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EPILEPSY

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Abstract
Epilepsy is a chronic neurological disorder characterized by recurrent epileptic seizures resulting from abnormal, excessive neuronal activity in the brain. This article reviews the etiology, clinical types, diagnosis, and modern treatment strategies of epilepsy. The content is based on international scientific literature and recent research findings.

Keywords: Epilepsy, epileptic seizures, electroencephalography, antiepileptic drugs, brain surgery, vagus nerve stimulation.

Introduction

Epilepsy is one of the most common chronic neurological diseases worldwide, characterized by pathological, excessive excitation of brain neurons leading to recurrent seizures (Fisher et al., 2014). It significantly affects patients' quality of life and poses serious medical, social, and economic challenges.

Etiology

The causes of epilepsy are multifactorial, with the main etiological factors including (Kwan & Brodie, 2000; Löscher & Potschka, 2020):
Genetic predisposition — various genetic mutations increase susceptibility to epileptic seizures.
Brain injury — traumatic brain injury, stroke, and other mechanical damage.
Infections — central nervous system infections such as meningitis and encephalitis.
Brain tumors — presence of neoplastic tissue.
Metabolic disturbances — electrolyte imbalances, diabetes, and others.

Clinical Types of Epilepsy

Epileptic seizures are classified into two main groups based on the site of onset, spread, and clinical manifestation (Fisher et al., 2017):
1. Generalized Seizures
Tonic-clonic seizures — sudden loss of consciousness, muscle stiffening and convulsions, frothing at the mouth, loss of bladder and bowel control. Duration usually 1-3 minutes (Fisher et al., 2014).
Absence seizures — brief loss of awareness with staring, more common in children.
2. Focal Seizures
Simple focal seizures — consciousness preserved; local muscle twitching, sensory disturbances such as altered smell or taste.

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Complex focal seizures — impaired consciousness lasting 1-2 minutes, accompanied by automatisms such as lip-smacking and altered perception of reality.

Diagnosis

Modern diagnostic methods essential for epilepsy evaluation include (Smith, 2019):
Electroencephalography (EEG) — the primary tool for detecting epileptic activity.
Magnetic resonance imaging (MRI) — identifies structural brain abnormalities.
Laboratory tests — assess metabolic disorders through blood tests.

Treatment

Treatment of epilepsy depends on the underlying cause. With proper management, approximately 70% of patients achieve complete seizure control (Brodie & Dichter, 1996).

Pharmacotherapy

Valproic acid — broad-spectrum antiepileptic effective for various seizure types.
Carbamazepine — mainly used for focal and tonic-clonic seizures.
Levetiracetam — a newer generation drug with high efficacy.
Lamotrigine — used for absence and focal seizures.
Topiramate — often used as adjunct therapy.
Phenobarbital — less commonly used due to side effects like sedation.

Surgical and Device-Based Therapies

In drug-resistant cases:
Vagus nerve stimulation — implantation of a device that reduces seizure frequency.
Brain surgery — resection of tumor or damaged tissue causing seizures.

Management Recommendations

Adherence to prescribed antiepileptic medications.
Maintaining adequate and quality sleep (at least 7-8 hours).
Avoiding stress and excessive mental strain.
Engaging in light physical activity.
Limiting prolonged screen time.

Conclusion

Epilepsy is a clinically and etiologically complex disorder requiring precise diagnosis and individualized treatment approaches. Modern diagnostic and therapeutic methods significantly improve patient outcomes and quality of life.

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