



An Overview of Polysomnography

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Polysomnography (PSG), a type of sleep study is a multi-parametric test used in the study of sleep and as a diagnostic tool in sleep medicine. The test result is called a polysomnogram, also abbreviated PSG. The name is derived from Greek and Latin roots: the Greek *polus* for "many, much", indicating many channels. Type I polysomnography, a sleep study performed overnight while being continuously covered by a credentialed technologist, is a comprehensive recording of the bio physiological changes that do during sleep. It is usually performed at night, when most people sleep, [1] though some labs can accommodate shift workers and people with circadian rhythm sleep disorders and do the test at other times of the day. The PSG monitors many body functions, including brain activity (EEG), eye movements (EOG), muscle activity or skeletal muscle activation (EMG), and heart rhythm (ECG), during sleep. After the identification of the sleep disorder sleep apnea in the 1970s, the breathing functions, respiratory airflow, and respiratory effort indicators were added along with peripheral pulse oximetry. Polysomnography no longer includes NPT, Nocturnal Penile Tumescence, for monitoring of erectile dysfunction, as it is reported that all male patients will experience erections during phasic REM sleep, regardless of dream content.

A polysomnogram will typically record a minimum of 12 channels requiring a minimum of 22 wire attachments to the patient. These channels vary in every lab and may be adapted to meet the doctor's requests. There is a minimum of three channels for the EEG, one or two measure airflow, one or two are for chin muscle tone, one or more for leg movements, two for eye movements (EOG), [2] one or two for heart rate and rhythm, one for oxygen saturation, and one each for the belts, which measure chest wall movement and upper abdominal wall movement. The movement of the belts is typically measured with piezoelectric sensors or respiratory inductance plethysmography. This movement is equated to effort and produces a low-frequency sinusoidal waveform as the patient inhales and exhales.

For the standard test, the patient comes to a sleep lab in the early evening and over the next 1–2 hours is introduced to the setting and "wired up" so that multiple channels of data can be recorded when he/she falls asleep. The sleep lab may be in a hospital, a free-standing medical office, or in a hotel. A sleep technician should always be in attendance and is responsible for attaching the electrodes to the patient and monitoring the patient during the study [3].

During the study, the technician observes sleep activity by looking at the video monitor and the computer screen that displays all the data second by second. In most labs, the test is completed and the patient is discharged home by 7 a.m. unless a Multiple Sleep Latency Test (MSLT) is to be done during the day to test for excessive daytime sleepiness [4].

Most recently, health care providers may prescribe home studies to enhance patient comfort and reduce expense. The patient is given instructions after a screening tool is used, uses the equipment at home and returns it the next day. Most screening tools consist of an airflow measuring device (thermistor) and a blood oxygen monitoring device (pulse oximeter). The patient would sleep with the screening device for one to several days, then return the device to the health care provider. The provider would retrieve data from the device and could make assumptions based on the information given. For example, series of

drastic blood oxygen desaturations during night periods may indicate some form of respiratory event (apnea). The equipment monitors, at a minimum, oxygen saturation. More sophisticated home study devices have most of the monitoring capability of their sleep lab technician run counterparts, and can be complex and time-consuming to set up for self-monitoring[5].

Type I polysomnography, a sleep study performed overnight while being continuously covered by a credentialed technologist, is a comprehensive recording of the bio physiological changes that do during sleep.

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