



- PhD in Biological Anthropology, Indiana University
- Specific research topic: Investigating the link between sleep, health and cognition of human and non-human primates
- In 2015, he was selected by the National Geographic magazine to speak as a grantee in a panel discussion on “Hacking the Brain” in the Emerging Explorers Class.
- Often published articles on human sleep, sleep behaviour, sleep disorders and other issues

**DR. DAVID R. SAMSON**

Assistant professor, University of Toronto, Mississauga

**SLEEP REMOVES WASTE IN THE NERVOUS SYSTEM**

Dr. David, who received his PhD in Biological Anthropology from Indiana University in 2013, has often published articles on human sleep, sleep behaviour, sleep disorders and other issues, and has been hailed by the author Theresa Fisher as “The Evolutionist” in Van Winkle’s “The 15 most Interesting People In Sleep”.

Sleep, according to him, affects the performance of our visual dynamics, memory, concentration, the ability to make decisions, and cognitive control of emotions. According to studies, poor quality sleep is associated with depression, anxiety and mental illness. Middle-aged people with good sleep quality can prevent cognitive decline in life later and reduce the risk of developing Alzheimer’s disease, and even delay the symptoms of physical ageing.

New technology, he said, has dramatically affected sleep and caused much damage to the body. The blue light emitted by mobile phones and television screens can prevent the body’s production of melatonin that regulates sleep, causing sleep disorders. In the United States, about 50 to 70 million people suffer from sleep disorders, and his research found that about 300 million people in Southeast Asia suffer from sleep disorders, these include insomnia, narcolepsy, sleep apnea, circadian phase disorders, seasonal affective disorders, and so on.

However, he discovered that the brain has a mechanism called the glymphatic system, which is responsible for the removal of waste from the nervous system: beta-amyloid protein which is a useless protein. Our brain produces a lot of beta-amyloid protein in a day, and one function of sleep is to remove these useless proteins. When we have enough sleep, the body can produce enough melatonin to expel beta-amyloid protein and to clean up brain waste.

If we browse our mobile phones at night or turn on the lights, we will inhibit melatonin production and produce more damaging beta-amyloid protein in our brains, making us susceptible to Alzheimer’s disease. He discovered that if the sleeping duration is too short, it could impair the sleep mechanism. Compared to other primates, humans has short sleep duration is relatively short; thus, we do not have much time to remove brain toxins. And so, getting enough sleep is so vitally important. This also explains why there is no Alzheimer’s disease in other primates than humans.

Nonetheless, technology is like a double-edged blade. Although human inventions destroy our health, it has also produced high-quality mattress, comfortable sleep environment, and a temperature-controlled home, allowing us to obtain better sleep quality and longer sleep duration, to create a fulfilling life.

**THE LEGACY OF SLEEP EVOLUTION**

50-70 million US sleepers have disorders and estimates up to 300 million in South East Asia

- » Insomnia
- » Narcolepsy
- » Sleep apnea
- » Circadian phase disorder
- » Seasonal affective disorder

Shining evolutionary light on human sleep and sleep disorders

Charles L. Nader, David R. Samson, and Andrew B. Kuper

**Science** Sleep Deprivation: Clearances from the Adult Brain

**Mechanisms**  
 Glymphatic system – cleaning out the brain!

- » Nedergaard and Goldman 2012
- » One of the biggest discoveries of the 21st century!
- » Alert nervous system produces byproducts:
  - o ATP
  - o Beta amyloid protein

