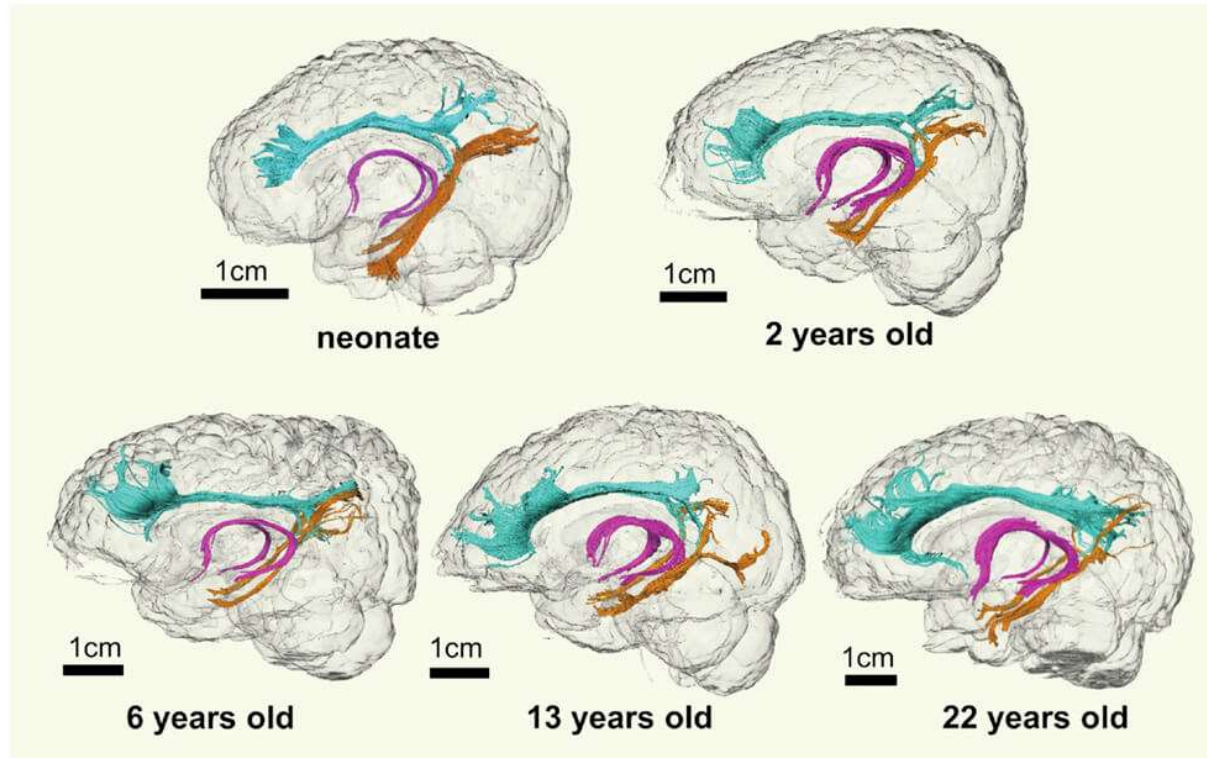
Photo by [Sharon McCutcheon](#) on [Unsplash](#)

REM

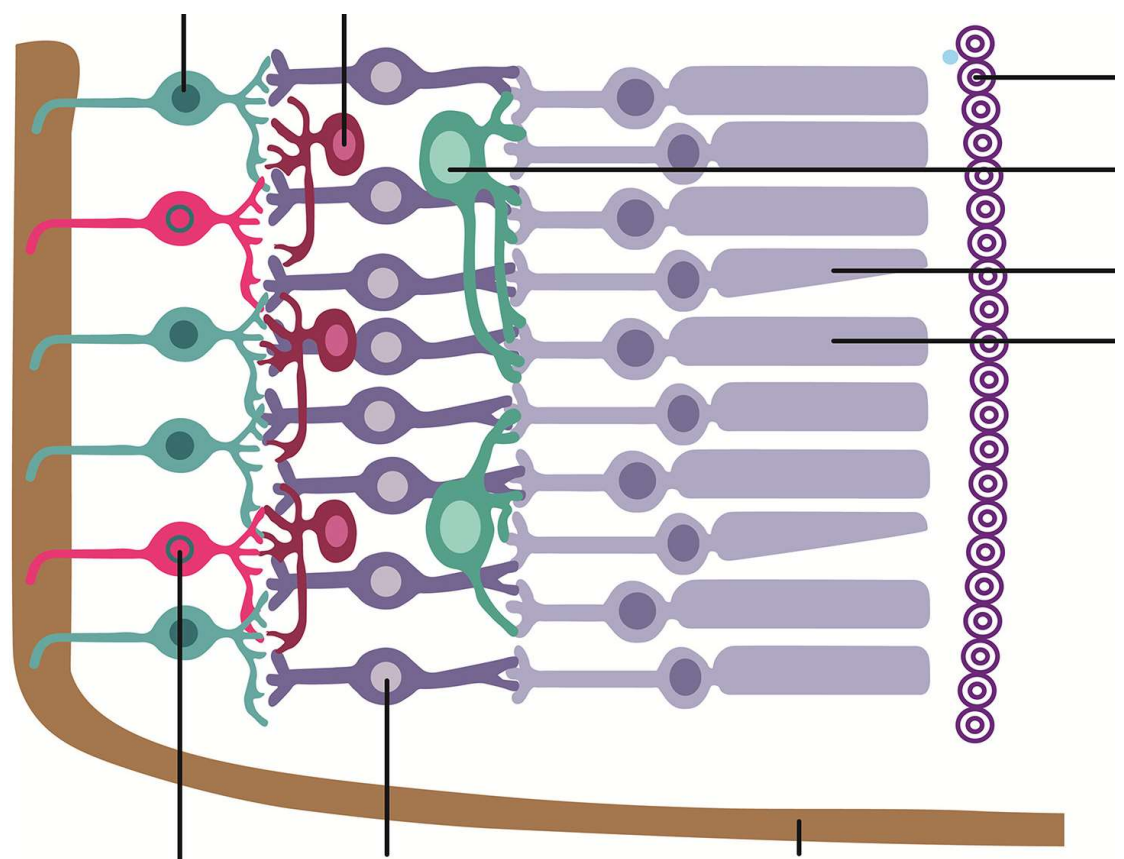


Awake





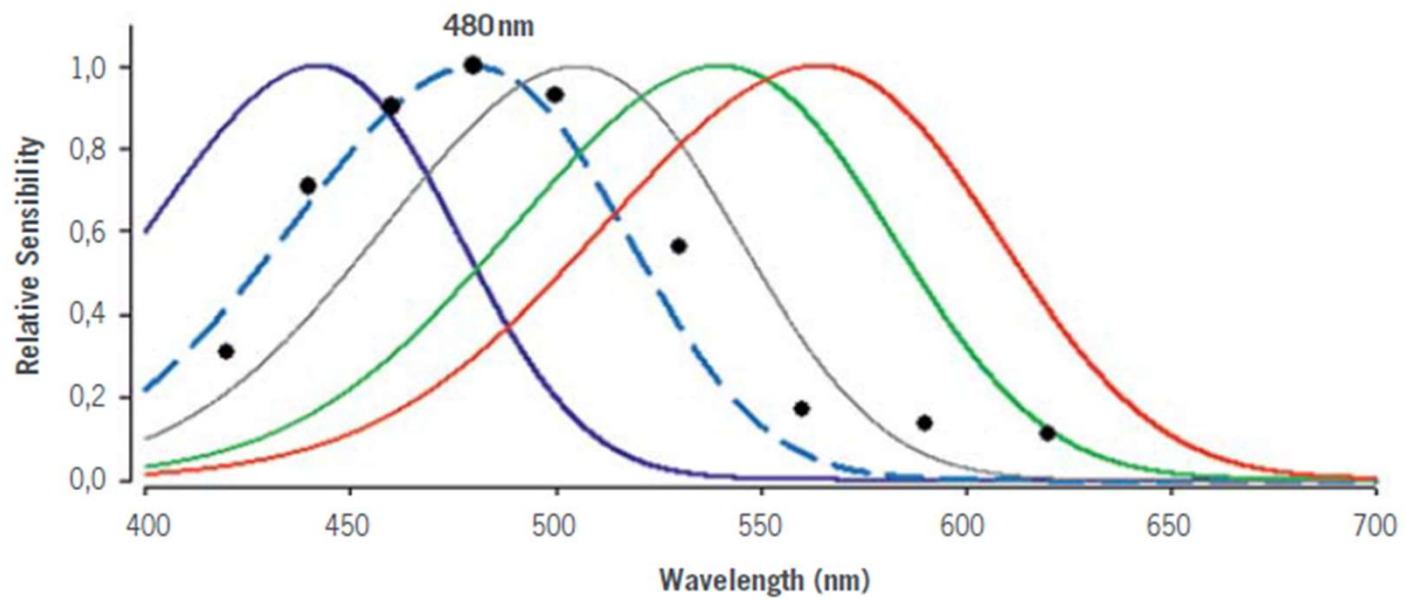
Source: commons.wikimedia.org

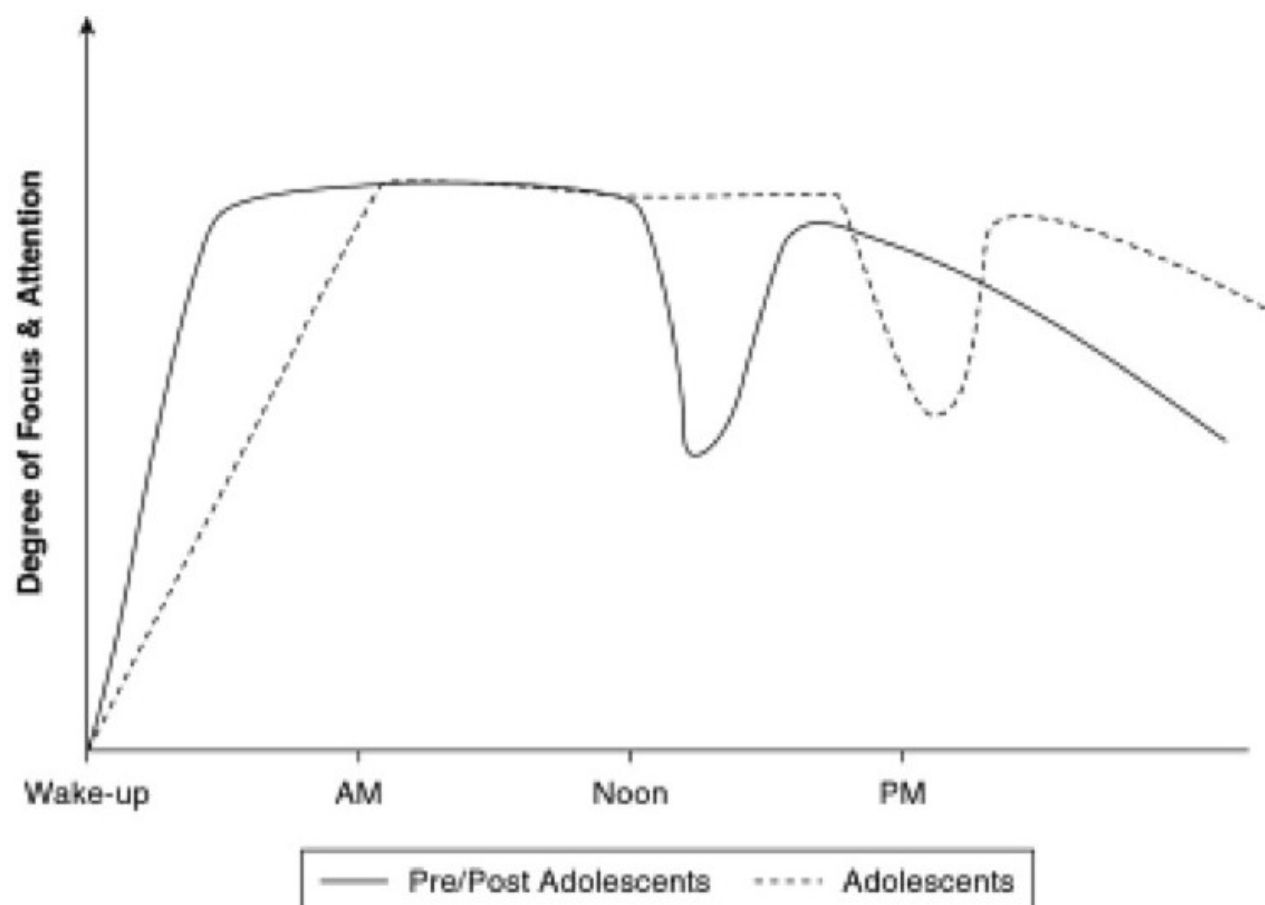


bipolar cell

optic nerve

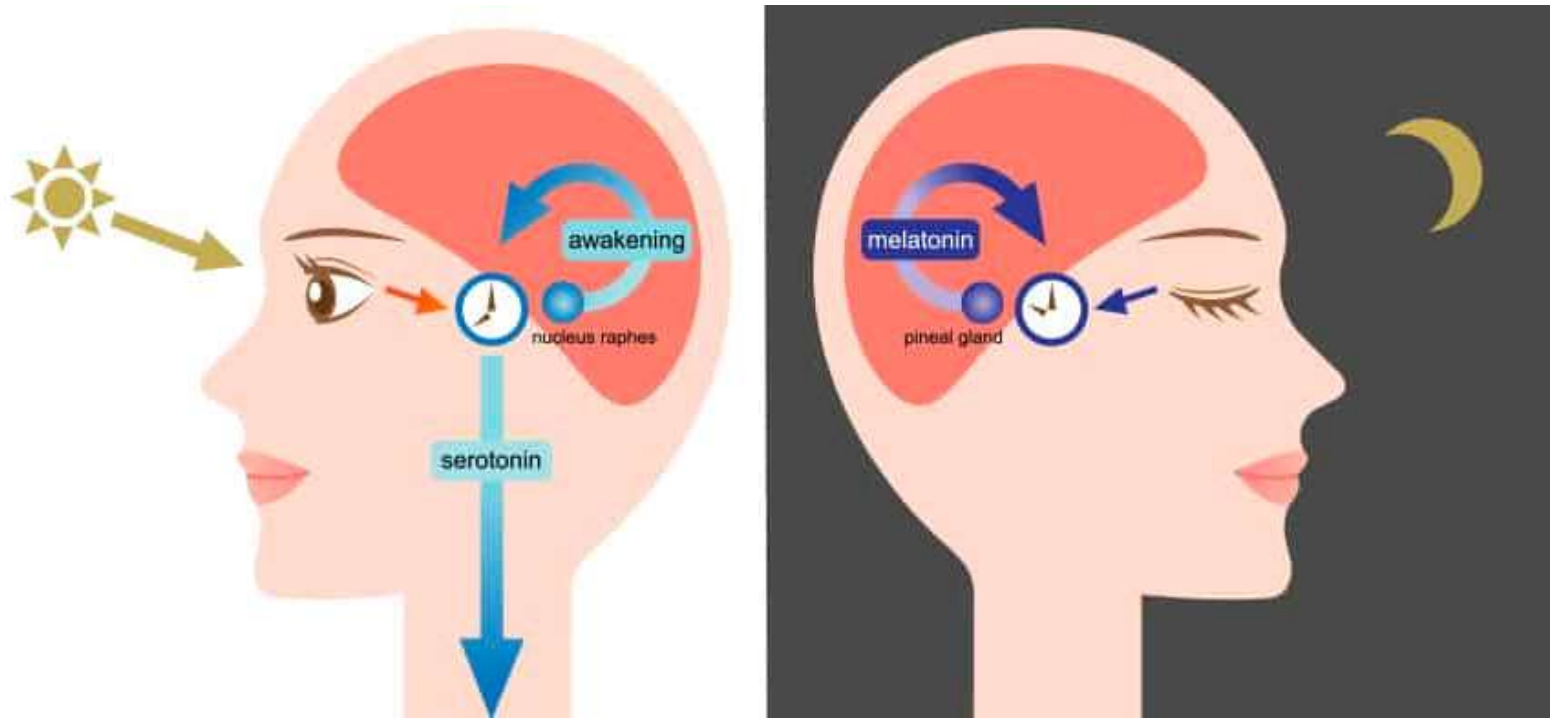
Intrinsically photosensitive
retinal ganglion cells ipRGC



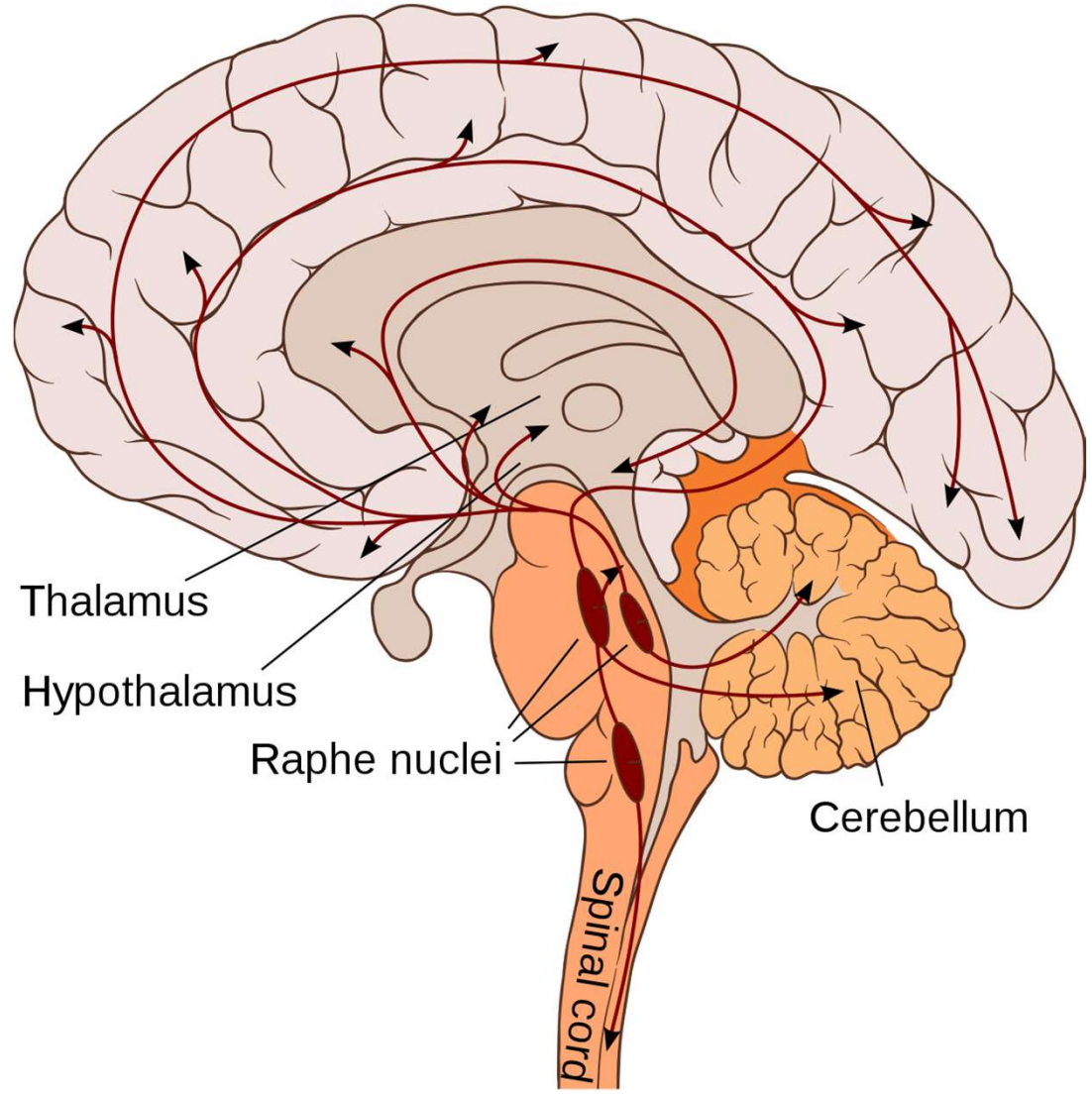


SOURCE: Sousa, D. A. (2006). *How the Brain Learns* (3rd ed.) Thousand Oaks, CA: Corwin Press. Reprinted by permission.

- 
- 30% in Nordic countries
 - Vulnerable, risk-taking, grades...



<https://mammothcomfort.com/melatonin-vs-serotonin-science-behind-good-nights-sleep/>



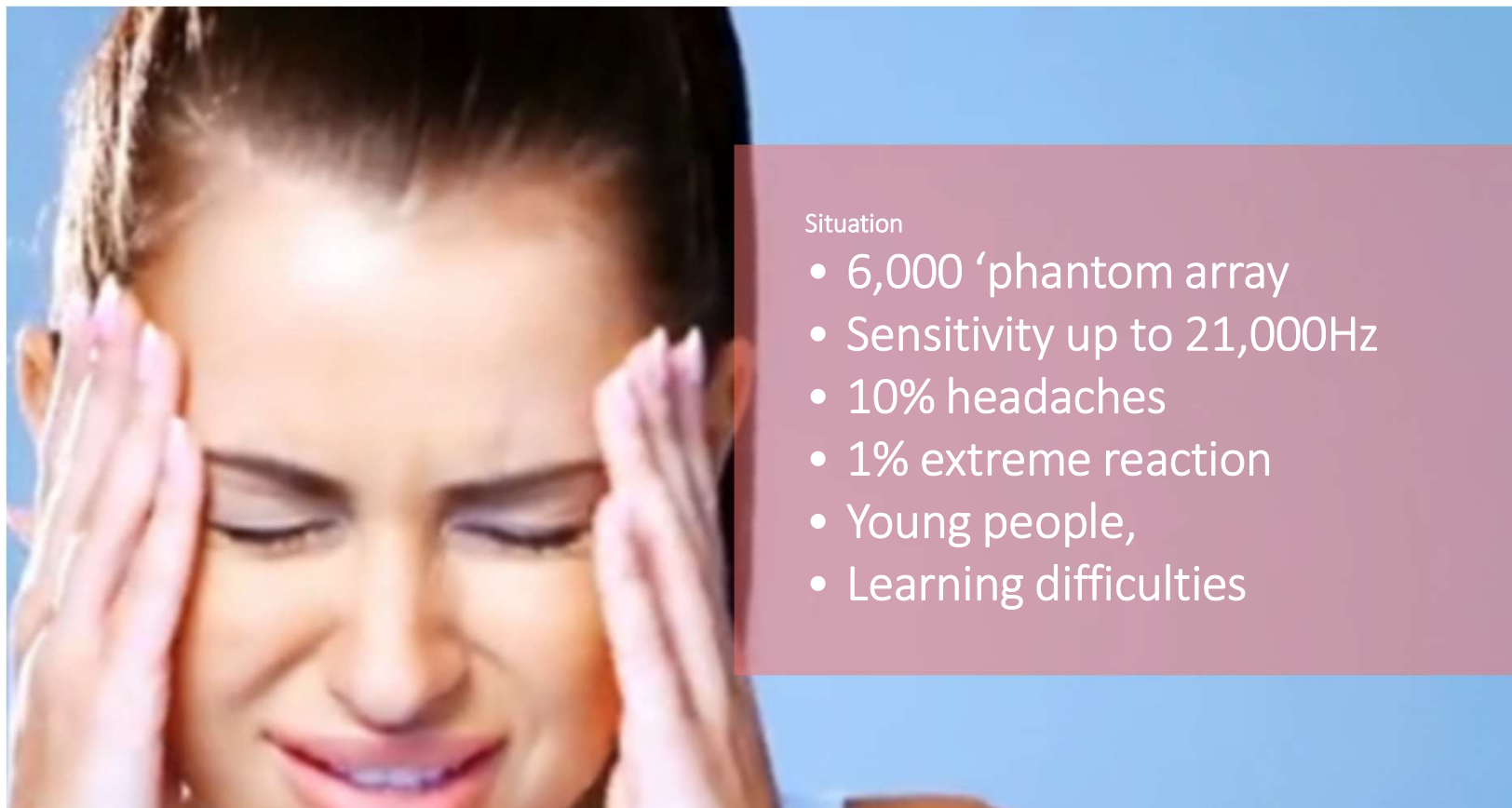
<https://images.app.goo.gl/33Uqj3mVeCB4rHdR8>



CRI 50

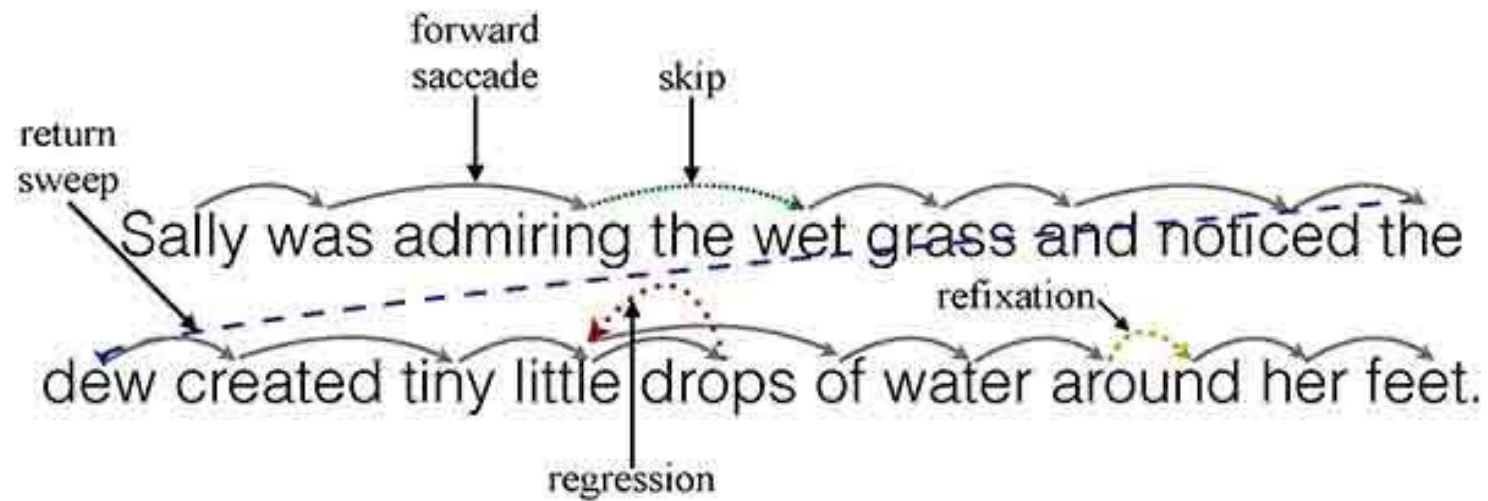
CRI 90

<https://clearlightdesigns.com.au/wp-content/uploads/2017/05/CRI-clearlightdesigns-large.jpg>



Situation

- 6,000 'phantom array
- Sensitivity up to 21,000Hz
- 10% headaches
- 1% extreme reaction
- Young people,
- Learning difficulties





Sunrise

Morning

Noon

Afternoon

Sunset

<2000k

3500-4500K

5500-6500K

3500-4500K

<2000K



BACK TO SCHOOL - 26 OCTOBER 2021 | ONLINE FROM 16:00 - 17:30

Are we getting the most from lighting upgrades in existing schools?

Bringing together stakeholders from government, education, design and manufacturing to share practical ideas on how we can get better value for money, improve quality and cut energy bills



Society of Light
and Lighting



AGE OF LIGHT
INNOVATIONS

ATKINS

THE
SWEYNE PARK
SCHOOL



IAIN MACRAE





Society of Light
and Lighting

Lighting for the eye and brain

Any questions?



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For information about upcoming SLL events visit
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