Sleep Disorders in Children
• Sleep, a fundamental need, consumes more than half of our first year of life and roughly a third of an adult’s life.
• Sleep is classically separated into REM (Rapid Eye Movement) and non-REM Sleep.
• Non-REM sleep can be subdivided into light non-REM sleep (Stages I and II) and slow-wave sleep (stages III and IV)
• In normal people the different sleep stages at night are followed after about 90 minutes by REM (Rapid Eye Movement) sleep. Dreaming occurs in REM sleep. The cycle repeats itself several times during the night. REM sleep is a very different kind of sleep.
Sleep and Children

Sleep is as important as food, drink, or safety in the lives of children. Although this may seem apparent, many of us actually do not allow our children to get the critical sleep they need to develop and function properly.

As quoted by Michael J. Breus, PhD
It's certainly not something we do on purpose. As a matter of fact, we often don't think much of it, and that is the problem. With parents working long hours, schedules packed with school, after-school activities, and other lifestyle factors, naps are missed, bedtimes are pushed back, mornings start earlier and nights may be anything but peaceful. Missing naps or going to bed a little late may not seem like a big deal, but it is. It all adds up, with consequences that may last a lifetime.

As quoted by Michael J. Breus, PhD
To understand the critical nature of sleep to our children's growth and development, we need to understand more about what sleep does, what healthy sleep is, and what happens when children do not get either the right amount of sleep, the best quality sleep, or both. We also need to understand the role sleep plays in being alert or drowsy, stressed or relaxed, and how that in turn may affect temperament, learning, and social behavior.

As quoted by Michael J. Breus, PhD
“Sleep is the power source that keeps your mind alert and calm. Every night and at every nap, sleep recharges the brain's battery. Sleeping well increases brainpower just as weight lifting builds stronger muscles, because sleeping well increases your attention span and allows you to be physically relaxed and mentally alert at the same time. Then you are at your personal best.”

Quoted from Healthy Sleep Habits, Happy Child by Marc Weissbluth, MD
Healthy sleep requires:

- A sufficient amount of sleep
- Uninterrupted (good quality) sleep
- The proper number of age-appropriate naps
- A sleep schedule that is in sync with the child's natural biological rhythms (internal clock or circadian rhythm)

If, over time, any of these essentials are not optimal, symptoms of sleep deprivation may occur.
Sleep Disorders in Children

Sleep disorders, such as problems falling asleep and sleep apnea, affect your child's ability to get the sleep needed for good growth, development and overall health. Sometimes, problems with sleeping contribute to learning, mood and behavioral troubles during the daytime. Problems with sleep can also disrupt your entire family's life.
Most Common Sleep Disorders in Children:
Obstructive apnea

- A common type of apnea in children, obstructive apnea, is caused by an obstruction of the airway (such as enlarged tonsils and adenoids). This is most likely to happen during sleep because that's when the soft tissue at the back of the throat is most relaxed. As many as 1% to 3% of otherwise healthy preschool-age kids have obstructive apnea.

- Symptoms include:
  - snoring (the most common) followed by pauses or gasping
  - labored breathing while sleeping
  - very restless sleep and sleeping in unusual positions
  - changes in color
Obstructive apnea

- Because obstructive sleep apnea may disturb sleep patterns, these children may also show continued sleepiness after awakening in the morning and tiredness and attention problems throughout the day. Sometimes apnea can affect school performance. One recent study suggests that some kids diagnosed with ADHD actually have attention problems in school because of disrupted sleep patterns caused by obstructive sleep apnea.
- Treatment for obstructive apnea involves keeping the throat open to aid air flow, such as with adenotonsillectomy (surgical removal of the tonsils and adenoids) or continuous positive airway pressure (CPAP), which is delivered by having the child wear a nose mask while sleeping.
Central apnea

- Central apnea occurs when the part of the brain that controls breathing doesn't start or properly maintain the breathing process. In very premature infants, it's seen fairly commonly because the respiratory center in the brain is immature. Other than being seen in premature infants, central apnea is the least common form of apnea and often has a neurological cause.
Mixed apnea

- Mixed apnea is a combination of central and obstructive apnea and is seen particularly in infants or young children who have abnormal control of breathing. Mixed apnea may occur when a child is awake or asleep.
Hypersomnia

• Young people with excessive somnolence are often very sleepy during the daytime or sleep for very long periods at night. These disorders, excessive somnolence (sometimes called hypersomnia), are different from sometimes feeling tired after not getting enough sleep at night. Signs of this condition often appear during the teen years or early adulthood. Your child may nap a lot during the day, fall asleep at odd times, or find it very hard to wake up after a long sleep. Excessive somnolence may be caused by other sleep disorders, such as narcolepsy or sleep apnea.
Insomnias

• Insomnias are disorders that make it very hard to fall asleep or to stay asleep. Most people have trouble sleeping once in a while. Babies and young children often wake up naturally during the night. But when children have trouble falling asleep or staying asleep and the problem lasts a long time, a condition such as restless legs syndrome or obstructive sleep apnea may be the cause.
Parasomnias (night terrors and sleep walking)

- Parasomnias are disruptions in your child's sleep. Night terrors may seem like nightmares, but they are far more intense. During a night terror, you may not be able to comfort your child. Signs of a night terror are sitting up in bed, shouting or screaming. During sleep walking, your child may seem confused or partly awake. They may either stay in bed or walk around without seeming to be aware of their surroundings. The next morning, children often will not remember either night terrors or sleep walking. While scary for parents, night terrors usually do not harm children. In some cases, though, night terrors and sleep walking may be a sign that your child has another sleep disorder.
Sleep phase (circadian rhythm) disorders

- Circadian rhythm disorders are disruptions in your child's regular daily cycles, including sleeping and waking. Most circadian rhythms are controlled by the "clock" in the brain that runs the body. Circadian rhythm disorders may be caused by a mismatch between the internal body clock's setting and conditions in the outside world - a common example is jet leg. They may also be a sign of a problem within the clock itself.
Sleep related movement disorders

- Sleep-related movement disorders include head banging, body rocking, periodic limb movements and growing pains (benign nocturnal limb pain of children). While the causes of these disorders are different, they all make it hard for your child to sleep, whether due to a strong urge to move (restless legs syndrome), muscle pain (growing pains) or involuntary movement (periodic limb movements and head banging).
"On your application it says you have narcolepsy. What is that?"
Narcolepsy

- Narcolepsy causes sleepiness that can't be controlled. People with narcolepsy, including children and teens, have "sleep attacks." Even if they have had a normal night's sleep, they may fall asleep without any warning during the day. These sleep attacks last from several seconds to a half hour or more. Signs of narcolepsy often appear during the teen years.
- Narcolepsy is a serious neurological sleep disorder that can begin at any age and will continue throughout life. The onset typically occurs during the teens or early twenties, but it can occur earlier or later in life.
Narcolepsy

- One of the symptoms of narcolepsy is excessive daytime sleepiness. This can occur as a sleep attack which may be uncontrollable. Sometimes children can “daydream” a lot and are awake, but very drowsy and sleepy. To counteract the sleepiness, young children can be hyperactive and they can have difficulties with attention span. A person with narcolepsy can fall asleep during any activity, but the tendency is to fall asleep during sedentary situations.

- Another important symptom of narcolepsy is cataplexy: a sudden loss of muscle control due to emotions. Cataplexy may occur more frequently during times of stress or fatigue. This can present itself in a fall and has been mistaken many times for “fainting spells”. Sometimes this symptom is more prevalent at first than the excessive sleepiness.
Narcolepsy

- In people with narcolepsy nighttime sleep is often disrupted.
- Many people with the disorder also have hallucinations.
- Often there is sleep paralysis as well. Sleep paralysis is a temporary inability to move, usually just before falling asleep or right after waking up. In people with narcolepsy REM sleep occurs immediately after falling asleep. In REM sleep we are paralyzed.
Pathophysiology of Narcolepsy

- Likely due to loss of hypocretin-containing neurons\(^1\)
  - Hypocretin promotes waking state
  - Loss destabilizes sleep/wake boundaries
- Inappropriate intrusion of non-REM and REM sleep into wakefulness; fragmented nighttime sleep\(^1,2\)
  - EDS, sleep attacks, naps
  - Cataplexy possibly related to REM sleep–specific atonia
- Genetic association (especially between narcolepsy with cataplexy and HLA DQB1*0602 positivity)\(^3\)

REM = rapid eye movement; HLA = human leukocyte antigen.

# Major Symptoms of Narcolepsy

<table>
<thead>
<tr>
<th>Major Symptoms</th>
<th>Prevalence Within Narcolepsy</th>
<th>Major Characteristics</th>
</tr>
</thead>
</table>
| Excessive daytime sleepiness (EDS)¹    | 100%                          | • Chronic pervasive sleepiness  
• Sleep attacks and inadvertent naps triggered by irresistible overwhelming urges to sleep |
| Cataplexy¹,²                           | 60%-100%                      | • Triggered by strong emotions (eg, laughter)  
• Atonia (loss of muscle tone)          |
| Disrupted nighttime sleep (DNS)¹,³     | 60%-90%                       | • Frequent arousals/awakenings ranging from seconds to several hours                    |
| Hypnagogic and hypnopompic hallucinations¹,³ | Up to 66%                   | • Vivid, terrifying dreams during sleep-wake transitions                                 |
| Sleep paralysis¹,³                      | ≈60%                          | • The inability to move and speak during onset of sleep or awakening                    |

Narcolepsy Is Underrecognized and Underdiagnosed

- Affects 1 in 2000 in the US\(^1\)
  - Prevalence \(\approx\) multiple sclerosis, > cystic fibrosis\(^2,3\)
- Most patients not definitively diagnosed until 10-15 years after first symptoms appear\(^1\)
- Approximately 75% of patients with narcolepsy remain undiagnosed\(^4\)

---

Diagnosis of a sleep disorder

Diagnosis of a sleep disorder can be made in a sleep lab.

- Doctors use polysomnography (PSG or sleep study) to identify sleep problems. During sleep, the body acts differently than while awake. A sleep study monitors your child's body functions during sleep, including sleep stages, eye movements, brain waves, muscle activity, breathing, body positions and heartbeat.
Diagnosis of a Sleep disorder

- A Multiple Sleep Latency Test is a daytime nap study that gathers information about your child's body functions and sleepiness during the day. The test is usually done right after a polysomnography (PSG or sleep study). During the MSLT, your child will take a series of naps every two hours throughout the day.

- Children usually have sleep studies with CPAP or Bi-PAP after they have been diagnosed with obstructive sleep apnea or another breathing disorder during sleep. CPAP stands for continuous positive airway pressure, and Bi-PAP for bi-level positive airway pressure.

As done by Seattle Children’s Hospital
Diagnosis of a Sleep Disorder

Sadly, a sleep disorder is often not recognized in young children until there is a serious school problem.

Children with a sleep disorder may be misdiagnosed with attention deficit disorder, or a drug or alcohol problem or the wrong sleep disorder.
Treatment of Sleep Disorders

- Treatments can consist of medications, sometimes surgery (removal of adenoids and tonsils), CPAP mask, management of sleep schedules, sleep hygiene etc.
- If children with a sleep disorder are treated properly and provided with reasonable accommodation (i.e. teachers and other school personnel make it possible to take naps during school), these children will have much better chances of succeeding in school and therefore much better opportunities in adult life. It is so crucial to make sure there is a fast and accurate diagnosis once a sleep disorder is suspected.
For more information or membership visit www.narcolepsynetwork.org

Powerpoint created by:
Eveline Honig, MD, MPH
Executive Director, Narcolepsy Network, Inc.