

Sleepwalking, Dream Enactment and other Parasomnias

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Dear Dr. Howell

"I have woken to my very tall, muscular husband kneeling over me, choking me-thankfully I could get in a scream...There have been other incidents where he has punched me in the face, etc. - we have even discussed what would happen if he hurt me badly in his sleep, how he would be able to explain it to the police that he did it in his sleep - PLEASE ANY information would be greatly appreciated - I have loved this man since high school - I cant bare the thought of watching him suffer with Parkinson's!"

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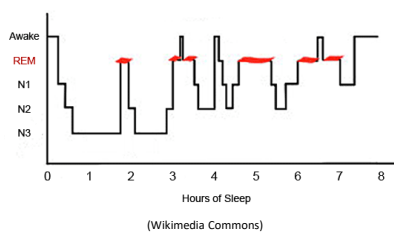
Parasomnias-abnormal nocturnal behaviors

- Sleepwalking and dream enactment are underreported
 - Embarrassment
 - No bedpartner to witness behaviors
 - Mild behaviors-especially in childhood
 - Misattribution to mental illness
 - Cultural taboos regarding disclosure of bedroom activities
 - Assign supernatural or religious explanation to these behaviors

(AASM ICSD-3 2015, Howell, Continuum 2020)

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Sleep Stages



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Normal Arousal from NREM sleep

- Transition from sleep to wake occurs within moments
- Typically from light N1 and N2 sleep

(Steriade et al 1988)

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Disorder of Arousal

- Conversely, arousal threshold from N3 sleep is high
 - SWA promotes sleep inertia and arousal duration is prolonged.
- Conditions that promote sleep drive lead to disorders of arousal
 - Sleep deprivation
 - Untreated sleep disorders
 - Sedating medications

(Pressman 2007)

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NREM sleep in Disorders of Arousal

- Sleepwalking
 - Sleep Related Eating Disorder
- Sleep Terrors*



Fuseli-Sleepwalking Lady Macbeth

(Tachibana 1991, Zucconi 1995, Schenck 1998)

(Wikimedia Commons)

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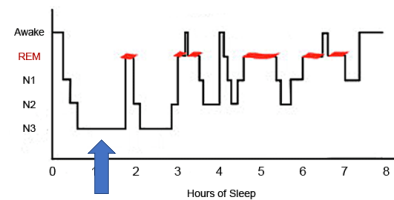
Sleepwalking

- Disorder of arousal emanating from deep NREM sleep
 - Minimal to no dream enactment
 - Difficult to awaken, often amnesic for behaviors
 - Occur in the first half of the night
- Nearly universal to some degree in childhood.
 - Can occasionally result in significant injury.
- Etiology-Failure to transition from sleep to wakefulness
 - Predisposed by underlying sleep disorders such as restless legs syndrome
 - Primed by processes that increase sleep drive: sleep deprivation, sedating medications
 - Precipitated by sleep fragmenting conditions such as OSA or noise

(AASM ICSD-3 2015)

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Sleep Stages



(Wikimedia Commons)

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Injurious behaviors in SW

- Higher Pain threshold to arousal during N3 sleep



(Ugucioni et al 2013)

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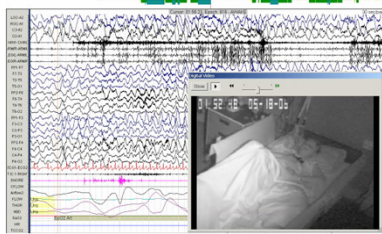
Provoked Confusional Arousal



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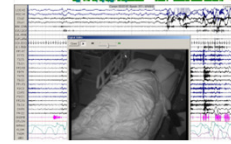
Spontaneous Confusional Arousal



(Used with permission by Dr. Mahowald)

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Sleep Related Eating Disorder



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(University of Minnesota)

(ICSD-2 2005)

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Sleep Related Eating-A Sleepwalking disorder with medical and dental consequences

- Sleep Related Eating Disorder
 - Amnestic Nocturnal Eating During Sleepwalking Episode
 - Often nightly binge eating.
 - Weight gain
 - Loss of glycemic control
 - Patients may lay in bed with oral bolus of food at night.
 - Combined with the decrease in salivary flow leads to dental caries.

(AASM ICSD-3 2015)

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(AASM ICSD-3 2015)

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Sleepwalking Treatment

- Address underlying sleep conditions nearly universally takes care of sleepwalking.
 - Optimize the duration and timing of sleep.
 - Address sleep deprivation
 - Align circadian rhythm
 - Treat sleep disorders such as restless legs syndrome and OSA
 - Minimize sedating medications.

(Irfan, Continuum 2020)

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(used with permission by Dr. Mahowald)

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What about REM sleep and REM Sleep Disorders?



The Dream
Rousseau 1910

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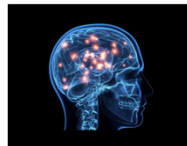
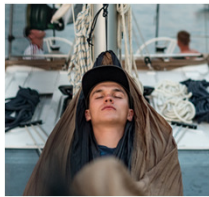
Discovery of REM



University of Chicago
circa 1950

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REM as Paradoxical Sleep



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REM and Hippocampal Replay

- Reactivation of hippocampal and limbic circuits during REM sleep



Wikimedia Commons

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Michel Jouvet



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REM Sleep Paralysis



The Nightmare
Fuseli 1781

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Paradox Lost-Feline



(Courtesy of Dr. Alon Avidan)

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Paradox Lost-Human?

- Sporadic Reports of Dream Enactment throughout antiquity

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Don Quixote

"...he was thrusting his sword in all directions, speaking out loud as if he were actually fighting a giant. And the strange thing was that he did not have his eyes open, because he was asleep and dreaming that he was battling the giant... He had stabbed the wine skins, believing that he was stabbing the giant, that the entire room was filled with wine..."

Miguel de Cervantes 1605



Don Quixote and Sancho Panza
Jules David 1887

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Index Case of RBD: September 1982 Minneapolis

- 68 yo male with history of dream enactment
- PSG demonstrated REM sleep without skeletal muscle atonia.



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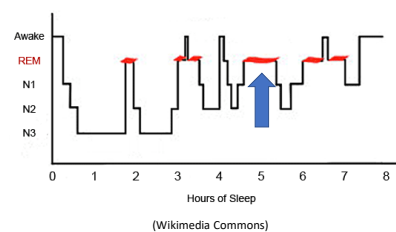
Original 6 RBD Cases



(Used with permission, Dr. Carlos Schenck)

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Sleep Stages



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Parasomnias-Dream Enactment

- Dream enactment-dream enactment occurring during REM sleep
- REM sleep Behavior Disorder (RBD)
 - Results in dream enactment, often vigorous, violent and potentially injurious to patients and bed partners.
 - 1% of the general population
 - 5% of elderly
 - Easy to awaken, clearly recall dream and behaviors
 - Occurs in the second half of the night
- Etiology-loss of normal REM motor paralysis

(AASM ICSD-3 2015, Howell, Continuum 2020)

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RBD-Sleep Injury



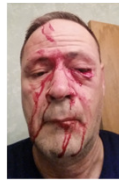
Minnesota Regional Sleep Disorders Center

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RBD-Sleep Injury



Minnesota Regional Sleep Disorders Center



University of Minnesota

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REM Sleep Behavior Disorder

RBD is most commonly associated with neurodegenerative disease, particularly α -Synucleinopathies:

- Parkinson's disease
- Dementia with Lewy Bodies
- Multiple System Atrophy



Alpha-Synuclein staining of a Lewy body in a patient with Parkinson's disease.

Courtesy Alon Avidan

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RBD-Prodromal syndrome

- RBD is a prodromal syndrome for Parkinson's disease (PD) and related neurodegenerative disorders.
 - Dementia with Lewy Bodies
 - Multiple System Atrophy
- Etiology-progressive alpha synuclein pathology.
 - 75% of surviving RBD patients convert in 12 years.



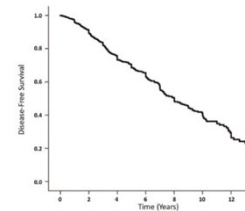
(Charcot 1879)

(AASM ICSD-3 2015, Howell, Continuum 2020)

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Neurodegenerative Risk of RBD

74% phenocconversion at 12 years



Postuma et al 2019

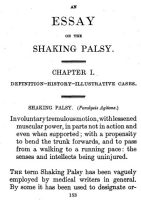
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Paralysis Agitans

Described by James Parkinson in 1817

- Combination of tremor and bradykinesia
- Noted frequent sleep disruption

(Parkinson 1817)

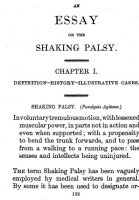


“...the sleep becomes much disturbed”

Case VI

“...the sleep becomes much disturbed. The tremulous motion of the limbs occur during sleep, and augment until they awaken the patient, and frequently with much agitation and alarm”

(Parkinson 1817)

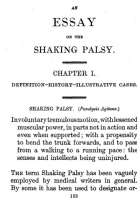


“...the sleep becomes much disturbed”

Case VI

“...when exhausted nature seizes a small portion of sleep, the motion becomes so violent as not only to shake the bed-hangings, but even the floor and sashes of the room.”

(Parkinson 1817)



Systemic Symptoms of Parkinson's disease

Hyposmia/Anosmia*
Constipation*
Dream Enactment*
Orthostasis
Depression
Hallucinations

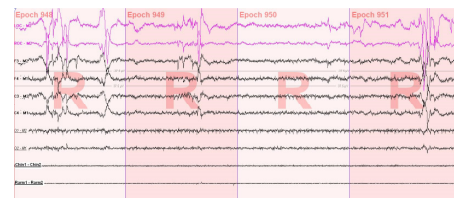
Sexual dysfunction
Personality Changes
-introversion
Oral Health
-Increased Dental Caries
-Decreased Salivary Flow

*occurs decades prior to movement disorder
(Schenck et al 1986, Ross et al 2008, Jankovic 2008, Boeve 2010)

Dream Enactment Behavior

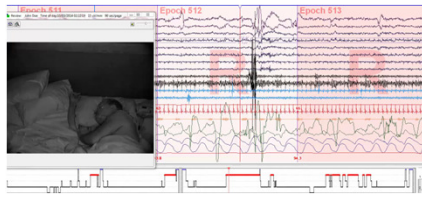


Normal REM Sleep Motor Activity



(University of Minnesota)

Subtle DEB (hand babbling)



(University of Minnesota)

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REM sleep Behavior Disorder-treatment

- Bedroom safety
 - Discuss sleeping separately from bed partners

(Howell, Continuum 2020)

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RBD Treatment

Melatonin (3-18mg)

Decreased DEB and partial restoration of REM atonia

Effect appears to linger for several nights after agent is discontinued.

Minimal sedating effects suggest that it may be more appropriate in the setting of advanced neurodegeneration.

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RBD Treatment-Medications

Donepezil and Rivastigmine

Acetylcholinesterase inhibitors
Particularly useful in setting of cognitive impairment

Clonazepam

Primary treatment for the first 30 years
Sedation is a concern in the setting of parkinsonism and progressive cognitive decline.

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RBD Treatment

Bed Alarm

REM provides a unique opportunity...

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Bed Alarm



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REM sleep Behavior Disorder a pathway for curing Parkinson's disease

- Important to meet with a physician to have often extended conversation to help understand their risks.
 - Loss of smell and constipation places an individual at higher risk for conversion within 5 years.
- RBD provides a unique opportunity for the development of disease modifying therapies-neuroprotection
- NAPS (North American Prodromal Synucleinopathy) Consortium
 - NIH funded investigation
 - <https://www.naps-rbd.org/>

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Final Thought

TRAVELodge NEWS Travelodge Says Nude Sleepwalkers More Common Than You Think

October 25, 2007 at 11:04 AM | 4 Comments

Travelodge UK has once again put out another wacky hotel survey, this time involving nude sleepwalkers. Yup, nude sleepwalkers and they are mostly men. Even more scary, the number of men sleepwalking is on the rise, increasing by sevenfold since last year's survey.



An astounding 95% of the hotel chain's sleepwalkers have been naked men. These night time sleeping wanderers were found in Travelodge reception areas across the UK, requesting the following information:

- Where is the bathroom - Can I check out as I am late for work - Do you have a copy of today's paper

One naked male sleepwalker even managed to get himself locked out of the hotel and later arrested.

Hmm...if we had to guess which of the three reasons for nude sleepwalkers was most compelling we would have to say alcohol abuse. C'mon...we all had that friend in college who whenever they got too drunk removed some article of clothing.

Anyways, Travelodge is sending out notices to its employees on how to deal with nude sleepwalkers. One such piece of advice is to keep a supply of towels at the front desk. We say also remind guests that there are security cameras around the hotel. Maybe that will save into their subconscious and force them to at least put on some pants before they sleepwalk around.

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Canine Dream Enactment



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Thank you

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References

- American Academy of Sleep Medicine. The AASM Manual for the Scoring of Sleep and Associated Events. Westchester, IL: American Academy of Sleep Medicine, 2011.
- American Academy of Sleep Medicine. International Classification of Sleep Disorders: Diagnostic and Coding Manual. 3rd edition. Westchester, IL: American Academy of Sleep Medicine, 2014.
- Bjorn et al. Sleep-Related eating disorder versus sleepwalking: A controlled study. *Sleep Medicine* 2012;13:1094-1101.
- Broughton RJ. Sleep disorders: disorders of arousal. Enuresis, somnambulism, and nightmares occur in confusional states of arousal, not in "dreaming sleep". *Science* 1968;129(3819):1070-8.
- Shuck et al. Spectral analysis of the variations in heart rate and cardiac activation on waking up in sleepwalking. *Rev Neurol*. 2005;133:43.
- Egga et al. Sleep architecture, sleep wave activity, and sleep spindles in adult patients with sleepwalking and sleep terrors. *Clin Neurophysiol* 2006;117:2929-39.
- Guilleminault et al. Sleep and wakefulness in somnambulism: a spectral analysis study. *J Psychosom Res* 2001;21:811-6.
- Guilleminault C, Kirovski C, Bao G, Arias V, Chan A, Li KK. Adult chronic sleepwalking and its treatment based on polysomnography. *Brain* 2005;128(Pt 5):1062-9.
- Guilleminault C, Kirovski C, da Rosa AC, et al. Sleepwalking, a disorder of NREM sleep instability. *Sleep Med* 2006;7:161-70.
- Patzino L, Haines P, Jassinati CA, Texano MG. CAP, epilepsy and motor events during sleep: the unifying role of arousal. *Sleep Med Rev* 2006;10(4):267-85.
- Perrault R, Carrier J, Desautels A, Montplaisir J, Zadra A. Electroencephalographic slow waves prior to sleepwalking/episodes. *Sleep Med* 2014;12(12):1468-72.

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References

- Pilon M, Montplaisir J, Zadra A. Precipitating factors of somnambulism: impact of sleep deprivation and forced arousals. *Neurology* 2008;70(24):2284-90.
- Pressman MR. Factors that prodigize, prime and precipitate NREM parasomnias in adults: clinical and forensic implications. *Sleep Med Rev* 2007;11(1):5-30.
- Schenck CH, Bundlie SR, Ettinger MG, Mahowald MW. Chronic behavioral disorders of human REM sleep: a new category of parasomnia. *Sleep* 1986;2(2):293-308.
- Schenck CH, Darcia JA, Petersen AT, Mahowald MW. Analysis of polysomnographic events surrounding 252 slow-wave sleep arousals in thirty-eight adults with injurious sleepwalking and sleep terrors. *J Clin Neurophysiol* 1998;15(2):159-66.
- Steriade M, Llinas RR. The functional states of the thalamus and the associated neuronal interplay. *Physiol Rev* 1988;68(3):649-742.
- Tachibana et al. Polysomnographic characteristics of healthy elderly subjects with somnambulism-like behaviors. *Biol Psychiatry* 1991;30:4-14.
- Ugocioni G, Palanca O, Giolmetti JL, Leu-Semenova S, Arnall I. Is sleep-related verbal memory consolidation impaired in sleepwalkers? *J Sleep Res*. 24:197-205.
- Videnovic A, Martin C, Albiol-Li L, et al. Increased REM sleep without atonia in Parkinson's disease patients with freezing of gait. *Neurology*. 2013;81:1030-5.
- Zacconi M, Oldani A, Ferri-Simamli L, Simme S. Arousal fluctuations in non-rapid eye movement parasomnias: the role of cyclic alternating pattern as a measure of sleep instability. *J Clin Neurophysiol* 1995;12(2):147-54.

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