

Investigation of sleep

Investigations of sleep and wake function

There are several methods that doctors and other health professionals use to investigate the nature of a person's sleep. Some methods involve listening to the patient's description of their sleep and wake pattern. Other techniques include measuring a person's brain waves and other body functions while they are asleep as well as during the day. The following methods are commonly used to investigate a person's sleep and wake function.

Interview

During the interview the doctor will ask questions not only about sleep habits but also day activities. What the patient does during the day is very important to their sleep. It is often useful for a partner or a member of the family to be present to report aspects of sleep behaviour that the patient may not be aware of.

Questions regarding sleep as a child and aspects of upbringing are part of the interview. Sometimes a psychiatric assessment is recommended. This is often a difficult request, which may not be welcome by the patient. However, psychiatrists or clinical psychologists are professionals with special expertise in probing the emotional part of our lives which is very important in sleep and wake function disorders.

Sleep diary

The person is often asked to keep a record of their bed time, how long it takes them to fall asleep, the number of awakenings through the night, any medications they take, the time they get up and a personal assessment of how well they slept. The sleep diary should be filled in when the person gets up in the morning. If the person forgets to fill in the diary after waking up they should not try to fill it in later during the day because it can be difficult to remember how they slept. The sleep diary is usually kept for a week or two.

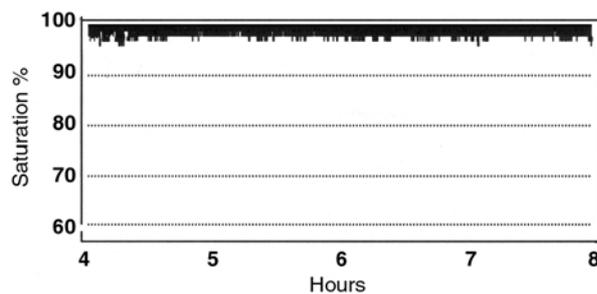
Sleep questionnaire

There are many questionnaires used to measure *subjective* symptoms of sleepiness and disturbed sleep. A popular and simple one is the Epworth Sleepiness Scale (ESS) developed by Dr Murray Johns at the Epworth Sleep Disorder Centre in Melbourne. It measures the probability of falling asleep in a series of common daily situations. The score of the ESS is between 0 and 24. Values above ten are suggestive of increased daytime sleepiness. However there is poor correspondence between self reported sleepiness and objective measure of tendency to fall asleep, such the multiple sleep latency test.

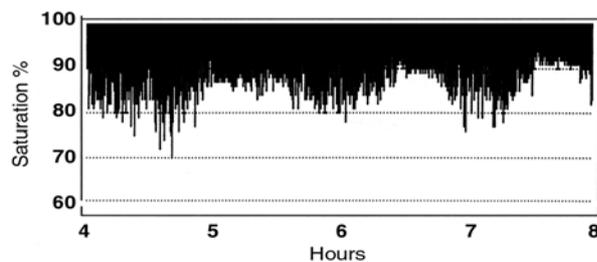
Measuring sleep

Overnight oximeter

An overnight oximeter is the recording of blood oxygen levels through the night. This test is used as a screening test for the diagnosis of disturbed breathing during sleep (sleep apnoea). During sleep the level of oxygen is maintained unchanged by regular breathing. However, if the person has sleep apnoea the oxygen levels tend to fluctuate and this suggests that a full sleep study is needed. The oximeter can be done in the patient's home with minimal disruption of night time routine.



Normal oxygen



Abnormal oxygen

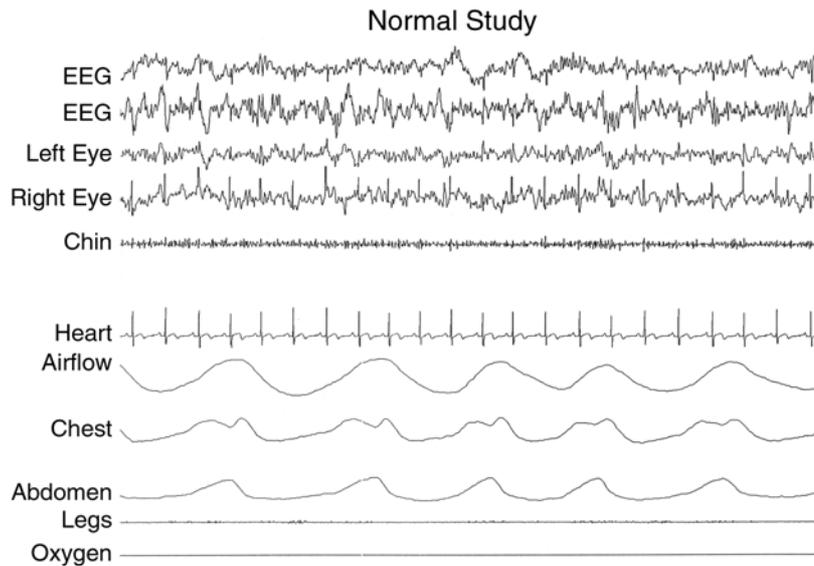
Overnight sleep study

An overnight sleep study is called overnight polysomnography (this means graph of many sleep functions). During a sleep study a person attends the sleep unit in the evening and is connected to wire leads (electrodes) before going to bed (fig. below). Different leads are applied to different areas to get information about brain waves, eye movements, breathing, blood oxygen, heart and muscle activity



This information is recorded through the night with the supervision of a sleep technician

The overnight recording lasts about 8 hours and is divided in 30 second periods called epochs. Each study is composed of 700 to 960 epochs that are analysed (scored) one by one by trained technicians. Polysomnography is a highly specialised and labour intensive test. It provides information on the length and quality of sleep. It allows a measurement of how long it takes a person to fall asleep, how many times they wake up through the night. Microphones are often used to measure snoring and elastic bands are applied to the chest to monitor the breathing muscles' activity. Small gold plated electrodes are applied to the shin to monitor leg movements which are often seen in patients with restless legs (restless legs syndrome).



30 seconds of recordings (one page). A sleep study is ~ 800 pages

Because the person is not used to having wires attached to them and they are not sleeping in their own bed, the sleep is often somewhat different from home. This is called the 'first night effect' and sometimes more than one night recording is needed so that the person gets used to the procedure.

During the day before the sleep study the person should continue their usual routine unless special instructions are given. For example, they should have the usual amount of alcohol or coffee.

Multiple sleep latency test

After an overnight sleep study, some people may be required to stay at the sleep unit and have a test to find out how sleepy they are during the day. This test is called a multiple sleep latency test or MSLT. During an MSLT the person is allowed to have 20 minute naps at 2 hour intervals during the day. Typically the naps occur at about 9 a.m., 11 a.m., 1 p.m. and 3 p.m. The technicians at the sleep unit will measure how long it takes the person to fall asleep during each of the naps.

The naps only last 20 minutes and so only non-REM sleep is usually recorded. However in some disorders such as narcolepsy, REM sleep can occur in the 20 minute naps and this can help in making a diagnosis.

A variant of the MSLT is called the 'maintenance of wakefulness test'. In this test the person is sitting in a comfortable chair in a darkened room and is asked to try and stay awake. The test lasts about 45 minutes and is repeated throughout the day.

