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## WHAT IS EPILEPSY?

It is my special honour on behalf of the Organizing Committee to welcome all participants of this great gathering under joint organisation of the Montenegrin Academy of Sciences and Arts (CANU-MASA) and the South East Europe Neurosurgical Society (SeENS).

The symposium is aimed at the recognition of Montenegrin Academy of Sciences and Arts at the international level, in which it has already achieved significant results and the affirmation of the South East Europe Neurosurgical Society that aims to develop continuing medical education and strengthen liaisons among colleagues in the region.

This symposium will basically focus on two topics: the first is related to all aspects of epilepsy with the main emphasis on surgical treatment, while the other refers to functional and peripheral nerve surgery.

### WHAT IS EPILEPSY?

It is one of the most difficult neurological diseases. It is a disease of all ages and the problem of doctors of all profiles. It is believed that 1% of the human population has epilepsy. An interesting fact is that nearly 80% of cases occur in poor and developing countries.

Epilepsy is as old as human civilization. In ancient times, it was thought to be a spiritual condition. Hippocrates and his school were the first to determine that epilepsy was not divine in origin but that it originated in the brain.

In practical medicine, epilepsy is considered as two seizures occurring at intervals longer than 24 hours. Epileptic seizure is a temporary sign and symptom occurring due to abnormal electrical activity in the brain.

The International League against Epilepsy and the International Bureau for Epilepsy define it as a disorder of the brain characterized by an enduring predisposition to generate epileptic seizures as well as by neurobiological, cognitive, psychological and social consequences of this condition.

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Epilepsy is characterized by long-term risk of recurrent seizures that can be manifested in several ways, depending on the affected part of the brain and years of age. The disease has a negative impact on the psycho-social status. This means social isolation and disability. All this may diminish the success in education and workability. Children with epilepsy develop learning disabilities. Depression and anxiety are frequent side effects of this syndrome. Attention deficit and hyperactivity disorder affect up to five times more children with epilepsy than children in the general population.

On the other hand, many ingenious persons throughout history, culture and art have suffered from epilepsy. Therefore, an average person can ask whether epilepsy is a curse from God or a blessing. This raises the question on the greatest biological secrets, the secrets of brain functioning.

The main cause of epilepsy can be genetic but also the result of structural and metabolic problems. However, in 60% of cases, the cause is unknown. Some types of epilepsy are caused by a defect within a single gene, but in most cases, it is the result of interaction between multiple genes.

Secondary causes of epilepsy include: brain tumours, strokes, head and brain injuries, infections of the central nervous system and brain damage related to child-birth. About 30% of brain tumours are announced by epilepsy. These are usually the slow-growing tumours and tumours localized in temporal region of the brain. Arteriovenous malformations and cavernous angiomas cause epilepsy in 40–60% of cases. In those that suffered stroke, epilepsy is developed in 4% of cases and this percentage can be up to 30% in the elderly. Head and brain injuries account for 6 to 20% of cases. The frequency following meningitis amounts to about 10%.

Other causes of epilepsy include: chronic alcohol use, Alzheimer's disease, multiple sclerosis, tuberous sclerosis and encephalitis.

## WHAT ARE THE MECHANISMS OF EPILEPTIC SEIZURES?

In epileptic seizures, as a result of structural or functional changes in the brain, a group of neurons starts triggering in an abnormal, excessive and synchronized manner, thus creating depolarization wave that disturbs unsynchronized and usual electrical brain activity. This is the result of the effect of inhibitory neurons, electrical changes in the excitatory neurons as well as the negative impact of adenosine. This results in creation of a specific area from which epileptic seizures can develop, and it is known as epileptic focus or seizure focus.

Gliososis, neuronal loss and atrophy of specific areas of the brain may be linked to epilepsy. But it is still unclear if epilepsy causes these changes or these changes result in occurrence of epilepsy. That is another great mystery of brain functioning.

## TREATMENT OF EPILEPSY

The treatment of epilepsy is long-lasting, complex and multidisciplinary and the collaboration of neurologists and neurosurgeons is the most important. Epi-

lepsy cannot be cured, but it can be controlled by medication in about 70% of cases. In those patients whose seizures do not respond to medication, the alternatives may include surgery or neurostimulation. Surgical treatment may be a solution for the patients with focal seizures, who had no results from other forms of treatment. The aim of surgery is total control over the seizures that can be achieved in 60–70% of cases.

In the majority of patients with epilepsy, seizures can be well controlled with appropriate medication. However, current estimates that 20–30% of patients with epilepsy are refractory to all forms of medical therapy. These medically intractable patients are candidates for surgical treatment in an attempt to achieve better seizure control.

Another group of patients who might benefit are those whose seizures may be relatively well controlled but who have certain characteristic presentations or lesions that strongly suggest surgical intervention might be curative.

The single most important determinant of a successful surgical outcome is patient selection. This requires detailed presurgical evaluation to characterize seizure type, frequency, site of onset, psychosocial functioning and degree of disability in order to select the most appropriate treatment from a variety of surgical options.

This type of evaluation is best carried out at a multi-disciplinary center experienced in the investigation and treatment of epilepsy.

There are many types of seizures and different forms of epilepsy. A seizure is defined as a paroxysmal self-limited change in behaviour associated with excessive electrical discharge from the central nervous system. Epilepsy is defined as a condition of recurrent seizures and medical intractability as recurrent seizures despite optimal treatment under the direction of an experienced neurologist over a two to three years period.

The second part of the symposium will present contemporary views in surgery of peripheral nerves by renowned European experts who published their papers in the most prestigious global magazines, and won numerous prizes and awards at European level.