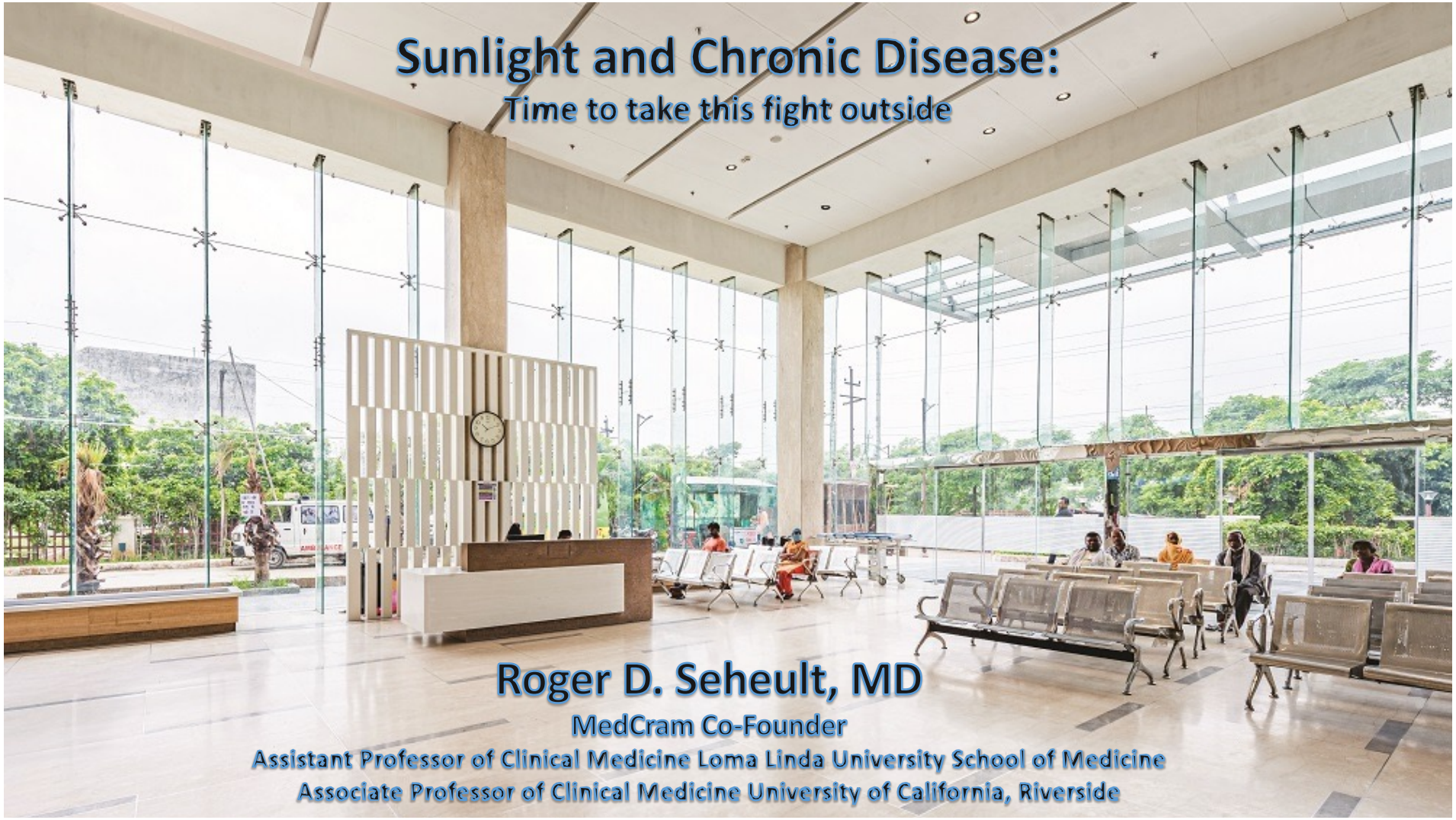
COPY OF TODAY’S POWERPOINT PRESENTATION



Sunlight and Chronic Disease:

Time to take this fight outside

Roger D. Seheult, MD

MedCram Co-Founder

Assistant Professor of Clinical Medicine Loma Linda University School of Medicine

Associate Professor of Clinical Medicine University of California, Riverside

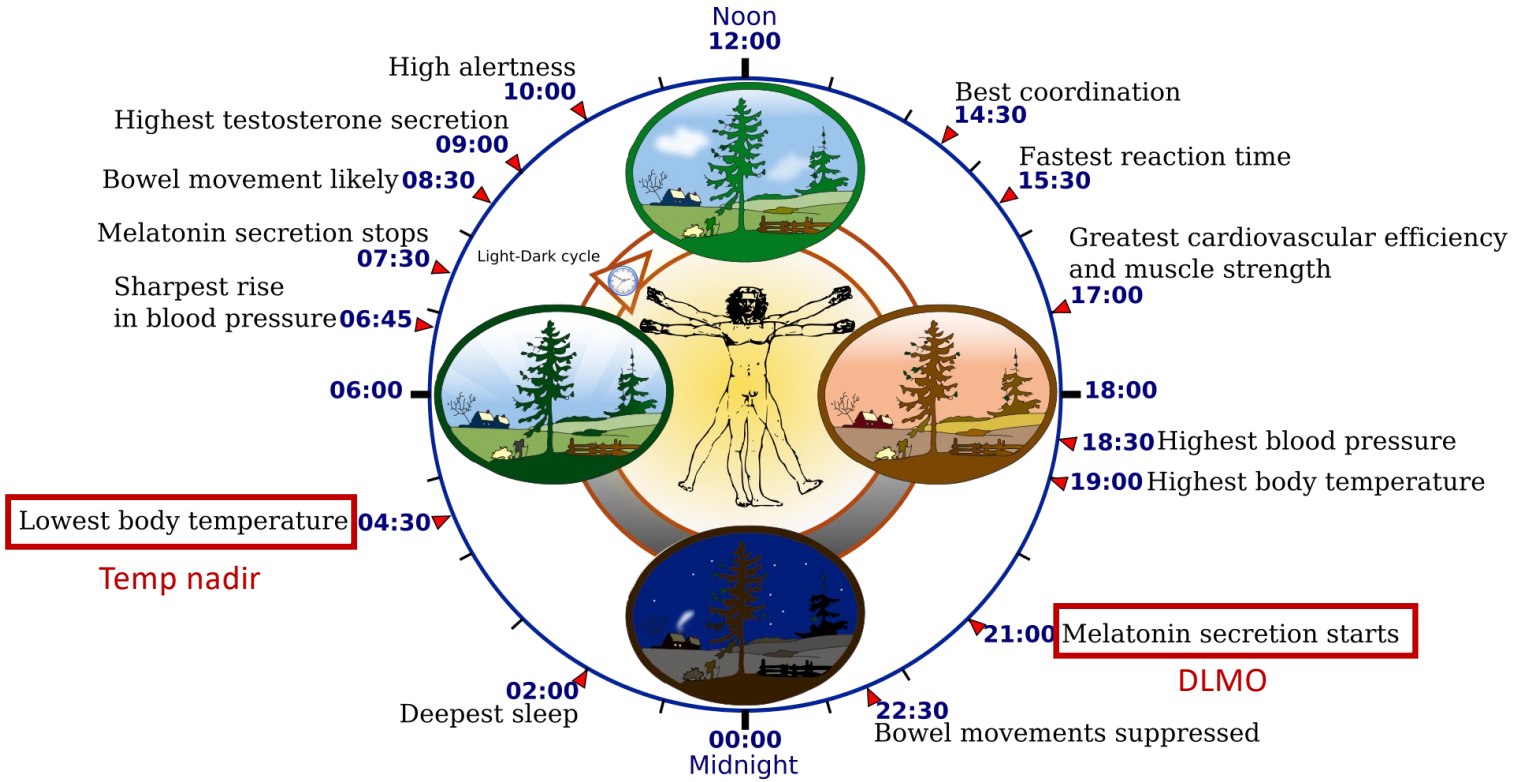
How Humans interact with Light

Sleep - Circadian Rhythm

Mood

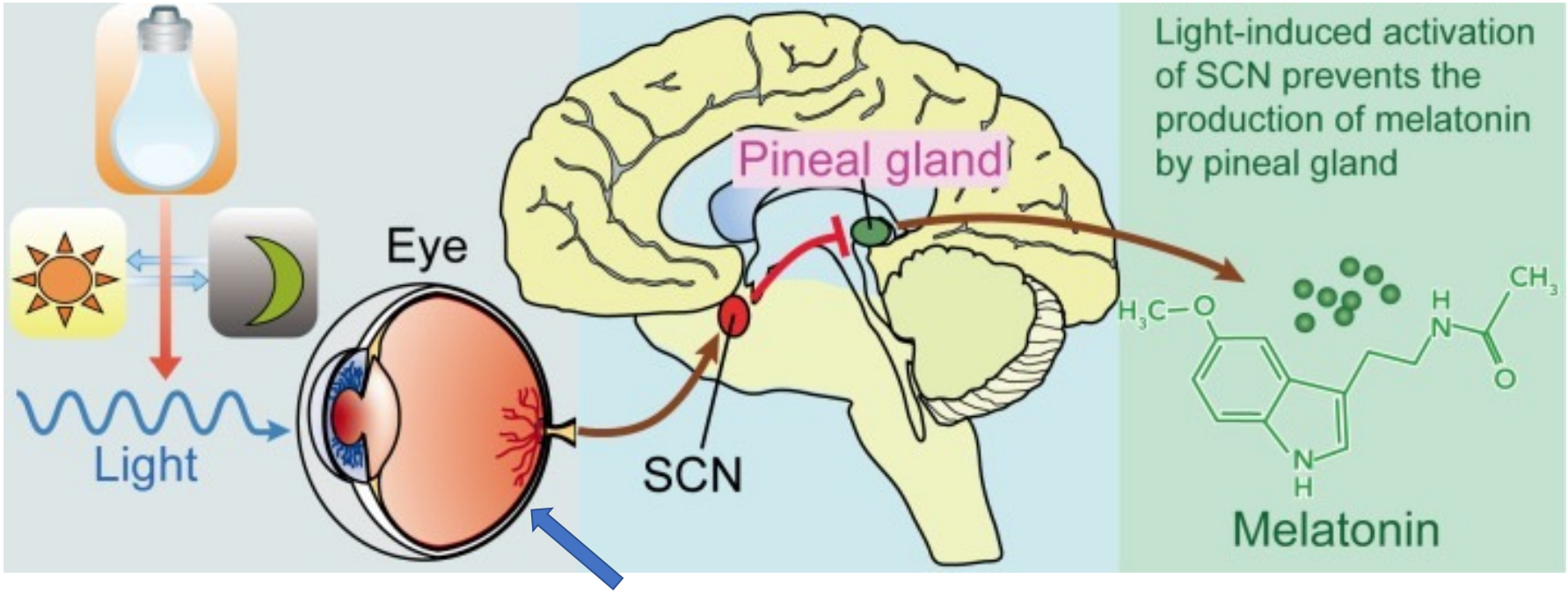
Mitochondrial

Circadian Rhythm




RTÉ
RTÉ

How the Master Clock is set…



intrinsically photosensitive Retinal Ganglion Cells = ipRGCs (peak sensitivity 460 and 484 nm)

Ma Z, Yang Y, Fan C, et al. Melatonin as a potential anticarcinogen for non-small-cell lung cancer. Oncotarget. 2016;7(29):46768-46784. doi:10.18632/oncotarget.8776.

Evening use of light-emitting eReaders negatively affects sleep, circadian timing, and next-morning alertness

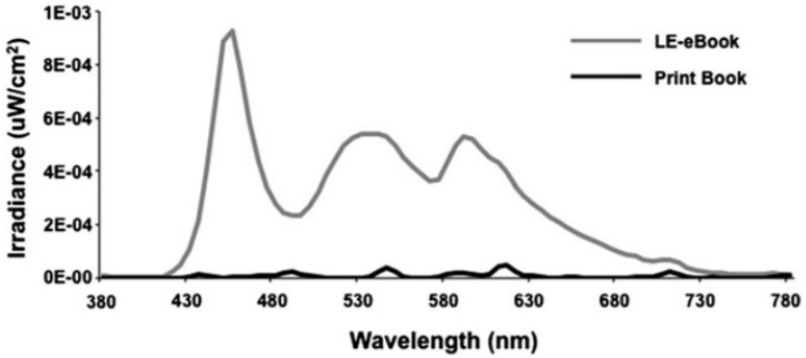
PNAS | January 27, 2015 | vol. 112 | no. 4 | 1232–1237

Anne-Marie Chang[a,b,1,2], Daniel Aeschbach[a,b,c], Jeanne F. Duffy[a,b], and Charles A. Czeisler[a,b]

[a]Division of Sleep and Circadian Disorders, Departments of Medicine and Neurology, Brigham and Women's Hospital, Boston, MA 02115; [b]Division of Sleep Medicine, Harvard Medical School, Boston, MA 02115; and [c]Institute of Aerospace Medicine, German Aerospace Center, 51147 Cologne, Germany

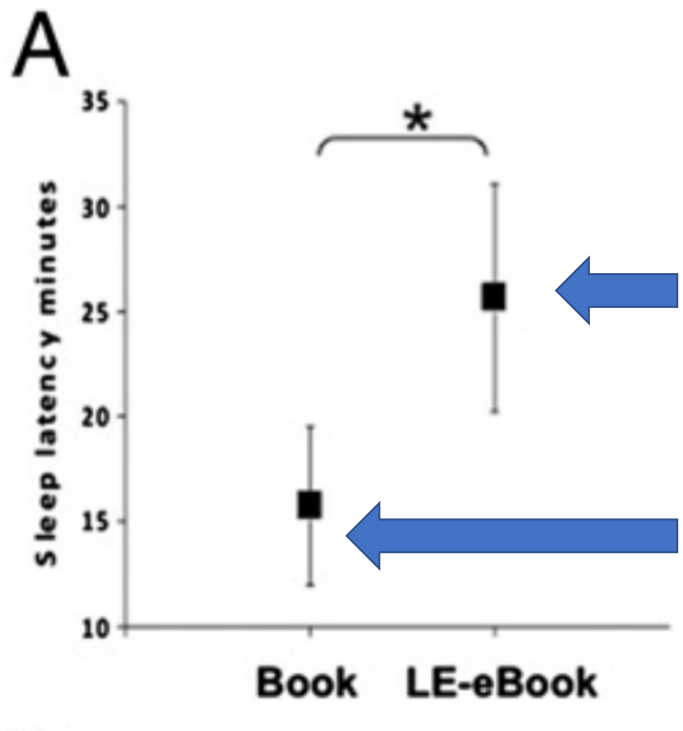
Edited by Joseph S. Takahashi, Howard Hughes Medical Institute, University of Texas Southwestern Medical Center, Dallas, TX, and approved November 26, 2014 (received for review September 24, 2014)

Irradiance of eBook versus Print Book



https://www.pnas.org/content/pnas/112/4/1232.full.pdf

Sleep Latency from use of eBook versus Print Book



Takes longer to go to sleep

Fall asleep more quickly

https://www.pnas.org/content/pnas/112/4/1232.full.pdf

What should I do in the Morning?

1) Sunlight before 9am. 30 sec – 30 minutes (full sun versus clouds)
   - -no sunglasses (blue blockers) , windows, or windshields (glasses and contacts ok) - it will take 7 to 50+ times longer and you won't get enough to stimulate the cortisol pulse on time

   or
   - 10,000+ lux (lamp), 20-30 minutes, 11-15 inches from the light box

What should I do in the Evening?

2) Other ways to mitigate light exposure:

- Mac & iPhone - Night shift
- PC (tablets emit ~40 lux) - install f.lux (free)
- Android - Twilight app and/or Night Light - can be used together
- TV - if no blue light reducing option on TV, can attach device “Drift TV”
- Blue light blockers are ok but not necessary, AND you still need to use dim lighting - wear for 3-4 hrs before bedtime

•Use warm/red light, dim, below your eyes rather than overhead light (simulating fire) - avg living room lighting is 100-300 lux

•Minimize light pollution in the bedroom (especially up high)

How Humans interact with Light

Sleep - Circadian Rhythm

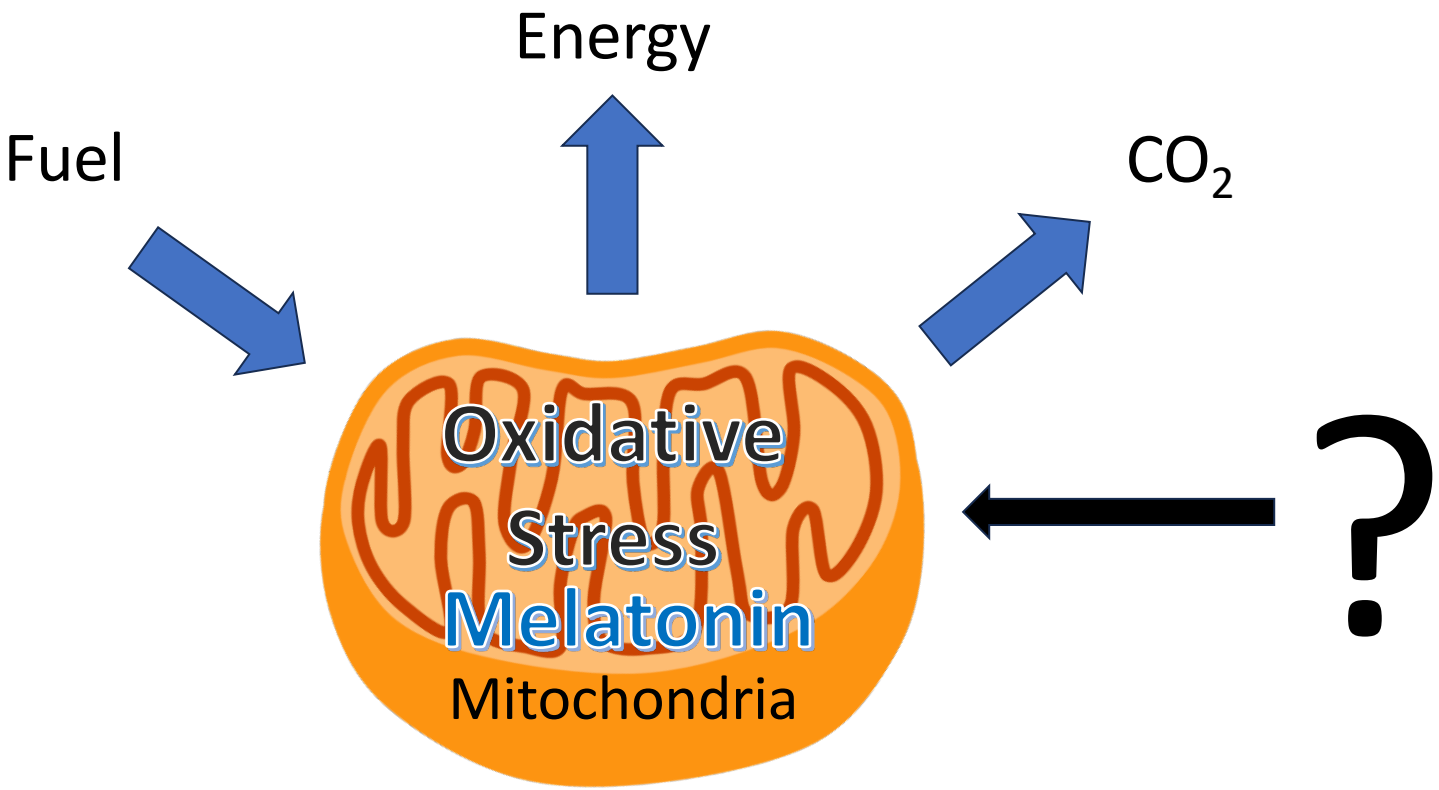
Mood

Mitochondrial

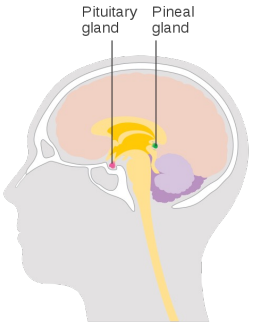
Longevity ≠ Chronic disease

Heart Disease
Diabetes
Obesity
Dementia
Inflammation
Long COVID
Cancer

Mitochondrial Dysfunction


Energy
Fuel
CO_2
Oxidative
Stress
Melatonin
Mitochondria
?

Total Body Melatonin Production



< 5%

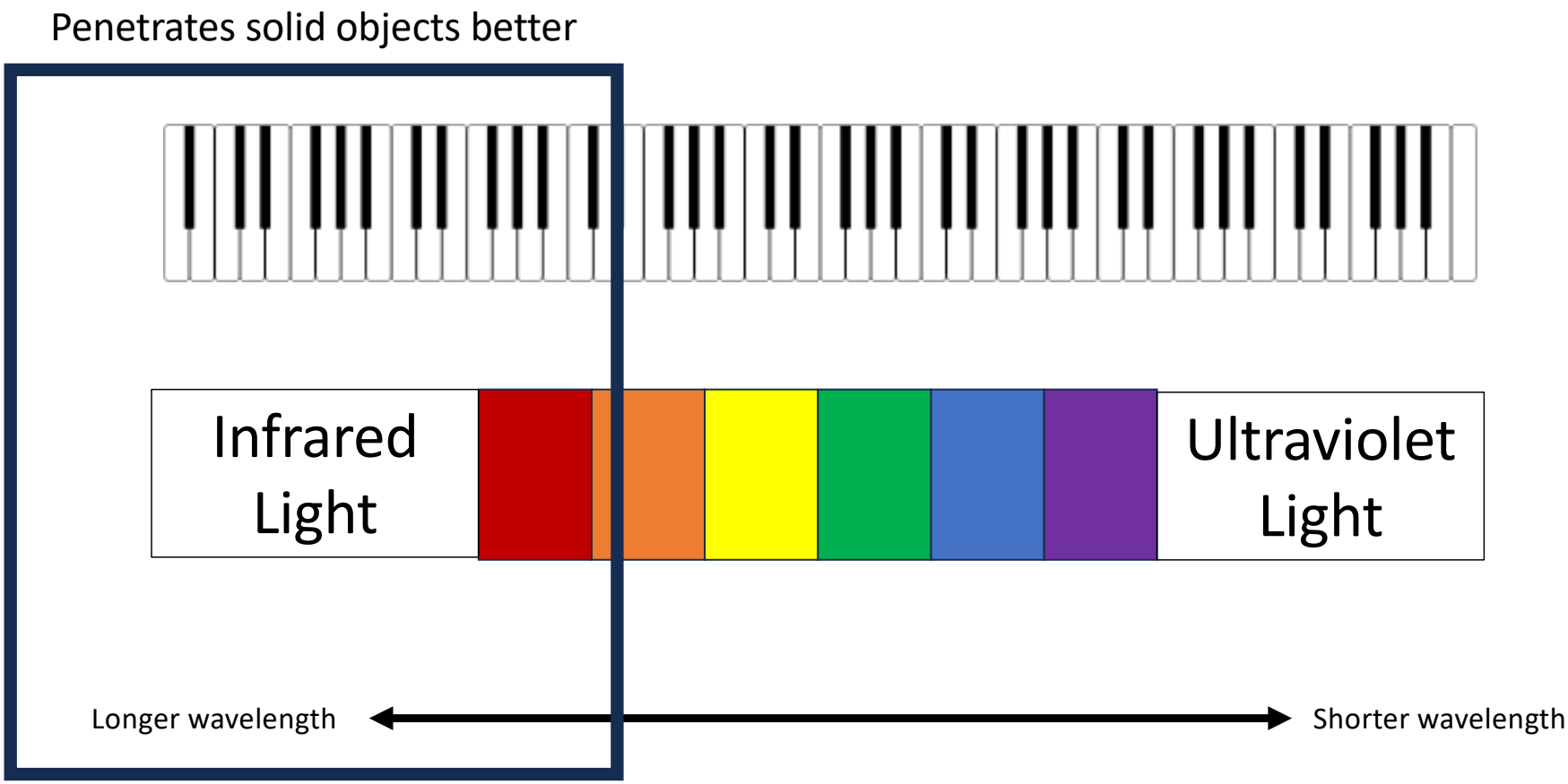
Pineal Gland

> 95%

Mitochondria

"It has now been shown that the mitochondria produce melatonin in many cells in quantities which are orders of magnitude higher than that produced in the pineal gland. This subcellular melatonin does not necessarily fluctuate with our circadian clock or release into the circulation system, but instead has been proposed to be consumed locally in response to the free radical density within each cell, in particular in response to Near Infrared (NIR) exposure."

Zimmerman, S. and Reiter, R. 2019. Melatonin and the Optics of the Human Body. *Melatonin Research*. 2, 1 (Feb. 2019), 138-160. DOI:https://doi.org/https://doi.org/10.32794/mr11250016.


Penetrates solid objects better
Infrared Light
Ultraviolet Light
Longer wavelength
Shorter wavelength

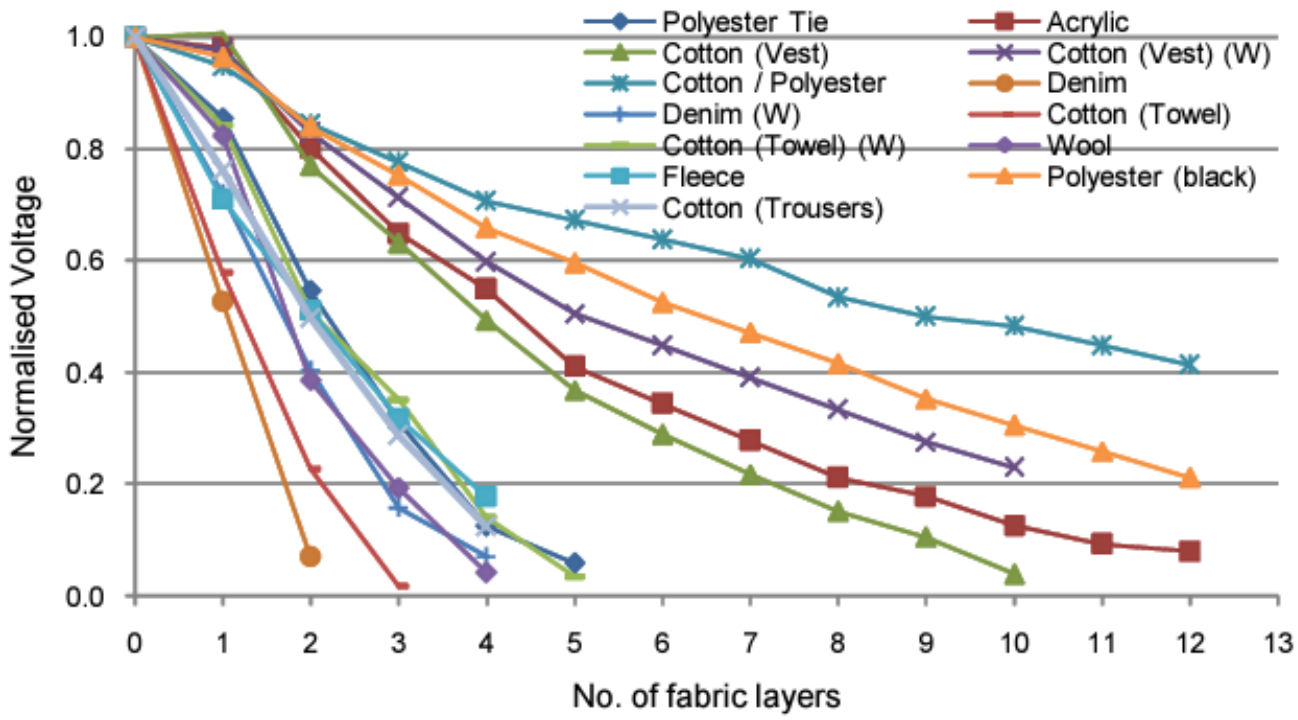
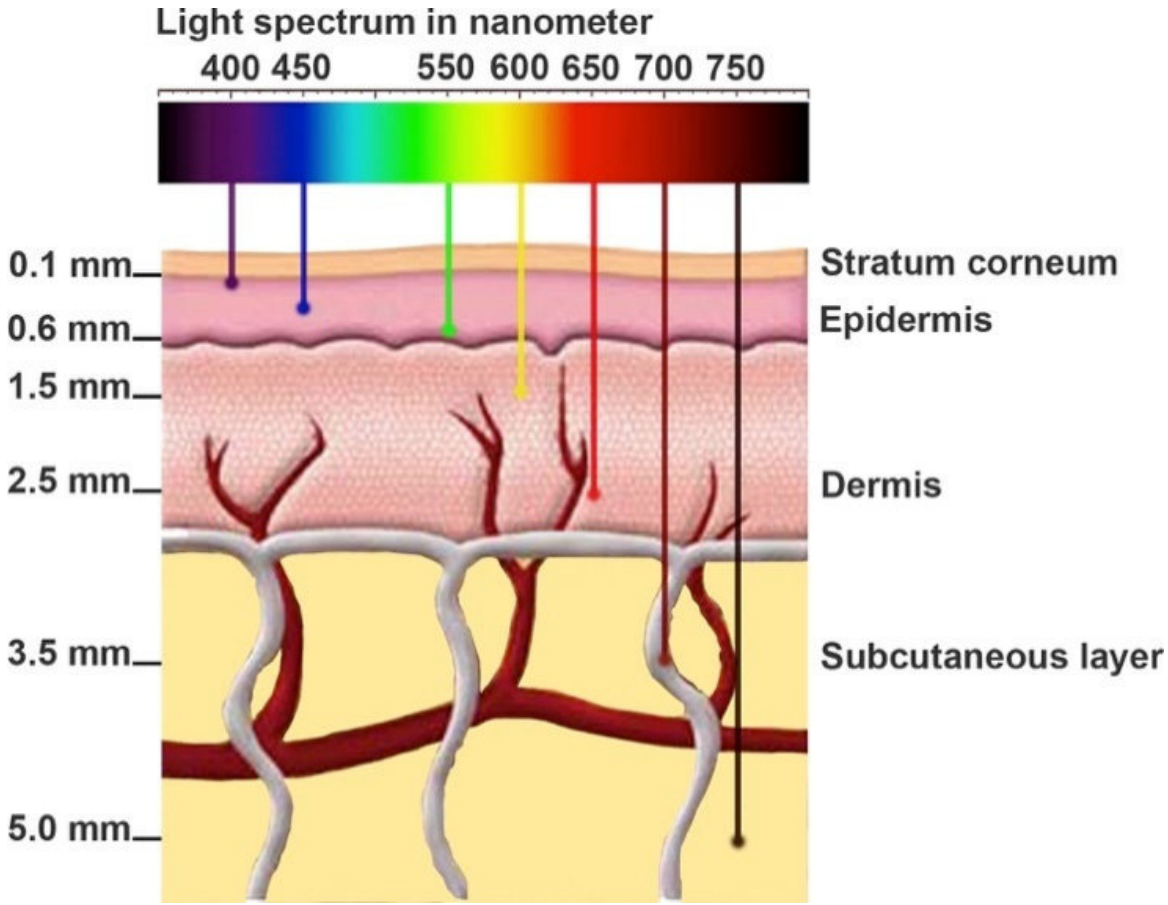


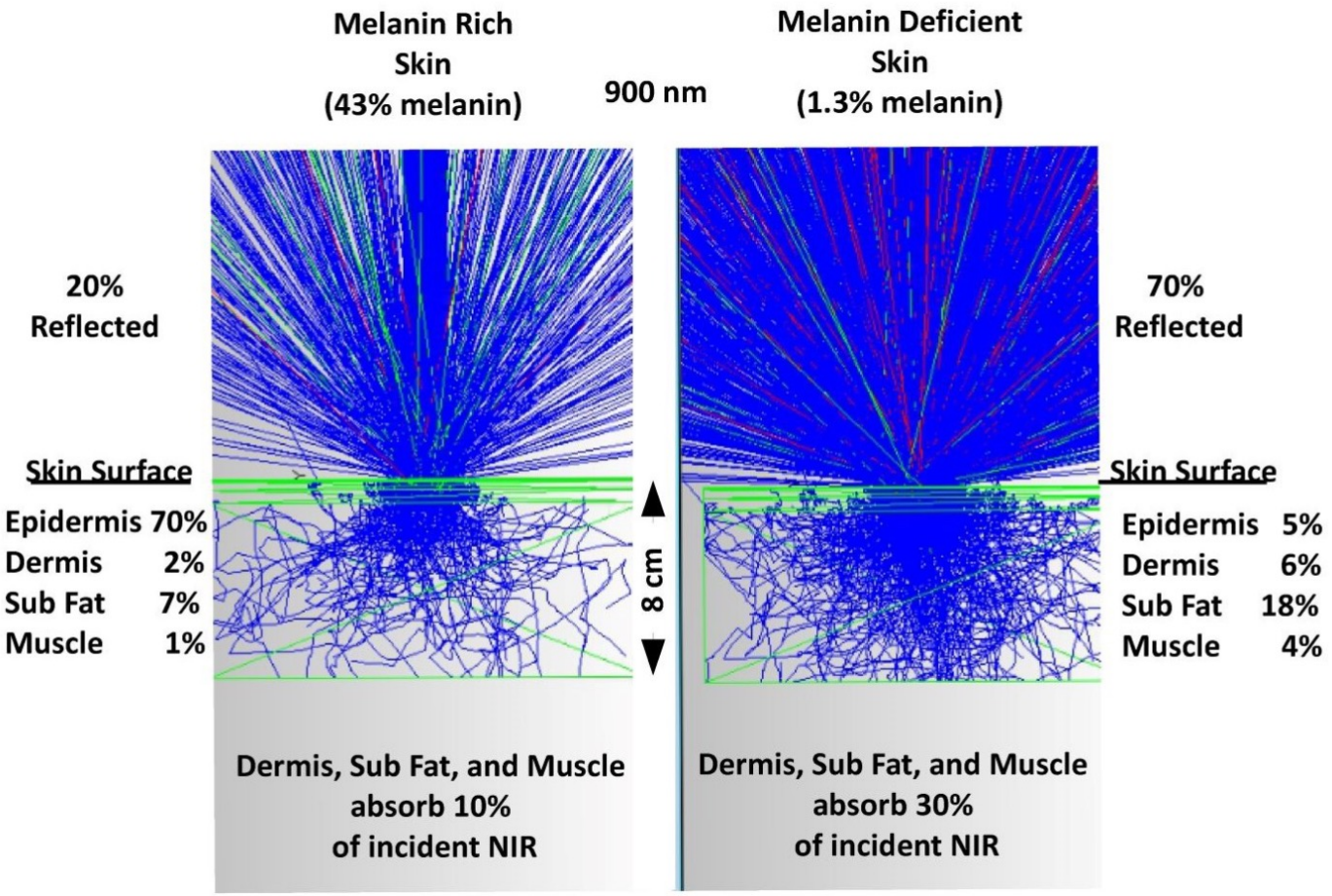
Figure 7: Point measurements showing drop in NIR intensity across multiple fabric layers. (W) signifies wet samples.

https://t.co/P0KMdqTFoI

Robert Fosbury – used by permission



https://www.researchgate.net/figure/Fig-3-Penetration-depth-of-light-into-tissue-according-to-its-wavelength_fig3_282040732



Zimmerman, S. and Reiter, R. 2019. Melatonin and the Optics of the Human Body. *Melatonin Research*. 2, 1 (Feb. 2019), 138-160. DOI:https://doi.org/https://doi.org/10.32794/mr11250016.

Article | Open access | Published: 08 July 2025

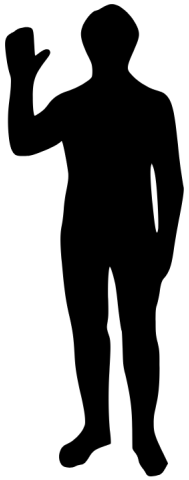
Longer wavelengths in sunlight pass through the human body and have a systemic impact which improves vision

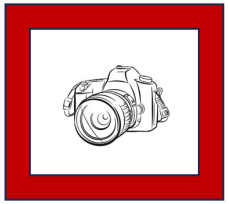
Glen Jeffery ✉, Robert Fosbury, Edward Barrett, Chris Hogg, Marisa Rodriguez Carmona & Michael Barry Powner

Scientific Reports **15**, Article number: 24435 (2025) | Cite this article

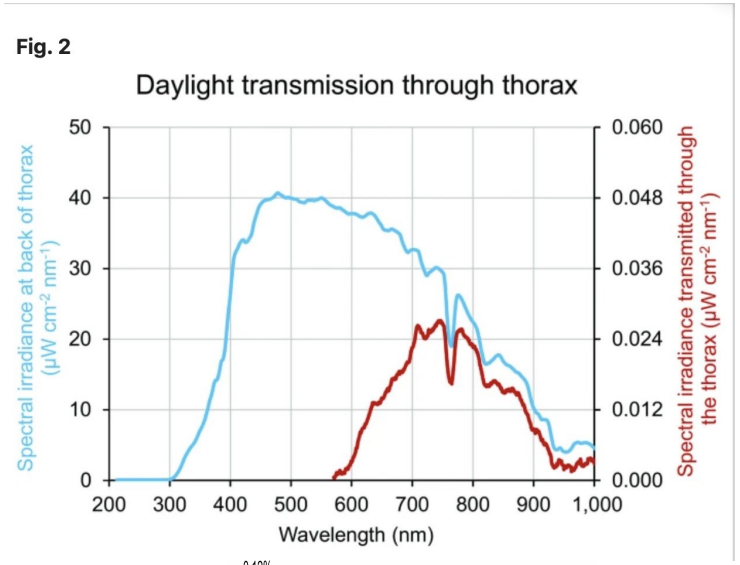
SUNLIGHT

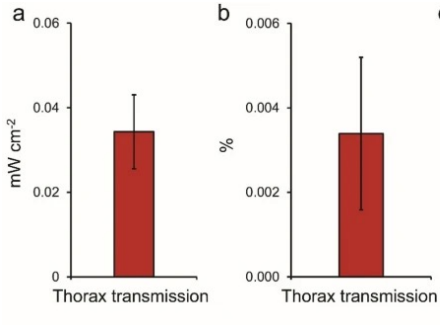
17 mW/cm²

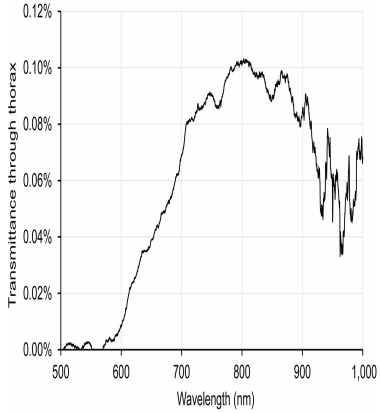




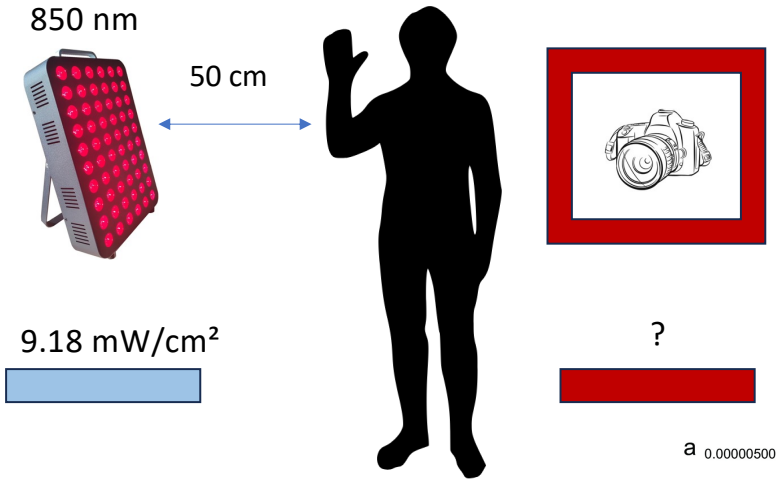
5.6 µW/cm²







LIGHT PANEL


850 nm
50 cm
9.18 mW/cm²
?

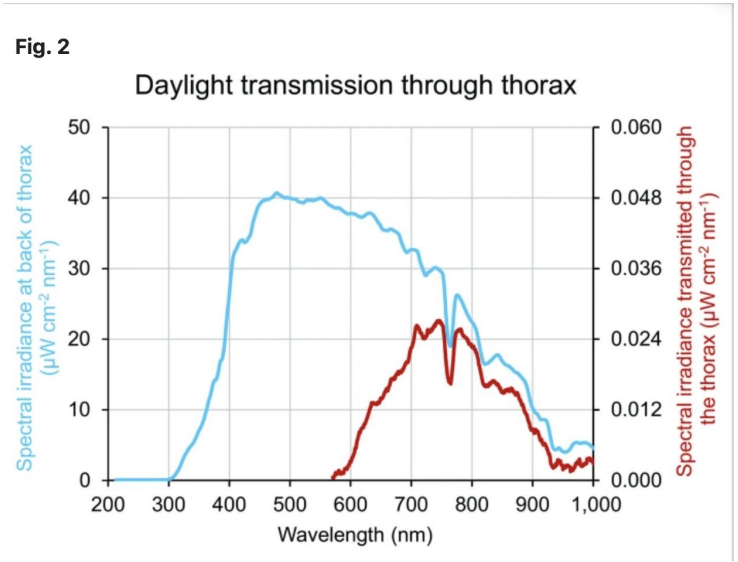
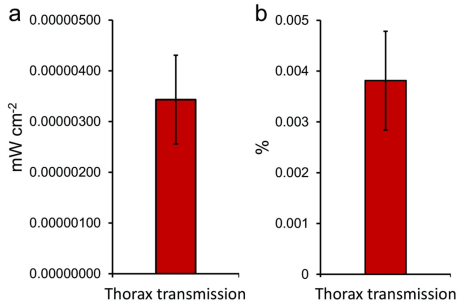
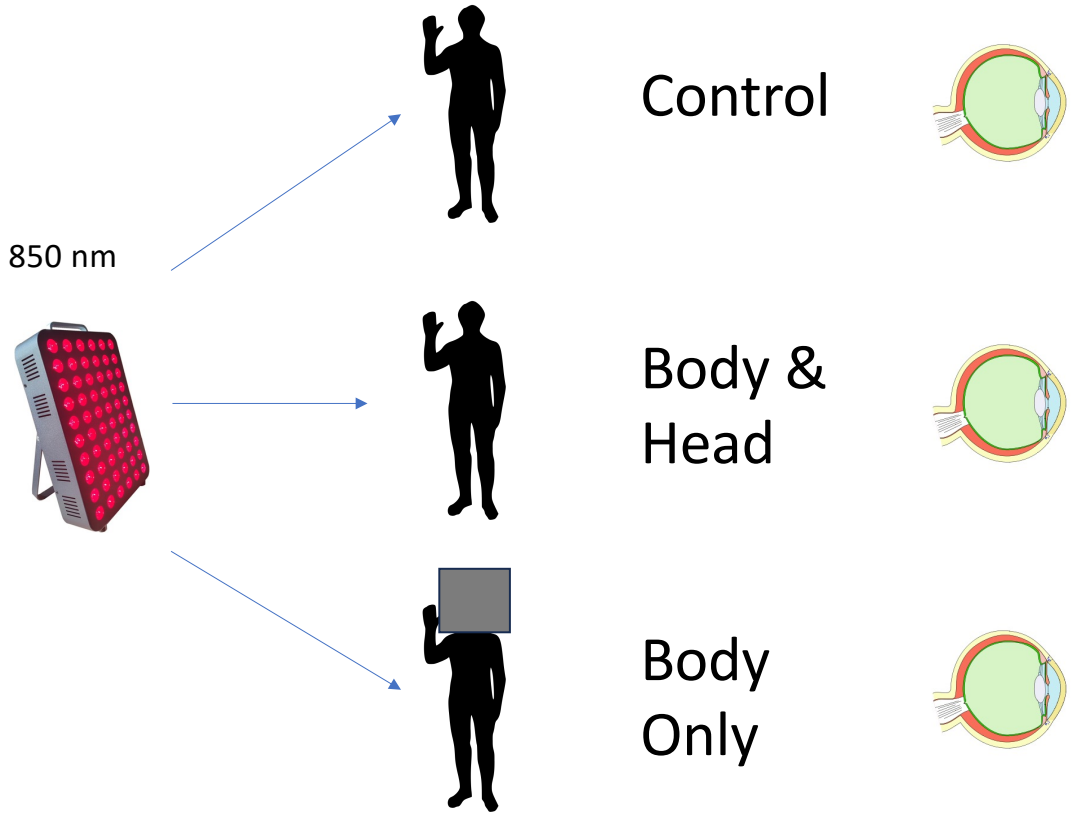
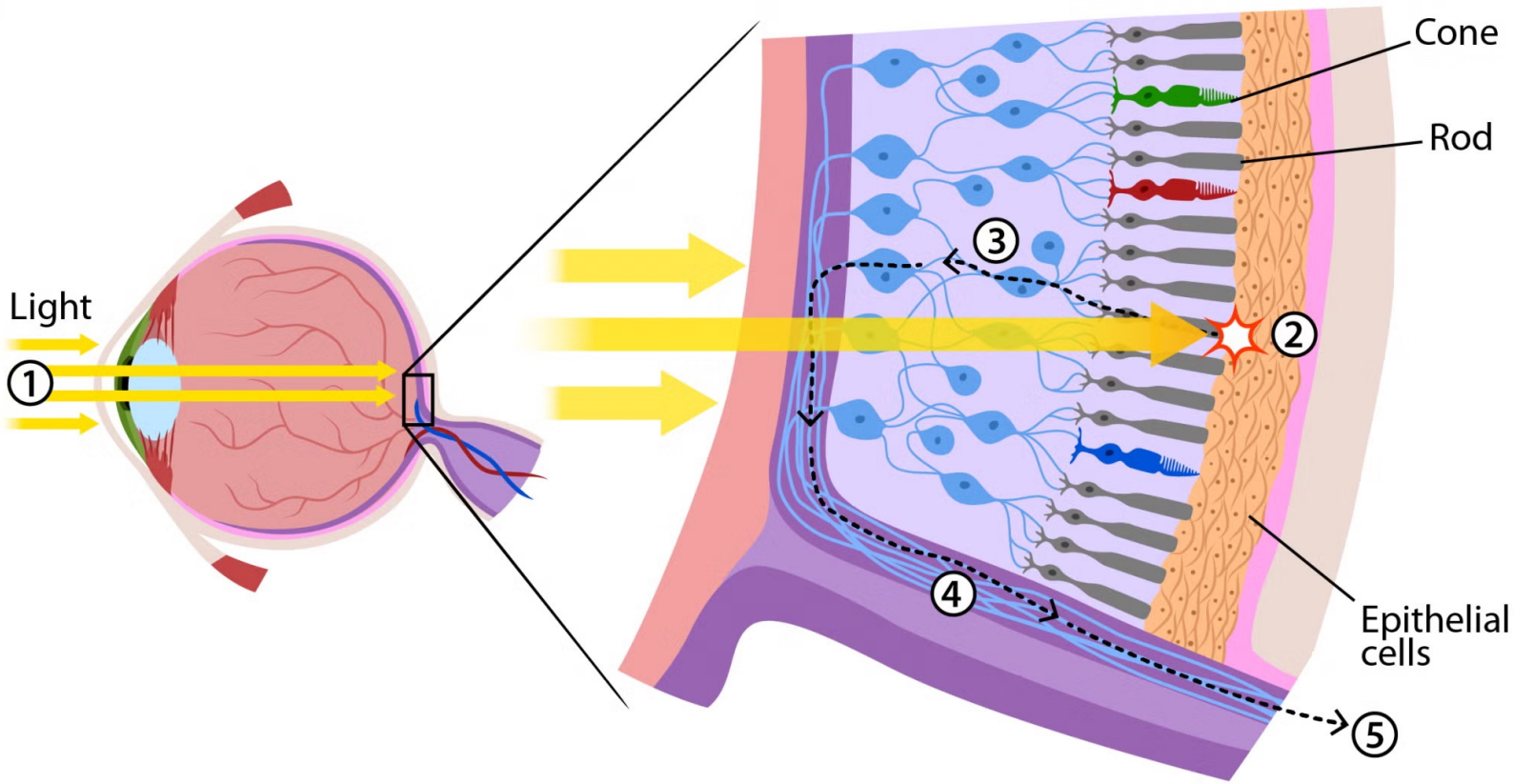


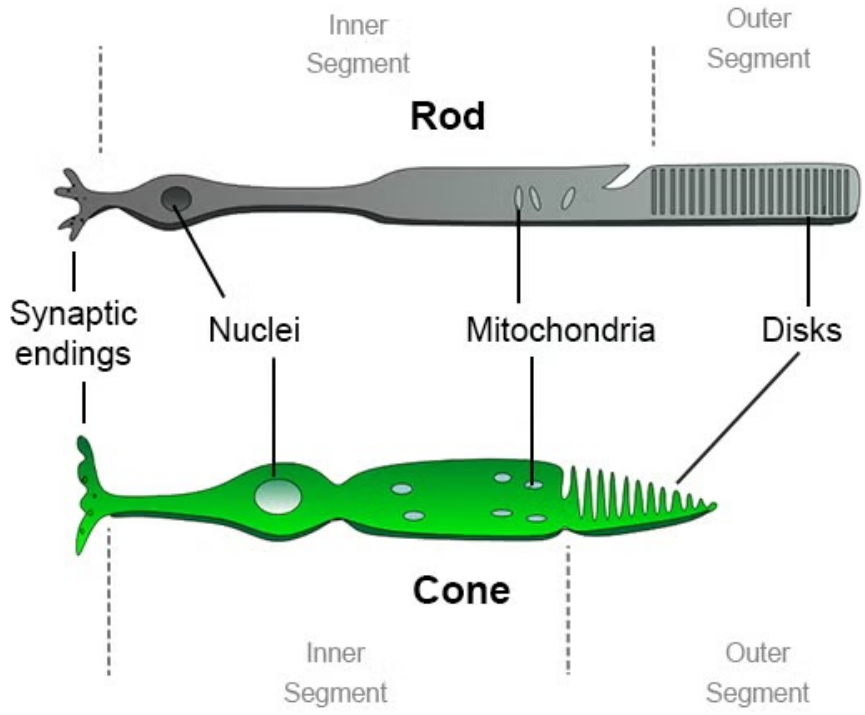
Fig. 2
Daylight transmission through thorax
Spectral irradiance at back of thorax (μW cm⁻² nm⁻¹)
Spectral irradiance transmitted through the thorax (μW cm⁻² nm⁻¹)
Wavelength (nm)
0
10
20
30
40
50
0.000
0.012
0.024
0.036
0.048
0.060
200
300
400
500
600
700
800
900
1,000


a
mW cm⁻²
0.00000500
0.00000400
0.00000300
0.00000200
0.00000100
0.00000000
Thorax transmission
b
%
0.005
0.004
0.003
0.002
0.001
0
Thorax transmission


850 nm
Control
Body &
Head
Body
Only

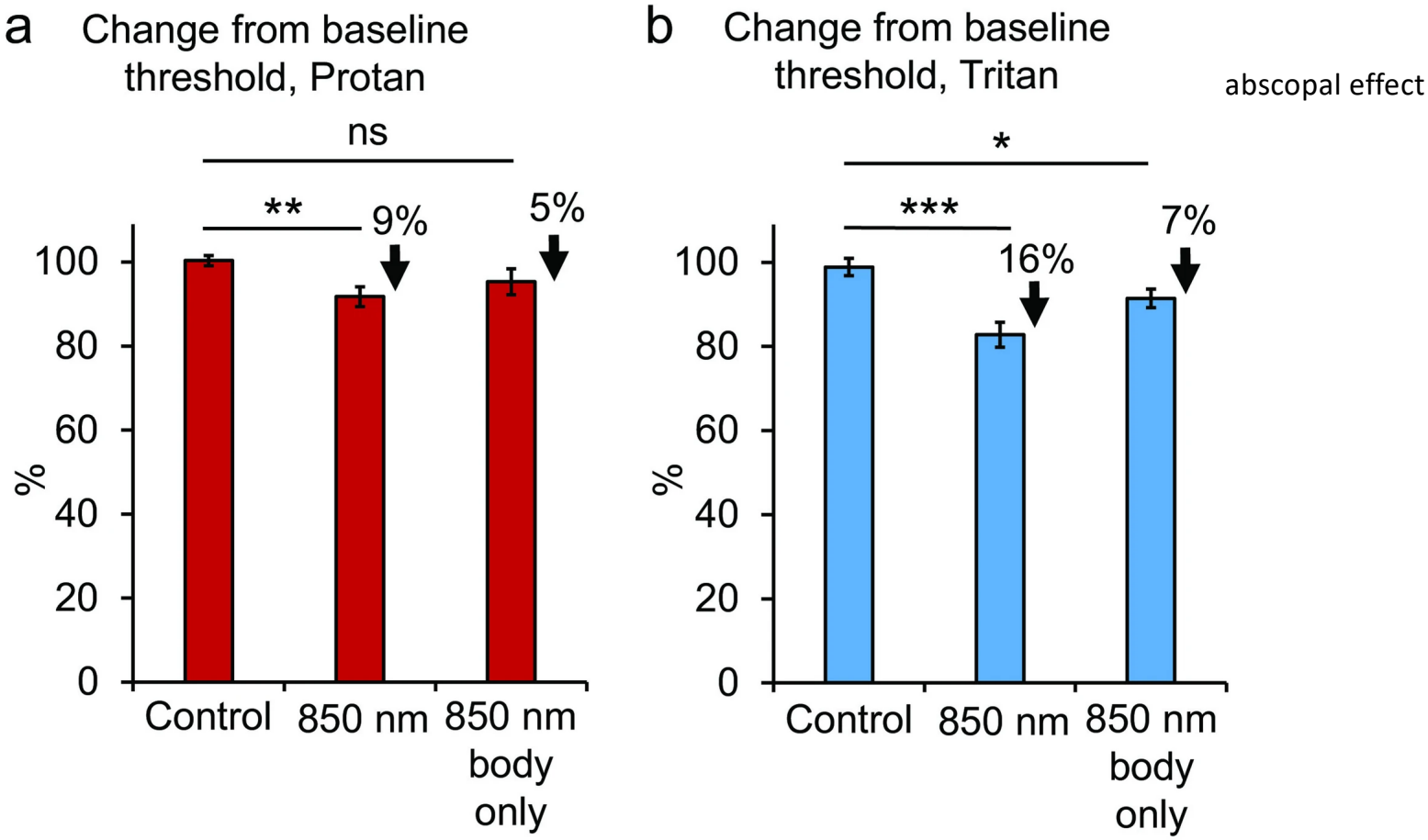


https://askabiologist.asu.edu/rods-and-cones

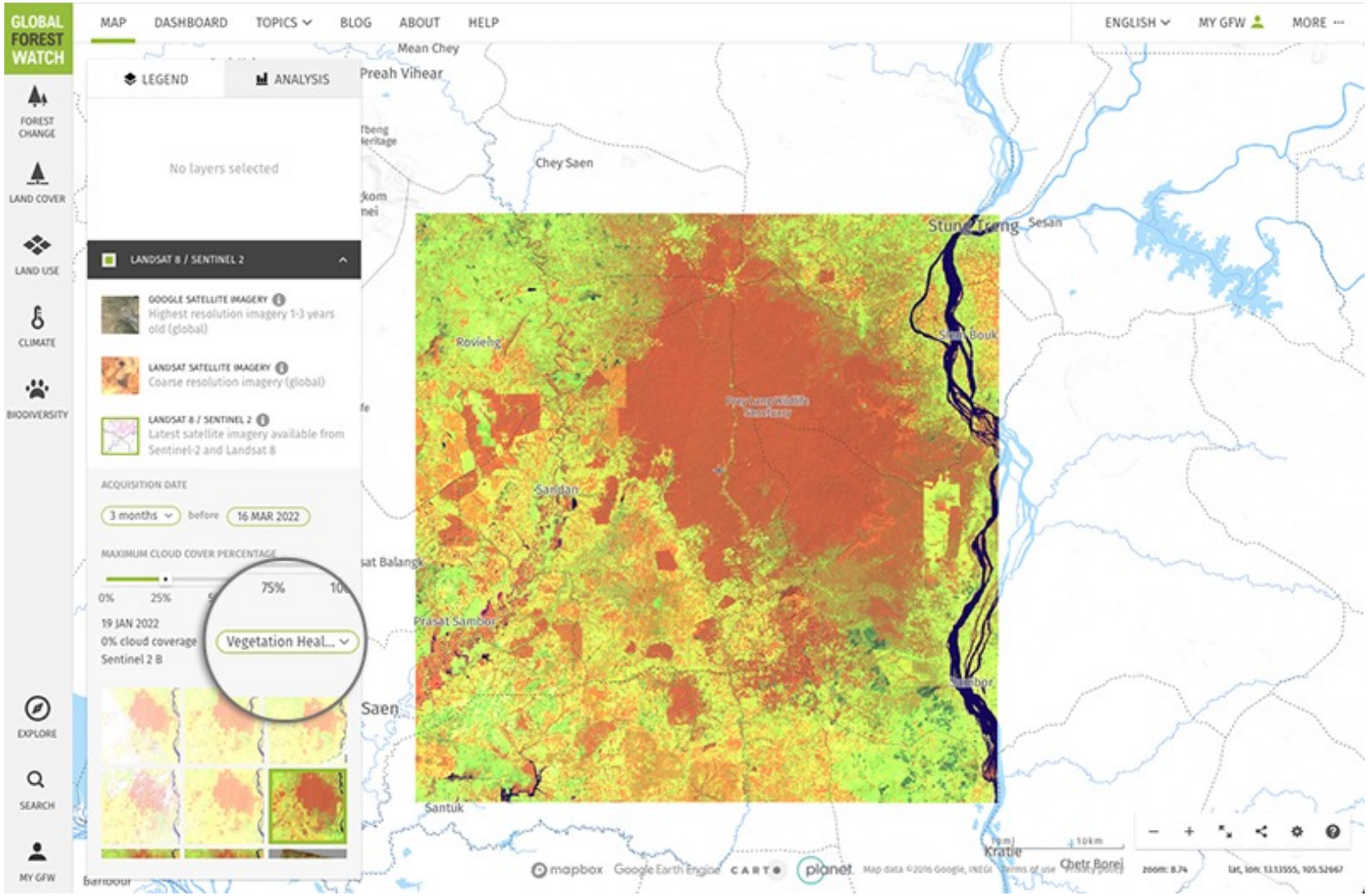


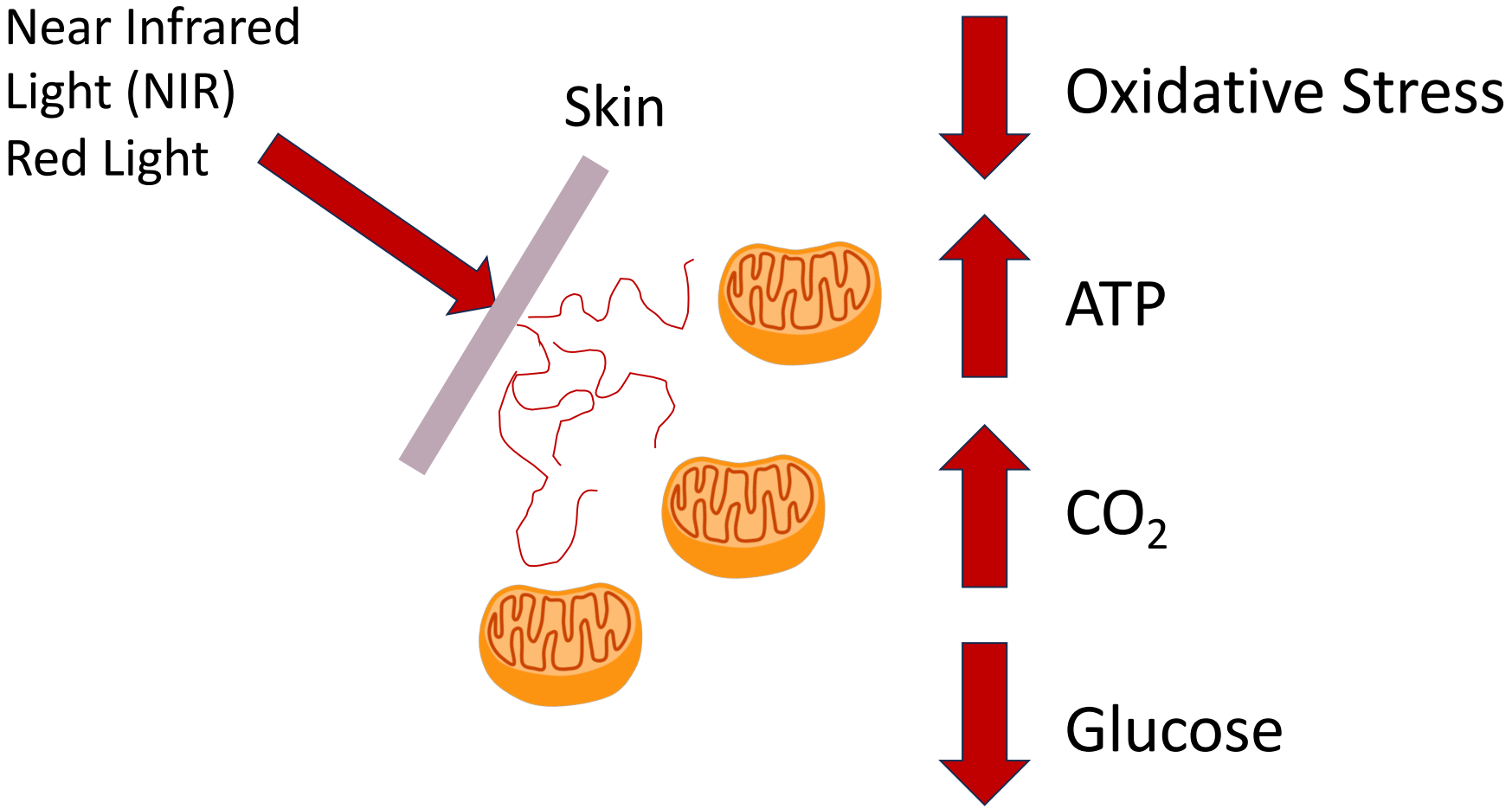
Cone Type	Perceived Color
L-cones	Red (Protan)
M-cones	Green (Deutan)
S-cones	Blue (Tritan)

https://askabiologist.asu.edu/rods-and-cones


a
Change from baseline threshold, Protan
ns
**
9%
5%
100
80
60
40
20
0
%
Control
850 nm
850 nm body only
b
Change from baseline threshold, Tritan
abscopal effect
*
***
16%
7%
100
80
60
40
20
0
%
Control
850 nm
850 nm body only

Bob Fosbury – Used by permission

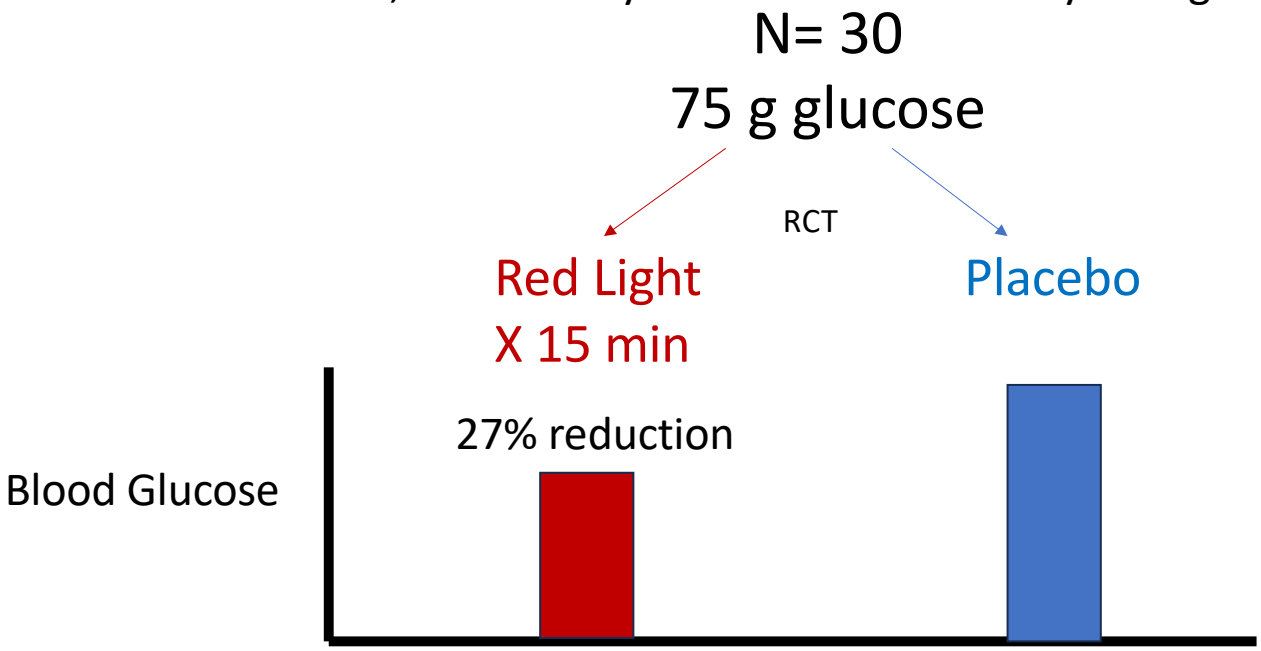

GLOBAL FOREST WATCH
MAP
DASHBOARD
TOPICS
BLOG
ABOUT
HELP
ENGLISH
MY GFW
MORE
FOREST CHANGE
LAND COVER
LAND USE
CLIMATE
BIODIVERSITY
EXPLORE
SEARCH
MY GFW
LEGEND
ANALYSIS
No layers selected
LANDSAT 8 / SENTINEL 2
GOOGLE SATELLITE IMAGERY
Highest resolution imagery 1-3 years old (global)
LANDSAT SATELLITE IMAGERY
Coarse resolution imagery (global)
LANDSAT 8 / SENTINEL 2
Latest satellite imagery available from Sentinel-2 and Landsat 8
ACQUISITION DATE
3 months
before
16 MAR 2022
MAXIMUM CLOUD COVER PERCENTAGE
0%
25%
75%
19 JAN 2022
0% cloud coverage
Sentinel 2 B
Vegetation Heal...
Mean Chey
Preah Vihear
Chey Saen
Sesan
Roviehg
Saridan
Prasat Sambor
Saen
Santuk
Kratie
Chetr Borei
mapbox
Google Earth Engine
CARTO
planet

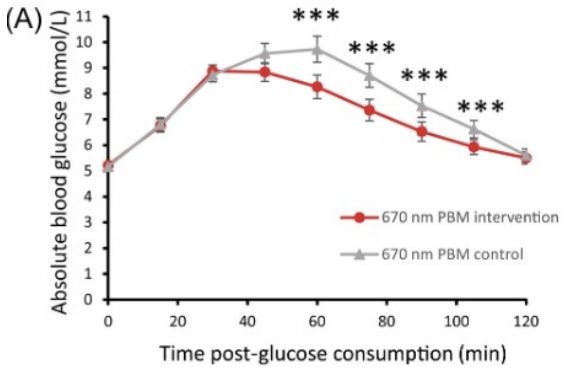

Near Infrared
Light (NIR)
Red Light
Skin
Oxidative Stress
ATP
CO_2
Glucose

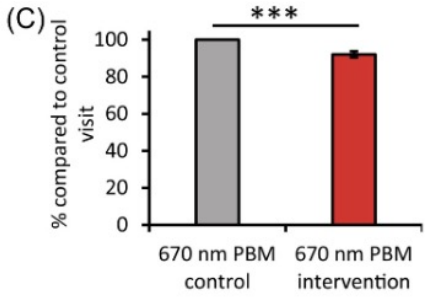
January 2024: Journal of Biophotonics

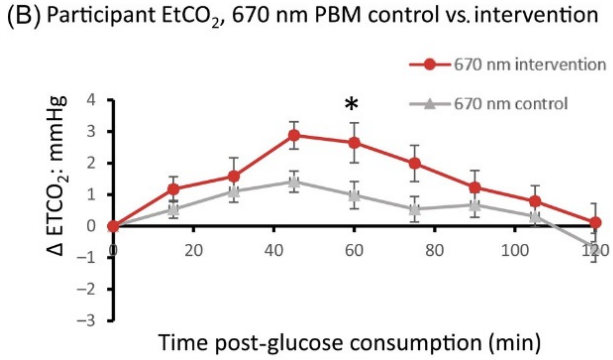
Light stimulation of mitochondria reduces blood glucose levels

Michael B. Powner, Glen Jeffery University College London




(A)
Absolute blood glucose (mmol/L)
Time post-glucose consumption (min)
670 nm PBM intervention
670 nm PBM control
***
***
***
***


(C)
% compared to control visit
670 nm PBM control
670 nm PBM intervention
***

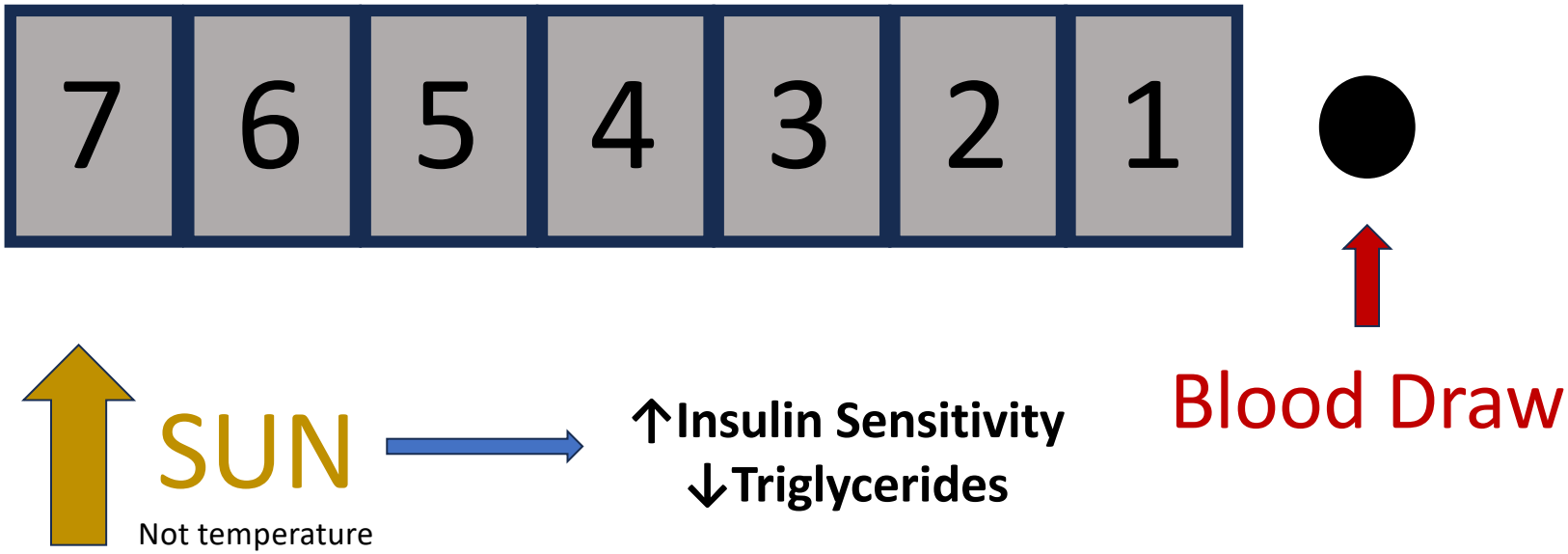

(B) Participant EtCO2, 670 nm PBM control vs. intervention
Δ ETCO2: mmHg
Time post-glucose consumption (min)
670 nm intervention
670 nm control
*

July 2019: Journal of Clinical Endocrinology and Metabolism

Associations of Outdoor Temperature, Bright Sunlight, and Cardiometabolic Traits in Two European Population-Based Cohorts

Noordam et al. Oxford and University of Leiden, Netherlands

N = 10,000



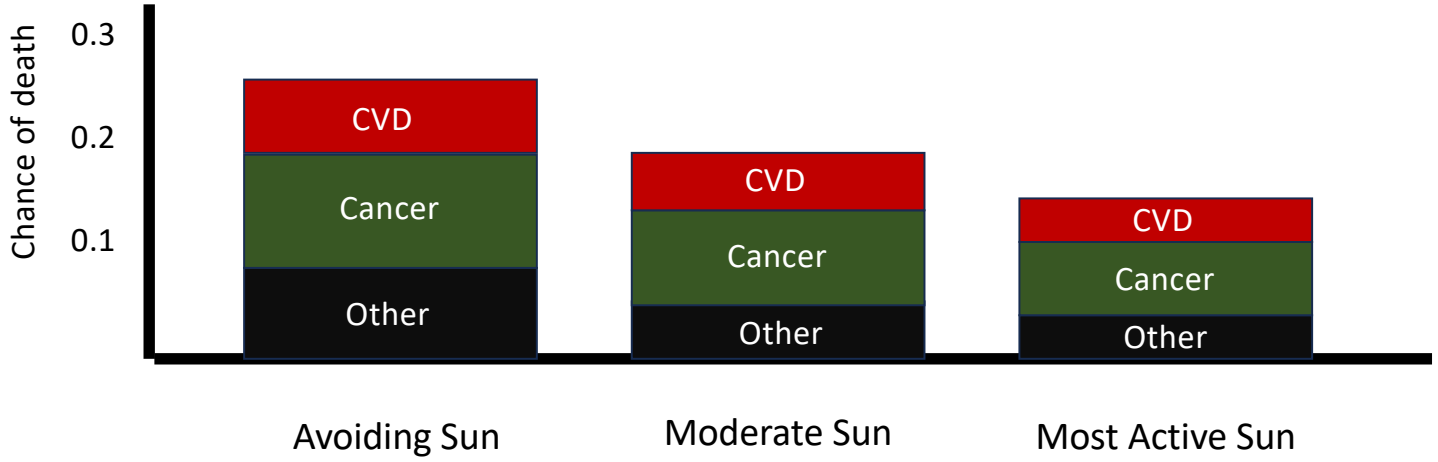
March 2016 : Journal of Internal Medicine

Avoidance of sun exposure as a risk factor for major causes of death: a competing risk analysis of the Melanoma in Southern Sweden cohort

Lindquist et al. Karolinska University Hospital

N = 30,000 20 year followup

Nonsmokers who avoided sun exposure had a life expectancy similar to smokers in the highest sun exposure group.



Health & Place 89 (2024) 103328

Contents lists available at ScienceDirect

Health and Place

journal homepage: www.elsevier.com/locate/healthplace

Higher ultraviolet light exposure is associated with lower mortality: An analysis of data from the UK biobank cohort study

Andrew C. Stevenson [a], Tom Clemens [a], Erola Pairo-Castineira [b,c], David J. Webb [d,e], Richard B. Weller [f,**], Chris Dibben [a,*]

[a] School of Geosciences, University of Edinburgh, Edinburgh, UK
[b] Roslin Institute, University of Edinburgh, Edinburgh, UK
[c] MRC Human Genetics Unit, Institute of Genetics and Cancer, University of Edinburgh, Western General Hospital, Edinburgh, UK
[d] Centre for Cardiovascular Science, University of Edinburgh, Edinburgh, UK
[e] University Clinical Research Centre, Western General Hospital, Edinburgh, UK
[f] Centre for Inflammation Research and Edinburgh Skin Network, University of Edinburgh, Edinburgh, UK

N = 400K
12.7 years followup
Shortwave radiation – UVA and UVB (ultraviolet light)
Solarium use in the UK

https://www.research.ed.ac.uk/files/460358814/1-s2.0-S1353829224001564-main.pdf

Solarium Use

Outside

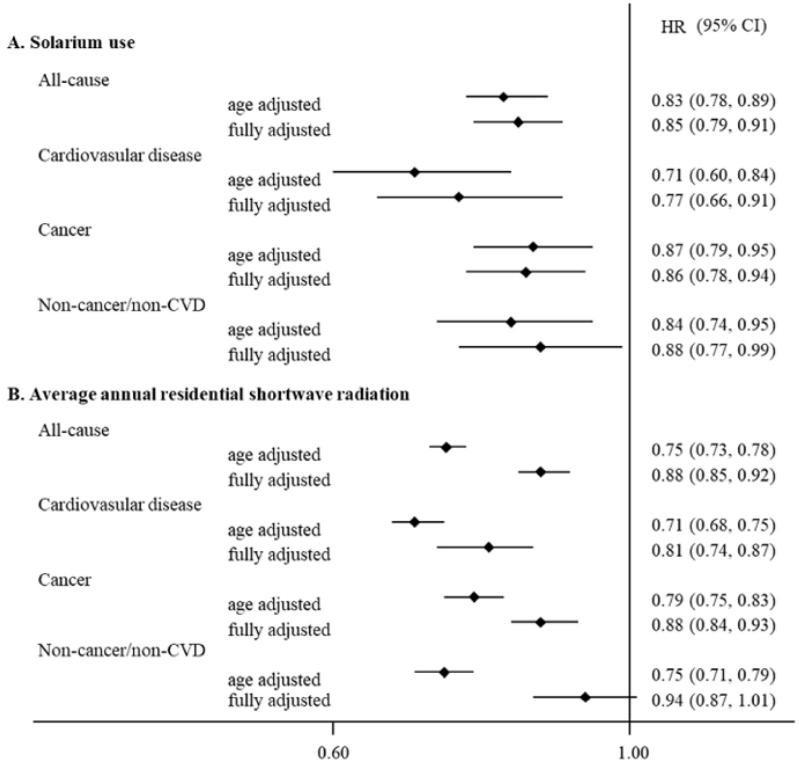


Fig. 2. A. Associations between solarium use and mortality. Fully adjusted models included age, sex, employment status, age completed education, adjusted Index of Multiple Deprivation, body mass index, smoking status, physical activity, average residential shortwave radiation, history of mental health concerns, health at baseline and risk-taking behaviour. **B.** Associations between average residential shortwave radiation and mortality. The hazard ratio represents a 2000 kJ/m^2 increase in shortwave radiation. Fully adjusted models included age, sex, employment status, age completed education, adjusted Index of Multiple Deprivation, smoking status, physical activity, sun-seeking behaviour, and risk-taking behaviour. N = 453,026. Multiply imputed results.
[a]CVD = cardiovascular disease.

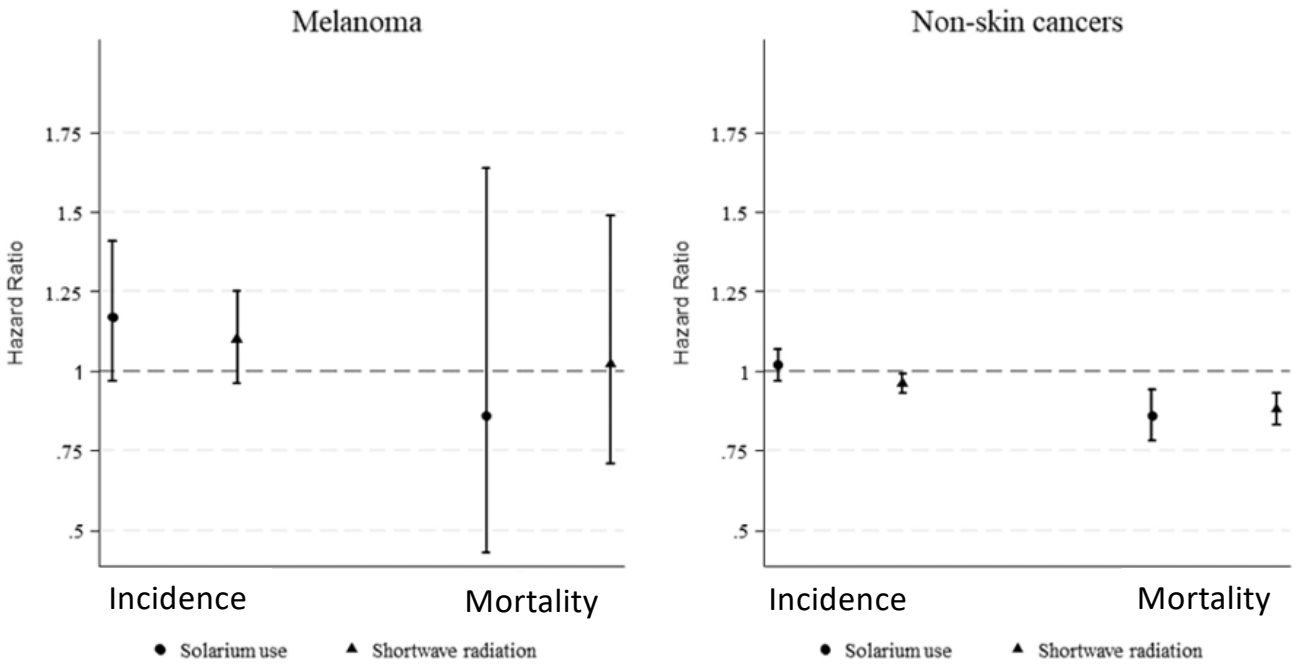


Fig. 3. Associations between ultraviolet exposures, non-skin cancer and melanoma incidence and mortality. Adjusted solarium use models included age, sex, employment status, age completed education, adjusted Index of Multiple Deprivation, body mass index, smoking status, physical activity, average residential shortwave radiation, history of mental health concerns, health at baseline, and risk-taking behaviour. Adjusted average residential shortwave radiation models included age, sex, employment status, age completed education, adjusted Index of Multiple Deprivation, smoking status, physical activity, sun-seeking behaviour, and risk-taking behaviour. N = 453,026. Multiply imputed results.

JOURNAL ARTICLE

Ultraviolet radiation is not the major cause of melanoma mortality in the UK and sun exposure advice should be revised

Richard B Weller ✉ , Jiayue Gu Author Notes

British Journal of Dermatology, Volume 192, Issue 3, March 2025, Pages 548–550,
https://doi.org/10.1093/bjd/ljae426
Published: 30 October 2024 **Article history** ▾

Pale skin has evolved as an adaptation to cope with a low light environment. Analysing data from the UK Biobank, we have shown that increased sunlight exposure – estimated from both geographical and behavioural information – correlates with significantly reduced all-cause, cardiovascular and cancer mortality in the white-skinned UK population.[2] Although there was a trend to increased incidence in melanoma with increased sun exposure, there was no rise in mortality. Our UK data corroborate similar studies from Sweden, showing that for north European populations, insufficient sunlight exposure is probably a significant health problem and physical activity outside with nonburning sun exposure will improve public health.[3]

https://academic.oup.com/bjd/article/192/3/548/7849684

PNAS RESEARCH ARTICLE | MEDICAL SCIENCES OPEN ACCESS

Brighter nights and darker days predict higher mortality risk: A prospective analysis of personal light exposure in >88,000 individuals

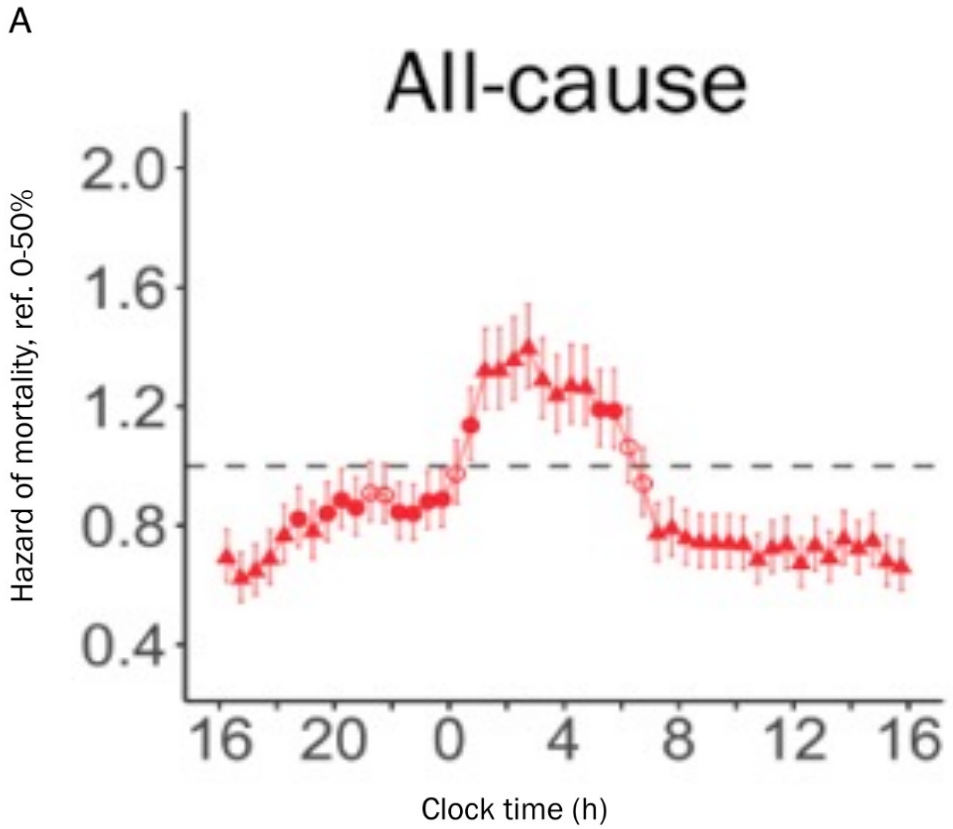
Daniel P. Windred [a,b,1], Angus C. Burns [c,d,e,f], Jacqueline M. Lane [c,d,e,f], Patrick Olivier [g], Martin K. Rutter [h,i], Richa Saxena [c,d,f,j], Andrew J. K. Phillips [a,b,2], and Sean W. Cain [a,b,1,2]

Edited by Joseph Takahashi, The University of Texas Southwestern Medical Center, Dallas, TX; received March 26, 2024; accepted August 29, 2024

October 15, 2024 | 121 (43) e2405924121

N = 88,905
Wore a light-sensor watch for 1 week (validated in 3000 for 4 repeat measurements)
Followed for 8 years and tracked mortality and causes

Model 1


A
All-cause
Hazard of mortality, ref. 0-50%
2.0
1.6
1.2
0.8
0.4
16
20
0
4
8
12
16
Clock time (h)

PNAS RESEARCH ARTICLE | MEDICAL SCIENCES OPEN ACCESS

Brighter nights and darker days predict higher mortality risk: A prospective analysis of personal light exposure in >88,000 individuals

Daniel P. Windred [a,b,1], Angus C. Burns [c,d,e,f], Jacqueline M. Lane [c,d,e,f], Patrick Olivier [g], Martin K. Rutter [h,i], Richa Saxena [c,d,f,j], Andrew J. K. Phillips [a,b,2], and Sean W. Cain [a,b,1,2]

Edited by Joseph Takahashi, The University of Texas Southwestern Medical Center, Dallas, TX; received March 26, 2024; accepted August 29, 2024

October 15, 2024 | 121 (43) e2405924121

These findings demonstrate the importance of maintaining a dark environment across the late night and early morning hours, when the central circadian pacemaker is most sensitive to light, and seeking bright light during the day to enhance circadian rhythms. Protection of lighting environments may be especially important in those at risk for both circadian disruption and mortality, such as in intensive care or aged-care settings (63, 64). Across the general population, avoiding night light and seeking day light may lead to reduction in disease burden, especially cardiometabolic diseases, and may increase longevity.

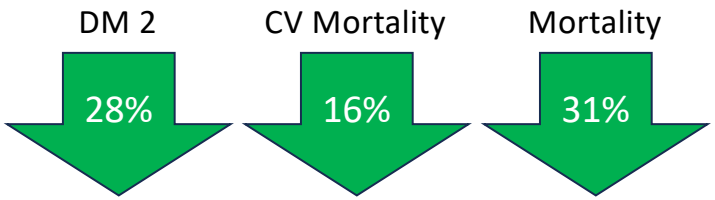
October 2018 : Environmental Research

The health benefits of the great outdoors: A systematic review and meta-analysis of greenspace exposure and health outcomes

Twohigg Bennett et al.

University of East Anglia

Metanalysis of 143 studies



Green Heart Louisville Project

4 mile^2 area of south Louisville, KY

Measured 745 subject's hsCRP

2019 – 2022 planted 8000 mature trees

Re-measured 745 subject's hsCRP

Dropped by 13-20 %

Correlates to a 10-15% drop in strokes

Nature is God's physician. The pure air, the glad sunshine, the beautiful flowers and trees, the orchards and vineyards, and outdoor exercise amid these surroundings, are health-giving—the elixir of life. Outdoor life is the only medicine that many invalids need. Its influence is powerful to heal sickness caused by fashionable life, a life that weakens and destroys the physical, mental, and spiritual powers.

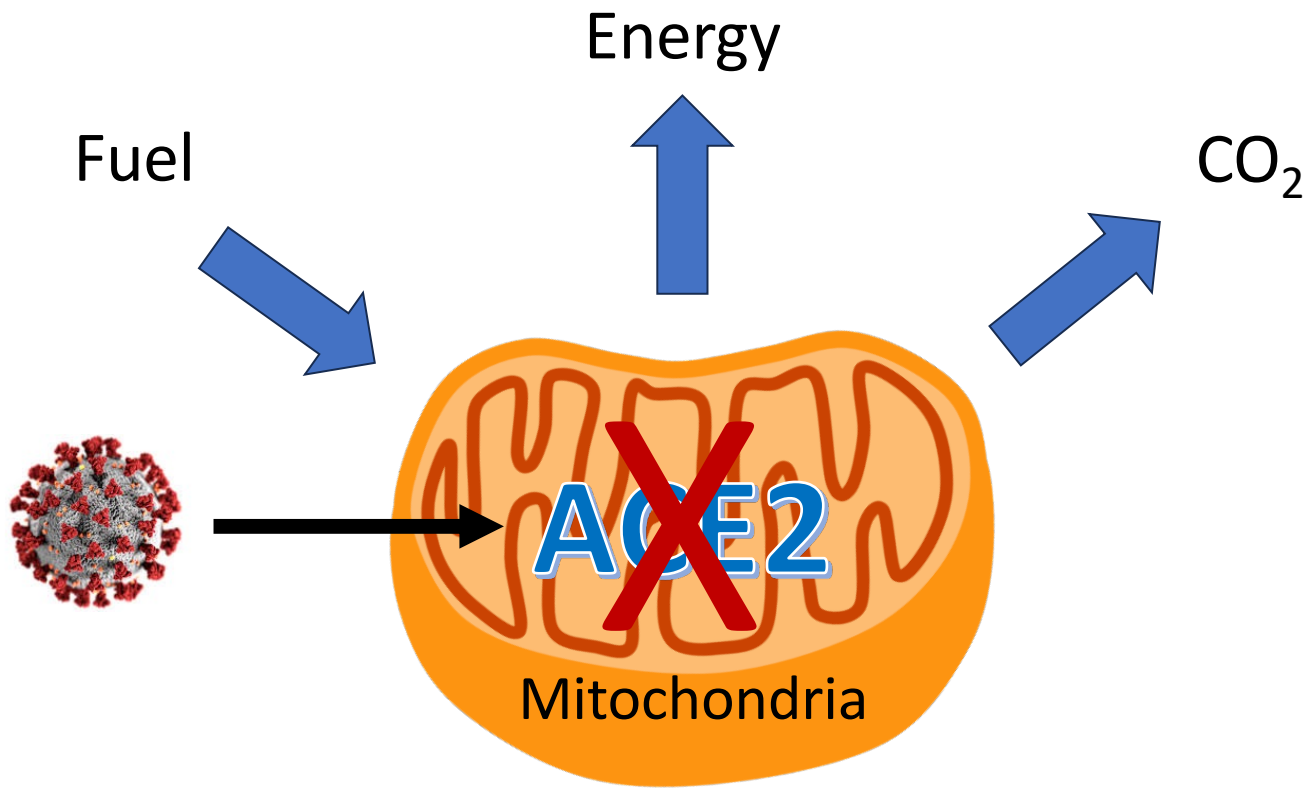
How grateful to weary invalids accustomed to city life, the glare of many lights, and the noise of the streets are the quiet and freedom of the country! How eagerly do they turn to the scenes of nature! How glad would they be for the advantages of a sanitarium in the country, where they could sit in the open air, rejoice in the sunshine, and breathe the fragrance of tree and flower! There are life-giving properties in the balsam of the pine, in the fragrance of the cedar and the fir. And there are other trees that are health-promoting. Let no such trees be ruthlessly cut down. Cherish them where they are abundant, and plant more where there are but few. 7T 77 (1902)

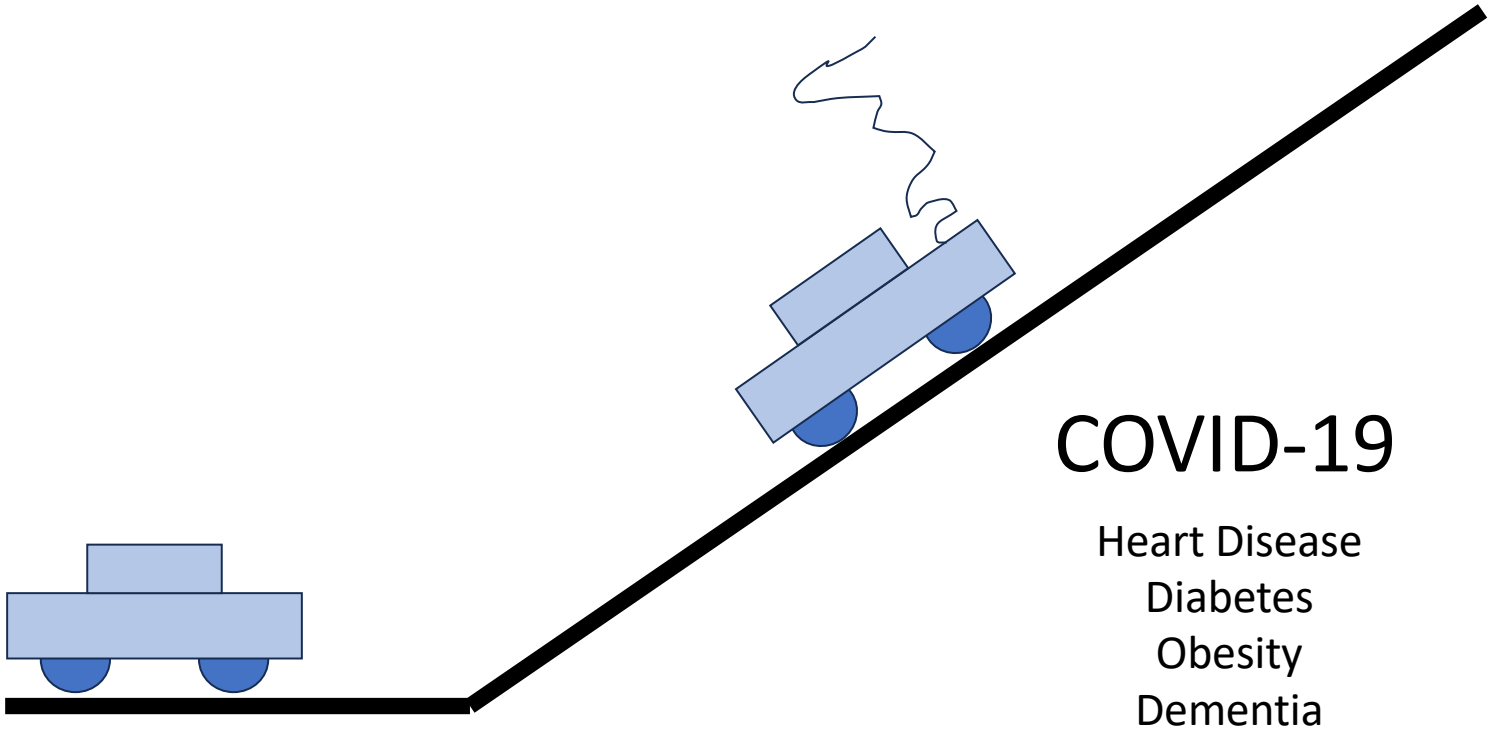
August 2024 : Journal of Investigative Dermatology

Sunlight: Time for a Rethink

Richard B. Weller Department of Dermatology, The University of Edinburgh, UK

Dermatologists and skin researchers have made great progress in understanding some aspects of the interaction between UV and our skin, but we need to stand back and take a more holistic view of UV exposure and human health. The United Nations Environmental Effects Assessment panel (Neale et al, 2023) and an Australian panel endorsed by the Cancer Council of Australia and Australasian College of Dermatologists (Neale et al, 2024) have both just produced position statements recognizing that **sunlight has beneficial effects that should be considered in formulating policy on sunlight exposure and highlighting the necessity of carrying out further research into these beneficial effects**. **We should take note.**


Energy
Fuel
CO_2
ACE2
Mitochondria



COVID-19

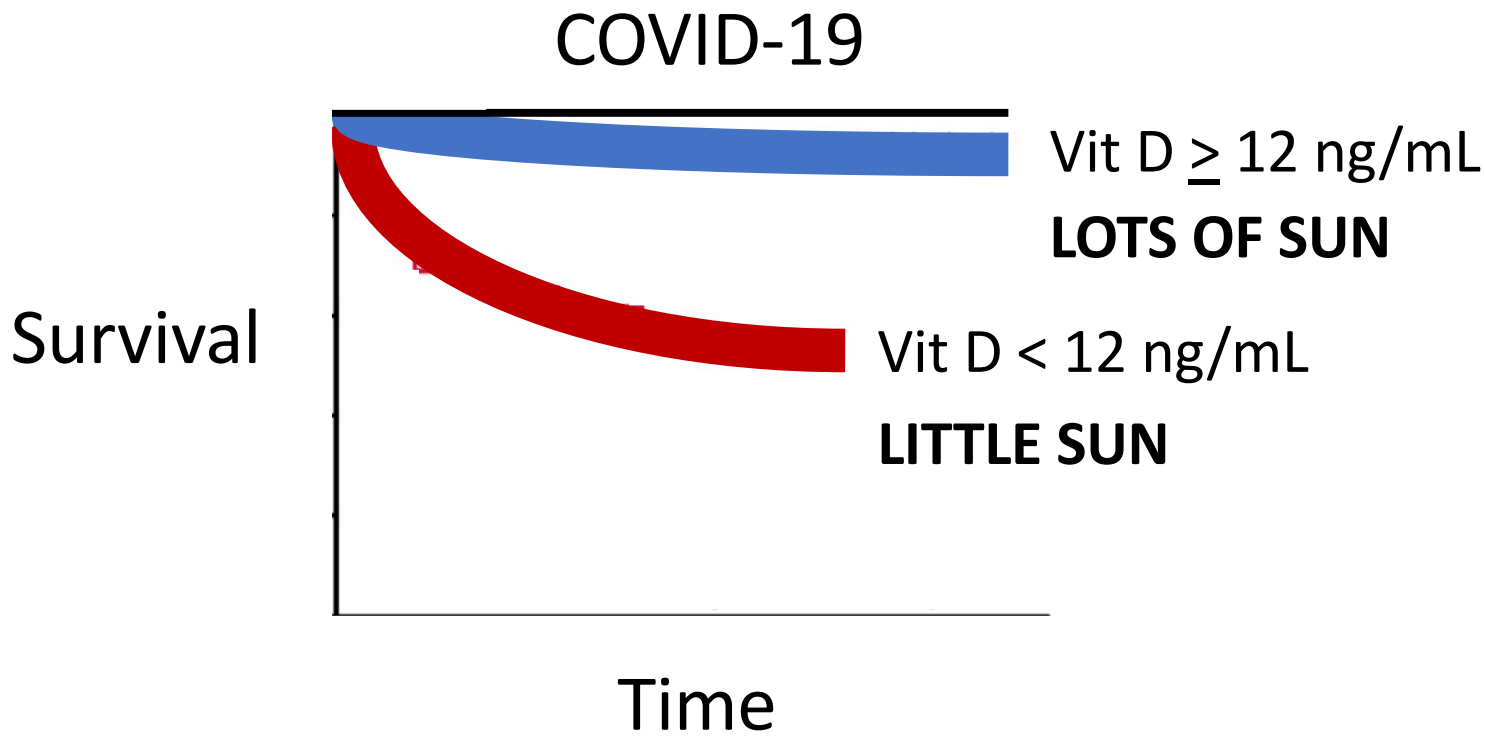
Heart Disease
Diabetes
Obesity
Dementia
Inflammation
Cancer

Sept 2020 : Nutrients

Vitamin D Deficiency and Outcome of COVID-19 Patients

Radujkovic et al. University of Heidelberg

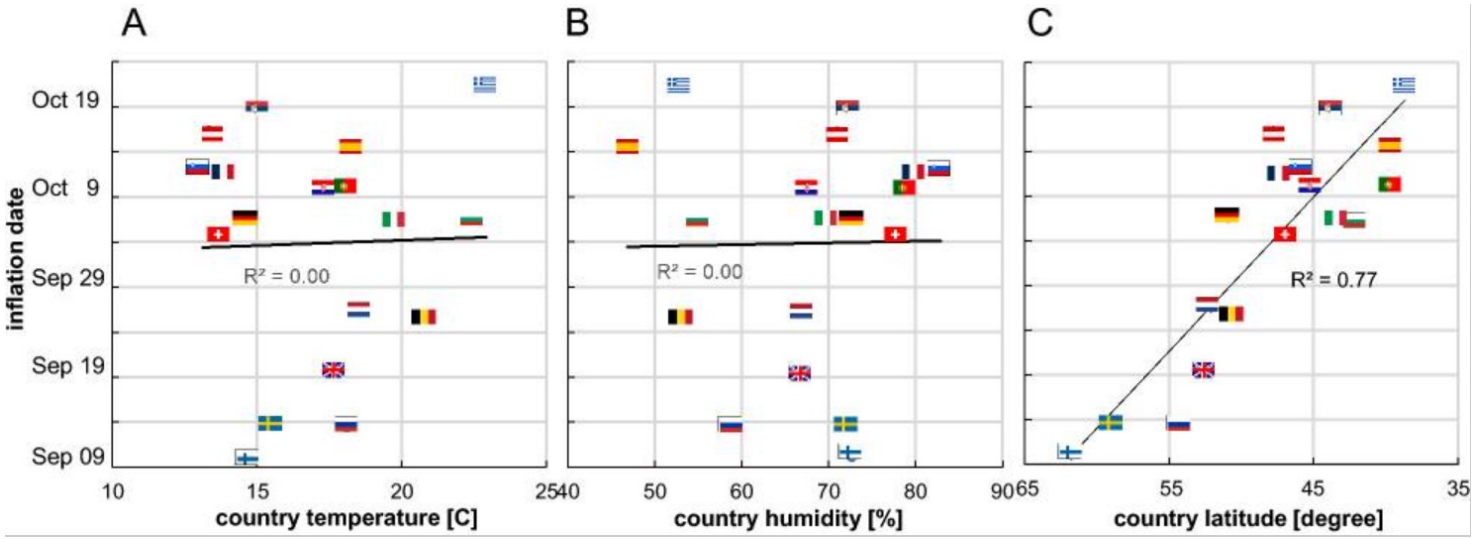
N= 92



Jan 2021 : Scientific Reports

Autumn COVID-19 surge dates in Europe correlated to latitudes, not to temperature-humidity…

Stephen Walrand Cliniques Universitaires Saint-Luc

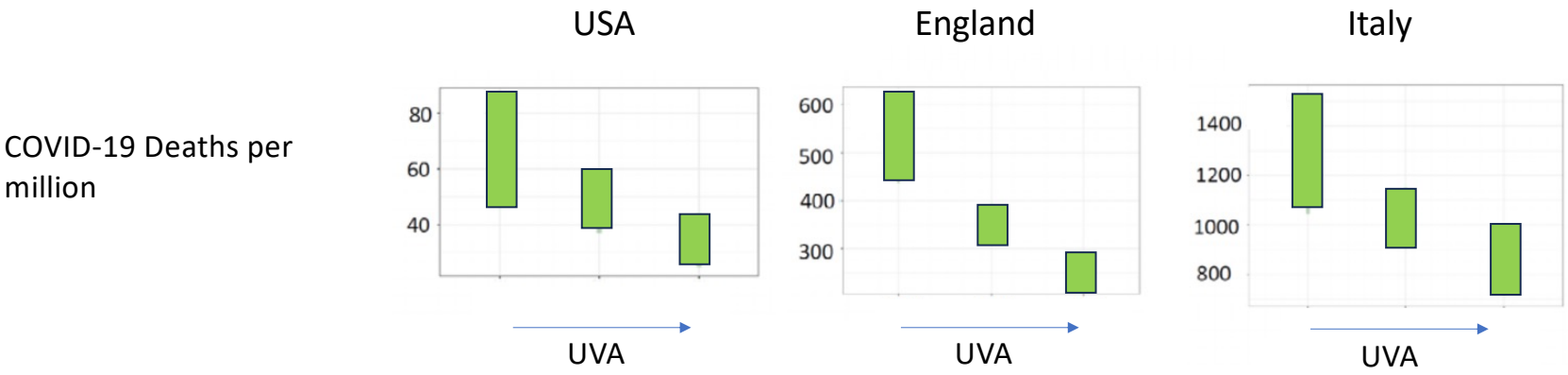


https://pmc.ncbi.nlm.nih.gov/articles/PMC7820009/

April 2021 : Epidemiology

Ultraviolet A radiation and COVID-19 deaths in the USA with replication studies in England and Italy

Cherrie et al. University of Edinburgh



"…it suggests that optimizing sun exposure may be a possible public health intervention. Given that the effect appears independent of a vitamin D pathway, it suggests possible new COVID-19 therapies…"

June 2022 : Melatonin Research

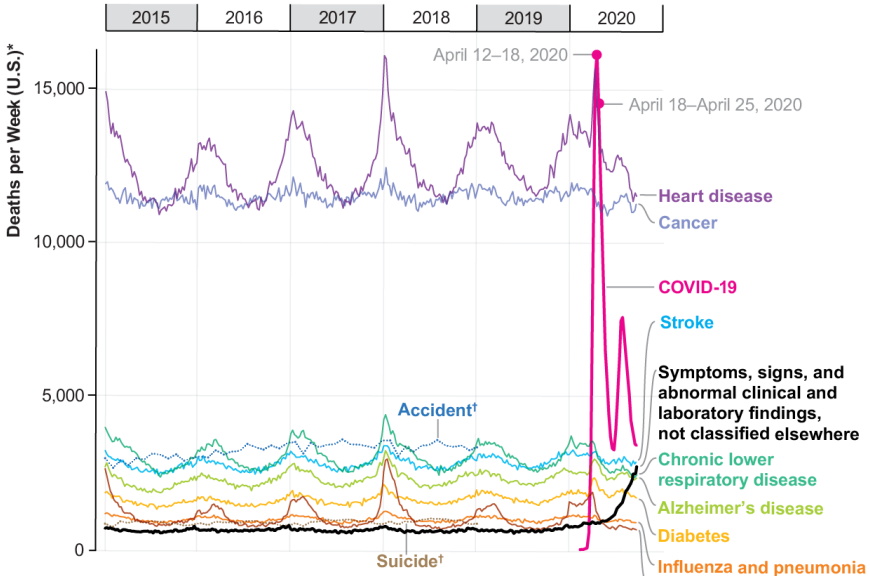
A geographical approach to the development of hypotheses relating to Covid 19 death rates

Skutsch, Seheult, et al. Universidad Nacional Autónoma de Mexico

Limiting to countries with more **than 50% of the population is overweight** there was a definite association with COVID-19 mortality and latitude.

COVID Outpaced Seven Top Killers in 2020

This chart shows deaths per week for the top 10 causes of death—per 2017 annual rankings—plus COVID-19 and a provisional category for abnormal clinical and lab findings. (This category includes cases pending COVID-19 test confirmation and may be revised later by public health officials.) In the last two weeks of April, more Americans died from COVID-19 than from heart disease.



*The 2019 and 2020 figures are provisional and were likely undercounted in recent weeks. Deaths caused by problems with the circulatory system (including heart disease) and the respiratory system are seasonal and tend to peak in cold winter months.

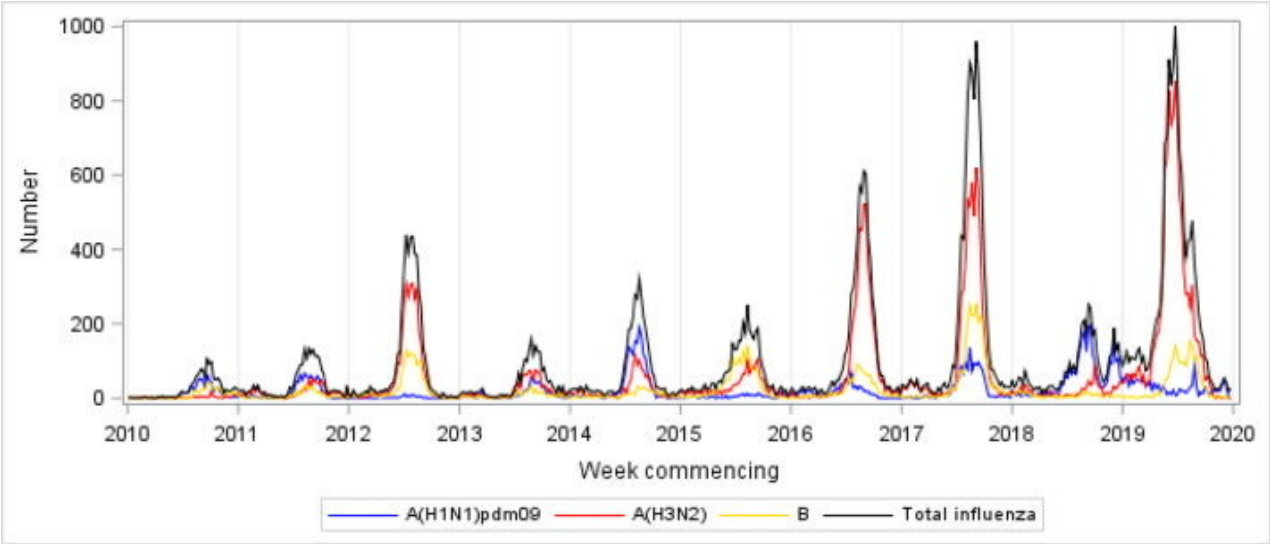
† Deaths caused by accidents and suicide are rooted in monthly reports. Data are not available for 2019 and 2020.

https://www.scientificamerican.com/article/debunking-the-false-claim-that-covid-death-counts-are-inflated1/

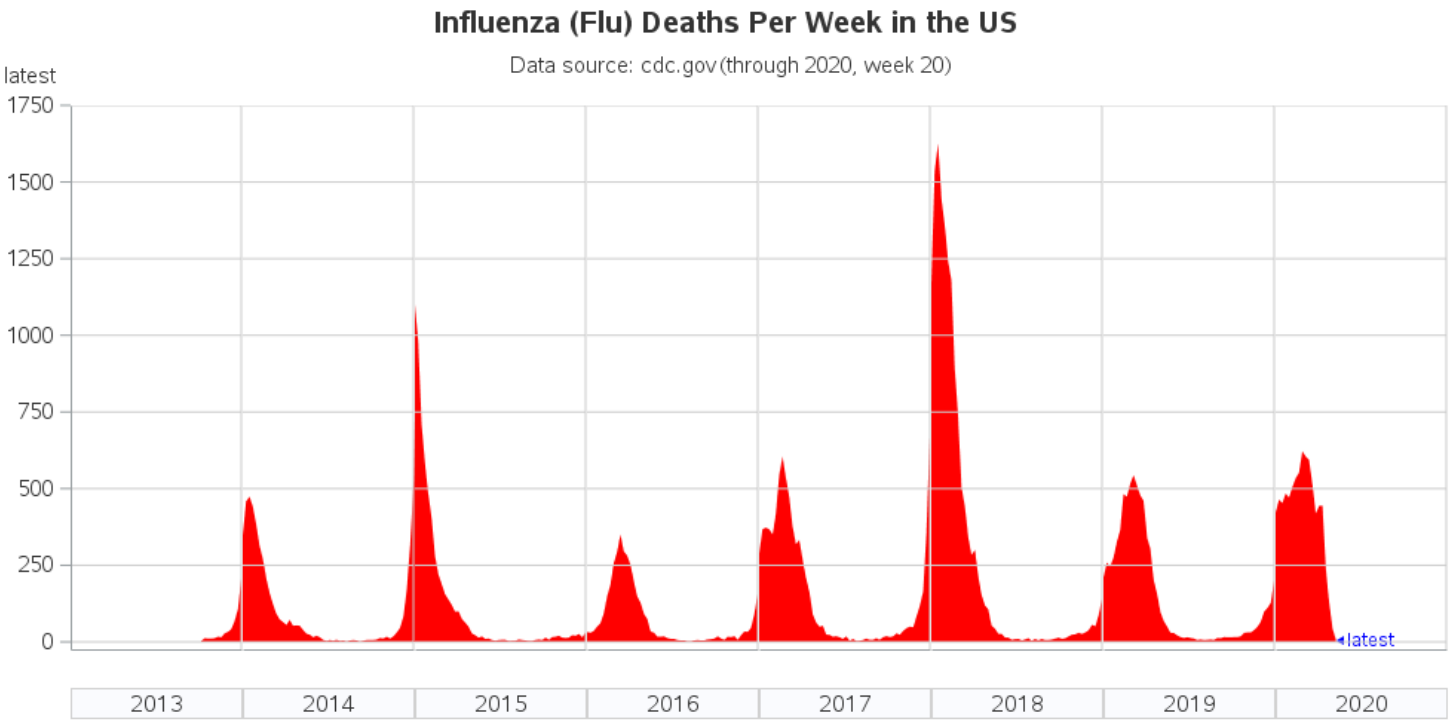
Influenza-associated mortality in Australia, 2010 through 2019: High modelled estimates in 2017

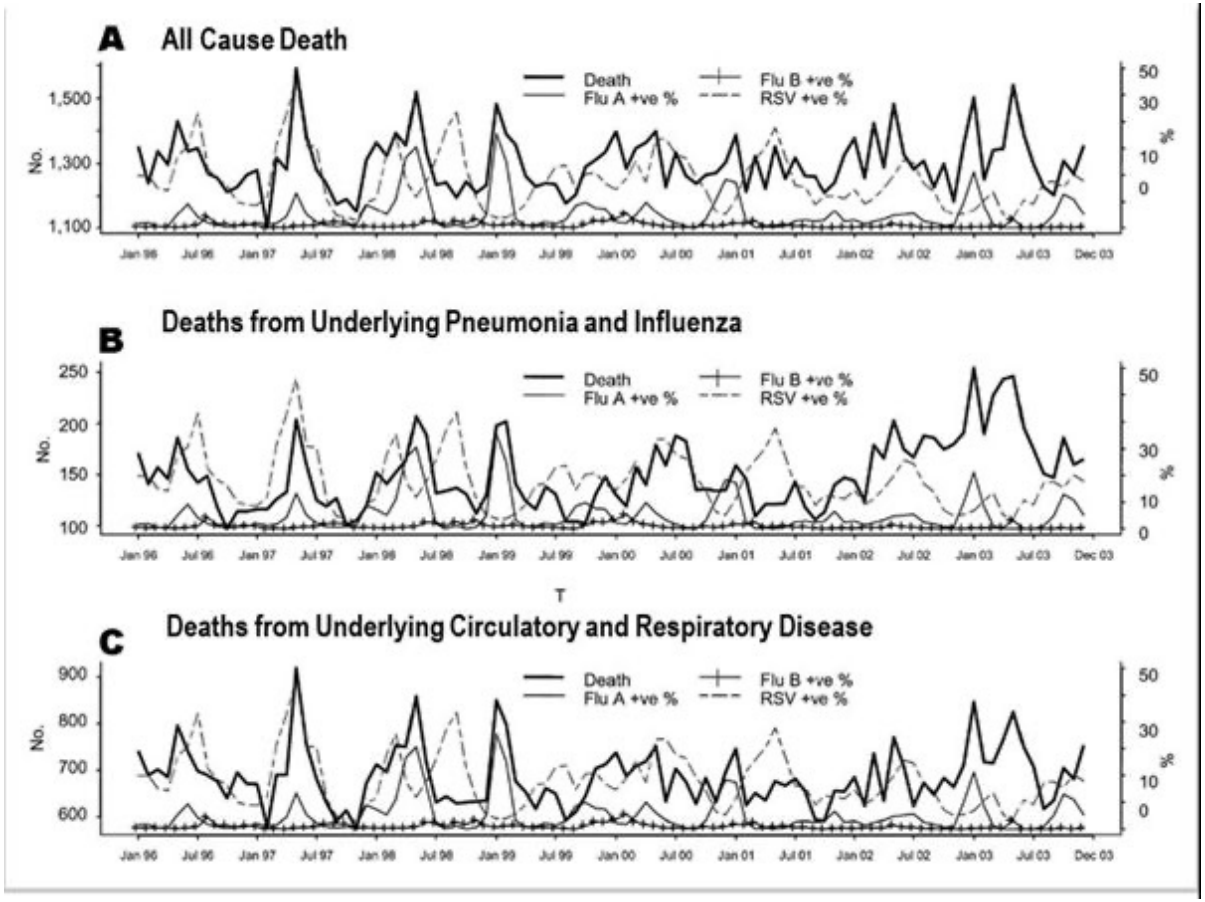
David J. Muscatello [a], Allen L. Nazareno [a b], Robin M. Turner [a c], Anthony T. Newall [a]

Show more



https://www.sciencedirect.com/science/article/abs/pii/S0264410X2101464X


Influenza (Flu) Deaths Per Week in the US
Data source: cdc.gov (through 2020, week 20)
latest
1750
1500
1250
1000
750
500
250
0
latest
2013
2014
2015
2016
2017
2018
2019
2020



Singapore (80 miles from the equator)

July 2020 : Mossavar-Rahmani Center for Business and Government

Sunlight and Protection Against Influenza

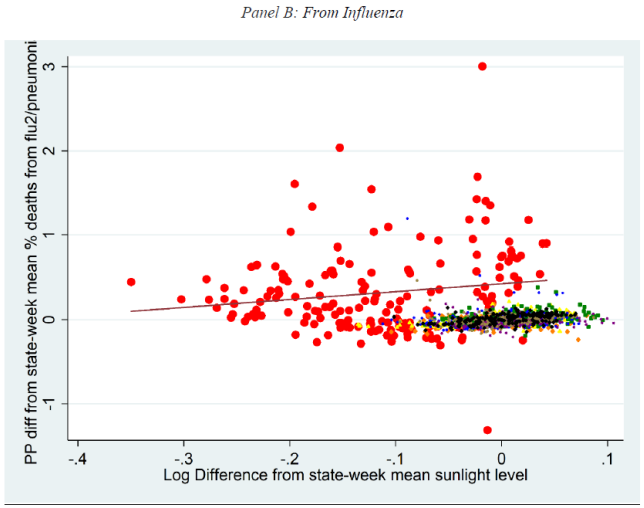
D. J. G. Slusky, R. J. Zeckhauser **Harvard Kennedy School**

Looked at **CDC data** for influenza and combined it with **solar radiation data** from the National Solar Radiation Database.

Richard Zeckhauser
Frank Plumpton Ramsey Professor of Political Economy

Abstract

Recent medical literature suggests that vitamin D supplementation protects against acute respiratory tract infection. Humans exposed to sunlight produce vitamin D directly. This paper investigates how differences in sunlight, as measured over several years across states and during the same calendar week, affect influenza incidence. We find that sunlight strongly protects against getting influenza. This relationship is driven almost entirely by the severe H1N1 epidemic in fall 2009. A 10% increase in relative sunlight decreases the influenza index in September or October by 1.1 points on a 10-point scale. A second, complementary study employs a separate data set to study flu incidence in counties in New York State. The results are strongly in accord.



Notes: Red Circles = 2009; Orange Diamonds = 2010, Yellow Triangles = 2011, Green Squares = 2012, Blue Pluses = 2013, Purple X's = 2014, Brown Small Circles = 2015, Black Small Diamonds = 2016. Line is linear best fit for 2009. Vertical axis is the residual after regressing difference in state-week mean flu index on difference in state-week mean weather controls.

Infrared light therapy relieves TLR-4 dependent hyper-inflammation of the type induced by COVID-19

Blanche Aguida[a], Marootpong Pooam[b], Margaret Ahmad [a,c], and Nathalie Jourdan[a]

[a]Cnrs, Ibps, Sorbonne Université, Paris, France; [b]Department of Biology, Faculty of Science, Naresuan University, Phitsanulok, Thailand; [c]Department of Biology, Xavier University, Cincinnati, Ohio, USA

ABSTRACT

The leading cause of mortality from COVID-19 infection is respiratory distress due to an exaggerated host immune response, resulting in hyper-inflammation and ensuing cytokine storms in the lungs. Current drug-based therapies are of limited efficacy, costly, and have potential negative side effects. By contrast, photobiomodulation therapy, which involves periodic brief exposure to red or infrared light, is a noninvasive, safe, and affordable method that is currently being used to treat a wide range of diseases with underlying inflammatory conditions. Here, we show that exposure to two 10-min, high-intensity periods per day of infrared light causes a marked reduction in the TLR-4 dependent inflammatory response pathway, which has been implicated in the onset of cytokine storms in COVID-19 patients. Infrared light exposure resulted in a significant decline in NFkB and AP1 activity as measured by the reporter gene assay; decreased expression of inflammatory marker genes IL-6, IL-8, TNF-alpha, INF-alpha, and INF-beta as determined by qPCR gene expression assay; and an 80% decline in secreted cytokine IL6 as measured by ELISA assay in cultured human cells. All of these changes occurred after only 48 hours of treatment. We suggest that an underlying cellular mechanism involving modulation of ROS may downregulate the host immune response after Infrared Light exposure, leading to decrease in inflammation. We further discuss technical considerations involving light sources and exposure conditions to put these observations into potential clinical use to treat COVID-19 induced mortality.

ARTICLE HISTORY
Received 08 July 2021
Revised 03 August 2021
Accepted 04 August 2021

KEYWORDS
Photobiomodulation therapy; reactive oxygen species; inflammation; Covid19; infrared therapy; cytokine storms

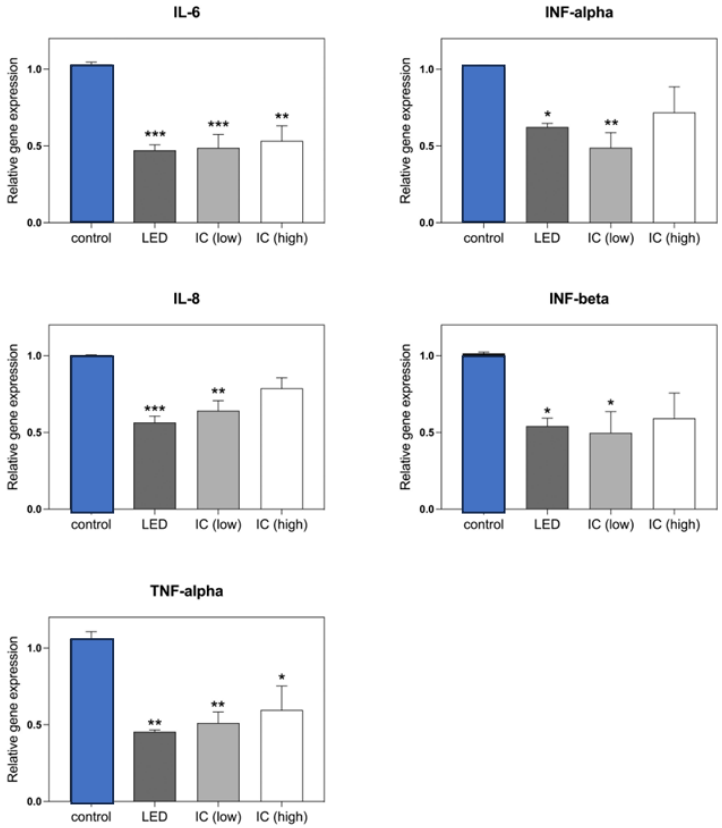


Figure 4. Gene expression analysis of Effect of Infrared Light on Inflammatory markers. Genes induced during the inflammatory response in HEK-TLR4 cell cultures including inflammatory cytokines (IL-6, IL-8) and transcription factors (TNF-α, INF-α, INF-β) were monitored by qPCR analysis subsequent to induction of the inflammatory response by LPS. The control condition represents the expression levels of cell cultures that had not been exposed to infrared light. In the other conditions, cultures were exposed to infrared light for 10 m every 12 h for 48 h as follows: LED: exposure to 6 W/m^2 infrared 720 nm LED lights, IC (low): exposure to 6 W/m^2 incandescent infrared light bulb (methods); IC (high): exposure to 46 W/m^2 incandescent infrared light bulb (methods). Data are shown as mean ± SE of four independent experiments (N = 4). The asterisks indicate significance level of the differences: *p-value < 0.1; ** p-value < 0.01; *** p-value < 0.001.

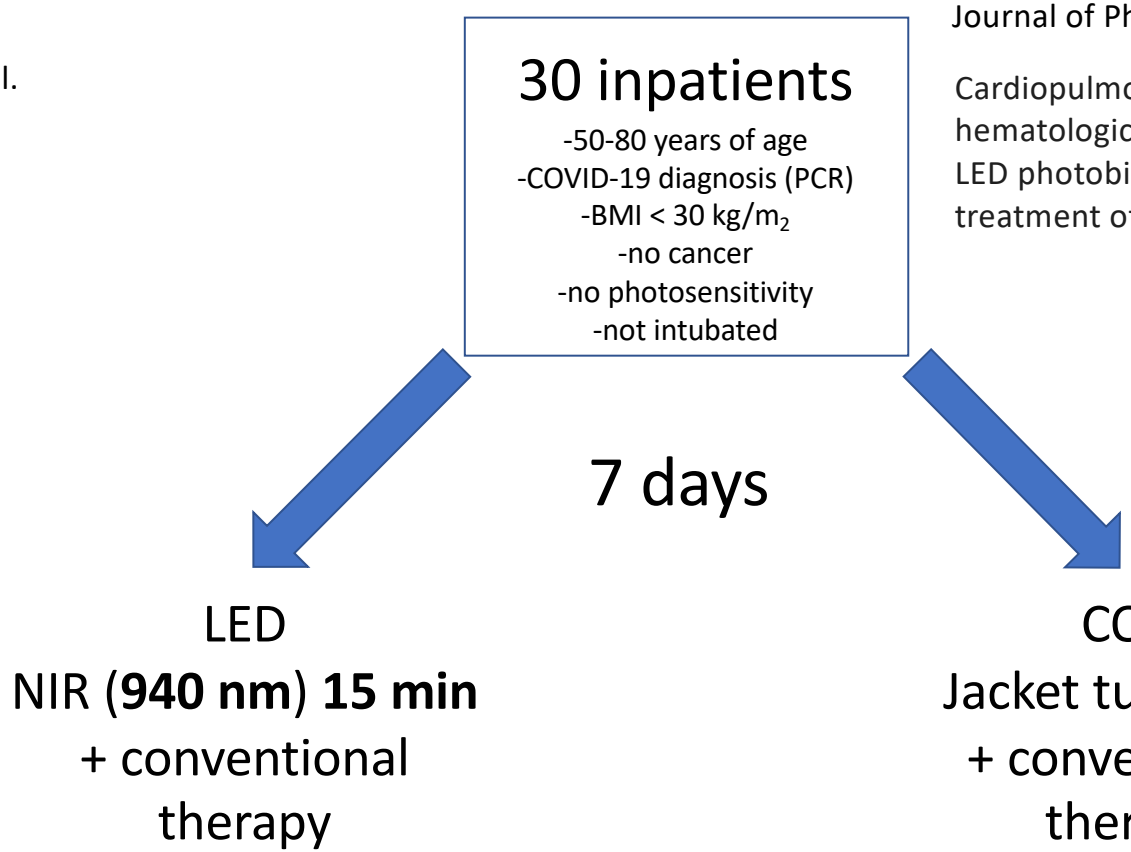
Study Type: Prospective, descriptive, single-blinded, randomized, and longitudinal trial

Jan 2023

Pereira et al.

Journal of Photochemistry and Photobiology

Cardiopulmonary and hematological effects of infrared LED photobiomodulation in the treatment of SARS-COV2



Endpoint:	NIR	CON	P-value
Oxygen Saturation improvement	**↑9.4%**	↑2.6%	< 0.0001
Tidal Volume	**↑74.4 mL**	↑22.1 mL	< 0.0001
MIP (cm H_2O)	**-24.9**	-7.0	< 0.0001
MEP (cm H_2O)	**19.1**	2.0	< 0.0001
RR	**-5.1**	-2.8	0.0009
HR	**-19.7**	-1.9	0.007
Lymphocytes (mm^{-3})	**+850**	-10	0.004
Days discharged compared	**8**	11.7	0.02

Different Hospital
Orthopedic Issue

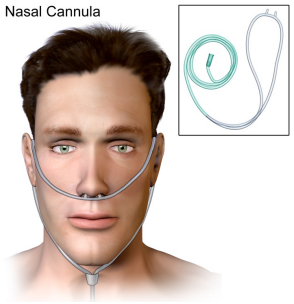
Our Hospital
COVID Hospitalization

Day 1	Day 7	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16	Day 17	Day 18	Day 19
COVID+	COVID+	COVID+ 4L NC	COVID+ 10L Oxymizer	COVID+ 10L Oxymizer	COVID+ 35L 100% High flow	COVID+ 15L Oxymizer	COVID+ 10L Oxymizer	COVID+ 6L NC	COVID+ 4L NC	COVID+ D/C

Dexamethasone

SoluMedrol 60 mg IV Q12h
Azithomycin
D/C Tylenol

Full Sunlight 20-30 minutes



Nasal Cannula (NC)

Oxymizer

High Flow NC

“Of all the remedies I have used or seen in use, I can find but one thing that I can call remedial for the whole disease… and that is a profuse supply of fresh air.”

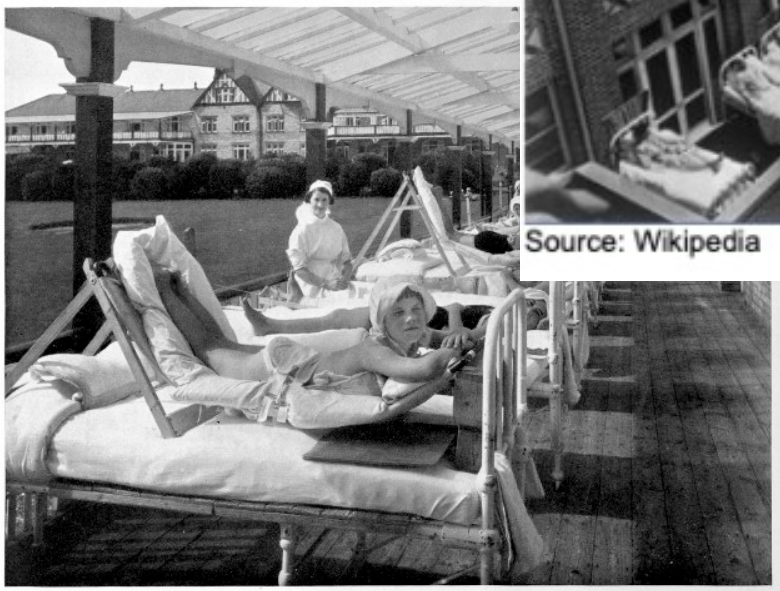
“Second only to fresh air, however, I should be inclined to rank light in importance for the sick. Direct sunlight, not only daylight, is necessary for a speedy recovery.”

-Florence Nightingale 1850s

"The feeble one should press out into the sunshine as earnestly and naturally as do the shaded plants and vines. The pale and sickly grain blade that has struggled up out of the cold of early spring, puts out the natural and healthy deep green after enjoying for a few days the health-and-life-giving rays of the sun. **Go out into the light and warmth of the glorious sun, you pale and sickly ones, and share with vegetation its life-giving, health-dealing power."—***The Health Reformer, May 1, 1871. HL 230.2*

“Make it habit **not to sit up after nine o'clock**. **Every light should be extinguished**. This turning night into day is a wretched, health-destroying habit…” *Published letter of Ellen G. White to her secretary 1888*

Source: Wikipedia



Senior Girls—Surgical Cases.
Correction of deformity being carried out by hyper-extension in plaster.
Children are accommodated with due regard to age as well as to physical condition.

https://www.museumofhealthcare.ca/explore/exhibits/breath/sanatoria.html

Recovering From Surgery? Get a Hospital Room With a View

By Jocelyn Solis-Moreira | Published on January 05, 2023

Fact checked by Nick Blackmer

Key Takeaways

- Researchers have found that a patient's hospital room might affect their outcomes after surgery. For example, having a window in their room was associated with a faster recovery after surgery.
- The study also found that patients in a hospital room away from the nurse's station had worse outcomes than patients who were in the staff's direct line of vision.
- Patients also seemed to recover faster in single occupancy rooms compared to double, likely because they have more privacy.

Case Study

15 year old CM

9/20/23 – diagnosis of B-cell ALL

9/22/23 – Started Chemo

5/31/24 – stopped chemo due to illness

6/1/24 – ER with 2-3 weeks of cough and runny nose found to have neutropenic fever and started on IV antibiotics

6/8/24 – CT scan (left) lingular pneumonia and acute sinusitis

6/18 – sputum culture revealed Cunninghamella (murcor fungus)

6/19 – Started on amphotericin B and posaconazole

6/24 – Bronchoscopy revealed fungus ball

6/25 – significant effusion requiring chest tube

6/28 – CT scan showing consolidation and hypoenhancement concerning for necrosis

6/29 – placement of larger size chest tube

6/30 – transferred to adult side of hospital for evaluation from thoracic surgery for lung removal

7/1 – underwent left hemi-clamshell thoracotomy and sternotomy with pneumonectomy, endoscopic GJ tube placement and Eloesser flap and then transferred to the SICU

7/2 – extubated and brought back to OR for dressing changes

7/8 increase in WBC – antibiotics broadened and new nodules found on 7/8 on CTPA. Thoracentesis performed

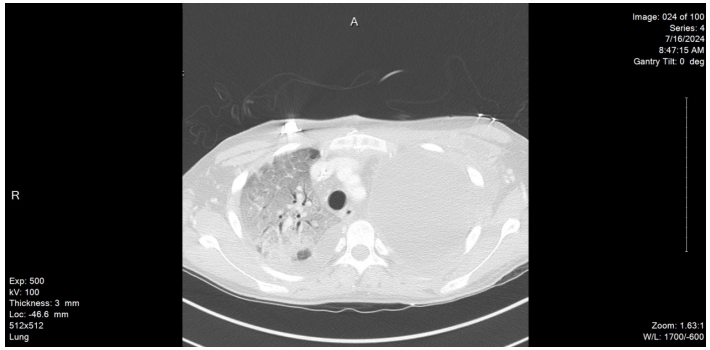
7/9 cultures sent

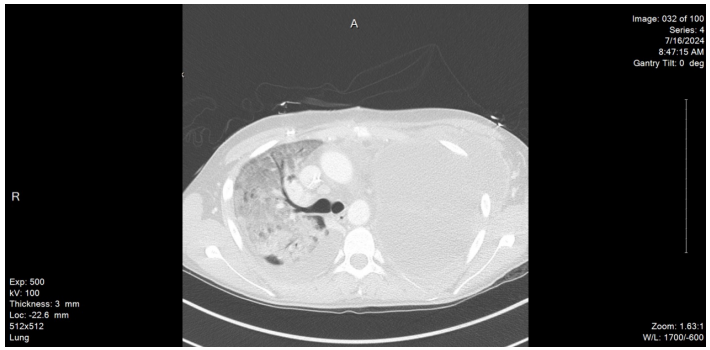
7/11 Eloesser flap closed

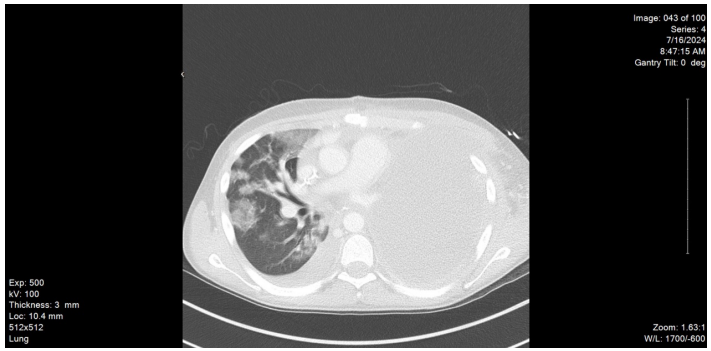
7/11 to 7/14 – posaconazole stopped (restarted on 7/13) d/t increasing LFTs, Lasix added d/t volume overload. Increased pain.

7/14-16 – on going fevers (despite both posaconazole and amphotericin B)

7/16 – worsening oxygenation and work of breathing requiring BiPAP (7/15) ongoing fever. CT performed.



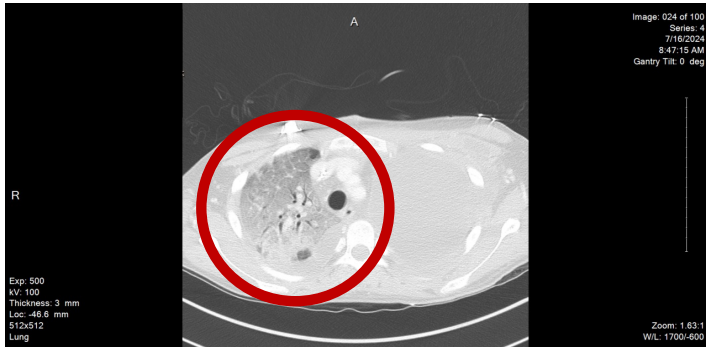




Multidisciplinary Care conference:
-likely invasive murcor and no surgical options
-not an ECMO candidate as there is no chance for recovery
-nothing further to offer patient
-Bronchoscopy? Thoracentesis on the left?
-discussed with parents the issues and after long discussion was made DNR, with focus on maintaining IV therapies and not escalating care
-engaged child life services to help communicate this to completely awake and alert patient
-patient was asked what he wanted.
-he expressed desire to go outside (7/16)

7/17	7/18	7/19	7/20
Outside 2-6PM	Outside 2:30-7:00pm	Outside 4:15-5:15pm	Outside 3-6:30pm
	Firefly 5 minutes TID	Firefly 5 minutes TID	Firefly 5 minutes TID
Fever	Fever gone	Fever gone	Fever gone
WBC = 27.5	WBC = 18.0	WBC = 7.9	
Neutrophils = 22.6	Neutrophils = 13.7	Neutrophils = 4.8	

-oxygen requirements reduced also during this time
-7/22 – repeated CT scan
-7/28 – transferred to the regular floor
-continued to use both the firefly and get outside into sunlight


A
Image: 024 of 100
Series: 4
7/16/2024
8:47:15 AM
Gantry Tilt: 0 deg
R
Exp: 500
kV: 100
Thickness: 3 mm
Loc: -46.6 mm
512x512
Lung
Zoom: 1.63:1
W/L: 1700/-600

7/16 → 7/22

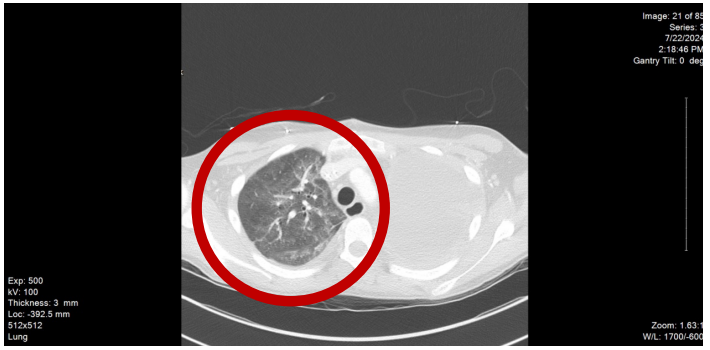


Image: 21 of 85
Series: 3
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2:18:46 PM
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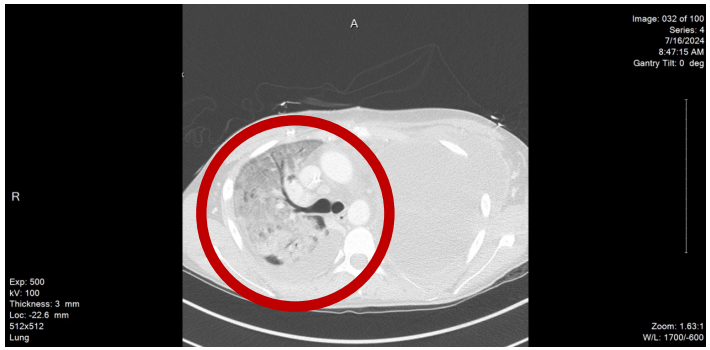
Zoom: 1.63:1
W/L: 1700/-600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Series: 4
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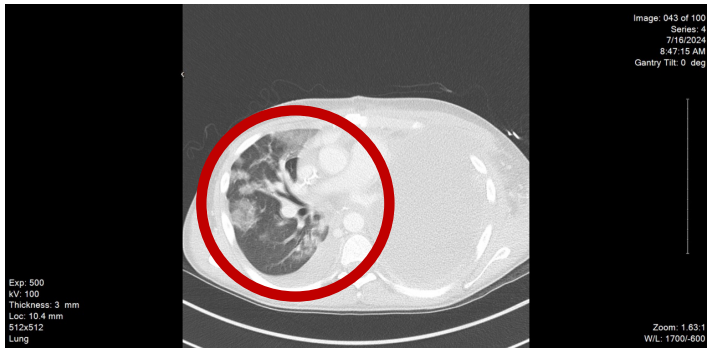
Exp: 500
kV: 100
Thickness: 3 mm
Loc: -22.6 mm
512x512
Lung
Zoom: 1.63:1
W/L: 1700/-600


Image: 29 of 85
Series: 3
7/22/2024
2:18:46 PM
Gantry Tilt: 0 deg
Exp: 500
kV: 100
Thickness: 3 mm
Loc: -368.5 mm
512x512
Lung
Zoom: 1.63:1
W/L: 1700/-600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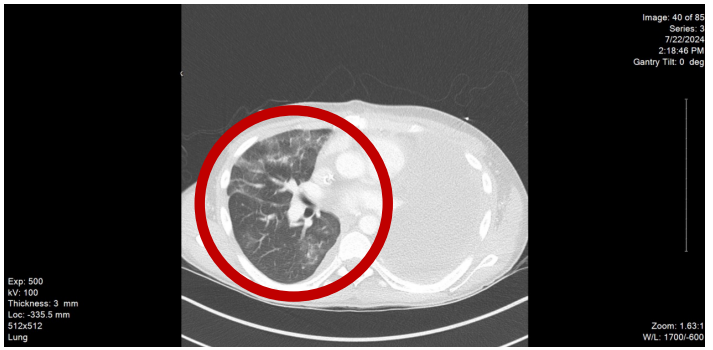
512x512
Lung
Zoom: 1.63:1
W/L: 1700/-600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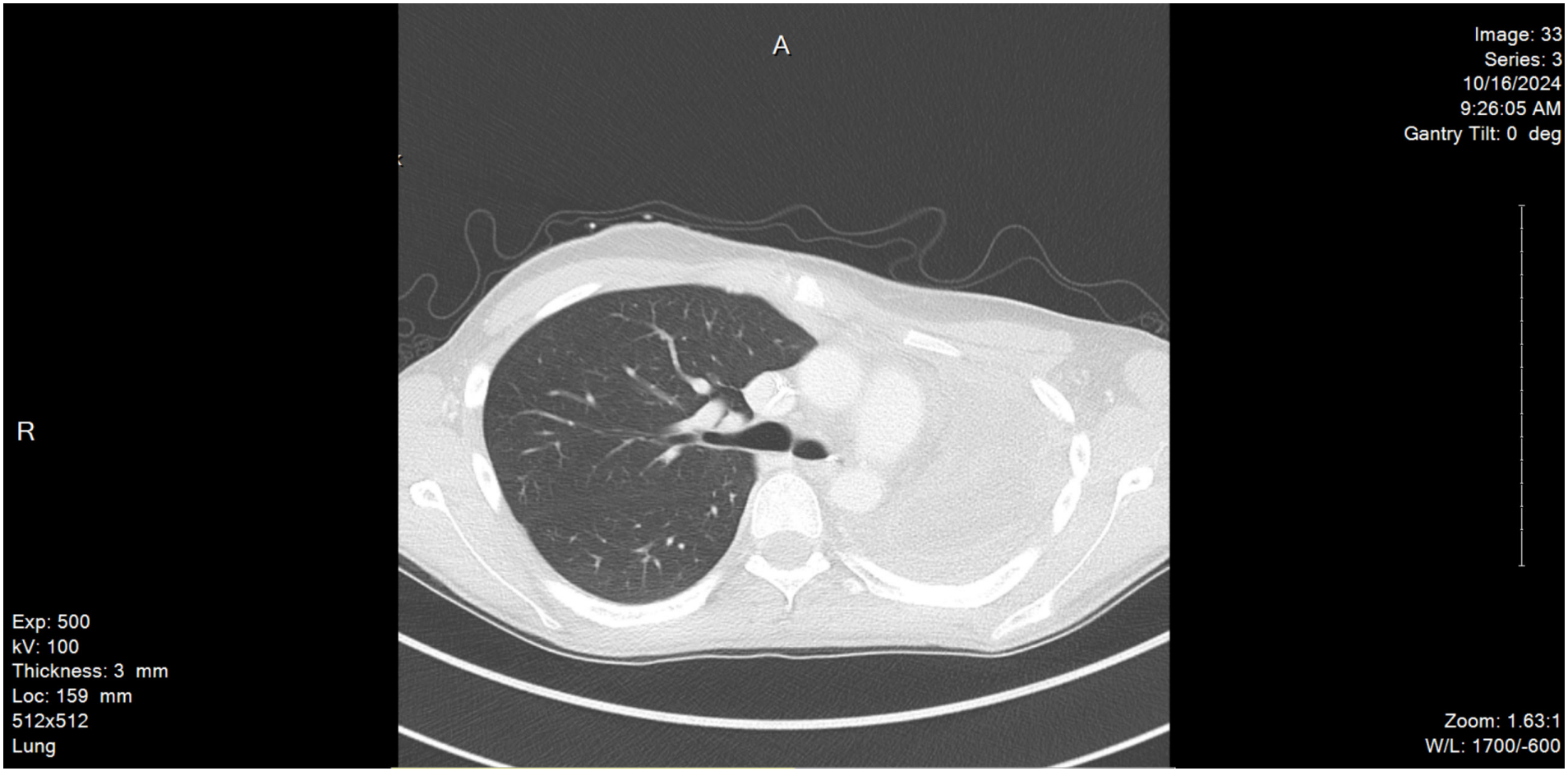
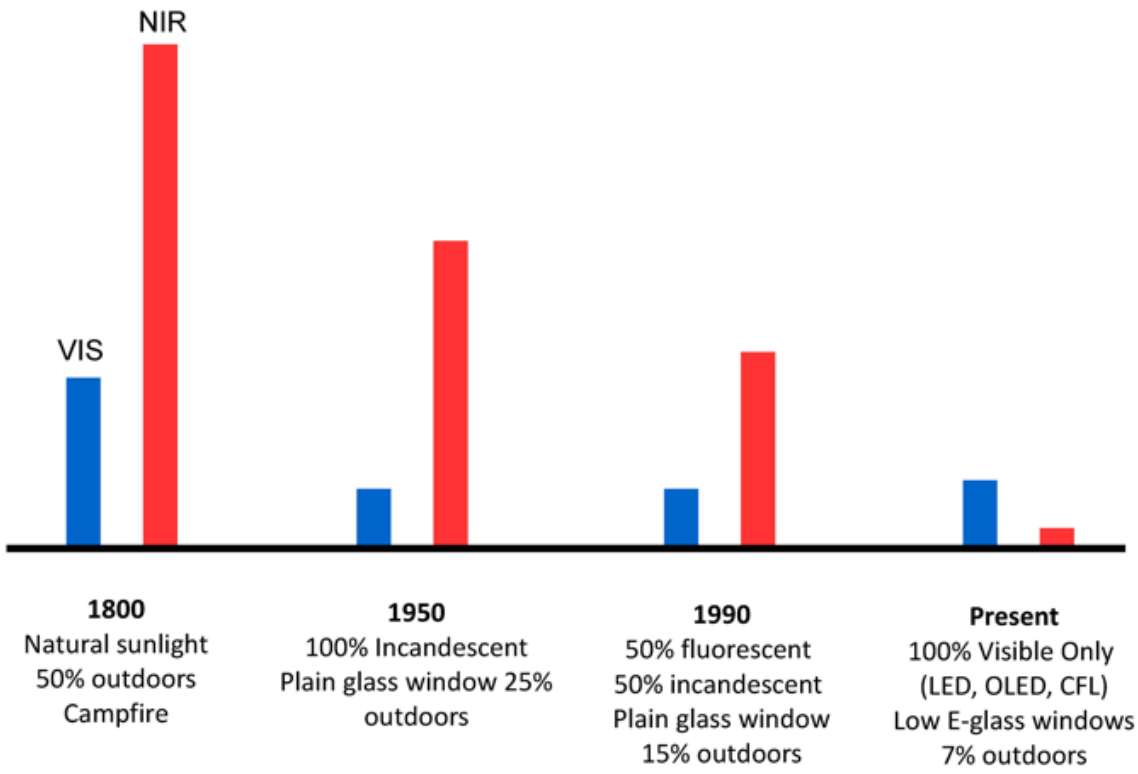
W/L: 1700/-600

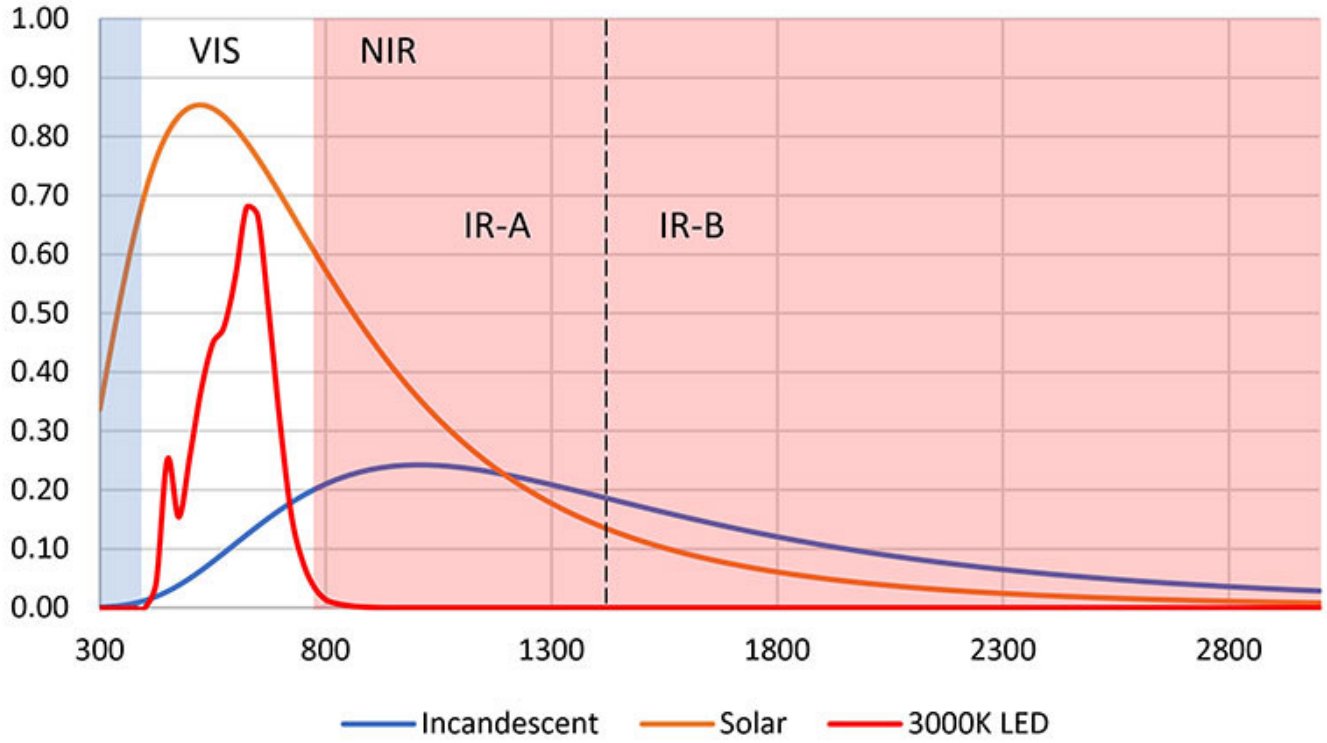

A
R
Image: 33
Series: 3
10/16/2024
9:26:05 AM
Gantry Tilt: 0 deg
Exp: 500
kV: 100
Thickness: 3 mm
Loc: 159 mm
512x512
Lung
Zoom: 1.63:1
W/L: 1700/-600

NIR human exposure is decreasing over the last century



Zimmerman, S. and Reiter, R. 2019. Melatonin and the Optics of the Human Body. *Melatonin Research*. 2, 1 (Feb. 2019), 138-160. DOI:https://doi.org/https://doi.org/10.32794/mr11250016.

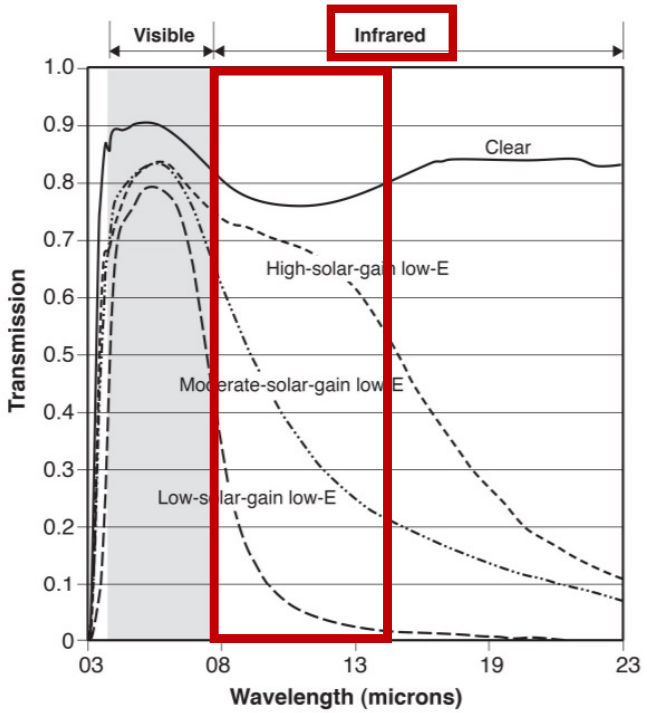
LED lights emit no NIR light at all



https://www.ies.org/fires/the-science-of-near-infrared-lighting-fact-or-fiction/

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Measure Guideline:
Energy-Efficient Window Performance and Selection



Regular Glass

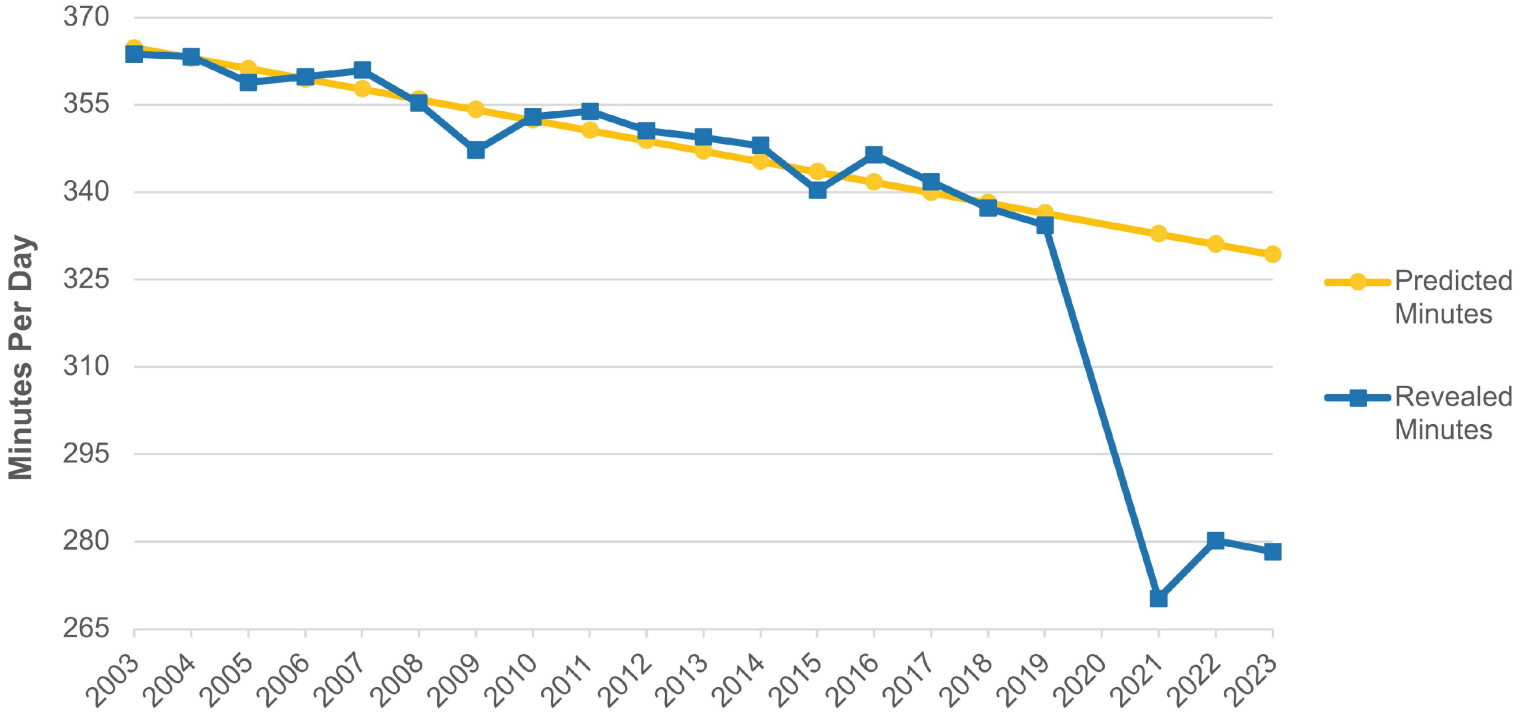
Low E-glass

Figure 9. Spectral transmittance curves for glazings with low-e coatings

Low-E Glass will not allow Infrared Light to pass through because of energy efficiency

https://www.nrel.gov/docs/fy13osti/55444.pdf

Figure 6. Predicted and revealed out-of-home time use, 2003–2023. Trend line and 2003–2018 data from Morris et al. (Citation2023); 2019–2023 data from this study.



https://www.tandfonline.com/doi/full/10.1080/01944363.2024.2385327#abstract

“I have a decided message for our people in Southern California ... for months I have carried on my soul the burden of the medical missionary work in Southern California. Recently much light has been given me in regard to the manner in which God desires us to conduct sanitarium work. We are to encourage the patients to spend much of their time out-of-doors.” LLM 474

We need to be intentional about getting outside for 20-30 minutes per day

93% of our lives are spent inside
Energy efficiency
-LEDs inside give off no infrared light
-Low-E glass blocks infrared light

May be the reason in part for rising chronic disease

We need an inpatient heliotherapy protocol

-able to have it selected by providers in hospitals
-army of volunteers from the community to take them outside and watch them
-even vented patients!
-length of stay?
-finances?
-beds?

Longevity ≠ Chronic disease

Take this fight outside