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### REPETITIVE SLEEP DISRUPTION, AN EXPERIMENTAL MODEL OF INSOMNIA, LEADS TO INCREASED SYMPATHETIC ACTIVITY

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**Introduction:** Sympathetic over-activity is an important feature of hypertension and might be the underlying mechanism of the link between insomnia with reduced total sleep time and hypertension. The normalized low frequency component of heart rate variability (HRV) spectra is considered a quantitative index of sympathetic activation. Thus, we investigated autonomic modulation via HRV in response to a novel repetitive sleep disruption protocol, an experimental model of insomnia.

**Methods:** Eight healthy participants (age  $28 \pm 2$  yrs; BMI  $23 \pm 1$  kg/m<sup>2</sup>) completed a 19-day in-hospital protocol. Following 3 nights of consolidated sleep (8h/night from 2300-0700), participants were exposed to three nights of sleep disruption (40 min sleep opportunity and 20 min experimental awakening monitored by staff, repeated between midnight and 6am) followed by one night 8h recovery sleep. This sleep disruption protocol repeated three times, followed by three additional nights of recovery sleep at the end of the study. Two-lead electrocardiography was recorded during 5min controlled breathing (15 breaths/min) in the morning at baseline, each sleep disruption block and recovery. Lomb-scargle periodogram algorithm was performed to generate the power spectrum analysis of R-R interval. Spectral power of LF (0.04–0.15 Hz) was analyzed in normalized units (nu; LF/[total power-very LF component]) as indicator of sympathetic modulation.

**Results:** There was a significant intervention effect ( $p=0.045$ ) on normalized LF measured during controlled breathing. Specifically, normalized LF showed a trend towards an increase over baseline ( $14 \pm 8$  nu,  $p=0.094$ ) following the first block of sleep disruption, and significantly increased during the second ( $22 \pm 8$  nu,  $p=0.009$ ) and third ( $21 \pm 8$  nu,  $p=0.015$ ) blocks of sleep disruption. Furthermore, normalized LF was still elevated after two nights of recovery sleep ( $23 \pm 8$  nu,  $p=0.009$ ) compared to baseline.

**Conclusion:** Sympathetic activity was exacerbated by repetitive experimental sleep disruption and was still elevated following two nights of recovery sleep. Our preliminary results indicate a disrupted autonomic function due to repetitive exposure to sleep disruption, an experimental model of insomnia.

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### ARE CLINICAL TRIAL PARTICIPANTS REPRESENTATIVE FOR PATIENTS WITH INSOMNIA?

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**Introduction:** It is vital to conduct clinical trials that test new medication in the intended patient population. However, given the often stringent inclusion and exclusion criteria of clinical trials, it can be debated whether the recruited patients are representative for the average patient with insomnia.

**Methods:** Via advertisements in newspapers and consultation of sleep centers, N=79 patients with insomnia were recruited to participate in a clinical trial to examine next morning effects of hypnotic drugs on driving performance and cognitive performance. The current analysis examined recruitment failures of this clinical trial.

**Results:** During initial screening, N=25 (31.6%) patients were excluded for practical issues and baseline demographics. Of them, N=8 were excluded because they either did not answer the phone, or had no further interest, or time to participate. N=2 were excluded because they did not speak Dutch. N=6 subject were either too young or too old, and N=6 did not meet the pre-set driving experience criteria. Another 3 subjects were not willing to stop driving for the duration of the study. Another N=49 (62%) patients were excluded for medical reasons: N=2 patients did not meet the criteria of insomnia, N=7 were engaged in shift work, N=2 reported having other sleep disturbances, and N=6 reported a sleep latency of more than 60 minutes. N=17 were excluded because they had comorbid psychiatric disease for which most of them received treatment (N=12) or had other health related issues (N=5). The other N=14 patients were not willing to stop their current treatment with hypnotic drugs. Of the N=5 subjects that were scheduled for screening, N=2 did not show up and were lost to follow up. N=3 subjects were scheduled for a single-blind 1-week placebo run-in week. These subjects failed due to a placebo response, i.e. they had a change in subjective sleep latency greater than 20 minutes.

**Conclusion:** Of N=79 patients that were recruited, N=0 (0%) were included in the study. This data illustrates that patient's which are selected for participating in clinical trial are not always representative for patients in real life.

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### DYSFUNCTIONAL SLEEP BELIEFS IN CANCER-RELATED INSOMNIA

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**Introduction:** Dysfunctional beliefs about sleep have been found to be an important factor in chronic insomnia and cancer-related insomnia (CRI). Treatment effect of cognitive behavioral therapy for insomnia in CRI was found to be associated with reduction in dysfunctional sleep beliefs. Previous studies however used a general questionnaire to assess the dysfunctional sleep beliefs in CRI. The current study aims to: 1) identify dysfunctional sleep beliefs specifically related to cancer; 2) examine whether these beliefs play a more important role in CRI.

**Methods:** A 26-item cancer-related sleep belief questionnaire (CRSBQ) was constructed by interviewing 32 cancer patients (female: male=20:12; average age=54.6yo) with comorbid insomnia and three experts in sleep medicine and psycho-oncology. The CRSBQ was then administered, along with the Dysfunctional Beliefs and Attitude about Sleep, 16-item version (DBAS-16), Insomnia Severity Index (ISI), and a questionnaire for sleep history, to 82 patients with comorbid cancer and insomnia (female: male=72:10; average age =48.6yo). The participants were divided to two groups based on whether the onset of insomnia was before (pre-cancer group) or after (post-cancer group) the diagnosis of cancer for further comparisons.

**Results:** Participants' average rating on CRSBQ was higher than average rating on DBAS-16 ( $t=33.11$ ,  $p<.001$ ). Both CRSBQ and DBAS-16 scores correlated with ISI ( $r=.265$ ,  $p<.05$  and  $.322$ ,  $p<.005$ , respectively). There was no significant difference on all the scales between pre-cancer and post-cancer groups.

**Conclusion:** Insomnia patients comorbid with cancer do have specific cancer-related sleep beliefs. However, these beliefs do not have a higher association with their sleep disturbance, whether the insomnia was a premorbid condition or not.

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## 0400

### COGNITIVE BIAS PHENOMENON IN INSOMNIA PATIENTS

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**Introduction:** Current study aimed to investigate cognitive bias on words stimuli in insomnia patients. Also by diversifying words stimuli, we investigated which types of words insomnia patients show cognitive bias most likely to.

**Methods:** Twenty-four insomnia patients based on DSM-IV criteria and 21 healthy controls were enrolled. Three types of words including 39 sleep-related, 40 neutral, and 40 negative words were used as experimental stimuli. In the subjective emotional rating tasks, all the participants were asked to rate the emotional intensity of randomly presented list of different types of words on a 7-point Likert scale ( $-3$  = most negative and  $+3$  = most positive). Subsequently, participants were asked to indicate whether each word stimulus was related to sleep or not.

**Results:** There were no significant differences in self-rated valence on 3 categories of words between two groups, but only simple main effect of types of words ( $p = 0.000$ ). Also, there were significant differences in the number of responses whether each stimulus is related to sleep in neutral category ( $p = 0.047$ ). Insomnia patients responded to neutral stimuli as sleep-related more frequently compared to control group ( $7.810 \pm 10.829$  vs  $2.714 \pm 2.432$ ).

**Conclusion:** Current results support the presence of a cognitive bias towards neutral stimuli among insomnia patients. The cognitive bias may contribute to underlying mechanism of primary insomnia.

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## 0401

### DREAM INCORPORATION OF INSOMNIA SUFFERERS AND GOOD SLEEPERS IN AN EXPERIMENTAL SETTING

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**Introduction:** Dream incorporation in laboratory setting manifests itself by direct (ex: experimenter, electrodes, etc) or indirect (ex: participating in an experiment) presence of elements referencing to the experimental setting. The presence of increased cortical activation during sleep and wakefulness in insomnia sufferers (INS) is well documented and is often reflected through enhanced information processing. This latter could increase awareness of sleeping environments and lead to dream incorporation of the experimental settings. The objective of the present study is to compare INS and good sleepers (GS) regarding dream incorporation for laboratory settings.

**Methods:** PSG was recorded in 12 INS and 12 GS (aged 30 to 45) for five consecutive nights (N1 to N5). On N3 and N5, participants were awoken during REM periods for dream collection. Dream incorporation of the laboratory setting was targeted with the following categories: environment (bed, electrodes, etc.) staff and experience (being awakened, report dreams, etc.). Dream elements referring to sleep but not related to laboratory settings were also quantified.

**Results:** Independent sample T tests were used to assess between groups differences in regards to 1) Environment 2) Staff 3) Experience and 4) Sleep dream incorporation. Two participants were excluded due to extreme data. Results showed a significant difference between INS and GS for environmental dream incorporation ( $p=.001$ ), INS reporting more environmental elements. No significant difference were found for Staff ( $p=.483$ ), Experience ( $p=.289$ ) and Sleep ( $p=.283$ ).

**Conclusion:** Because a greater number of elements from the laboratory environment is observed in INS' dreams, it might suggest that INS are more hyperaroused at sleep onset and display enhanced information processing. Results also suggest that INS appeared more mindful of their surroundings since the immediate, concrete, external elements of the environment are more prone to be treated and so, incorporated in dreams.

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## 0402

### ALTERED PERCEPTION OF TIRED FACES IN INSOMNIA: A STUDY COMPARING NORMAL AND POOR SLEEPERS

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**Introduction:** Insomnia is associated with reduced emotion intensity ratings for facial expressions of sadness and fear. Considering tired faces are often rated as appearing sad, individuals with insomnia may show reduced intensity ratings for expressions of tiredness. As a first step in exploring this possibility, we compared normal and poor-sleepers in their ratings for the expression intensity of tiredness and alertness whilst observing sleep-related and neutral faces.

**Methods:** Fifty-six normal-sleepers (NS:  $26.95 \pm 9.32$  yrs, 68% female) scoring  $<8$  on the Insomnia Severity Index (ISI;  $3.73 \pm 2.12$ ) and 58 poor-sleepers (PS:  $26.19 \pm 9.16$  yrs, 86% female) scoring  $\geq 8$  on the ISI ( $13.14 \pm 3.94$ ), observed 98 facial photographs (49 neutral; 49 sleep-related). Between 0–100, participants were required to rate the extent to which each face appeared as tired and alert. 0 indicated not at all, 100 indicated very much so. Sleep-related faces were created by manipulating neutral photographs to include previously identified facial tiredness cues: depressed eyelids, increased pretarsal show, bags under eyes, drooped corners of mouth. Mean ratings were compared between-groups.

**Results:** All participants rated sleep-related faces as more tired and less alert relative to neutral photographs,  $F(1,112)=70.91$ ,  $P=.001$ . A mixed ANOVA demonstrated a significant group x face (neutral vs. sleep-related) x rating (tired vs. alert) interaction  $F(1,112)=8.03$ ,  $P=.005$ : revealing that compared to normal-sleepers ( $63.80 \pm 13.04$ ), poor-sleepers ( $56.61 \pm 14.39$ ) showed lower ratings for the expression of tiredness, but not alertness (NS:  $34.69 \pm 14.91$ ; PS:  $37.09 \pm 12.23$ ), whilst observing the sleep-related faces. Ratings of tiredness (NS:  $36.39 \pm 12.55$ ; PS:  $34.98 \pm 13.12$ ) and alertness (NS:  $57.86 \pm 11.42$ ; PS:  $54.10 \pm 12.92$ ) did not differ between groups whilst observing neutral faces.

**Conclusion:** The present study, using normal and poor-sleepers, provides suggestive evidence that insomnia is associated with reduced ratings of expression intensity for sleep-related facial photographs displaying tiredness. Previous research from our group confirms individuals with insomnia misperceive their own, but not other peoples, facial appearance as more tired than they are. As such, the current results