



Health Services Vocational Collage

Electrical Picture of The Brain

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Abstract

Experts in many different fields work in hospitals and various health institutions. In this way, the system progresses in a very controlled manner. Electroneurophysiology technician performs various neurophysiological measurements to easily and quickly diagnose diseases caused by Central Nervous System (CNS) problems. The person who uses and directs all these devices such as electromyography, electroencephalogram and polysomnography under the supervision of specialist physicians is called an electroneurophysiology technician. These technicians can also easily take care of the maintenance and cleaning of the devices. The electroneurophysiology technician who keeps patient records also ensures that the records are archived regularly. At the same time, it plays an important role in easily solving any problems related to the devices. In this study, I aimed to compile information about the electroneurophysiology department and its technicians, which is a new field in our country, as a result of literature research and present it to those who are interested.

Keywords: Electroneurophysiology, electroencephalography, electroencephalogram.

Introduction

Electroneurophysiology is the scientific field dedicated to the recording and examination of the electrical activity of the brain and the nervous system (Uskudar University, 2023). Hans Berger, a psychiatrist, and neurologist is known as the innovator of electroencephalography (EEG), the method used to record the electrical activity of the brain. During World War I, Hans Berger conducted the first electroencephalogram recording by placing electrodes in the brains of individuals who had suffered head injuries (1924). In the subsequent years, he demonstrated that electroencephalogram recordings could also be made using electrodes placed on the scalp (Ummuhan, 2022). Today, electroencephalography is recorded using electrodes attached to the scalp, following the internationally accepted 10-20 system (Betül et al, 2019). Our brain continuously generates very low-intensity electrical currents and emits these waves in a regular manner (About EEG, 2023). EEG is the process of recording these waves in a computerized environment. EEG recording is performed by placing small electrodes on the scalp through a conductive

substance called "paste." For the most accurate EEG recording, the patient's hair must be clean. During the recording, the technician should pay attention to commands such as opening and closing the eyes, and if the patient is in a state of sleep, they should avoid opening their eyes or moving. Changes in electrical potential between the electrodes placed on the skull are recorded by the computer, and the results are interpreted by an expert who provides the necessary information to the patient. When examining the obtained recording, deviations from the norm can be used to diagnose various brain disorders (Donald and Fernando, 2017). EEG is a completely painless and harmless examination method. It does not cause discomfort. There is no exposure to electricity or radiation. It is not harmful to pregnant women, does not harm the brain, and EEG recordings can be taken from individuals of all ages, including newborns (Canan, 2023).

In EEG recording, the following steps are followed:

1. The technician performs the initial measurement and determines the exact placement of the electrodes, marking them with a special pen. EEG paste is

applied to the electrodes to enhance conductivity.

2. After this determination, the electrodes are placed on the scalp using adhesive. Sometimes, electrode caps may be used instead. The electrodes are connected to the EEG device to transmit brain waves.

3. Once the preparations are complete, the recording process begins. Sometimes, to obtain more reliable results, you may need to fall asleep during the recording. Certain eye and body movements can interfere with the quality of the results.

4. While EEG records brain waves, your body movements are simultaneously recorded with a video camera. These recordings can provide guidance in diagnosis and treatment.

5. After the EEG recording, the electrodes are removed, and the results are delivered to the physician (Acıbadem, 2022).

Diseases That Can Be Diagnosed By EEG

EEG can be applied to patients with suspected or diagnosed neurological disorders where measuring brain activity is crucial for diagnosis and monitoring.

These patients can be summarized as follows:

- Epilepsy patients
- Those suspected of or diagnosed with brain hemorrhage
- Stroke or cerebrovascular disease patients
- Individuals with suspected brain tumors or brain cancer
- Presence of infections affecting brain tissue such as encephalitis
- Excessive sleepiness (narcolepsy) or insomnia
- Individuals with a history of head trauma
- Dementia
- Patients in a coma state (Acıbadem, 2022)

Types of Electroencephalogram

Routine (Awake) EEG: Also known as the awake EEG, this type of EEG recording requires the patient to remain calm while sitting or lying down. The patient is asked to open and close their eyes 4-5 times with 10-second intervals during the EEG recording. Deep breathing exercises are performed for 3-5 minutes. Additionally, a photic

stimulation activation method is used for 5-7 minutes. The goal of routine EEG is to evoke epileptic foci or abnormal activity actively (About EEG, 2023).

Sleep EEG: Sleep EEG is recorded while the patient is asleep. The patient should ideally stay awake as much as possible before the recording. However, for patients who cannot fall asleep, medications such as chloral hydrate may be administered to induce sleep (About EEG, 2023).

Sleep-Wake EEG: In a Sleep-Wake EEG examination, routine (awake) EEG recordings are obtained at the beginning of the examination. After 15-20 minutes of awake EEG recording, the patient is asked to fall asleep, and the examination continues. In sleep EEG examinations, depending on the situation, a 1-hour recording is performed, after which the patient is awakened (About EEG, 2023). This type of EEG can be informative in diseases such as epilepsy, coma, brain death, and dementia (Avicenna, 2023).

1-3 Hour EEG Monitoring: EEG monitoring involves simultaneous video recording during EEG recording. The goal here is to compare simultaneous EEG changes with suspected movements or seizure-like events, allowing for a

comprehensive assessment. Thus, it becomes possible to evaluate the seizure both visually and by recording brain activity simultaneously for a certain period (About EEG, 2023).

All-Night EEG and 24-Hour EEG Monitoring: This involves recording EEG for the entire night, 24 hours, or longer (About EEG, 2023).

EEG Technician's Duties and Responsibilities

According to the regulation regarding the job descriptions and duties of healthcare professionals and other healthcare workers:

a) Performs electrophysiological applications such as electroencephalography (EEG), electromyography (ENMG), polysomnography (PSG), positive airway pressure (PAP) titration, evoked potential studies, as directed by the physician.

b) Monitors the patient throughout the procedure, reports any unusual conditions or complications observed regarding the patient's condition to the physician.

c) Prepares the necessary devices, electrodes, materials, and medications

for procedures and emergency situations. Calibrates the devices before the procedure. Ensures the suitability of the environment for procedures.

d) Ensures the cleaning and maintenance of the devices and materials used after the procedure and stores them properly (Legislation, 2014).

Occupation and Career Opportunities

Graduates of the Electroneurophysiology program can work in electroencephalography, evoked potentials, and sleep units in public or private hospitals or clinics under the supervision and control of specialists in neurology, otorhinolaryngology, psychiatry, pediatrics, chest diseases, and physiology. They can also work as electrophysiology technicians in scientific research conducted domestically and internationally at universities. In addition, those who successfully complete the associate degree programs in "Electroneurophysiology" can be appointed as Healthcare Technicians according to the Public Personnel Selection Examination (KPSS). Graduates who have completed associate degree programs in "Electroneurophysiology" can transfer

vertically to undergraduate programs in "Nursing, Nursing and Health Services, Physiotherapy and Rehabilitation" if they are successful in the External Transfer Exam (DGS) organized by OSYM (Biruni, 2021).

In the Electroneurophysiology program, training is provided on how to apply electrophysiological methods such as Electromyography (EMG), Polysomnography (PSG), and Electroencephalography (EEG), which are essential for the examination of cognitive and behavioral analysis in the brain and the diseases that result from the loss of these functions. The number of graduates with the title of Electroneurophysiology Technician is quite limited, and in today's world, where the importance of the healthcare field is increasing, there can be seen a significant demand for professionals in this field (Biruni, 2021).

The general aim of this study is to contribute to understanding the development of EEG from the past to the present, how EEG is recorded and by whom, and the job description of EEG technicians. Additionally, it aims to provide information about job and career opportunities for individuals who wish to choose this field after graduation.

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