

Enlighten Project

Durham University Enlighten Research Team explores the impact of the physical environment on health and well-being with a particular focus on the harsh nature of the critical care environment.

Dr Paul L Chazot, Biosciences Durham University

Dr Laura Johnston, artist/designer, Artist in Residence and Post Doctoral Research Fellow

S Tees Hospitals NHS Foundation Trust, Dr Gordon Dougal & Quietmind Foundation (US)

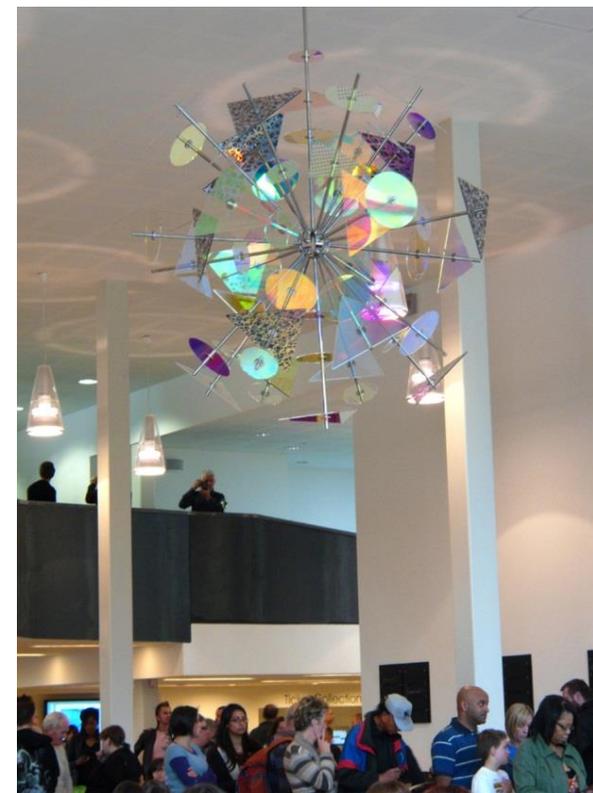


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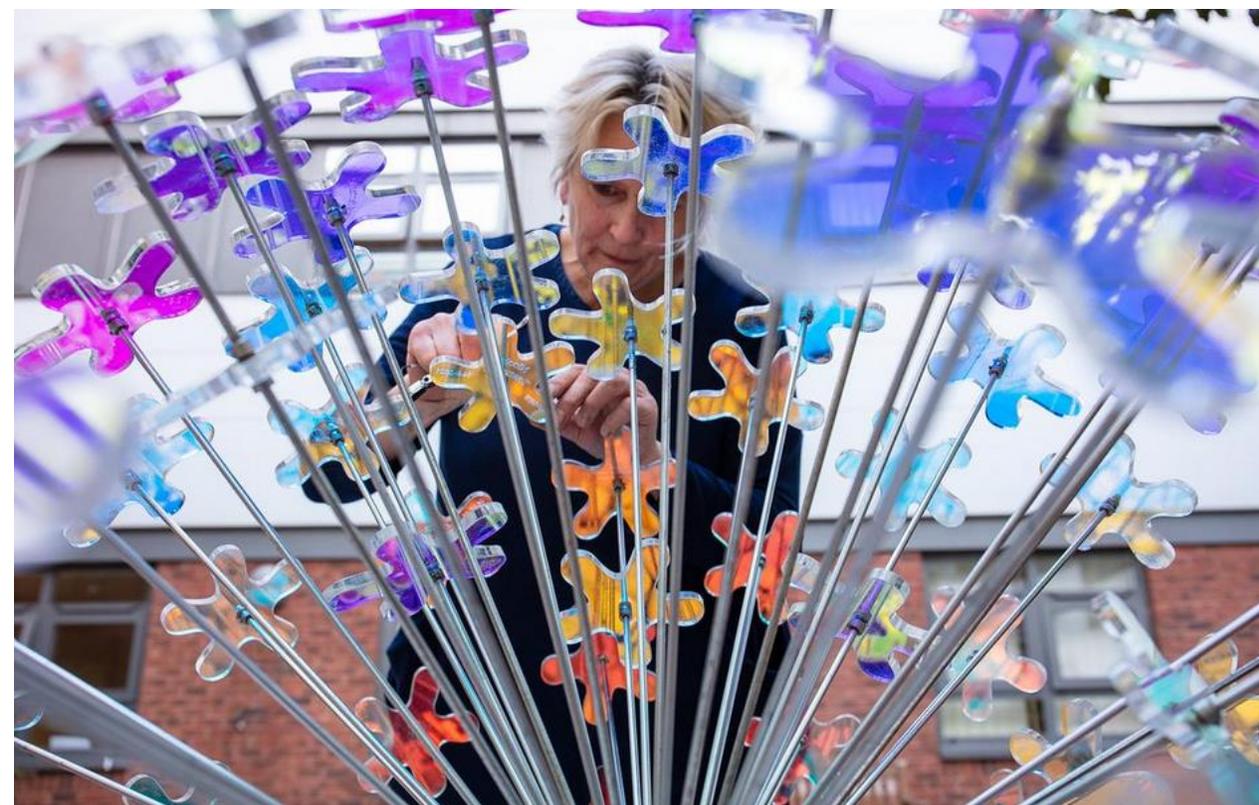


Durham
University

Wolfson Research Institute
for Health and Wellbeing



Laura Johnston Studios www.laurajohnston.com



The Enlighten project brings together art and science to investigate whether we can improve well-being and recovery by making changes to healthcare environments



...with a particular focus on critical care

EXPERIENCING THE CRITICAL CARE ENVIRONMENT...

What does an intensive care unit look like?



Jeannette: admitted to ICU November 2017 *"...I thought I was in a space ship"*

Enlighten Project Test case:

ICU - JAMES COOK UNIVERSITY HOSPITAL, MIDDLESBROUGH

- LIMITED NATURAL LIGHT
- WINDOWS LOCATED BEHIND BEDS
- PATIENTS HAVE LIMITED/NO VIEW OUTSIDE – BEDS FACE INTO THE UNIT



DELIRIUM

a major problem in critical care

Between 45% and 67% of critical care patients experience delirium

Causes of this condition are little understood

Sufferers are at increased risk of dying during admission, longer hospital stays and cognitive impairment even after discharge.

It is a challenging condition to recognise and very difficult to treat once it has manifested. Trying simple interventions to improve the patients' environment and help with orientation are worth exploring...

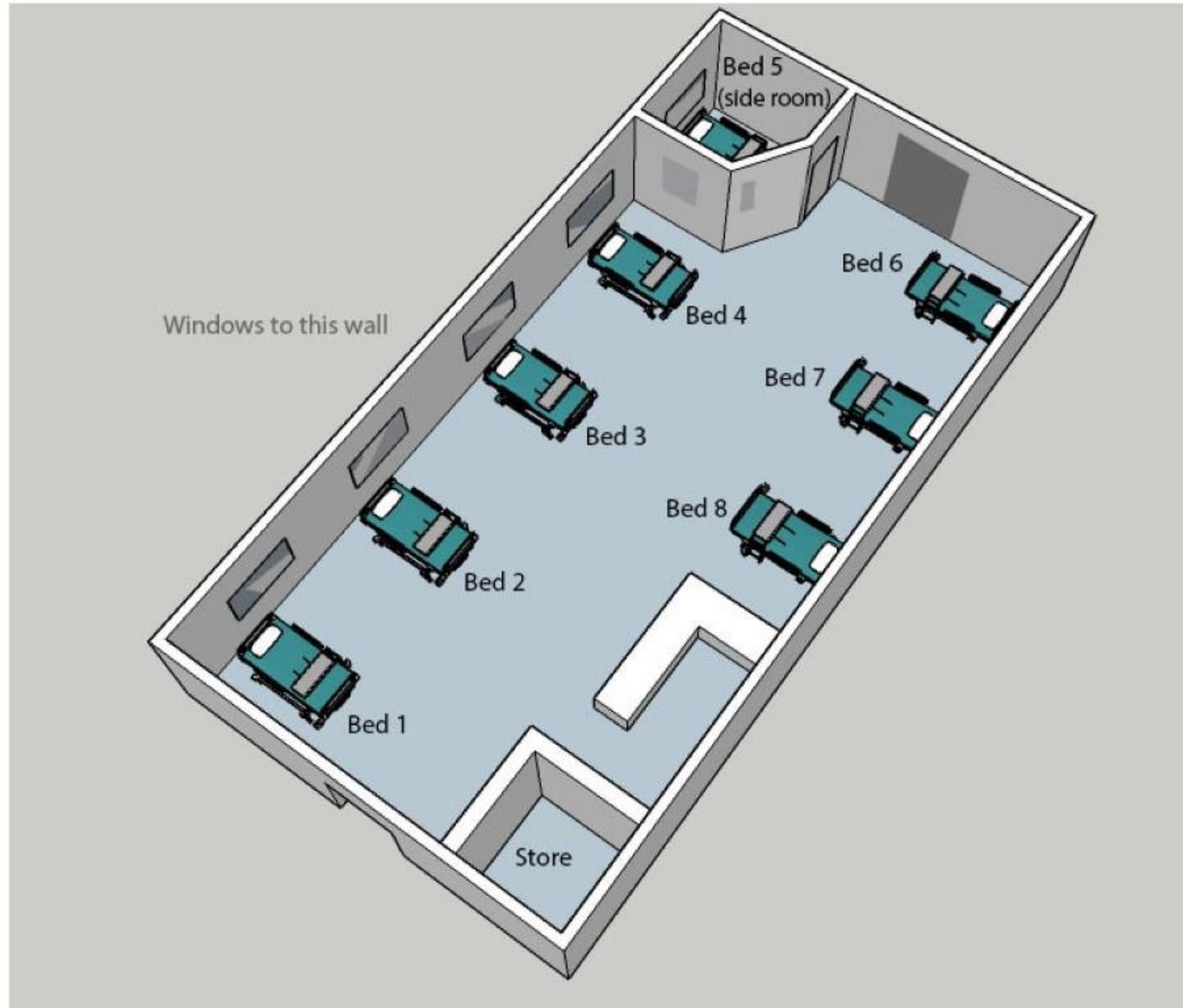
EXPLORING PATIENT EXPERIENCE OF CRITICAL CARE...

*Carol's journey in critical care:
An Enlighten Project case study*



Trends in Anaesthesia and Critical Care - April 2022

ICU WARD AT JAMES COOK UNIVERSITY HOSPITAL



Each bed space is experienced differently – view and light levels important factors



Patients eye-view...

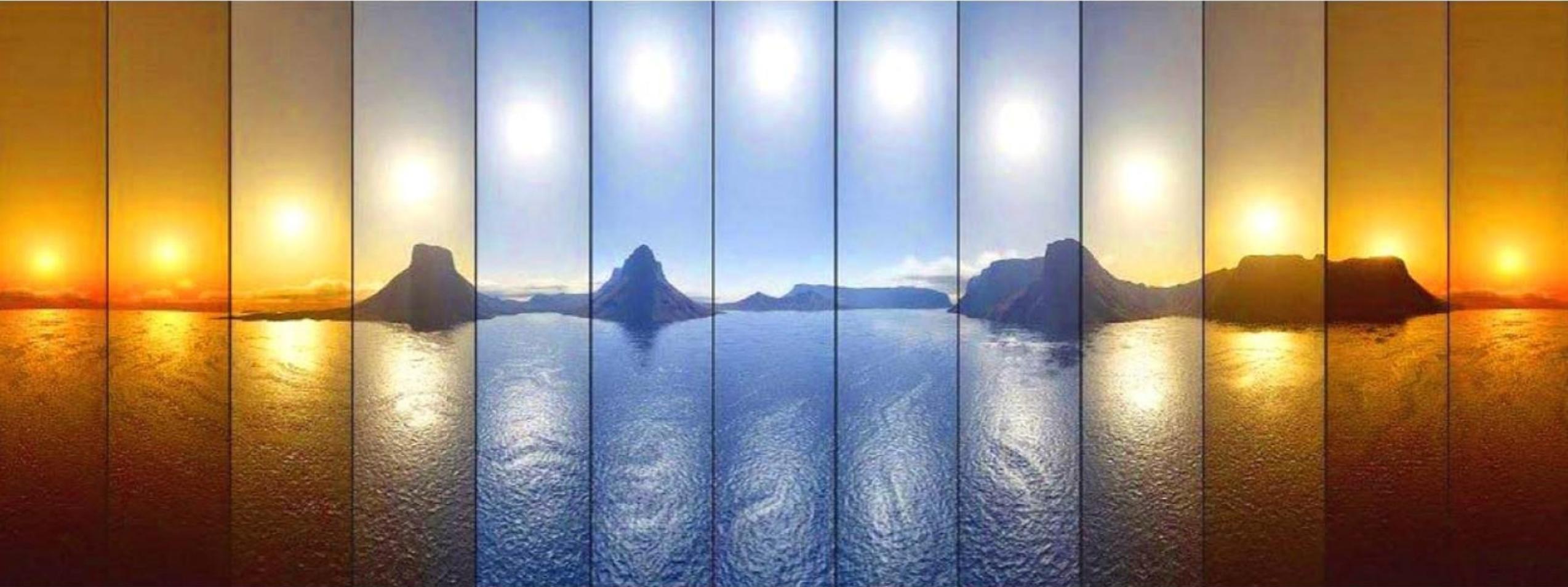








Daylight regulates circadian rhythms





HEALING POWER OF NATURE AND LIGHT...

Natural light and a view on to nature has been found to:

- Improve mood
- Reduce the length of stay
- Reduce the need for pain killers

Roger Ulrich (1984)

FLORENCE NIGHTINGALE....

“It is the unqualified result of all my experience with the sick, that second only to their need of fresh air is their need of light...and that it is not only light but direct sun-light they want.”

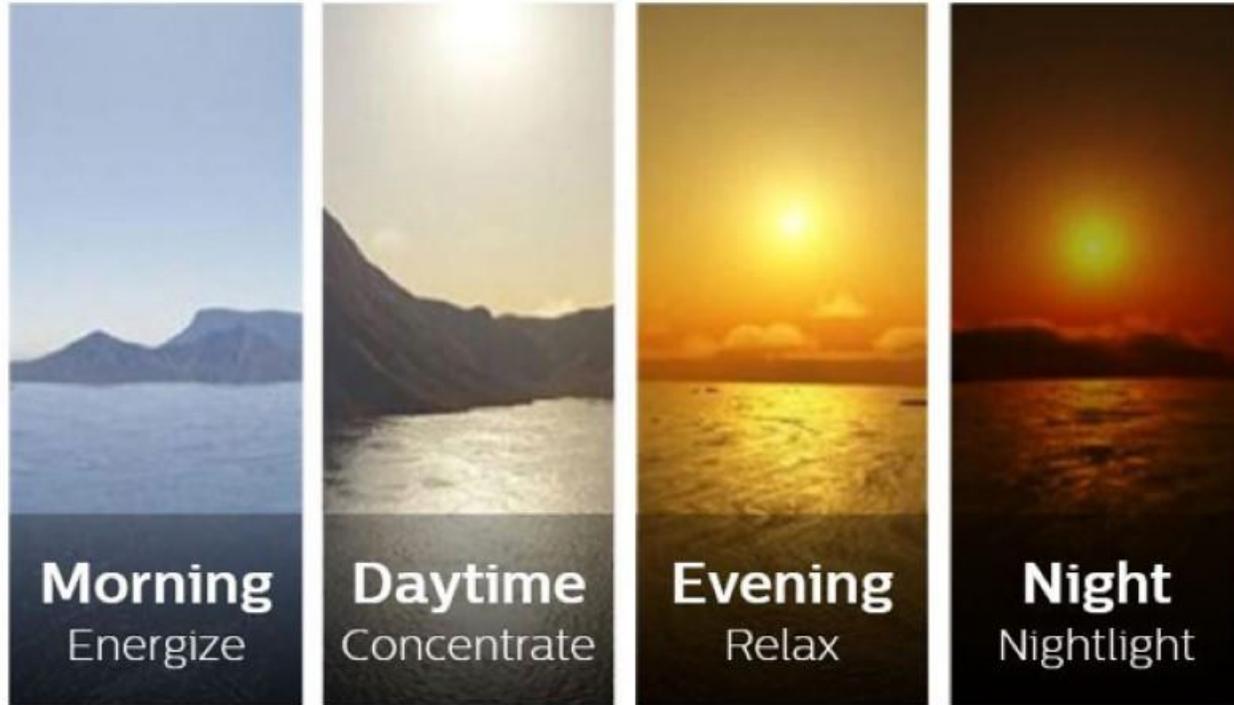


ICU LIGHT STUDY – LACK OF DIRECT NATURAL LIGHT, RELIANCE ON ELECTRICAL CEILING LIGHTING

- HETEROGENEITY OF LIGHT PROFILES ACROSS THE UNIT
- ABRUPT CHANGES AS LIGHTS ARE SWITCHED ON AND OFF
- OVERNIGHT: SHARP ‘PULSES’ OF LIGHT AS LIGHTS SWITCHED ON FOR PROCEDURES



Altering the ambient light to match the changing colour temperature of natural light

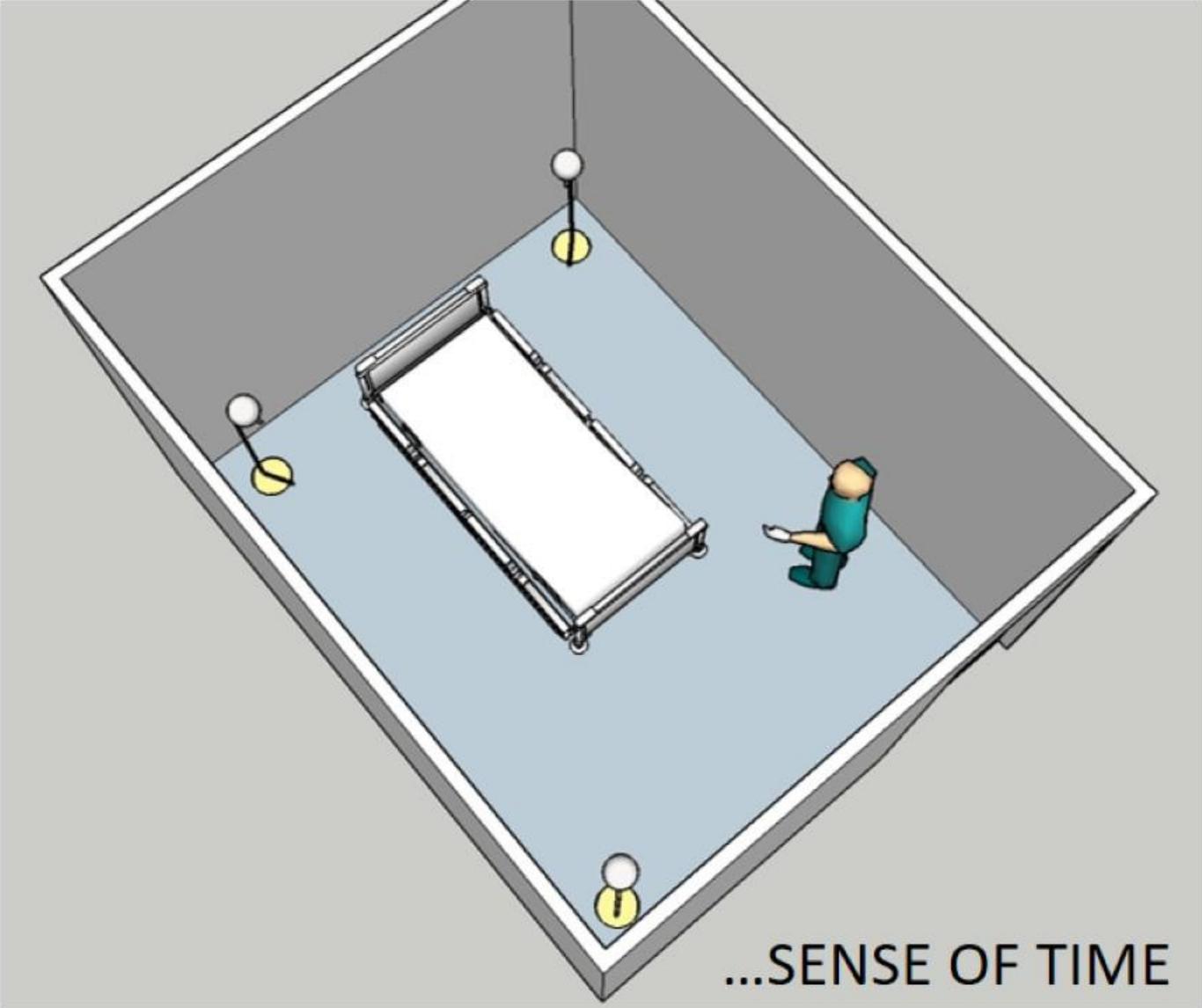


Smart home technology: Philips Hue

...simple and affordable



Enlighten Project installation – colour changing light



Carols feedback...

'the warm morning light was lovely – there were lots of comments from the nurses, coming in every morning on a day shift saying it was lovely to see the orange light and waking up to it was nice'

In the evening when visiting time was over: *'the warm sunset colours helped to cheer me up'*

'I got used to the light changing during the day and I made sure the lamp came with me when I moved to a different bed space!'

Enlighten Project installation - Creating a 'view'



Projector

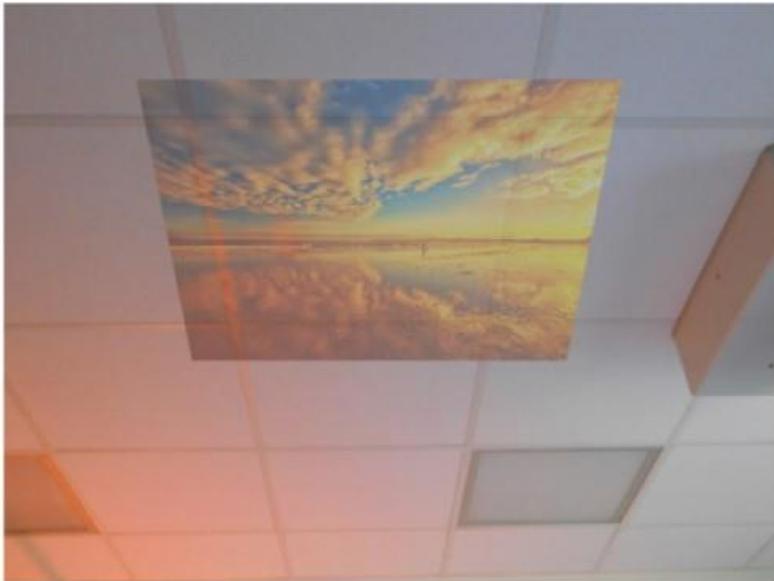
Affordable and easy to install



NATURE INDOORS....



Can we bring in the sky?



Could patients select and control their view?



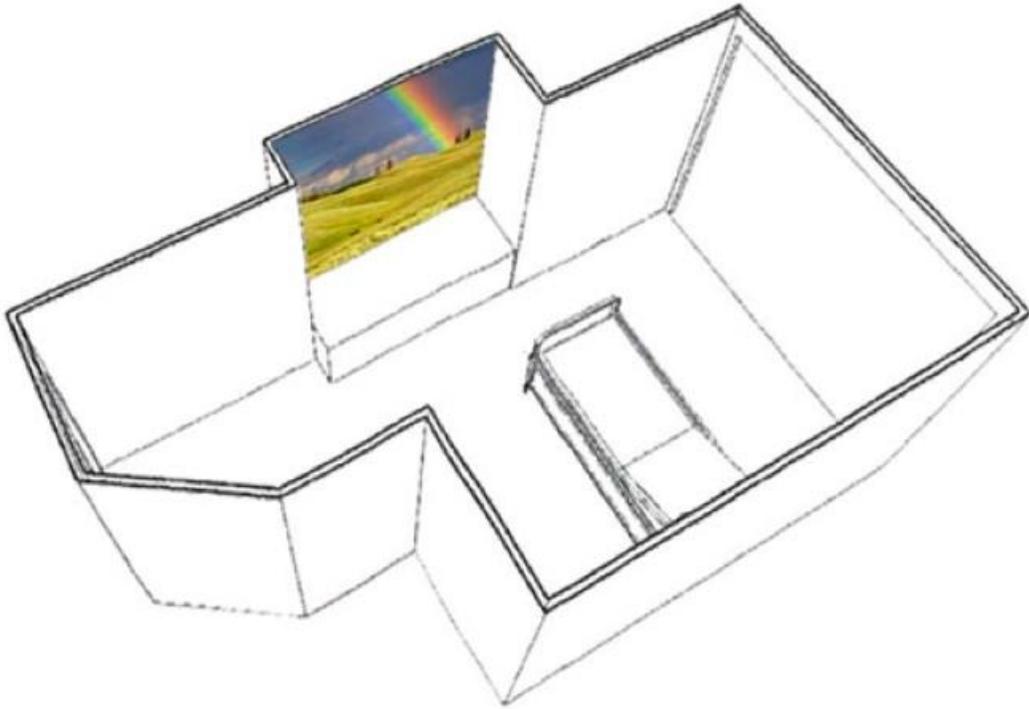
Photos were donated by Dave Christie



Photographs and videos of natural views are projected on to walls/ceiling



Patient control – potential to create a personalised experience?



Exciting areas for future development...

A GARDEN FOR CRITICAL CARE

...taking ICU patients outside into a natural environment

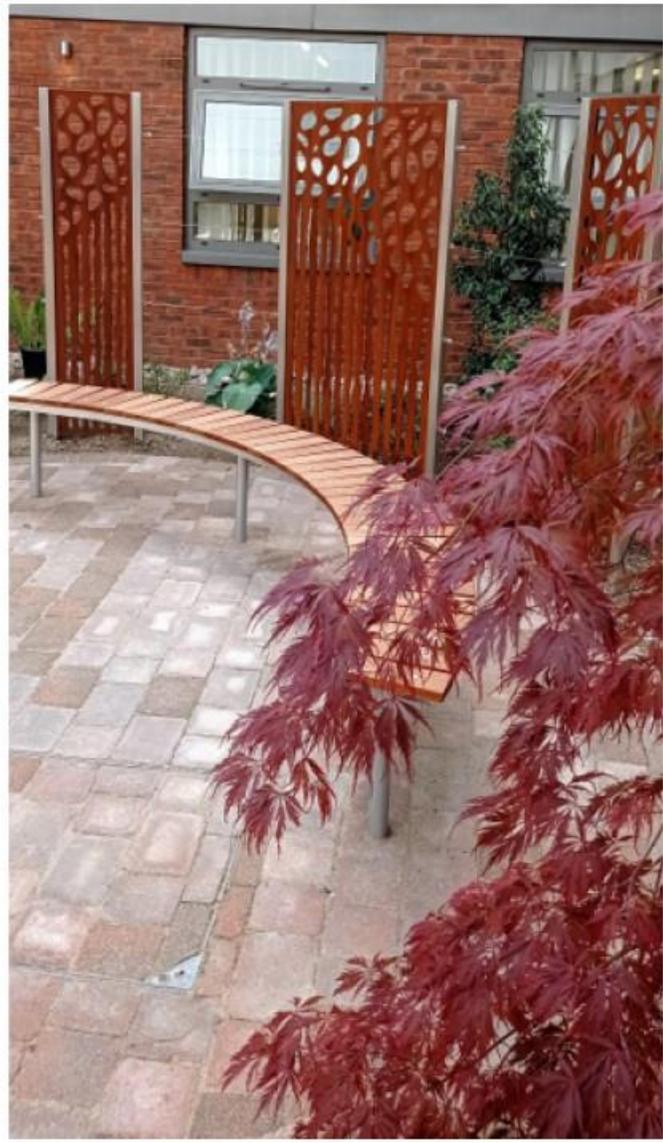


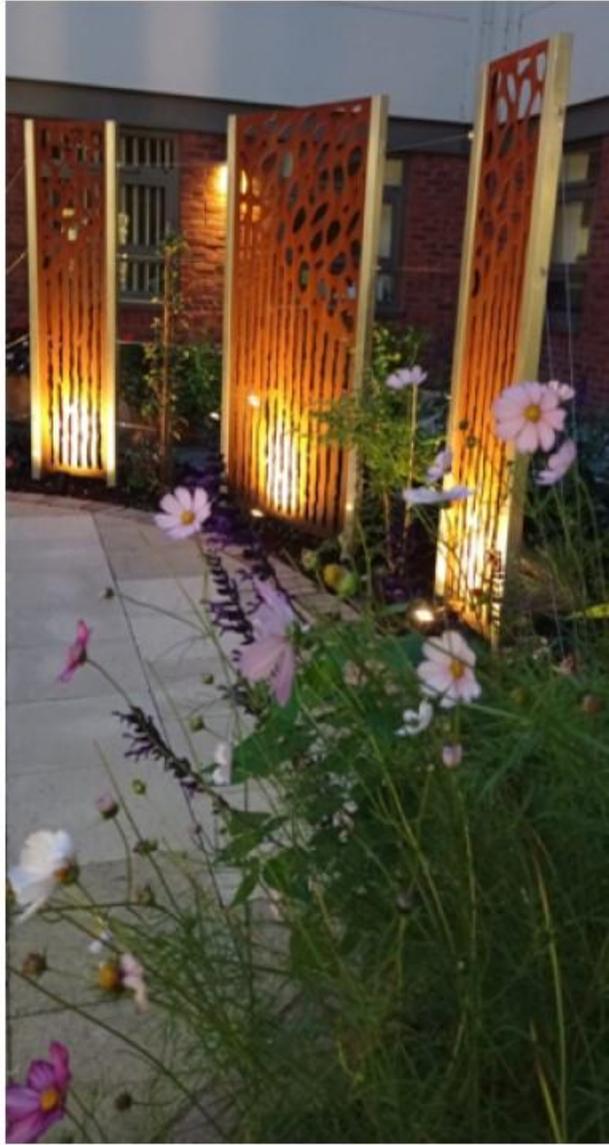
One of the courtyard gardens off the main corridor is made into a private space for ICU patients with an etched design applied to the glass...



The Plan - a restorative space where planting creates private areas for patients to meet their families and where staff can spend quiet time...











'I finally know where I am and what time of day it is – I feel alive and am coming back to myself.'

....an ICU patient experiencing a hospital garden for the first time



'Just feeling the breeze on your face is wonderful... we love it – it's beautiful'



'As soon as you walk into the garden you feel it – it's such a calm, beautiful place. The sculpture is wonderful!'

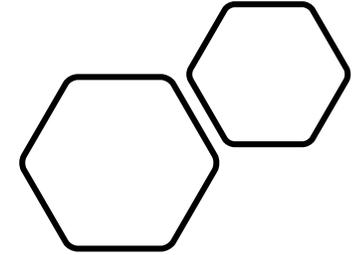


'Coming here and seeing the plants and artworks make us feel as if someone cares' he



A wedding took place in the garden in August...





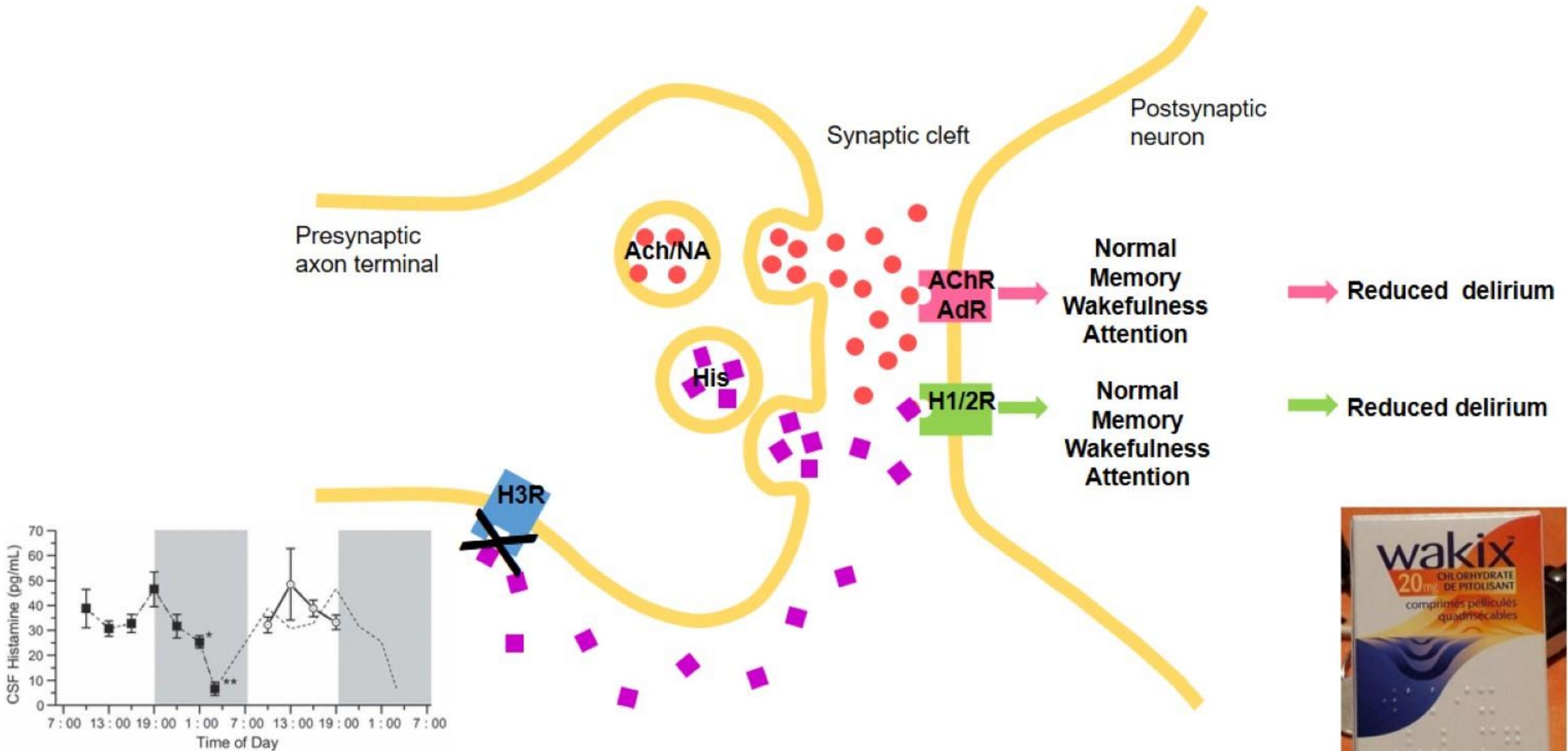
...and an 18th Birthday party last week!!

Evaluating Impact of Enlighten Project interventions...

Research Methods

- Qualitative data –
interviews/questionnaires
- Quantitative data - Physiological
Changes
- Behavioural Changes

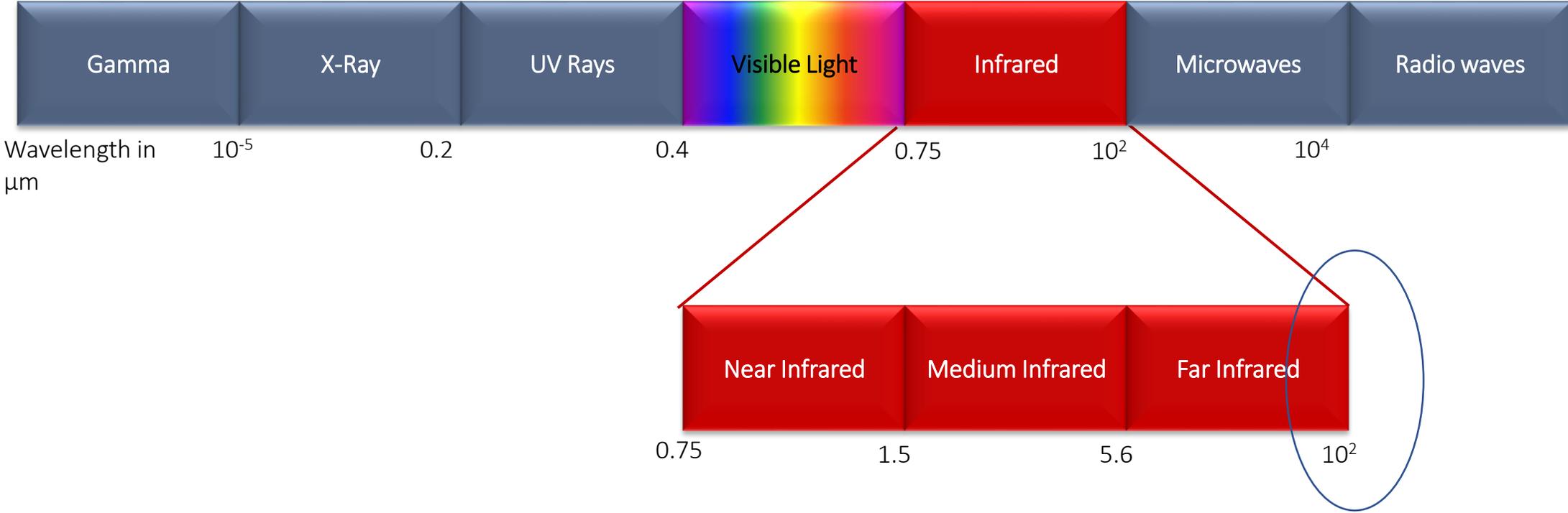
Potential effects of H₃ histamine receptor antagonist on delirium



Chazot et al. *Frontiers in Pharmacology* (2019)

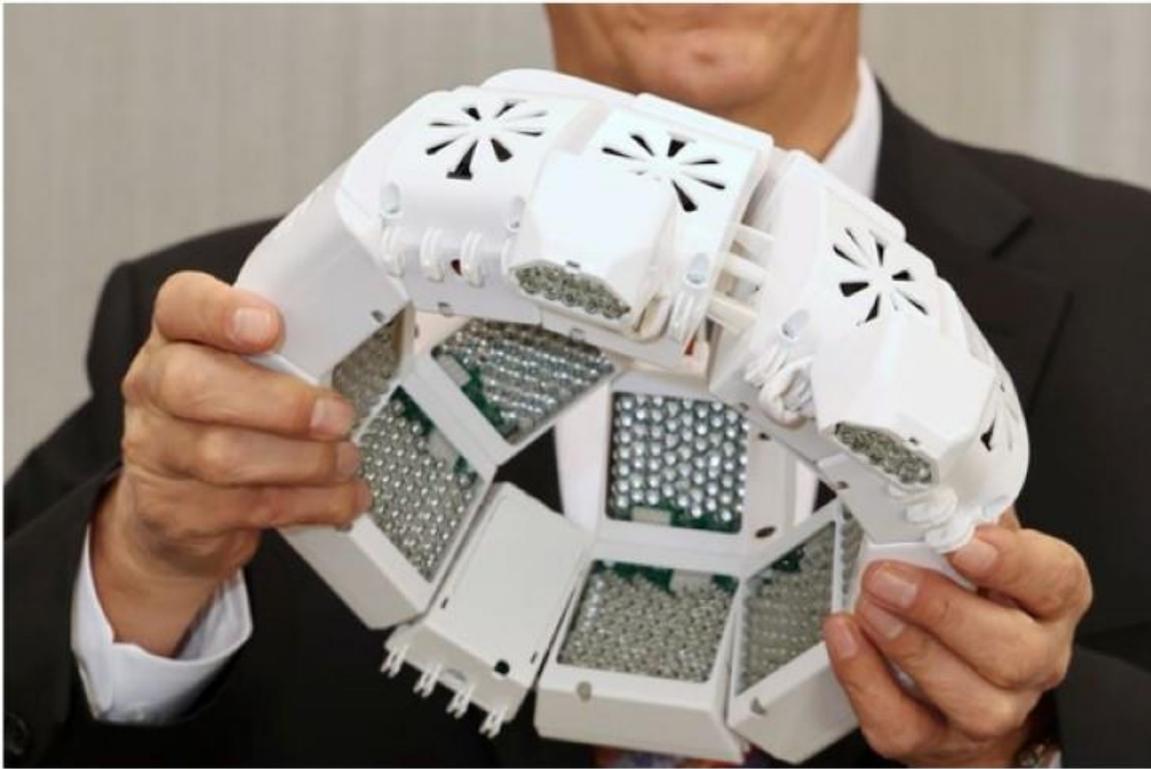


The light spectrum



Helmet for self-delivery of therapy

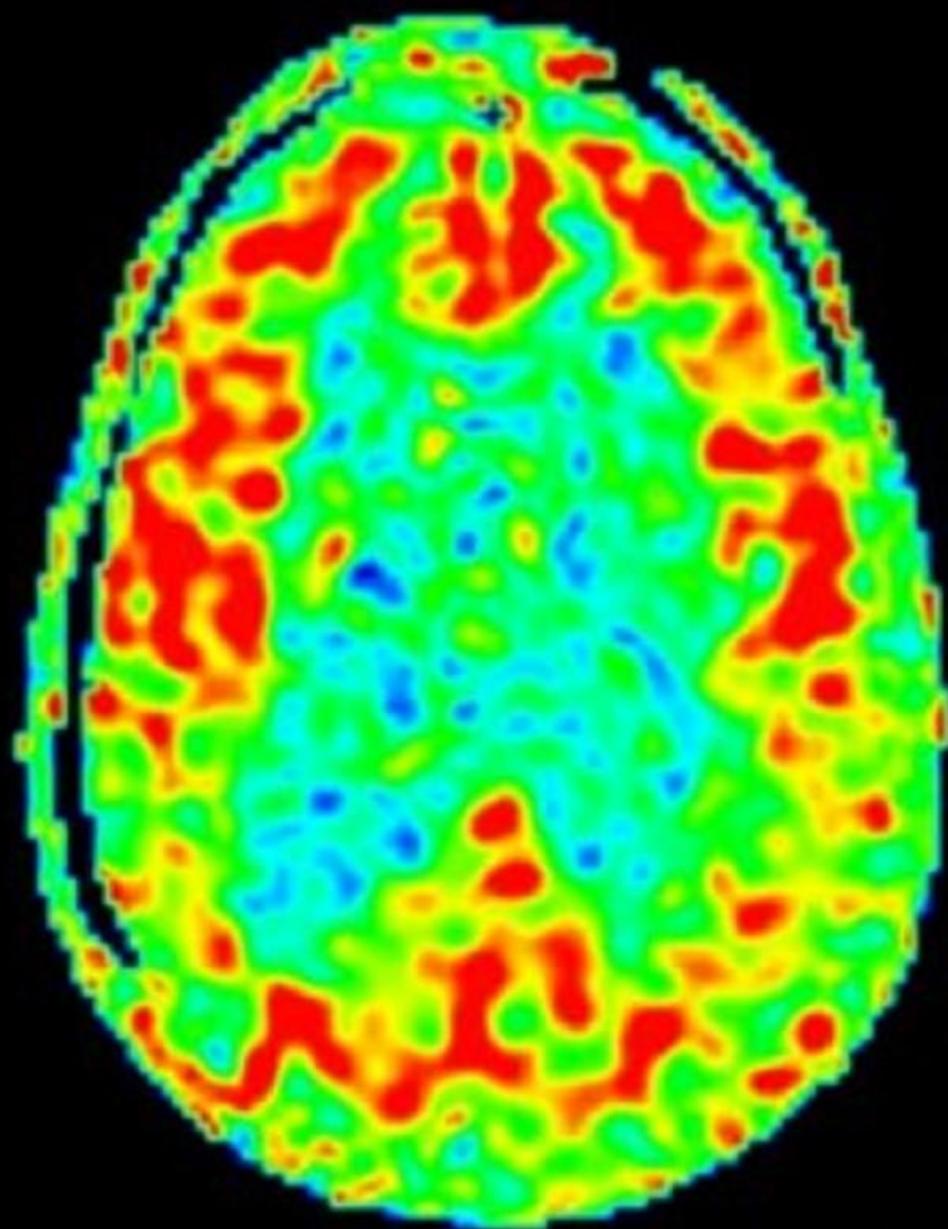
Clinical validation



2 x 6 minutes per day for 8 or 12 weeks

R 182

Jan 05 2017



P 77

M = 60

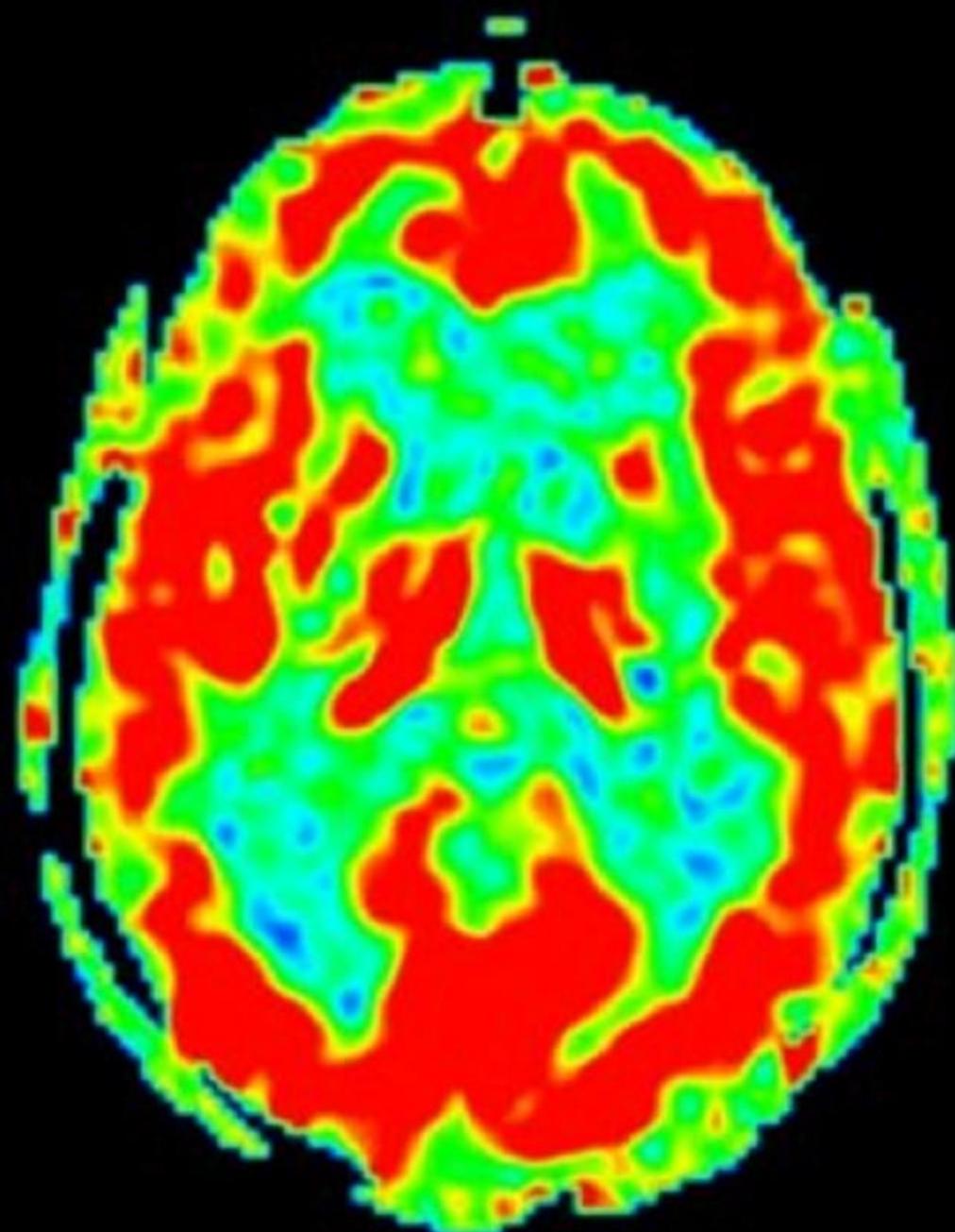
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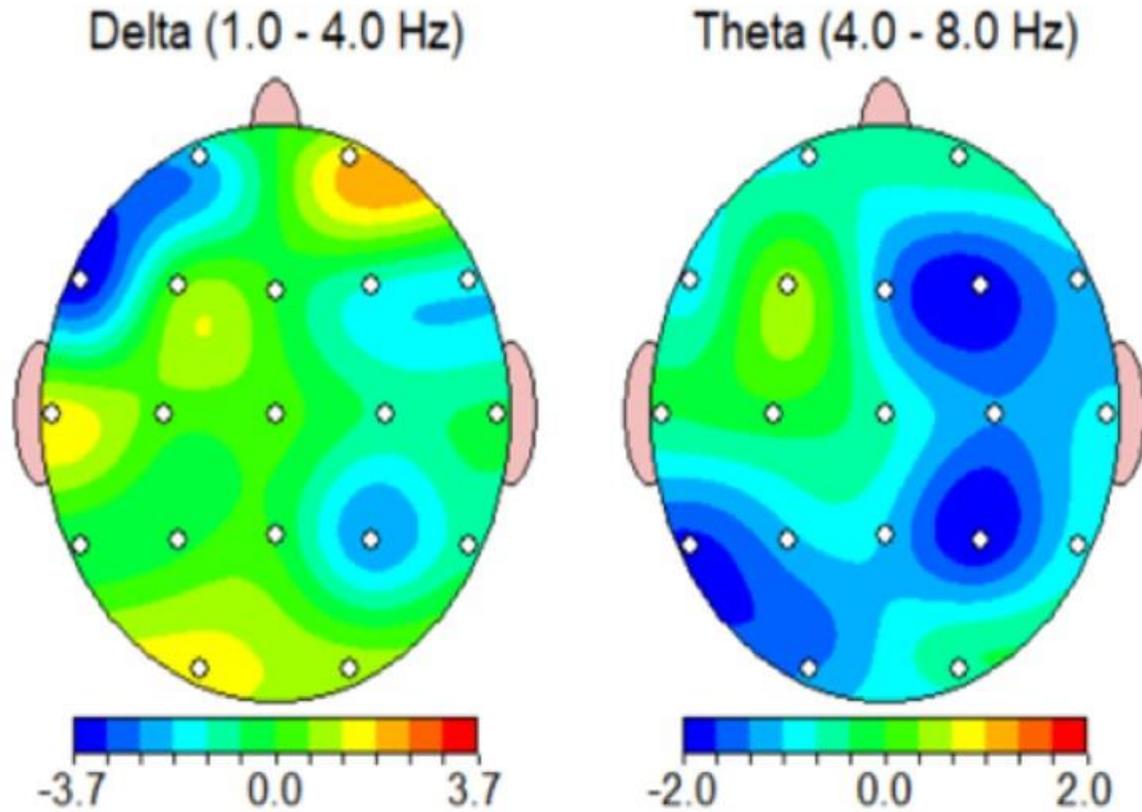
Jan 19 2017

Ex: 2834

Se: 5

In: 54





qEEG

Active cohort post less pre- treatment
aggregate amplitude change.

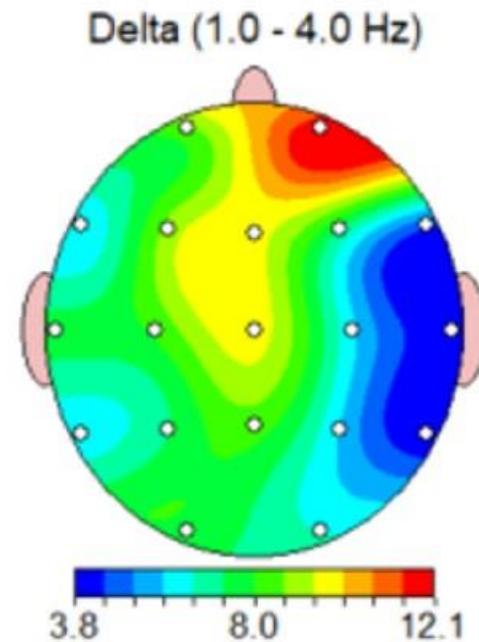
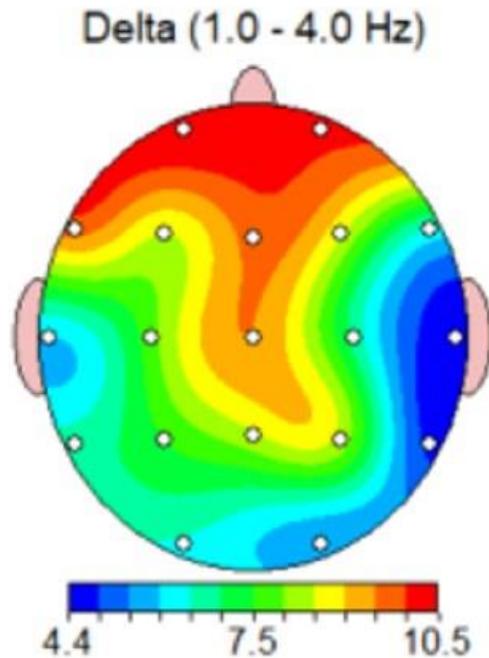
The **blue** regions indicate reduced
slower frequency amplitudes that
correlate with **improved memory
and executive functioning test
scores.**

Absolute Power Group Mean ($\mu\text{V Sq}$)

Pre-treatment

Post-treatment

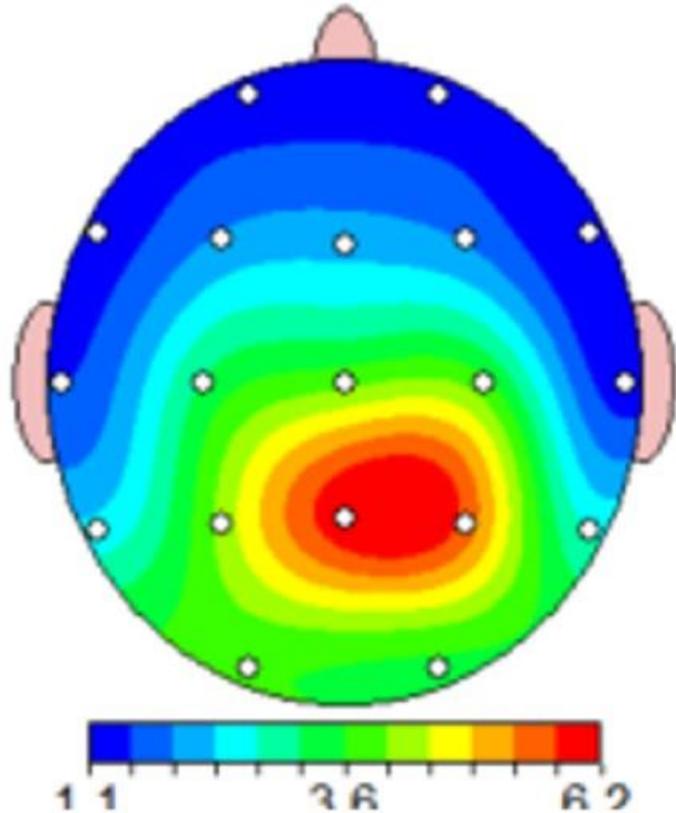
Decreased Delta power supports improved neuromodulatory efficiency, i.e., cognitive performance



Sensory Motor Rhythm Activity

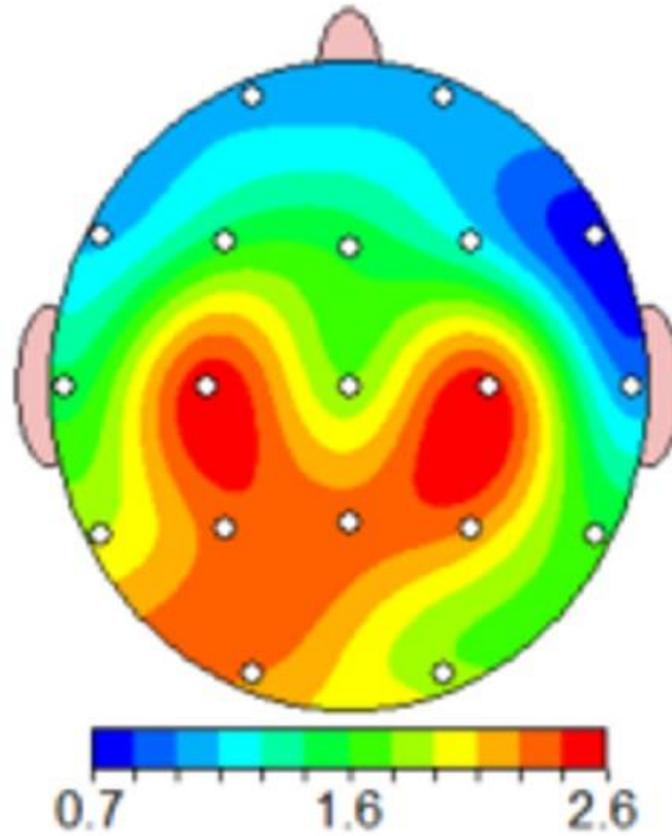
Pre-treatment

Beta 1 (12.0 - 15.0 Hz)



Post-treatment

Beta 1 (12.0 - 15.0 Hz)

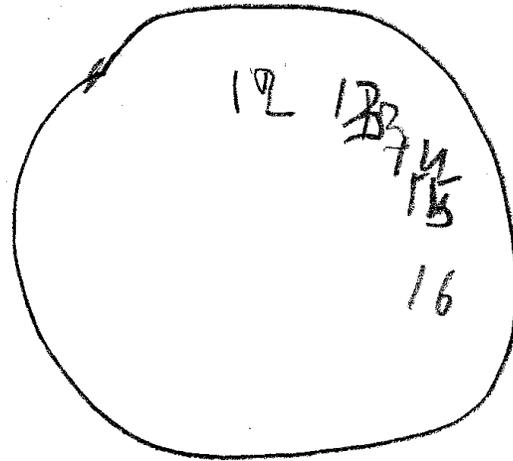


- SMR is associated with relaxed attention and optimized cognitive performance.

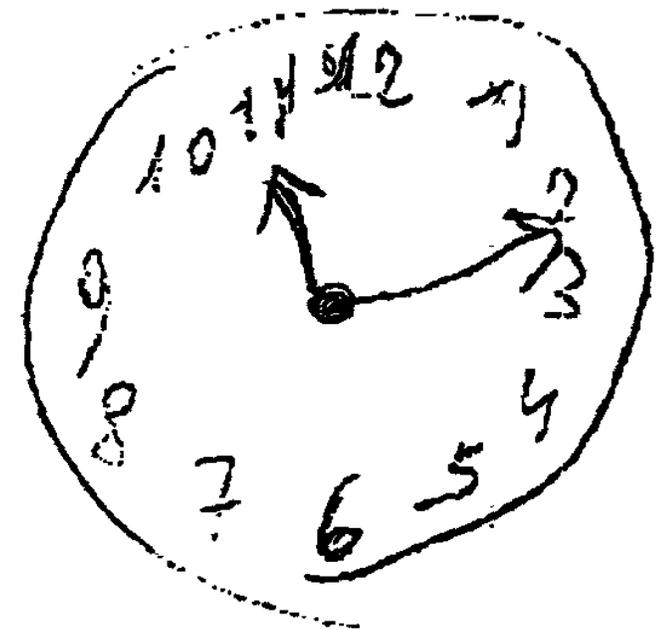
- *Note the significant reduction in frontal and prefrontal hypoactivity (blue) and the corresponding increased (red) SMR activity bilaterally, through the sensory-motor, parietal and left occipital regions.*

Effects on Alzheimer's

Clock
Drawing
Before
Treatment

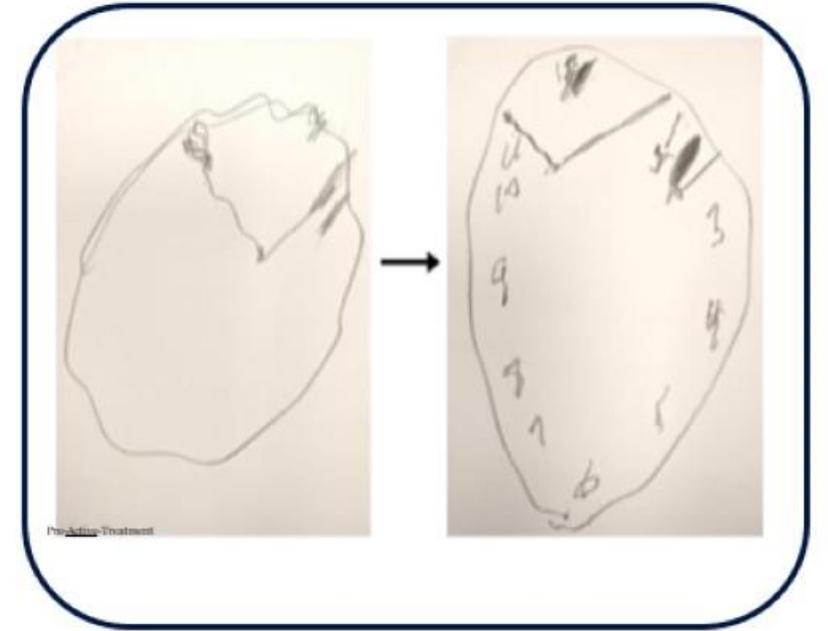
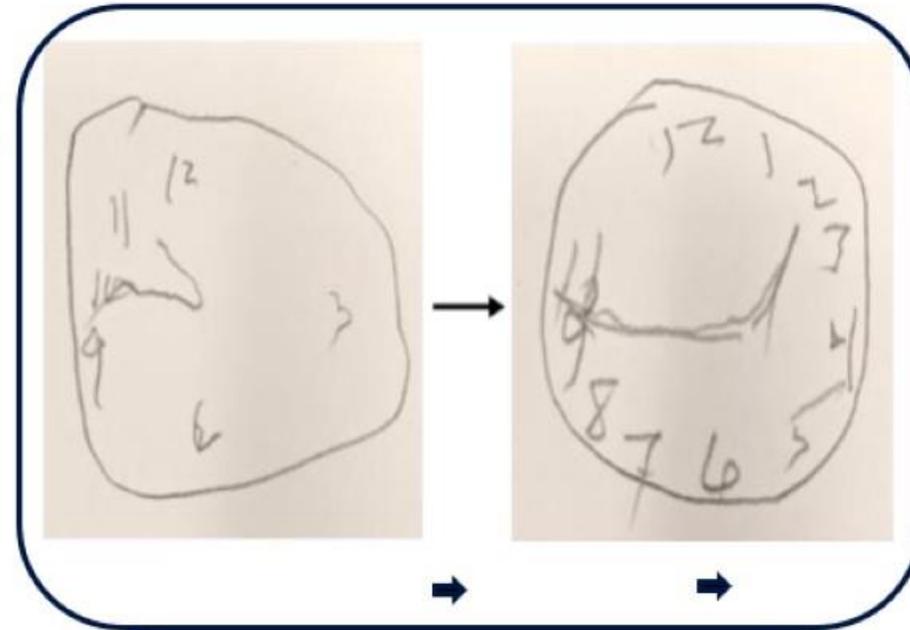


Clock drawing
after 5 weeks of
daily 6min.
treatment

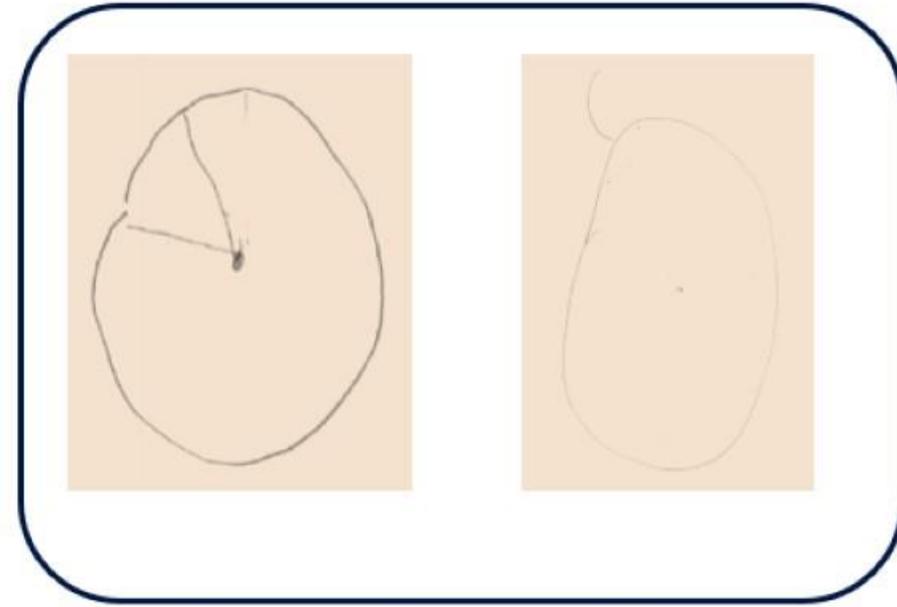
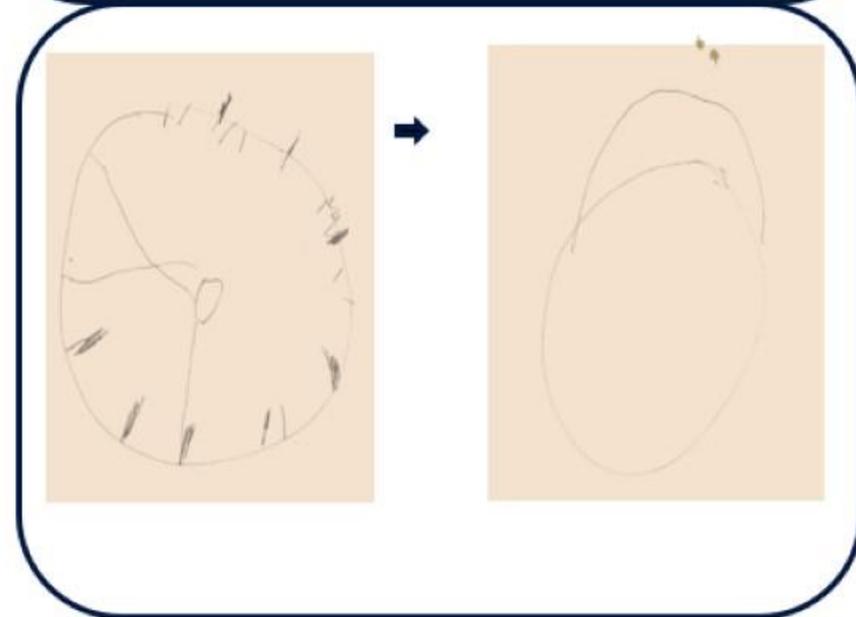


Clock Drawing Test:

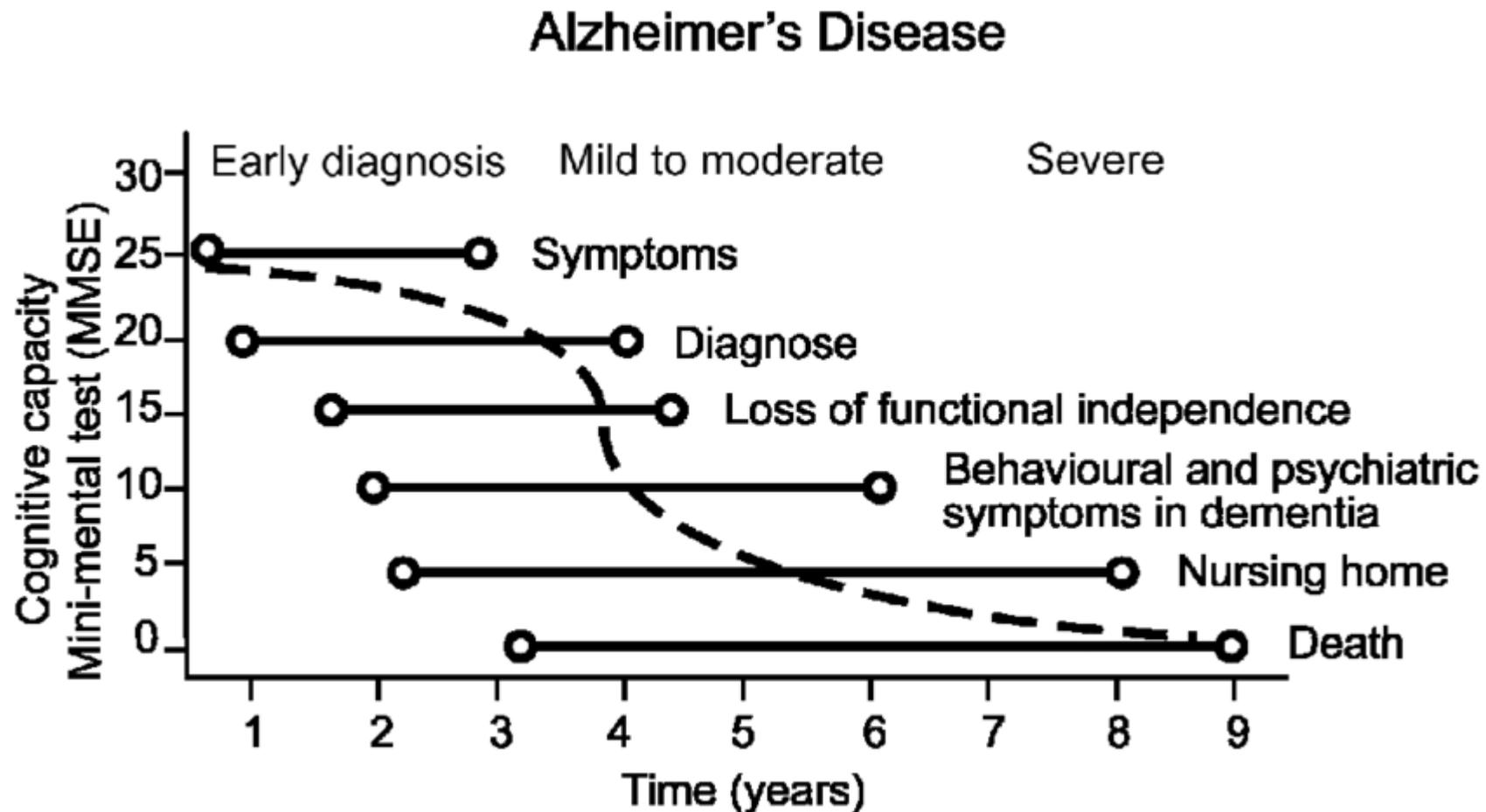
Active



Placebo



MMSE – memory performance

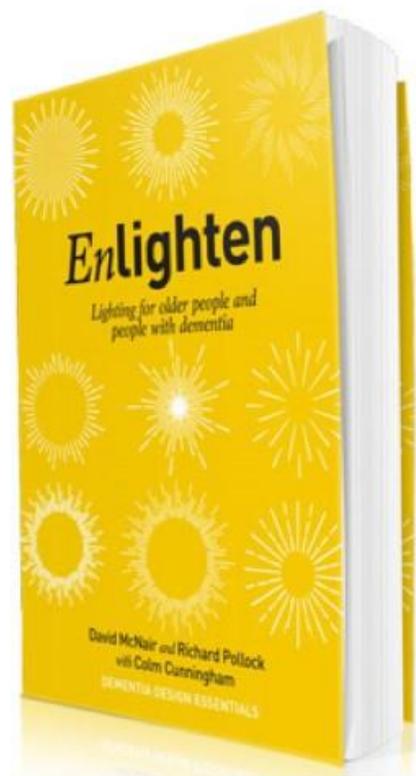


Mini Mental Status Exam

Item	Active Arm				
	Before		After		p-value
	Mean	SD	Mean	SD	
MMSE	22.8	2.6	27.6	2.8	<0.001

Item	Control Arm				
	Before		After		p-value
	Mean	SD	Mean	SD	
MMSE	23.2	1.6	24.6	2.5	0.066

Gender Differences of Dementia in Response to Intensive Self-Administered Transcranial and Intraocular Near-Infrared Stimulation. *Cureus* 13(7): e16188. doi:10.7759/cureus.16188



"Do not go gentle into that good night, Old age should burn and rave at close of day; Rage, rage against the dying of the light" *Dylan Thomas*