ISCTM
International Society for CNS Clinical Trials and Methodology

Sleep Working Group

February 18, 2026
Washington, DC

Chairs: Margaret Moline & Georg Dorffner

Major Contributor: David McLaughlin

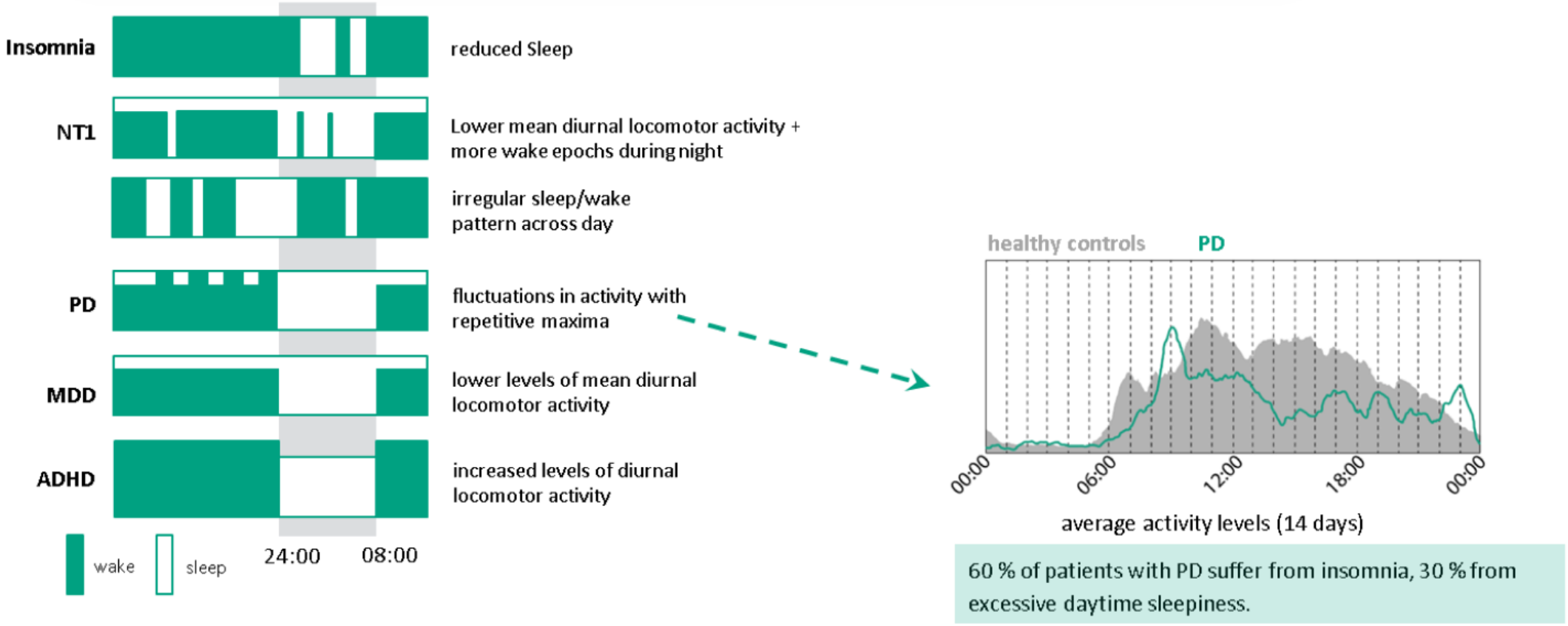
Disclosures

Georg Dorffner: Shareholder and part-time employee of The Siesta Group Schlafanalyse GmbH

Margaret Moline: full-time employee of Eisai, Inc.

David McLaughlin: Owner of Cerebral Innovations

Sleep in CNS Disorders



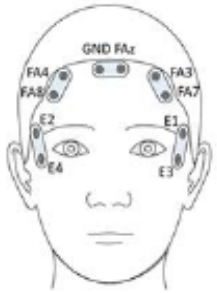
60 % of patients with PD suffer from insomnia, 30 % from excessive daytime sleepiness.

Measurement Instruments for Sleep

Portable PSG

Supervised In-Lab Polysomnography (PSG)

Actigraphy (Accelerometer)



Reduced Montage PSG

Single Channel EEG

Heart Rate (Photoplethysmography)

Heart Rate + Actigraphy

Sources: Neurosoft.com thesiestagroup.com somno-art.com ouraring.com itamar-medical.com choosemuse.com

Deliverables:

1. Review paper on the current evidence for objective sleep endpoints as biomarkers for neurological or psychiatric disorders in CNS trials

2. A consensus paper on criteria and validation strategies for measurement instruments, as compared to gold standard (PSG)

Agenda

- Review of contributions to Deliverable 1
  - Screening of references found
  - Results of AI re-evaluation
  - Analysis of paper contributions received
  - Structure of paper sections
  - Determination of remaining gaps (key elements for each disorder)
- Agreement on next steps and timelines for Deliverable 1
- Prepare discussion for Deliverable 2

Volunteers

- Michaela Gold: AD (Alzheimer's)
- Benjamin Nelson: MDD (Major depressive disorder)
- Bridget Kajs: PTSD (Post-traumatic stress disorder)
- Igor Korolev: SZ (Schizophrenia)
- Daniel Smith: MS (Multiple sclerosis)
- Gary Zammit: BD (Bipolar)
- Marge Moline: PD (Parkinson's)
- Georg Dorffner: GAD (General anxiety disorder)
- Sofie Mesens: Pediatric Disorders
- David McLaughlin: others

Analysis

Disorder	Papers on comparison	Papers on treatment
Alzheimer‘s	5	6
PTSD	17	
Schizophrenia	10	5
MDD	23	16
Bipolar	21	
Parkinson‘s	4	
General Anxiety	18	1
Multiple Sclerosis	7	

Example of AI-based analysis

- GAD

Study	Population	Comparison	TST	SOL	SE	WASO / Wake ti	REM	REM Lat	Night es	SWS /	Sleep Quali (subjective	Other PSG variabl (sig.)	Main Findings (sig. only)	Eviden Streng
Palmer & Alfano (2017) – Sleep architecture and daily affect/somatic reports in GAD youth	Children with GAD vs controls; PSG after 1 week actigraphy/diaries	Child GAD vs healthy controls											No statistically significant between-group differences in PSG sleep-architecture variables were reported; PSG variables were examined mainly as predictors of daily symptoms.	Moderate (controlled; designed for associations rather than group
Forbes et al. (2008) – Sleep in adolescents with anxiety disorders, MDD, and controls	Adolescents with anxiety disorders (mixed) vs MDD vs controls; 2 PSG nights	Anxiety disorders (mixed) vs controls		↑ (night 2 vs controls; p<0.005)						↓ (both nights vs controls; p reported as group effect with post hoc vs controls)		Awakenings ↑ vs MDD (both nights); time awake and stage 4 showed group effects (pairwise vs controls not consistently specified)	Across two nights, the anxiety-disorders group showed significantly less slow-wave sleep than controls (and MDD). On night 2, they also showed significantly longer sleep latency than controls.	Moderate (controlled; not GAD-specific)
Horváth et al. (2016) – State/trait anxiety effects on sleep (PSG in 1083 subjects)	Adults referred for PSG; grouped by high/low state and trait anxiety	High vs low state/trait anxiety groups (not clinical GAD)		↑ (group differences; p<0.001)				(varied) significant group differences (p<0.001)		↓ stage 3% with higher anxiety (p=0.026)		Stage 2% ↑ (p=0.003); number of REM stages ↓ in high-anxiety trait groups (p<0.001)	Large PSG dataset shows statistically significant associations between anxiety levels and sleep structure: higher anxiety linked with longer SOL, ↑stage-2%, ↓stage-3%, fewer REM stages, and significant differences in REM latency.	Moderate (large n; nonclinical/clinical mix; cross-sectional)
Liang et al. (2022) – Sleep misperception in anxiety-related disorders with insomnia (retrospective PSG)	Adults with anxiety-related disorders + insomnia; PSG used to define misperception	Within anxiety-related disorders: misperception subgroups (not GAD-specific)											Paper focuses on sleep-state misperception; PSG differences are primarily between misperception subgroups rather than GAD vs controls. No GAD-specific PSG group comparisons were reported.	Low–Moderate (retrospective; not GAD-
Xu et al. (2024) – PSG features of insomnia in GAD, MDD, bipolar mania vs primary insomnia	Adults with insomnia: GAD+insomnia (GI), MDD+insomnia (DI), bipolar mania+insomnia (BI), and primary insomnia (PI)	GI vs DI / PI / BI (no healthy controls)						↓ vs DI (DI > GI; Bonferroni-corrected)				Microarousals (NM) ↑ and apnea–hypopnea index (AHI) ↑ in GI vs PI (Bonferroni-corrected); awakenings number higher in GI vs BI (Bonferroni-corrected)	Among insomnia patients, GI showed significantly shorter REM latency than DI; GI also showed significantly higher microarousals and AHI than primary insomnia (all surviving strict Bonferroni correction).	Moderate (multi-group PSG; no healthy controls; strict correction)
Zhang et al. (2024) – Depression and anxiety: PSG parameters and treatment outcomes	Clinical depression/anxiety samples; PSG compared by diagnosis and treatment response	Anxiety diagnosis vs non-anxiety (not necessarily GAD); and treatment response analyses		(treatment outcomes) ↓ SOL in effective vs ineffective group (p<0.001) – includes anxiety and				(treatment outcomes) ↑ REM latency in effective vs ineffective anxiety outcome (p=0.034)					Study is not GAD-specific. It reports significant PSG differences mainly related to treatment outcomes (e.g., shorter SOL in effective groups) and some diagnosis-based comparisons in broader anxiety categories.	Low–Moderate (heterogeneous diagnoses; focus on treatment outcomes)
Liu et al. (2025) – Stellate ganglion block for sleep disturbance in GAD (RCT)	Adults with generalized anxiety disorder and sleep disturbances; SGB vs conventional treatment	Treatment effect within GAD (SGB vs control)	↑ (post-treatment objective TST increased; reported as significant)		↑ (post-treatment objective sleep efficiency increased; reported as								RCT in GAD with sleep disturbance reports significant improvements in objective sleep (↑TST and ↑sleep efficiency) after stellate ganglion block compared to conventional treatment.	Moderate (RCT; outcomes not purely GAD-vs-control baseline differences)