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## Neurology : Introduction

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Neurology implies the branch of medicine pertaining to the study and treatment of disorders of the nervous system. The nervous system is a complex, sophisticated system that regulates and coordinates body activities. It consists of two major divisions:

- First is Central nervous system: the brain and spinal cord, and
- Second Peripheral nervous system: all other neural elements, such as eyes, ears, skin, and other “sensory receptors”.

A doctor who has specialisation in neurology is known as a neurologist. The neurologist treats disorders that affect the brain, spinal cord, and nerves, such as:

- Demyelinating diseases of the central nervous system, such as multiple sclerosis
- Cerebrovascular disease, such as stroke
- Headache disorders
- Infections of the brain and peripheral nervous system
- Neurodegenerative disorders, such as Alzheimer’s disease, Parkinson’s disease, and Amyotrophic Lateral Sclerosis (Lou Gehrig’s disease)
- Movement disorders, such as Parkinson’s disease
- Seizure disorders, such as epilepsy
- Spinal cord disorders

- Speech and language disorders.

Neurologists do not perform surgery. If one of their patients requires surgery, they refer them to a neurosurgeon.

A number of neurologists also have additional training or interest in one area of neurology, such as stroke, epilepsy, neuromuscular, sleep medicine, pain management, or movement disorders.

## WHO'S NEUROLOGIST

Neurologist is a medical doctor who possesses specialized training in diagnosing, treating and managing disorders of the brain and nervous system. Pediatric neurologists are doctors with specialized training in children's neurological disorders. A neurologist's educational background and medical training includes an undergraduate degree, four years of medical school, a one-year internship and three years of specialized training.

Many neurologists also have additional training in one area of neurology such as stroke, epilepsy or movement disorders.

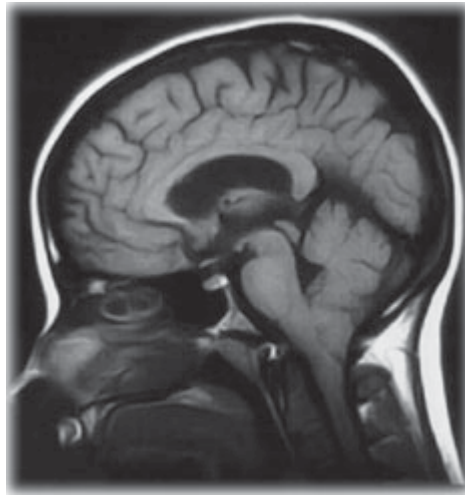
## Role Play by Neurologist

Neurologists are principal care providers or consultants. In comparison to other physicians a patient has a neurological disorder that requires frequent care, a neurologist is often the principal care provider. Patients with disorders such as Parkinson's disease, Alzheimer's disease or multiple sclerosis may use a neurologist as their principal care physician. In a consulting role, a neurologist will diagnosis and treat a neurological disorder and then advise the primary care physician managing the patient's overall health. For instance, a neurologist would act in a consulting role for conditions such as stroke, concussion or headache. Neurologists can recommend surgical treatment, but they do not perform surgery. When treatment includes surgery, neurologists will monitor surgically treated patients and supervise their continuing treatment.

Neurosurgeons are medical doctors who specialize in performing surgical treatments of the brain or nervous system.

### **Treatment by Neurologist**

Disorders of the nervous system, brain, spinal cord, nerves, muscles and pain are mainly treated by Neurologist. Common neurological disorders include:



- Stroke
- Alzheimer's disease
- Headache
- Epilepsy
- Parkinson's disease
- Sleep disorders
- Multiple sclerosis
- Pain
- Tremor
- Brain and spinal cord injuries
- Brain tumours
- Peripheral nerve disorders
- Amyotrophic lateral sclerosis.

## **New Findings**

In last few years, research has advanced understanding fundamental mechanism of the brain. With this new understanding, neurologists are finding new treatments and, ultimately, cures for many neurological diseases, which are among the most destructive and costly public health problems in the United States. For instance, research breakthroughs now permit neurologists to successfully treat stroke patients with clot-busting medication proven to reduce deaths and decrease disability.

Research developments have also produced new medications that relieve migraines, slow the progression of multiple sclerosis and improve movement in Parkinson's patients. These are just a few of the many advances gained from research that are improving the lives of millions of men and women around the world suffering from neurological disorders. To keep research advancing toward future cures and treatments, it's significant for patients to advocate for additional research funding. Contact your members of Congress and ask them to support neurology research.

## **NEUROLOGICAL EXAMINATION**

During this examination, the health history of the patient is reviewed by neurologist with special attention to the current condition. The patient then takes a neurological exam. Typically, the exam tests mental status, function of the cranial nerves (including vision), strength, coordination, reflexes, and sensation. This information endorse the neurologist determine whether the problem exists in the nervous system and the clinical localization. Localization of the pathology is the key process by which neurologists develop their differential diagnosis. Further tests may be needed to confirm a diagnosis and ultimately guide therapy and appropriate management.

## **Neurologists Tasks**

In the clinic the chief task of Neurologists is to examine patients who have been referred to them by other physicians in both the

inpatient and outpatient settings. A neurologist will start their interaction with a patient by taking a comprehensive medical history, and then perform a physical examination focusing on evaluating the nervous system. Components of the neurological examination include assessment of the patient's cognitive function, cranial nerves, motor strength, sensation, reflexes, coordination, and gait. In few examples, neurologists may order additional diagnostic tests as part of the evaluation. Commonly employed tests in neurology comprise imaging studies such as computed axial tomography (CAT) scans, magnetic resonance imaging (MRI), and ultrasound of major blood vessels of the head and neck. Neurophysiologic studies, including electroencephalography (EEG), needle electromyography (EMG), nerve conduction studies (NCSs) and evoked potentials are also commonly ordered.

Neurologists frequently perform lumbar punctures in order to assess characteristics of a patient's cerebrospinal fluid. Advances in genetic testing has made genetic testing an important tool in the classification of inherited neuromuscular disease.

The role of genetic influences on the development of acquired neuromuscular diseases is an active area of research.

Some of the conditions commonly encountered treated by neurologists include radiculopathy, neuropathy, headaches, stroke, dementia, seizures and epilepsy, Alzheimer's Disease, Attention deficit/hyperactivity disorder, Parkinson's Disease, Tourette's syndrome, multiple sclerosis, head trauma, sleep disorders, neuromuscular diseases, and different types of infections and tumours of the nervous system.

Neurologists are also asked to evaluate unresponsive patients on life support in order to confirm brain death. Treatment options vary depending on the neurological problem. They can include everything from referring the patient to a physiotherapist, to prescribing medications, to recommending a surgical procedure.

Some neurologists specialize in certain parts of the nervous system or in specific procedures. For example, clinical

neurophysiologists specialize in the use of EEG and intraoperative monitoring in order to diagnose certain neurological disorders. Other neurologists specialize in the use of electrodiagnostic medicine studies - needle EMG and NCSs. In the US, physicians do not typically specialize in all the aspects of clinical neurophysiology - i.e. sleep, EEG, EMG, and NCSs.

The American Board of Clinical Neurophysiology certifies US physicians in general clinical neurophysiology, epilepsy, and intraoperative monitoring. The American Board of Electrodiagnostic Medicine certifies US physicians in electrodiagnostic medicine and certifies technologists in nerve conduction studies. Sleep medicine is a subspecialty field in the US under several medical specialties including anesthesiology, internal medicine, family medicine, and neurology.

Neurosurgery is a distinct specialty that involves a different training path, and emphasizes the surgical treatment of neurological disorders. There are also many non-medical doctors, those with PhD degrees in subjects such as biology and chemistry, who study and research the nervous system. Working in labs in universities, hospitals, and private companies, these neuroscientists perform clinical and laboratory experiments and tests in order to learn more about the nervous system and find cures or new treatments for diseases and disorders.

There is a great deal of overlap between neuroscience and neurology. A large number of neurologists work in academic training hospitals, where they conduct research as neuroscientists in addition to treating patients and teaching neurology to medical students.

### **General Caseload**

Neurologists are responsible for the diagnosis, treatment, and management of all the conditions mentioned above. When surgical intervention is required, the neurologist may refer the patient to a neurosurgeon. In some countries, additional legal responsibilities of a neurologist may include making a finding of brain death

when it is suspected that a patient has died. Neurologists frequently care for people with hereditary (genetic) diseases when the major manifestations are neurological, as is frequently the case.

Lumbar punctures are frequently performed by neurologists. Some neurologists may develop an interest in particular subfields, such as stroke, dementia, movement disorders, neurointensive care, headaches, epilepsy, sleep disorders, chronic pain management, multiple sclerosis, or neuromuscular diseases.

### **Overlapping with other Specialities**

Overlapping with other specialties, varying from country to country and even within a local geographic area is also a case. Acute head trauma is most often treated by neurosurgeons, whereas sequelae of head trauma may be treated by neurologists or specialists in rehabilitation medicine. Although traditionally stroke cases have been managed by internal medicine or hospitalists, the emergence of vascular neurology and interventional neurologists has created a demand for stroke specialists. The establishment of JCAHO certified stroke centres has increased the role of neurologists in stroke care in many primary as well as tertiary hospitals. Some cases related to nervous system infectious diseases are treated by infectious disease specialists.

Most of cases related to headache are diagnosed and treated primarily by general practitioners, at least the less severe cases. Likewise, most cases of sciatica and other mechanical radiculopathies are treated by general practitioners, though they may be referred to neurologists or a surgeon (neurosurgeons or orthopedic surgeons).

Pulmonologists and psychiatrists also treat sleep disorders. Cerebral palsy is initially treated by pediatricians, but care may be transferred to an adult neurologist after the patient reaches a certain age. Physical medicine and rehabilitation physicians also in the US diagnosis and treat patients with neuromuscular diseases through the use of electrodiagnostic studies (needle EMG and nerve conduction studies) and other diagnostic tools. In the United

Kingdom and other countries, many of the conditions encountered by older patients such as movement disorders including Parkinson's Disease, stroke, dementia or gait disorders are managed predominantly by specialists in geriatric medicine.

Clinical neuropsychologists are often called upon to evaluate brain-behaviour relationships for the purpose of assisting with differential diagnosis, planning rehabilitation strategies, documenting cognitive strengths and weaknesses, and measuring change over time (e.g., for identifying abnormal aging or tracking the progression of a dementia).

### **Relationship to Clinical Neurophysiology**

Neurologists in some countries, like USA and Germany, may subspecialize in clinical neurophysiology, the field responsible for EEG and intraoperative monitoring, or in electrodiagnostic medicine nerve conduction studies, EMG and evoked potentials. In other countries, this is an autonomous specialty (e.g., United Kingdom, Sweden, Spain).

### **Interaction with Psychiatry**

Some are of the view that mental illnesses are neurological disorders affecting the central nervous system, traditionally they are classified separately, and treated by psychiatrists. In a 2002, Professor Joseph B. Martin, Dean of Harvard Medical School and a neurologist by training, wrote in an article that "the separation of the two categories is arbitrary, often influenced by beliefs rather than proven scientific observations. And the fact that the brain and mind are one makes the separation artificial anyway". Neurological disorders generally have psychiatric manifestations, such as post-stroke depression, depression and dementia associated with Parkinson's disease, mood and cognitive dysfunctions in Alzheimer's disease and Huntington disease, to name a few. Hence, there is not always a great distinction between neurology and psychiatry on a biological basis. The dominance of psychoanalytic theory in the first three quarters of the 20th century has since then been largely replaced by a focus on pharmacology. In spite of the



shift to a medical model, brain science has not advanced to the point where scientists or clinicians can point to readily discernible pathologic lesions or genetic abnormalities that in and of themselves serve as reliable or predictive biomarkers of a given mental disorder.

### **EMERGING FIELD OF NEUROLOGICAL ENHANCEMENT**

The rising field of neurological enhancement concentrates on the potential of therapies to improve such things as workplace efficacy, attention in school, and overall happiness in personal lives. However, this field has also led to questions about neuroethics and the psychopharmacology of lifestyle drugs.