Parasomnias

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No Disclosures
The third edition of the ICSD (ICSD-3) includes seven major categories of sleep disorders:

- Insomnia
- Sleep-related breathing disorders
- Central disorders of hypersomnolence
- Circadian rhythm sleep-wake disorders
- Parasomnias
- Sleep-related movement disorders
- Other sleep disorders
Wake versus Sleep

- **WAKE**
  - Active and moving
  - Aware of our surroundings
  - Our behavior is interactive with the environment

- **SLEEP**
  - Not moving
  - Not aware of our surroundings
  - Our behavior is not interactive with our environment
Wake versus Sleep

- However the brain is not such a simple structure.
- There are many states that are not entirely conscious or unconscious.
- The patient is asleep but moving.
## Classification of abnormal sleep-related movements

<table>
<thead>
<tr>
<th>Simple movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Involving quick jerks of limbs or body</td>
</tr>
<tr>
<td>- Hypnic jerks</td>
</tr>
<tr>
<td>- Propriospinal myoclonus</td>
</tr>
<tr>
<td>- Benign myoclonus of infancy</td>
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<tr>
<td>- Epileptic myoclonus</td>
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<tr>
<td>- Isolated or nonperiodic limb movements</td>
</tr>
<tr>
<td>Involving muscles of mastication</td>
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<tr>
<td>- Bruxism</td>
</tr>
<tr>
<td>- Facial myoclonus</td>
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<tr>
<td>- Palatal myoclonus</td>
</tr>
<tr>
<td>Prolonged contractions</td>
</tr>
<tr>
<td>- Leg cramps</td>
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Classification of abnormal sleep-related movements

Periodic movements

Of the limbs

- Periodic limb movements
## Classification of abnormal sleep-related movements

### Rhythmical movements

<table>
<thead>
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<th>Of the limbs</th>
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<tr>
<td>• Hypnic foot tremor</td>
</tr>
<tr>
<td>• Alternating leg muscle activation</td>
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</table>

<table>
<thead>
<tr>
<th>Of the body or head</th>
</tr>
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<tr>
<td>• Rhythmical movement disorder of sleep (body rocking, juxta capita)</td>
</tr>
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</table>
# Classification of abnormal sleep-related movements

## Complex movements and behaviors: Nonstereotyped

<table>
<thead>
<tr>
<th>Category</th>
<th>Conditions</th>
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<tr>
<td><strong>NREM sleep-related parasomnias</strong></td>
<td>- Disorders of arousal (from NREM sleep)</td>
</tr>
<tr>
<td></td>
<td>- Confusional arousals</td>
</tr>
<tr>
<td></td>
<td>- Sleepwalking</td>
</tr>
<tr>
<td></td>
<td>- Sleep terrors</td>
</tr>
<tr>
<td></td>
<td>- Sleep-related eating disorder</td>
</tr>
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<td><strong>REM-related parasomnias</strong></td>
<td>- REM sleep behavior disorder</td>
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<td></td>
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<tr>
<td></td>
<td>- Nightmare disorder</td>
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<tr>
<td><strong>Other parasomnias</strong></td>
<td>- Exploding head syndrome (sensory)</td>
</tr>
<tr>
<td></td>
<td>- Sleep-related hallucinations (sensory)</td>
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<td></td>
<td>- Sleep enuresis</td>
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<td>- Parasomnia due to a medical disorder</td>
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<td><strong>Psychogenic events originating in sleep</strong></td>
<td>- Panic attacks</td>
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<td></td>
<td>- Dissociative events</td>
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# Classification of abnormal sleep-related movements

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<th>Complex movements: Stereotyped</th>
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<tr>
<td>Epileptic seizures</td>
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<td>Psychogenic events (sometimes)</td>
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</table>
Parasomnias

- Parasomnias are undesirable physical events (movements, behaviors) or experiences (emotions, perceptions, dreams) that occur during entry into sleep, within sleep, or during arousals from sleep. The observed behaviors are more complex and appear more purposeful than the stereotyped activity seen in movement disorders.
Classification of Parasomnias

The parasomnia category is divided into:

- (NREM)-related parasomnias
- (REM)-related parasomnias
- Other parasomnias.
PATHOPHYSIOLOGY

• Sleep and wakefulness are not mutually exclusive states.
• Dysfunction in the orchestration of neural pathways regulating wake, (NREM) sleep, and (REM) sleep can produce state dissociation, resulting in the ability to perform complex motor behaviors outside of consciousness.
The general criteria for the NREM-related parasomnias include:

- Recurrent episodes of incomplete awakening
- Absent or inappropriate responsiveness
- Limited or no cognition or dream report
- Partial or complete amnesia for the event
(NREM)-related parasomnias

- Confusional arousals
- Sleepwalking
- Sleep terrors
- Sleep related abnormal sexual behavior
- Sleep-related eating disorder
Confusional arousals

- Elpenor syndrome, sleep drunkenness, or sleep inertia
- Mental confusion or confusional behavior
- Patients appear to be awake and may exhibit goal-directed behaviors.
- Speech is generally slow and devoid of content
- Appear bewildered and have little to no memory of the event
Sleep-related abnormal sexual behavior

- A confusional arousal variant that is characterized by abnormal sexual behaviors without awareness of intention.
- Behaviors may include prolonged or violent masturbation and sexual vocalizations, initiation of sexual intercourse with bed partners, or sexual assault of minors or adults who may be in close proximity to the patient.
Sleep terrors

- Night terrors or pavor nocturnus
- Characterized by a sudden arousal from sleep associated with sitting up in bed, intense fear, and a piercing scream
- Intense autonomic activation including tachycardia, tachypnea, diaphoresis, facial flushing, and mydriasis
Sleep terrors

- Individuals appear frightened and confused and are inconsolable and difficult to arouse.
- Adults typically present with explosive episodes during which they may bolt out of bed in a violent or agitated manner and have partial dream recollection after the event.
Sleepwalking (somnambulism) is characterized by a sequence of complex behaviors in sleep, including ambulation that is more elaborate and seemingly goal-directed than what is seen with confusional arousals.
Sleepwalking

- Episodes begin with a confusional arousal that is followed by the individual leaving the bed.

- Ambulation is typically slow and quiet, with the eyes open.

- Running, jumping, vocalization, and other automatic or purposeless behaviors, occasionally occur.
Sleepwalking

- Patients appear confused and can be agitated or aggressive when aroused.
- Self-injury is not uncommon
- Complete amnesia is typical, although some patients have partial recollection of their behavior.
Sleep-related eating disorder

- Involuntary eating associated with diminished levels of consciousness during an arousal from sleep
- Must be accompanied by consumption of inedible or toxic substances (e.g., high caloric processed foods, frozen foods, cat food, cigarettes, or cleaning solutions), insomnia, sleep-related injury, occurrence of dangerous behaviors in the search for or while cooking food, morning anorexia, or adverse health consequences from recurrent binge eating of high caloric food, including weight gain, metabolic disorders (e.g., diabetes mellitus, hyperlipidemia), hypertension, and OSA.
Clinical features of non-rapid eye movement (NREM) parasomnias in adults

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<tr>
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<td><strong>Timing at night</strong></td>
<td>First third of the major sleep period, less commonly in the morning during transition from sleep to wakefulness or during light NREM sleep</td>
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<tr>
<td><strong>Gender distribution</strong></td>
<td>Equal</td>
<td>Equal</td>
<td>Males &gt; females</td>
<td>Females &gt; males</td>
<td></td>
</tr>
<tr>
<td><strong>Event semiology</strong></td>
<td>Confusion and disorientation during an arousal from sleep; slow speech devoid of content</td>
<td>Screaming, agitation, intense fear, facial flushing, sweating; inconsolable, difficult to arouse</td>
<td>Slow and quiet ambulation, occasionally with more agitated behaviors</td>
<td>Abnormal sexual behaviors without awareness</td>
<td>Involuntary eating associated with diminished level of consciousness during an arousal from sleep</td>
</tr>
<tr>
<td><strong>Event duration</strong></td>
<td>3 to 15 minutes</td>
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</tr>
<tr>
<td><strong>Event recall</strong></td>
<td>Typically none</td>
<td>May have partial dream recollection after event</td>
<td>Typically none</td>
<td>Typically none</td>
<td>May have partial awareness during event or recall after event</td>
</tr>
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<td><strong>PSG characteristics</strong></td>
<td>Slow wave sleep, with rhythmic theta or delta activity</td>
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EMG: electromyography; NREM: non-rapid eye movement; PSG: polysomnography.
REM Sleep - Related Parasomnias

- Recurrent isolated sleep paralysis
- Nightmare disorder
- REM sleep behavior disorder
Recurrent isolated sleep paralysis

• Characterized by the intrusion and persistence of REM sleep-related atonia into wakefulness

• Unable to move or call out, yet many will have a dramatic sense of impending doom or urgency to flee.

• May also be accompanied by hallucinations.
Recurrent isolated sleep paralysis

- Sleep paralysis is usually an isolated symptom.
- SP is related to sleep deprivation
Nightmare disorder

- Nightmares are distressing dreams that have an emotional carryover into wakefulness.
- Nightmares usually do not have a motor component.
Nightmares

Did You Know?
Mary Shelley wrote the classic story Frankenstein after a vivid nightmare. That must have been some bad dream!
REM-related parasomnias
Normal Sleep Architecture
Timing of sleep-related movements and behaviors throughout the sleep period

- **Sleep-wake transition movements**: Hypnic jerks, hypnagogic foot tremor, periodic limb movements, and sleep-related rhythmic movement disorder.
- **Disorders of arousal**: Confusional arousals, sleep-related abnormal sexual behavior, sleep terrors, sleepwalking, and sleep-related eating disorder.
- **REM sleep behavior disorder, nightmares, and sleep paralysis**

**Ontogenetic history**

- Wake
- REM
- Stage N1
- Stage N2
- Stage N3

*Time through the sleep period*

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* Examples include hypnic jerks, hypnagogic foot tremor, periodic limb movements, and sleep-related rhythmic movement disorder.

† Disorders of arousal from non-REM sleep include confusional arousals, sleep-related abnormal sexual behavior, sleep terrors, sleepwalking, and sleep-related eating disorder.

REM: rapid eye movement.
Other Parasomnias

• Exploding head syndrome
• Sleep-related hallucinations
• Sleep enuresis
• Parasomnia associated with medical disorders
• Parasomnia due to a medication or substance
Exploding Head Syndrome

• Exploding head syndrome (EHS) is a disorder characterized by the perception of loud noises (e.g. a bomb explosion, gunshot or cymbal crash) when going to sleep or awakening.

• EHS is not associated with pain.

FRESE, A., SUMM, O. & EVERS, S. 2014. EXPLODING HEAD SYNDROME: SIX NEW CASES AND REVIEW OF THE LITERATURE, CEPhALALGIA, 1468-2982

BRIAN A.S. 2014. EXPLODING HEAD SYNDROME, SLEEP MEDICINE REVIEWS, 6: 489-493
Exploding Head Syndrome

- However the noise attacks can elicit a great deal of fear, confusion and distress in sufferers. Reports of tachycardia and palpitations are also common.
- Female > Male: Average age 50
- Usually self limited. Tricyclics and calcium channel blockers have been tried.
Sleep Related Hallucinations

- People report hearing voices, feeling phantom sensations and seeing people or strange objects in their rooms. Bugs or animals crawling on the walls are a common vision.
- Hypnogogic - onset
- Hypnopopnic – awakening
- Associated with Narcolepsy
Sleep Enuresis

- Childhood
- Usually self limited and resolves with maturation

- adult bedwetting
- Genetics.
- Urinary tract infection (UTI)
- Small bladder
- Diabetes
- Kidney disease
- Enlarged prostate gland
- Prostate cancer
- Bladder cancer
- Side effects of medications
- Neurological disorders
- Stress, anxiety, fear, and other psychological issues
- Sleep apnea
- An imbalance of the antidiuretic hormone (ADH)
Sleep Enuresis

- Childhood
- Usually self limited and resolves with maturation
- Adult Onset isolated Night time only enuresis is VERY uncommon

Parasomnias associated with other medical conditions

- Alpha-synuclein is a normal synaptic protein that may have a role in vesicle production. An aggregated and insoluble form of alpha-synuclein is a major component of Lewy bodies.
- It is also thought to play a role in the development of Parkinson’s Disease, Multiple System Atrophy and Lewy body dementia.
Parasomias associated with other medical conditions

- Parkinson’s Disease, Lewy body dementia, and other “Synucleinopathies” are associated with REM Sleep Behavior disorder.
- REM Sleep Behavior Disorder may precede their neurologic decline.

An Essay on the Shaking Palsy.

Chapter I. Definition—History—Illustrative Cases.

Shaking Palsy. (Paralysis Agitans.)

Involuntary tremulous motion, with lessened muscular power, in parts not in action and even when supported; with a propensity to bend the trunk forwards, and to pass from a walking to a running pace: the senses and intellects being uninjured.

James Parkinson 1817
Parasomias associated with other medical conditions

- Medical problems that provoke arousals, such as chronic obstructive pulmonary disease (COPD), hypoglycemia, gastroesophageal reflux, congestive heart failure, or renal disease, and neurologic issues ranging from head trauma, brain tumors, and encephalitis, have been reported to initiate complex sleep-related movements or behaviors.
Parasomnias due to a Medication or Substance

- **Nightmares**
  - sedative/hypnotics
  - β-blockers
  - Amphetamines
  - Dopamine agonists
  - Montelukast
  - Varenicline
Parasomnias due to a Medication or Substance

- REM Sleep Behavior Disorder
  - serotonergic antidepressants
Parasomnias due to a Medication or Substance

• **Hallucinations**
  – Hallucinogenic medications (LSD, etc)
  – Dopaminergic
Parasomnias due to a Medication or Substance

- **Complex Movements**
  - Zolpidem
Provocative factors

- Poor sleep hygiene
- Sleep deprivation
- Circadian rhythm disturbances (e.g., jet lag)
- Fever or other illnesses
- Emotional stress
- Medication use
- Ingestion of alcohol or sedatives before sleep onset
- Medical problems that provoke arousals
Management of Parasomnias

- **Management strategies vary according to:**
  - the type of movement or behavior
  - its frequency and severity
  - whether or not an underlying sleep or other medical or neurologic disorder is present.
Management of Parasomnias

- Infrequently occurring disorders of arousal (eg, sleepwalking, confusional arousals, sleep terrors) rarely need to be treated.
- Educate about triggers for events, including sleep deprivation.
- Counselled about ensuring a safe sleep environment.
- Remove causative agents (SSRI in RSBD, Zolpidem – Complex behaviors)
Management of Parasomnias

• For most parasomnias and abnormal movements, however, patients will continue to have minor occurrences, despite medication or behavioral modification.

• The overarching goal of therapy is to keep the patient and others safe.

• Patients should be reassured and clinicians should resist the urge to overtreat.
Failure of Treatment

- Repeat detailed history
- Event calendar
- Video EEG
- Confusional events at night in older adults may be a sign of medication intolerance or progression of an underlying neurocognitive disorder.
# Complex movements during sleep: Distinguishing clinical features

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<th>Behavior</th>
<th>Disorders of arousal</th>
<th>Sleep-related eating disorder</th>
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<th>Psychiatric events</th>
<th>Nocturnal seizures</th>
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<tbody>
<tr>
<td>Confused, semi-purposeful movement with eyes open</td>
<td>Eating high caloric or unusual foods with eyes open</td>
<td>Sometimes combative, violent dream enactment with eyes closed</td>
<td>Vivid, disturbing dreams, may end with a sudden jolt or jerk</td>
<td>Inability to move with preservation of eye and diaphragmatic movement</td>
<td>Variable, may involve panic or dissociative symptoms</td>
<td>Dependent on location of epileptic focus; may be brief, simple or complex stereotypical behavior</td>
<td></td>
</tr>
<tr>
<td>Age of onset</td>
<td>Variable</td>
<td>Older adults</td>
<td>Childhood or adulthood</td>
<td>Variable</td>
<td>Adolescence to adulthood</td>
<td>Variable</td>
<td></td>
</tr>
<tr>
<td>Family history</td>
<td>Yes</td>
<td>Unknown</td>
<td>No</td>
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<td>No</td>
<td>No</td>
<td>Variable</td>
</tr>
<tr>
<td>Time of occurrence</td>
<td>First third of night</td>
<td>First half of night</td>
<td>During REM sleep</td>
<td>Second half of the night most common (during REM sleep)</td>
<td>Upon awakening</td>
<td>Any time</td>
<td>Any time, but more likely in first half of night</td>
</tr>
<tr>
<td>Frequency</td>
<td>Once per night but not every night</td>
<td>Variable</td>
<td>Variable; a few times per month to nightly</td>
<td>May be nightly</td>
<td>Variable, less than weekly</td>
<td>Variable</td>
<td>Frontal lobe seizure can occur multiple times per night; less often for temporal lobe seizures</td>
</tr>
<tr>
<td>Duration</td>
<td>Minutes</td>
<td>Minutes</td>
<td>Seconds to a minute</td>
<td>Movement lasts seconds</td>
<td>Seconds to a minute</td>
<td>Variable (usually minutes or longer)</td>
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<tr>
<td>Memory of event</td>
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<td>Fragmentary to full dream recall</td>
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<td>Stereotypical movements</td>
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<td>No</td>
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<td>PSG findings</td>
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REM: rapid eye movement; PSG: polysomnogram; NREM: non-REM; EMG: electromyography; RLS/WED: restless legs syndrome/Willis-Ekbom disease.
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UpToDate 2016

Classification of sleep disorders. Brooke G Judd, MD
Michael J Sateia, MD

Disorders of arousal from non-rapid eye movement sleep in adults. Nancy Foldvary-Schaefer, DO, MS

Approach to abnormal movements and behaviors during sleep. Bradley V Vaughn, MD

Rapid eye movement sleep behavior disorder. Michael Howell, MD, Carlos Schenck, MD