

## Alzheimer's/Dementia/Elderly

Tsai YF, Wong TK, Juang YY, Tsai HH.

**The effects of light therapy on depressed elders.** *Int J Geriatr Psychiatry.* 2004 Jun;19(6):545-8.

**BACKGROUND:** Elderly depression has gradually become a severe issue in the health care system. No studies have focused on evaluating the effects of light therapy on the elderly with depression in a subtropical climate area. **OBJECTIVES:** To evaluate the effects of light therapy on hospitalized, depressed elders living in a subtropical climate area. **METHODS:** Experimental design was used. For the experimental group, patients sat in front of a light box, receiving 5000 lux in the morning. The light therapy course was administered for 50 minutes per day and lasted for 5 days. The control group did not receive any treatment. **RESULTS:** Depressive symptoms were significantly reduced in the experimental group at post-test but no significant decline was found in the control group. **CONCLUSIONS:** Based upon the results of this study, light therapy could be used to decrease depressive symptoms in the elderly.

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Ancoli-Israel S, Martin JL, Gehrman P, Shochat T, Corey-Bloom J, Marler M, Nolan S, Levi L.

**Effect of light on agitation in institutionalized patients with severe Alzheimer disease.** *Am J Geriatr Psychiatry.* 2003 Mar-Apr;11(2):194-203

Department of Psychiatry, University of California, San Diego, Veterans Affairs San Diego Healthcare System, San Diego, CA 92161, USA.

**OBJECTIVE:** Preliminary data suggest that morning bright light might improve symptoms of agitation, a serious problem in patients with dementia. The authors expand on an earlier pilot study by evaluating the effect of bright light therapy on agitated behavior in a large sample of patients with severe dementia. **METHODS:** Ninety-two patients were randomly assigned to morning bright light, morning dim red light, or evening bright light. Agitation was rated by research staff who observed the patients every 15 minutes throughout the treatment period and by caregivers at one time-point before and one time-point after treatment. **RESULTS:** Morning bright light delayed the acrophase of the agitation rhythm by over 1.5 hours. Bright light was associated with improved caregivers' ratings but had little effect on observational ratings of agitation. **CONCLUSION:** Although the result that light shifted the peak of the agitated behavior might be generalizable to patients with milder forms of AD, the fact that agitation was not ameliorated might not be. Because the suprachiasmatic nucleus (SCN) of patients with severe AD is likely to be more degenerated, and the circadian activity rhythms deteriorate as the disease progresses, it is still possible that patients with more intact SCNs, that is, patients with mild or moderate AD, might benefit from light treatment even more than those with severe AD.

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Fetveit A, Skjerve A, Bjorvatn B.

**Bright light treatment improves sleep in institutionalised elderly--an open trial.** *Int J Geriatr Psychiatry.* 2003 Jun;18(6):520-6.

Department of Public Health and Primary Health Care, Section for General Practice, University of Bergen, Norway.

**STUDY OBJECTIVES:** This study evaluates the effects of bright light therapy among demented nursing home patients with sleep disturbances. **DESIGN AND SETTING:** 11 nursing home patients with actigraphically measured sleep efficiency below 85% took part in an open, non-randomised study where the subjects served as their own control. **INTERVENTION:** After two weeks of baseline measurements and two weeks of pretreatment measurements, patients received bright light exposure 2 h/day within the period 08:00-11:00 for two weeks. **MEASUREMENTS AND RESULTS:** Sleep-wake patterns during the 24-h day were evaluated by nursing staff ratings and wrist-worn motor activity devices (actigraphs). Sleep improved substantially with bright light exposure. Waking time within nocturnal sleep was reduced by nearly two h, and sleep efficiency improved from 73% to 86%. Corresponding improvements were found in nursing staff ratings. Effects were consistent across subjects. **CONCLUSIONS:** The findings add further evidence of the effectiveness of morning bright light exposure in the treatment of disturbed sleep among demented nursing home patients.

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Graf A, Wallner C, Schubert V, Willeit M, Wlk W, Fischer P, Kasper S, Neumeister A.

**The effects of light therapy on mini-mental state examination scores in demented patients.** Biol Psychiatry. 2001 Nov 1;50(9):725-7.

Department of General Psychiatry, University of Vienna, Vienna, Austria.

**BACKGROUND:** Preliminary evidence suggests that demented patients may experience beneficial effects of light therapy. The authors tested whether bright light therapy (BLT) is capable of improving cognitive functions in patients with Alzheimer-type dementia (AD) or vascular dementia (VD). **METHODS:** Twenty-three patients with AD or VD were randomly assigned to either evening BLT or dim light therapy (DLT). Effects of light therapy on cognitive functions were assessed before and after light therapy using Mini-Mental State Examination (MMSE) scores. Body temperature rhythm (BTR) was additionally recorded pre- and posttreatment. **RESULTS:** Irrespective of their diagnosis, patients treated with BLT ( $p = .0012$ ) but not with DLT ( $p = .73$ ) showed a statistically significant increase in MMSE total scores after light therapy. Evening BLT simultaneously induced a significant phase delay of 56 min on BTR ( $p = .025$ ). **CONCLUSION:** Our preliminary results suggest that short-term evening BLT may exert beneficial effects on cognitive functioning in patients with dementia.

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**Yamadera H, Ito T, Suzuki H, Asayama K, Ito R, Endo S.**

**Effects of bright light on cognitive and sleep-wake (circadian) rhythm disturbances in Alzheimer-type dementia.** Psychiatry Clin Neurosci. 2000 Jun;54(3):352-3.

Department of Neuropsychiatry, Nippon Medical School, Tamanagayama Hospital, Tama, Tokyo, Japan.

Twenty-seven patients with Alzheimer-type dementia (ATD) were treated with bright light therapy in the morning for four consecutive weeks. The cognitive state of each patient was evaluated with the Mini-Mental-State Examination (MMSE) and circadian rhythm with actigram before and after therapy for all of the patients and those of two groups divided by the severity criteria of the Clinical Dementia Rating. The therapy improved the circadian rhythm disturbances. Although the therapy caused no remarkable effects on dementia severity, it improved the MMSE scores, especially in the early stages of ATD. These results suggest that bright light therapy improved the circadian rhythm disturbances and then bettered the cognitive state in early-stage ATD.

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**Ito T, Yamadera H, Ito R, Endo S.**

**Effects of bright light on cognitive disturbances in Alzheimer-type dementia** Nippon Ika Daigaku Zasshi. 1999 Aug;66(4):229-38 [Article in Japanese]

Department of Neuropsychiatry, Nippon Medical School, Tokyo, Japan

We investigated the effectiveness of bright light therapy on cognitive disturbances and its effect on circadian (sleep-wake) rhythm in Alzheimer-type dementia (ATD). Twenty-seven patients with ATD were treated with bright light therapy in the morning for 4 consecutive weeks. We evaluated the cognitive functions and circadian rhythms of the patients as a whole, and as members of two groups (one: questionable and mild dementia; the other: moderate and severe dementia; both groups classified by the severity criteria of Clinical Dementia Rating). We assessed circadian rhythms by actigraphy and cognitive states by Mini-Mental-State Examination (MMSE) and Alzheimer's Disease Assessment Scale (ADAS) before and after light therapy. Bright light therapy improved circadian rhythm. Although bright light therapy had no Significant effect on the Severity of dementia, it improved the MMSE scores, cognitive functions of ADAS scores (memory > language) and non-cognitive functions of ADAS scores (behavior = mood), especially in the questionable and mild dementia group. These results suggest that bright light therapy improves cognitive functions with the modification of circadian rhythm, especially in the early stages of ATD.

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Van Someren EJ, Swaab DF, Colenda CC, Cohen W, McCall WV, Rosenquist PB.

**Bright light therapy: improved sensitivity to its effects on rest-activity rhythms in Alzheimer patients by application of nonparametric methods.** Chronobiol Int. 1999 Jul;16(4):505-18.

Graduate School Neurosciences Amsterdam, Netherlands Institute for Brain Research, The Netherlands.

Sleep-wake rhythm disturbances in patients with Alzheimer's disease (AD) make a strong demand on caregivers and are among the most important reasons for institutionalization. Several previous studies reported that the disturbances improve with increased environmental light, which, through the retinohypothalamic tract, activates the suprachiasmatic nucleus (SCN), the biological clock of the brain. The data of recently published positive and negative reports on the effect of bright light on actigraphically assessed rest-activity rhythms in demented elderly were reanalyzed using several statistical procedures. It was demonstrated that the light-induced improvement in coupling of the rest-activity rhythm to the environmental zeitgeber of bright light is better detected using nonparametric procedures. Cosinor, complex demodulation, and Lomb-Scargle periodogram-derived variables are much less sensitive to this effect because of the highly nonsinusoidal waveform of the rest-activity rhythm. Guidelines for analyses of actigraphic data are given to improve the sensitivity to treatment effects in future studies.

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Van Someren EJ, Kessler A, Mirmiran M, Swaab DF.

**Indirect bright light improves circadian rest-activity rhythm disturbances in demented patients.** Biol Psychiatry. 1997 May 1;41(9):955-63.

Graduate School of Neurosciences Amsterdam, Netherlands.

Light is known to be an important modulator of circadian rhythms. We tested the hypothesis that an enduring increase in the daytime environmental illumination level improves rest-activity rhythm disturbances in demented patients. Actigraphy was performed before, during, and after 4 weeks of increased illumination in the living rooms of 22 patients with dementia clinically diagnosed as probable Alzheimer's disease, multi-infarct dementia, dementia associated with alcoholism, or normal pressure hydrocephalus. The results indicated that during increased illumination, the stability of the rest-activity rhythm increased in patients with intact vision, but not in visually impaired patients.

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Satlin A, Volicer L, Ross V, Herz L, Campbell S.

**Bright light treatment of behavioral and sleep disturbances in patients with Alzheimer's disease.** Am J Psychiatry. 1992 Aug;149(8):1028-32.

Department of Psychiatry, Harvard Medical School, Belmont, Mass.

**OBJECTIVE:** The authors tested the hypothesis that evening bright light pulses would improve sleep-wake patterns and reduce agitation in patients with Alzheimer's disease who have severe sundowning (a syndrome of recurring confusion and increased agitation in the late afternoon or early evening) and sleep disorders. **METHOD:** Ten inpatients with Alzheimer's disease on a research ward of a veterans' hospital were studied in an open clinical trial. All patients had sundowning behavior and sleep disturbances. After a week of baseline measurements, patients received 2 hours/day of exposure to bright light between 7:00 p.m. and 9:00 p.m. for 1 week. During the baseline week, the treatment week, and a posttreatment week, patients were rated by nurses for agitation, sleep-wake patterns, use of restraints, and use of prescribed-as-needed medication. On the last 2 days of each week, patients wore activity monitors. Activity counts were analyzed for circadian rhythmicity. **RESULTS:** Clinical ratings of sleep-wakefulness on the evening nursing shift improved with light treatment in eight of the 10 patients. The proportion of total daily activity occurring during the nighttime decreased during the light-treatment week. The relative amplitude of the circadian locomotor activity rhythm, a measure of its stability, increased during the light-treatment week. More severe sundowning at baseline predicted greater clinical improvement. **CONCLUSIONS:** Evening bright light pulses may ameliorate sleep-wake cycle disturbances in some patients with Alzheimer's disease. This effect may be mediated through a chronobiological mechanism.

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Mishima K, Okawa M, Hishikawa Y, Hozumi S, Hori H, Takahashi K.

**Morning bright light therapy for sleep and behavior disorders in elderly patients with dementia.** Acta Psychiatr Scand. 1994 Jan;89(1):1-7.

Department of Neuropsychiatry, Akita University School of Medicine, Japan.

Fourteen inpatients with dementia showing sleep and behavior disorders (average age = 75 years), and 10 control elderly people (average age = 75 years) were carefully observed for 2 months. Four weeks of morning light therapy markedly improved sleep and behavior disorders in the dementia group. The measurement of sleep time and the serum melatonin values suggests that sleep and behavior disorders in the dementia group are related to decreases in the amplitude of the sleep-wake rhythm and decreases in the levels of melatonin secretions. Morning light therapy significantly increased total and nocturnal sleep time and significantly decreased daytime sleep time. These results indicate that morning bright light is a powerful synchronizer that can normalize disturbed sleep and substantially reduce the frequency of behavior disorders in elderly people with dementia.

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Ancoli-Israel S, Martin JL, Kripke DF, Marler M, Klauber MR.

**Effect of light treatment on sleep and circadian rhythms in demented nursing home patients.** J Am Geriatr Soc. 2002 Feb;50(2):282-9.

Department of Psychiatry, University of California San Diego, USA.

**OBJECTIVES:** To determine whether fragmented sleep in nursing home patients would improve with increased exposure to bright light. **DESIGN:** Randomized controlled trial. **SETTING:** Two San Diego-area nursing homes. **PARTICIPANTS:** Seventy-seven (58 women, 19 men) nursing home residents participated. Mean age +/- standard deviation was 85.7 +/- 7.3 (range 60-100) and mean Mini-Mental State Examination was 12.8 +/- 8.8 (range 0-30). **INTERVENTIONS:** Participants were assigned to one of four treatments: evening bright light, morning bright light, daytime sleep restriction, or evening dim red light. **MEASUREMENTS:** Improvement in nighttime sleep quality, daytime alertness, and circadian activity rhythm parameters. **RESULTS:** There were no improvements in nighttime sleep or daytime alertness in any of the treatment groups. Morning bright light delayed the peak of the activity rhythm (acrophase) and increased the mean activity level (mesor). In addition, subjects in the morning bright light group had improved activity rhythmicity during the 10 days of treatment. **CONCLUSION:** Increasing exposure to morning bright light delayed the acrophase of the activity rhythm and made the circadian rhythm more robust. These changes have the potential to be clinically beneficial because it may be easier to provide nursing care to patients whose circadian activity patterns are more socially acceptable.

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