PROJECT

Supervisor:	Andrea Galbiati
Title:	Dreaming in action: the relevance of oneiric activity in REM behaviour disorder and its impact on neuropsychological and mood functioning
Curriculum:	Cognitive and Behavioural Sciences
Link to the personal page of the University or relevant hospital site website:	https://www.unisr.it/docenti/g/galbiati-andrea

Description of the Project (max 3,000 characters including spaces)

Background/gap of knowledge

Isolated Rapid Eye Movement (REM) sleep behavior disorder (iRBD) is characterized by the loss of muscle atonia during REM sleep, leading to vivid and often physically enacted dreams (American Academy of Sleep Medicine, 2014). iRBD is widely regarded as a prodromal stage of neurodegenerative disorders, particularly synucleinopathies such as Parkinson's disease (PD) and dementia with Lewy bodies (DLB)(Galbiati et al., 2019). Research has established an association between iRBD and increased risk of neurodegeneration (Postuma et al., 2019), yet the precise relationship between dreaming activity, cognitive function, mood disturbances, and disease progression remains unclear (Fasiello et al., 2023). Understanding the qualitative and quantitative aspects of dreaming in iRBD could provide crucial insights into the neurobiological mechanisms underlying this disorder and its early markers in the prodromal phases of neurodegeneration.

Rationale and hypothesis

Given the strong link between iRBD and neurodegeneration, investigating dream content and frequency, along with neuropsychological and mood assessments, could offer early indicators of cognitive decline. Dream content in iRBD often features aggression, negative emotions, and complex motor behaviors, which may reflect underlying neural dysfunction. We hypothesize that:

-Dreaming activity in iRBD patients will show specific alterations, including increased emotional intensity and motor-related themes, compared to healthy controls.

-These alterations will correlate with neuropsychological deficits, particularly in executive function and visuospatial abilities.

-Mood disturbances, such as anxiety and depression, will be associated with dream features and may serve as early predictors of neurodegenerative risk.

Objectives and specific aims

1)Characterize the dreaming activity in iRBD:

-Analyze dream recall frequency, emotional content, and thematic elements using structured dream reports and questionnaires.

2)Investigate the relationship between dreaming activity and neuropsychological function:

-Assess cognitive performance using neuropsychological tests focused on executive function, memory, and visuospatial skills.

-Determine correlations between dream characteristics and cognitive performance.

3)Evaluate the role of mood disturbances in dream alterations:

-Measure anxiety, depression, and emotional well-being in iRBD patients and controls.

-Explore associations between mood states and dream features.

4)Assess the predictive value of dream alterations for neurodegeneration risk:

-Follow-up longitudinally to identify potential markers predictive of conversion to Parkinson's disease or related neurodegenerative conditions.

5)Explore the association between dream features and neurophysiological variables of REM and NREM sleep extracted through PSG analysis.

Expected outcomes

-Identification of specific alterations in dreaming activity that differentiate iRBD patients from healthy individuals.

-Establishment of links between dream features, cognitive deficits, and mood disturbances.

-Development of a potential early biomarker model for predicting neurodegeneration based on dream characteristics.

-Contribution to the understanding of neural mechanisms underlying iRBD and its progression toward neurodegenerative diseases, aiding in early diagnosis and intervention strategies.

Skills that the student should acquire (max. 600 characters including spaces):

The student will acquire skills in sleep research methodologies, including video-polysomnography (vPSG) analysis and REM sleep behavior assessment. They will develop expertise in dream content analysis, neuropsychological testing, mood assessments and EEG analysis. Additionally, they will gain experience in statistical analysis (e.g., regression, correlation models) and longitudinal study design. Critical thinking, scientific writing, and ethical research practices will also be enhanced through data interpretation and publication preparation.

References (max. 15)

- American Academy of Sleep Medicine. (2014). International Classification of Sleep Disorders – Third Edition (ICSD-3). Darien, IL: American Academy of Sleep Medicine.
- Galbiati A, Verga L, Giora E, Zucconi M, Ferini-Strambi L. The risk of neurodegeneration in REM sleep behavior disorder: A systematic review and meta-analysis of longitudinal studies. Sleep Med Rev. 2019 Feb;43:37-46. doi: 10.1016/j.smrv.2018.09.008. Epub 2018 Nov 8. PMID: 30503716.
- Postuma RB, Iranzo A, Hu M, Högl B, Boeve BF, Manni R, Oertel WH, Arnulf I, Ferini-Strambi L, Puligheddu M, Antelmi E, Cochen De Cock V, Arnaldi D, Mollenhauer B, Videnovic A, Sonka K, Jung KY, Kunz D, Dauvilliers Y, Provini F, Lewis SJ, Buskova J, Pavlova M, Heidbreder A, Montplaisir JY, Santamaria J, Barber TR, Stefani A, St Louis EK, Terzaghi M, Janzen A, Leu-Semenescu S, Plazzi G, Nobili F, Sixel-Doering F, Dusek P, Bes F, Cortelli P, Ehgoetz Martens K, Gagnon JF, Gaig C, Zucconi M, Trenkwalder C, Gan-Or Z, Lo C, Rolinski M, Mahlknecht P, Holzknecht E, Boeve AR, Teigen LN, Toscano G, Mayer G, Morbelli S, Dawson B, Pelletier A. Risk and predictors of dementia and parkinsonism in idiopathic REM sleep behaviour disorder: a multicentre study. Brain. 2019 Mar 1;142(3):744-759. doi: 10.1093/brain/awz030. PMID: 30789229; PMCID: PMC6391615.
- Fasiello E, Scarpelli S, Gorgoni M, Alfonsi V, Galbiati A, De Gennaro L. A systematic review of dreams and nightmares recall in patients with rapid eye movement sleep behaviour disorder. J Sleep Res. 2023 Jun;32(3):e13768. doi: 10.1111/jsr.13768. Epub 2022 Oct 31. PMID: 36316953.