Sleep and the Immune System

BY EDWIN CINTRON, RPSGT AND KORNELIA DENEAU, RPSGT

It is often wondered how it is that some people are more at risk of catching colds, viruses, and other common illnesses while others do not. It is obvious that this is directly affected by the body's immune system, but sleep may play a major part. The amount of restorative sleep one is able to acquire plays a crucial role in strengthening the immune system. Making sure you get plenty of rest is not just an old wives' tale after all.

There are no proven medications available that help to strengthen the immune system. This makes it important to lead a healthy lifestyle, which includes getting enough sleep. No one is really sure about the function of sleep as far as its role in the healing process, but body temperature appears to be important. Rats that are chronically deprived of sleep show increases of 10° C, or more. This suggests that sleep has cooling functions. Conversely, rats deprived of sleep for two weeks or more show a significant drop in body temperature suggesting that sleep may also have a role in heat retention. Studies of sleep deprivation done by Dr. Allen Rechtschaffen, et al, have shown that this constant drop in body temperature leads to death after 11-22 days in rats. It is estimated that it would take as long as 7 months for complete sleep deprivation to result in death for humans. A good, deep sleep (delta sleep, in particular) allows the body to produce more growth hormones. This, in turn, helps the body to rebuild the immune system.

Loss of restorative sleep can lead to many different diagnoses including the flu, colds, or other illnesses. One theory suggests that the tiredness associated with the illness may be the body sending a message. The message is simple. Sleep is needed. So why is sleep so important? To answer this, one must consider that when asleep, the human body is using less energy for other things. It can devote more energy to attack invading bacteria and/or viruses more effectively. In older adults, the ability to fight off infection is not as good as it is in younger adults. In response to an infection, one of the body's defense mechanisms is to increase body temperature (fever) to kill the cells causing the illness. Since the amount of slow wave sleep is less in older adults, this could explain why the immune system is weaker in the elderly. The amount of slow wave sleep in early adulthood (age 16-25 years) is about 18.9%, and it drops to 3.4% during middle age (age 36-50 years)

Healthy sleep also plays a very important role from infancy through adolescence. The impact of poor sleep becomes apparent with this population in a diverse manner. The lack of restorative sleep affects not only the health of the child but also the physical stature. The need for sleep and the repair of tissues is key for further growth. It is well known that in normal subjects, growth hormone is released during sleep in a pulsatile pattern with peaks during slow-wave sleep. We also know that the percentage of slow-wave sleep is increased during the developmental years. In pre-pubertal children, secretion of the growth hormone is clearly coupled with sleep onset. It peaks during the first third of the night, during slow wave sleep, and is secreted exclusively during other stages of sleep.

To better understand the consequences of poor sleep in the pediatric population, one can take into consideration the health issues of those with Down Syndrome (DS). Children with DS have been reported to have severe growth arrest and Microcephaly. Additionally, it should be considered that many patients with DS have been reported to present with obstructive sleep apnea. Given the above sleep alterations, the relationship between sleep structure and growth hormone production during sleep is strongly suspected in this population. Growth hormone release is known to be reduced in children with sleep apnea, probably due to the consequent sleep fragmentation. Growth hormone production can become normalized if the sleep apnea is effectively treated.

Aside from the physical status, sleep deprivation has an effect on a patient's mental status as well. When a person is severely sleep deprived, this has been known to lead to irritability, hallucinations, psychosis, etc... It has been shown that sleep deprivation leads to delusional thoughts and hallucinations as what was seen when Peter Tripp stayed awake for 201 hours in 1953. What makes this remarkable is some believe that recovery of these symptoms comes after just one night of sleep. For clinical depression, sleep deprivation has been used as a treatment as well. 40-60% of cases showed significant and rapid improvement of symptoms by utilizing sleep deprivation as a form of treatment for depression. The portion of sleep that seems to offer the highest amount of restitution again appears to be slow wave sleep, not only for immunity, but for the mental status as well.

There are other medical conditions that have been attributed to a lack of sleep. For example, if a person sleeps for too little or too long, it can lead to symptoms of Diabetes Mellitus. Sleeping less than 6 hours, or for more than 9 hours, has been linked to this metabolic inability to stabilize glucose levels. One study showed that when subjects were only allowed to sleep for only 4 hours per night, an 18 year old could not metabolize their glucose level any better than an 80 year old. Hypertension, also, has been linked to not getting an adequate amount of sleep. For example, in a study done by the American Heart Association, it was found that 80% of the growth hormone, which is important in healing and muscle regeneration, is released during delta sleep. Since Fibromyalgia patients show a decreased level of delta sleep, this may contribute to the muscular pain involved in this muscle disorder. Fibromyalgia is a chronic musculoskeletal pain disorder, which, to date, has no FDA approved treatment to help with symptoms.

The fact that some people become ill more often than others may be related to the fact that some people show more delta sleep than others. There are no known medications that improve immunity. However, slow wave sleep is most important in boosting the immune system, and exercise has been shown to increase the amount of slow wave sleep. It is estimated that 47 million adults in the United States do not get the required amount of sleep. This puts everyone at risk of health problems because the immune system is not able to repair itself without an adequate amount of sleep.

References
   http://www.npi.ucla.edu/sleepresearch/SleepDream/sleep_dreams.htm

continued on page 22
Sleep and the Immune System

continued from page 16


About the Authors
Edwin Cintron, RPSGT is an instructor of Polysomnography at Erwin Technical Center in Tampa, Florida and has been on the A2Zzz Magazine Editorial Board since 1998. Cintron

MONTANA REGIONAL SLEEP SEMINAR 2006, October 12-14, 2006, at the Mansfield Health Education Center in Billings, Montana. For more information contact Karen Allen at karen.allen@svh-mt.org or call toll free 800-4 SNORES.

APT FALL REVIEW COURSE, October 21-22, 2006, at the Hilton Indianapolis Hotel, Indianapolis, IN. For more information and registration visit www.aptweb.org.

INAUGURAL PATIENT SLEEP CONFERENCE, October 27-29, 2006, Minneapolis, MN. Hilton Minneapolis/St. Paul Airport Mall of America. First-of-its-kind gathering of patients and their families and sleep clinicians. Included are patient classes, and there will be clinical break-out sessions for Sleep Technologists. Sleep and respiratory CEUs will be awarded. Contact: tnasca@talkabouthsleep.com or call Tracy Nasca at (952) 358-7070 or visit www.talkabouthsleep.com.

SPRING SLEEP SEMINAR, March 16-18, 2007, hosted by Washington Regional Medical Center Sleep Disorders Center, Kansas City Marriott Country Club Plaza, Kansas City, Missouri. For more information, contact Melinda Trimble at mtrimble@wregional.com or phone (479) 527-0178.


Sleep and the Immune System
continued from page 22

was the recipient of the of the 2005 APT Sharon Keenan Award and was the first ever recipient of the APT Dr. Allen DeVilbiss Literary Award in 2002.

Kornelia Deneau, RPSGT has been working in the field of Polysomnography for seven years. She has had experience working in a trauma pediatric hospital setting, and has experience performing sleep studies on adults as well. She is currently the Clinical Coordinator at Good Shepherd Medical Center for Sleep Disorders in East Texas.

They may be contacted through the APT National Office at apt@aptweb.org.

Show you care by wearing the new…
Sleep Disorders Awareness Pin
Presented by the APT
Order form page 32