

CLINICAL PHYSIOLOGY

The professional body for Neurophysiological Physiologists is the Association of Neurophysiological Scientists (ANS – formerly the Electrophysiological Technologists Association). The ANS has an Education Committee which oversees the body of knowledge for the discipline and informs curricula for training at undergraduate and masters level. ANS has a long standing and close relationship with the British Society for Clinical Neurophysiology (BSCN) which is the professional body of the medical staff within the discipline.

Neurophysiologists are involved in a variety of activities, mainly within the area of diagnostic investigations for conditions affecting the brain, spinal cord, peripheral nerves and muscles. Referrals for these investigations may almost any medical specialty. In general, the investigations are divided into three major categories:

- 1. Electroencephalography (EEG)** This is a recording of the spontaneous electrical activity of the brain through the intact scalp. Electrodes are placed on the scalp and recordings are carried out whilst the patient is sitting or lying comfortably so that they are able to relax and even to become drowsy and sleep. The EEG is mainly used to investigate disorders of consciousness – “fits, faints and funny turns”. Most EEGs are recorded with simultaneous video recording to improve the interpretation as brain activity is extremely sensitive to changes in alertness and environmental factors. Neurophysiologists carry out the recordings and prepare a report after analysing the results. This may contribute to a diagnosis of epilepsy which has lifelong implications for the patient both medically and socially making accurate interpretation crucial. Sometimes it is necessary to make prolonged recordings over a longer period to capture events or abnormal activity and this may be done with an ambulatory recording setup or as an inpatient in dedicated EEG Telemetry units. EEG is also used in the critical care setting where patients with head injuries or other causes of coma may need an EEG to determine prognosis. Again, interpretation of the findings of these tests are very complex and sensitive (e.g. decisions regarding organ donation and whether or not to continue treatment may depend on the result). In dedicated epilepsy units where patients are under consideration for epilepsy surgery it may be necessary to record EEG invasively from the brain to identify focal origins

of abnormality. This enables the surgeon to remove just the abnormal areas and to spare the functional areas

2. Evoked Potentials (EPs) These are electrical potentials recorded from the nervous system in response to an external stimulus, e.g. a flash of light or a moving pattern on a TV screen. Using this test, it is possible to explore which part of the visual pathway is causing a problem as we can measure a response from the retina in the eye itself as well as from the brain. Conditions such as multiple sclerosis and various ophthalmic disorders are investigated with EPs. Intra-operative monitoring of EPs during surgery is an expanding specialist area of work in neurophysiology. In this discipline, neurophysiologists work closely with orthopaedic surgeons and neurosurgeons to monitor neural pathway function during operations on the spine and pelvis. They can also monitor the function of the cortex (for epilepsy surgery/ tumour resection) and monitor and map the neural axis and peripheral nerves. The aim in all of these procedures is to ensure that the surgery does not damage vulnerable parts of the nervous system which could result in paralysis or other neurological deficits post-surgery. Surgeons rely on the neurophysiologist to provide constant and accurate information on neural function throughout the operation and this is crucial to improved outcomes.

3. Peripheral Nerve Conduction Studies and Electromyography (NCS and EMG) These investigate the function of the nerves and muscles, principally in the limbs. Electrodes are applied over the nerves and electrical stimuli applied to enable the conduction velocity of the nerves to be measured. This is used to evaluate nerve function in a variety of conditions from simple nerve compressions such as carpal tunnel syndrome to complex conditions such as myasthenia gravis and motor neurone disease. Neurophysiologists carry out these delicate recordings and provide reports to contribute to the diagnosis and which are often used to decide whether or not to operate on a compressed nerve.

Most investigations are performed in an outpatient setting although very sick patients from neonates in incubators to crash victims in intensive care units are seen at the bedside. Some tests need to be prolonged and may be carried out in the patient's home.