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Sleep Studies, A Diagnostic Tool
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A Diagnostic Tool

"Sleep well and sweet dreams" is the blessing of many parents when children scamper off to bed. Sleeping well, however, is no simple matter for many individuals and the dream phase can be troublesome, even fatal, to some people. Snoring and dreaming have been viewed, simply, as a stage differing in behavior and brainwave pattern from wakefulness. In the early fifties, through EEG measurements, researchers discovered that normal sleep is a cycle comprised of several distinct, repeated phases, each with its own specific brainwave patterns. Much of their work was focused on humans, although many mammals have similar sleep patterns. As an example, Dr. Hendricks cited sleep apnea that occurs in cats, dogs, etc. and is now Dr. Hendricks' pet, Checkers, a cat that is now Dr. Hendrick's pet.

Dr. Hendricks, who has pursued this area of study since 1974, treats dogs, cats, and some other animals suffering from sleep disorders at the hospital. She explained that this is the only facility where such treatment for animals is available. Most of her patients are referred by the neurology department at the Veterinary School. In her research she also works closely with the sleep clinic and the cardiovascular-pulmonary group at the Hospital of the University of Pennsylvania (HUP). Medicine is beginning to recognize the implications of sleep disorders, and Dr. Hendricks views this study as an important diagnostic tool. "We should be paying attention to what is going on during sleep. Abnormalities may manifest themselves first in sleep while they may still be subclinical in waking."

As an example, Dr. Hendricks cited sleep apnea (hypersomnia with periodic apnea, HPA), a disorder found primarily in middle-aged men. These individuals breathe normally during waking, but in slow-wave sleep they begin to have pauses in breathing. In REM sleep they cease to breathe for long periods, sometimes up to eighty-percent of the REM phase. The pauses are often 40 to 60 seconds long. As an example, Dr. Hendricks cited sleep apnea that occurs in cats. She suspects that dogs may suffer from sleep apnea and could be used as models to study the disorder, since many owners have reported loud snoring, gasping, and shifting of the head to an elevated position by their dogs. "It is easier to get animals to sleep than humans, and we can easily observe them. Their sleep cycles are shorter and one person can handle the observation. It is also easier to follow an animal from puppyhood to old age as the disorder progresses." She hopes to have available soon the sensitive instruments needed to measure blood gases and breathing rates of animals while they are soundly asleep. Only in this way will she be able to confirm her suspicion that dogs do suffer from apnea. Dr. Hendricks also hopes to find a reason for the unexplained deaths of very young puppies, and explains that apnea has been implicated in sudden infant death syndrome which is fatal to many human babies.

To study animals in their sleep, the veterinary school has a special soundproof cage which is lighted, heated, and ventilated. The animal is observed through a one-way mirror, and the cage is spacious enough to house a large dog. Dr. Hendricks said that dogs and cats adjust quickly to the cage. "We play with them, then we put food and water in the cage, and a litterpan for a cat. The animals eat and then fall asleep in the quiet, warm environment." Then they are observed. Often a video camera is positioned in front of the mirror to record the entire sleep cycle. Brain (EEG) and muscle (EMG) activity may also be recorded at the same time.

One animal studied in this manner was Checkers, a cat that is now Dr. Hendrick's pet. Checkers was brought to the hospital by her owners because, while sleeping, she moved around so violently that she destroyed furniture and often landed on the floor across the room. The cat was tested and checked and no neurological disorders were found. Dr. Hendricks then studied her sleep cycle and the cerebral activity in conjunction with muscular activity in the neck muscles was recorded by EEG and EMG. It was found that the cat went through the normal slow-wave sleep and then entered REM sleep. In this phase normal behavior never occurred. Instead, the cat exhibited violent movements although her neck muscles were in an atonic state. When comparing the cat's movements to sleepwalking in man, Dr. Hendricks explained that sleepwalking occurs during slow-wave sleep and not during the REM phase. The disorder of Checkers is a different one and its causes remain a mystery. A second cat with identical signs has recently been studied.

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