



Faculty of Health and Medical Sciences



# THE EFFECT OF NATURALISTIC LIGHT ON DEPRESSIVE MOOD, FATIGUE, SUBJECTIVE SLEEP QUALITY AND MELATONIN AND CORTISOL BLOOD LEVELS IN STROKE PATIENTS ADMITTED FOR REHABILITATION – Randomised controlled trials

Anders West, MD (1), S. Simonsen, MD (1), H. Sennels MD, PhD (3), P. Jennum MD, DMSc (2), N. Cyril MS (1), M. Schønsted, MB (1), A. Zielinski, MD (1), B. Sander, MSc, PhD (4), H. K. Iversen MD, DMSc (1)

**Institutions.** (1) Clinical Stroke Research Unit; (2) Danish Center for Sleep Medicine; (3) Department of diagnostic, Clinical Biochemistry; (4) Department of Ophthalmology, University of Copenhagen, Rigshospitalet, Glostrup.



## Presenter Disclosure Information

Anders West, MD, PhD student.

### Title

THE EFFECT OF NATURALISTIC LIGHT ON DEPRESSIVE MOOD,  
FATIGUE, SUBJECTIVE SLEEP QUALITY AND MELATONIN AND CORTISOL  
BLOOD LEVELS IN STROKE PATIENTS ADMITTED FOR REHABILITATION  
– Randomised controlled trials

### **FINANCIAL DISCLOSURE:**

No relevant financial relationship exists

### **FOUNDING FROM**

- Market Development Foundation
- The Capital Region of Copenhagen
- Travelling grant from the University of Copenhagen
- Support from the involved departments



## Background

The most frequent complications registered after stroke include:

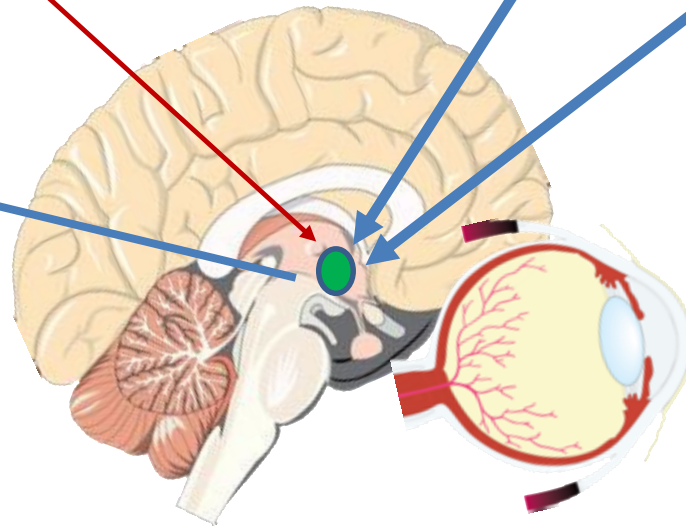
- Depressive mood (25-30%)
- Decreased sleep quality (46-76%)
- Fatigue (30-70%)

These symptoms can have an adverse effect on:

- Cognitive function
- Functional recovery
- Quality of life
- Survival

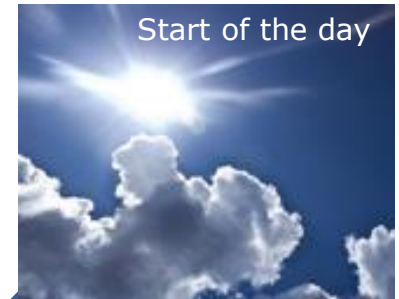


# Background

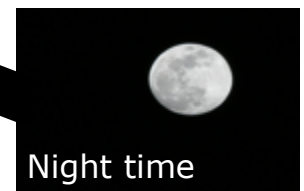
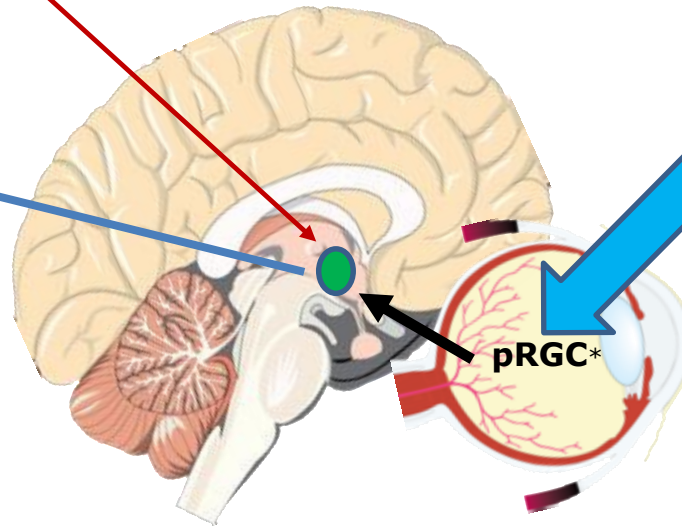


- Mood
  - Sleep
  - Fatigue
- among others...

# Background



- Mood
- Sleep
- Fatigue  
among others...



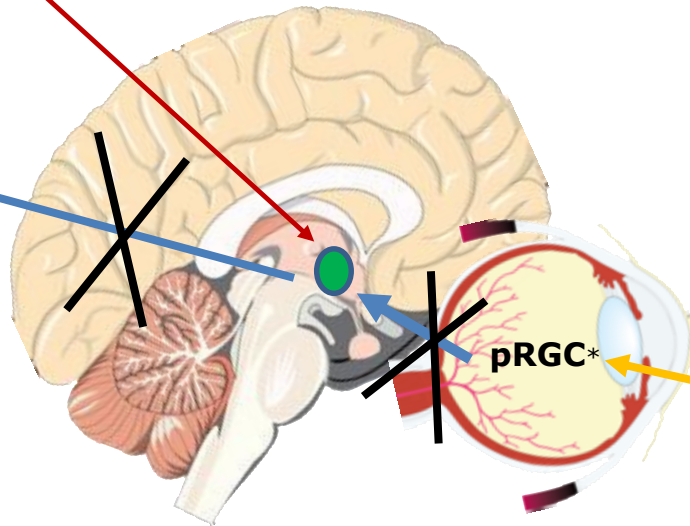
\*Photosensitive Retinal Ganglion Cells (pRGC)



# Background



- Mood
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  - Fatigue
- among others...



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# Aim

To evaluate the effect of naturalistic lighting on complications in post stroke patients admitted for rehabilitation.



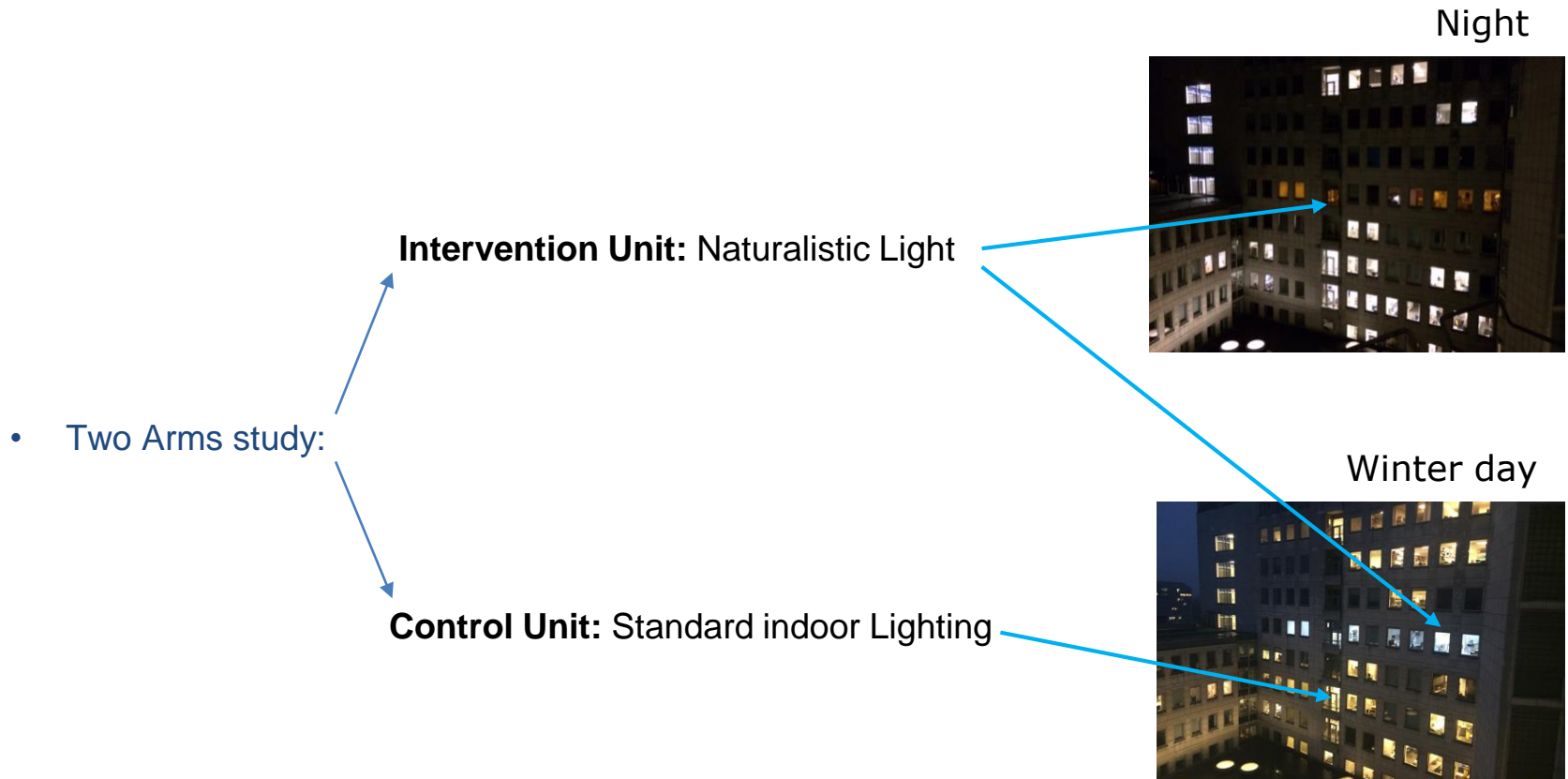
# Design and Methods

- Design:
  - quasi-randomized controlled trial
- Inclusion criteria:
  - Candidates for at least 2 weeks in-hospital rehabilitation, from 1 May 2014 to 1 June 2015
- Exclusion criteria:
  - GCS <15
  - No functional retinal or optic nerve in both eyes.
  - Not able to open the eyes.
  - Severe language disorder (severe aphasia) with lack of reading and writing ability (aleksia)
  - Not able to cooperate sufficient to questionnaires and physical tests
  - Less than two weeks of hospitalization in the rehabilitation unit.





# Design and Methods



# RESULTS



## Baseline characteristics



Characteristics	Intervention Unit Circadian Light	Control Unit Normal lighting	P-value
Age, mean, years (SD)	72.69 (10.27)	72.52 (10.10)	0.94
Gender			0.93
Female, number (pct.)	24 (62)	20 (63)	
Male, number (pct.)	15 (38)	12 (38)	
History of depression, number (pct.)	2 (5)	3 (9)	0.49
NIHSS, mean score (SD)	7.00 (6)	5.44 (4)	0.34
Admission length, mean days (SD)	38.7 (17.5)	29.0 (12.9)	<b>0.02*</b>

\*Caused by differences in the personnel handling the time of discharge at the two units.



## Main findings - Questionnaires

- The **depressive mood** and **fatigue** was significantly lower in the intervention group at discharge compared with the control group.
- No difference was found regarding **sleep quality**.

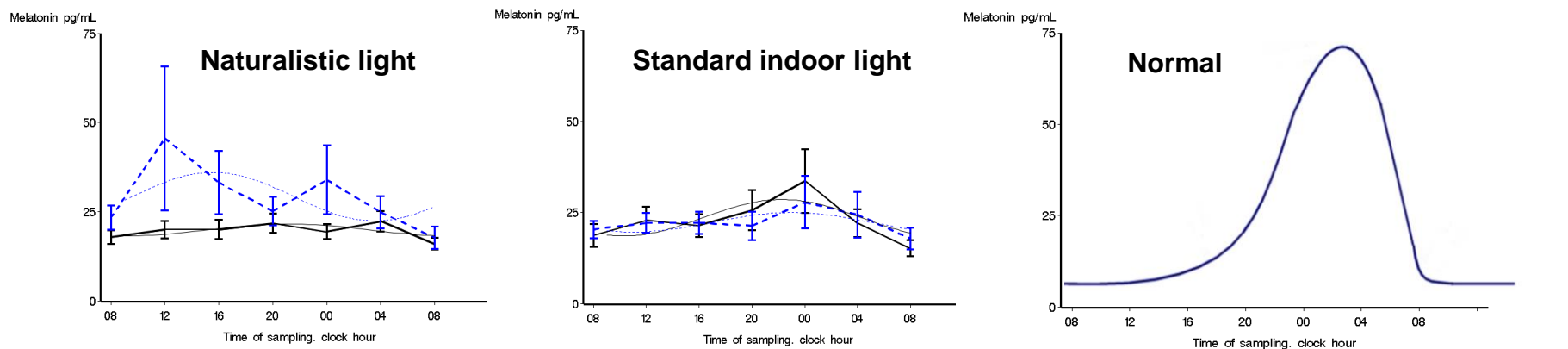
Depressive Mood	N (IU;CU)	p-value
HAM-D <sub>6</sub>	(30;29)	<b>0.002</b>
MDI	(31;31)	<b>0.002</b>
Subjective Sleep	N (IU;CU)	p-value
PSQI	(27;30)	NS
Fatigue	N (IU;CU)	p-value
Epworth	(26;30)	NS
Rested Statement	(28;30)	<b>0.041</b>
VAS fatigue	(20;19)	NS
MFI-20 General part	(28;30)	<b>0.019</b>

- Calculated by covariance analyze, (ANCOVA, SAS).
- Antidepressants medicine was included as a confounder.
- IU = Intervention Unit, CU = Control Unit



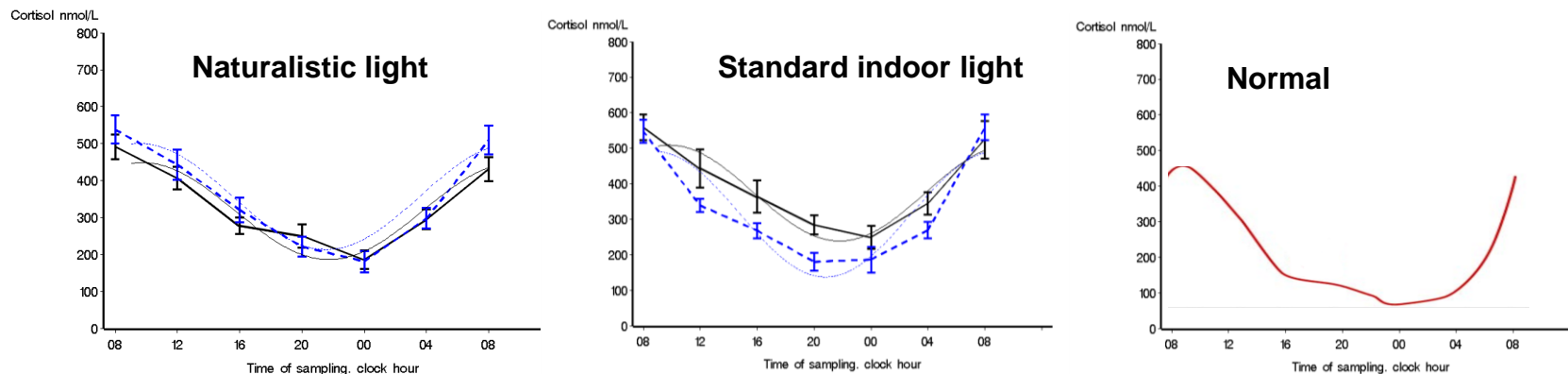
## Main findings – Blood collection

- The melatonin levels showed **no** diurnal rhythm at admission and discharge in either of the patient groups.



- Cortisol levels showed **significant** diurnal rhythm at admission and discharge in both groups.

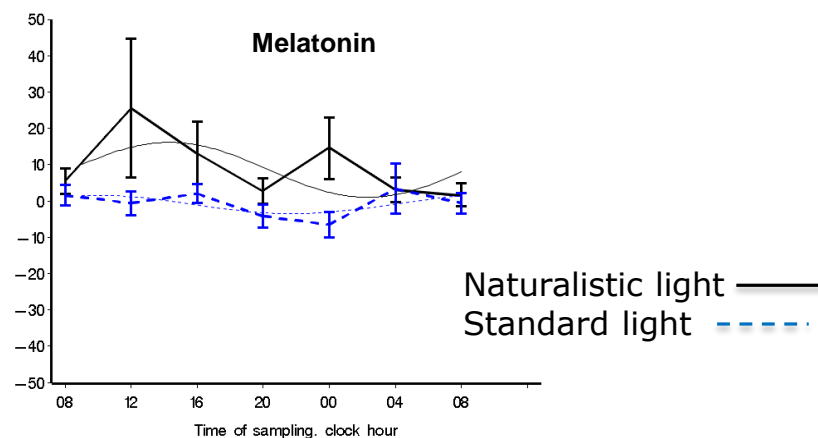
*Inclusion* ———  
*Discharged* - - - -



## Main findings – Blood collection

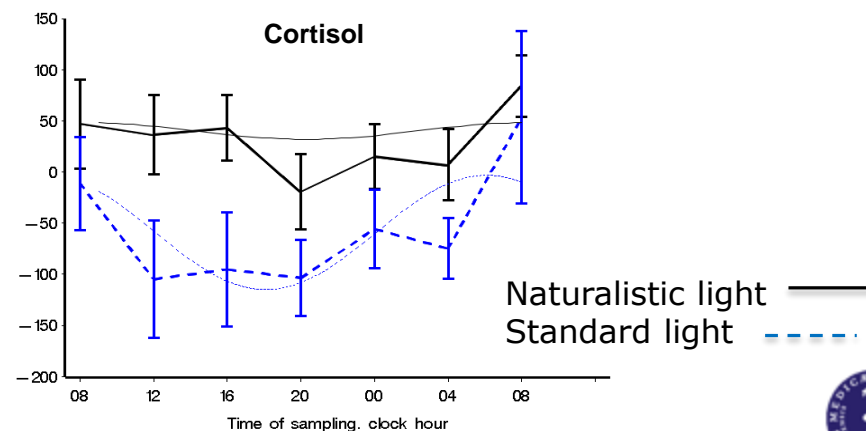
- Melatonin levels increased significantly in patients under naturalistic light and were unchanged under standard indoor light.

Marker	Mean diff	p-value
Control Unit (N=19) <sup>1</sup>	-1.7	NS
Intervention Unit (N=23) <sup>2</sup>	9.2	<b>0.030</b>



- Cortisol levels significantly decreased during the admission under standard indoor light and were unchanged under naturalistic light.

Marker	Mean diff	p-value
Control Unit (N=20) <sup>1</sup>	-65.4	<b>0.003</b>
Intervention Unit (N=22) <sup>1</sup>	-1.3	NS



Calculated difference between inclusion and discharged. <sup>1</sup>Parametric Paired t-test. <sup>2</sup>Non-Parametric Paired test/Wilcoxon Signed Rank test. Day time = 12-24. NS = Not significant. Blood levels were measured for a 24-hour period every 4 hours and mean levels were calculated.



## Strengths and weaknesses

### Weaknesses:

- Not blinded examinations
- Many confounders due to real life setting

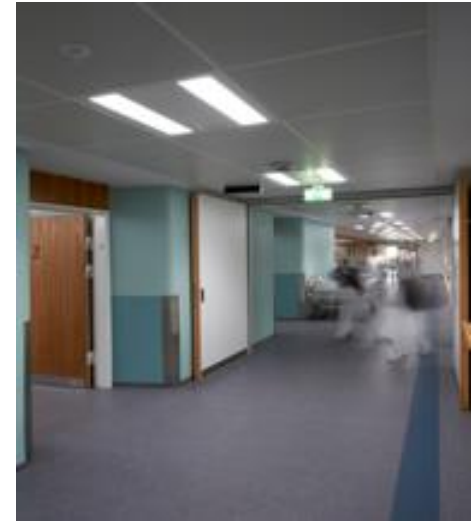
### Strengths:

- Real life setting
- Two comparable units
- The study period includes all 4 seasons



# Conclusion

1. Our findings show for the first time that stroke patients exposed to naturalistic light during admission had significantly decreased depressive mood and fatigue at discharged within the effect range of antidepressant medicine.
2. Stroke patients have disrupted diurnal rhythm in melatonin blood levels, while there was found preserved diurnal rhythm of cortisol blood levels in both groups.
3. Stroke patients exposed to naturalistic light during admission had significantly increased melatonin blood levels at discharged.
4. Stroke patients exposed to standard indoor light during admission had significantly decreased cortisol blood levels.
5. No significant difference in Subjective Sleep Quality was found.

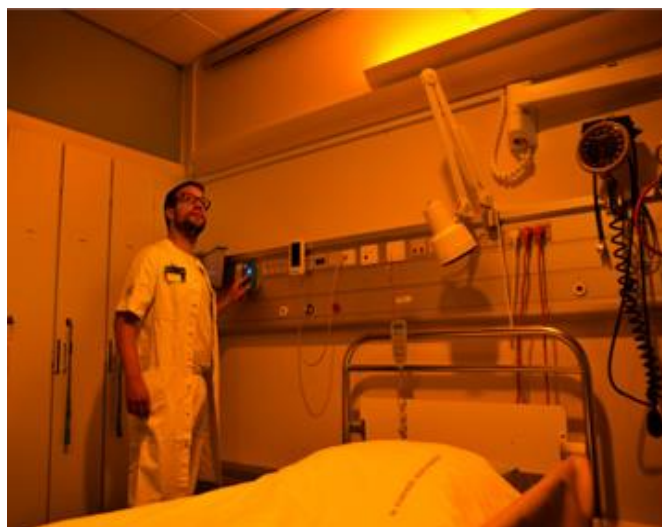




# Thank you for your attention!

Service manager  
Svend Morten  
Christiansson  
Service Center  
Rigshospitalet

Architect  
Maj Lis Brunsgård  
Seligmann  
Service Center  
Rigshospitalet



PhD student Sofie A  
Simonsen, MD

Alexander Zielinski, MB

Niklas Cyril, MS

Marie Schønsted, MB

Henriette Sennels MD, PhD

Birgit Sander, MSc, Ph.D

Head of Danish center of  
Sleep medicine, Professor  
Poul Jennum MD, DMSc.

Head of the stroke Unit,  
Associate research professor  
Helle K. Iversen, MD, DMSc.

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