

Epilepsy is a common brain disease characterized by the recurrent occurrence of spontaneous seizures that affects an estimated 50 million people worldwide. The prevalence of epilepsy is estimated at 4-7 per 1,000 persons in developed countries, and 5-74 per 1,000 persons in developing countries. In Australia, approximately 500,000 people will be diagnosed with epilepsy at some stage in their lifetime. Epilepsy is not only a common disease but also a costly disease. The total annual hospital costs in the USA for epilepsy patients are more than \$2.7 billion, 20 % of which is directly treatment fee. The economic burden of epilepsy is even heavier in developing country as most epilepsy patients in these countries are treated with multiple anti-seizures drugs that are often expensive. In China, the total costs for epilepsy patient are more than half of the average annual income. In addition to suffering seizures, epilepsy patients also experience a variety of serious comorbidities, including respiratory, cardiovascular, and neurologic dysfunctions. Psychiatric disorders also seriously influence the life of epilepsy patients. Beyond seizures and these comorbidities, epilepsy patients often experience bodily injury due to a loss of consciousness, suffer from major psychological and cognitive disorders, and are at a high risk of unexpected sudden death. The negative social stigma associated with be epileptic is another heavy burden for patients. Many misconceptions for epilepsy patients and their families have been conveyed since the disease was first described 4,000 years ago. Today epileptics still have to endure serious limitations to their economic, social and cultural rights. For example, unemployment rates of epileptics are much higher than non-epileptic individuals. Taken together, Epilepsy is serious international socioeconomic problem that must be addressed.

Unfortunately, as the mechanisms of epilepsy are complex and poorly understood, there is currently no drug available that prevents or cures epilepsy. To date, the most common treatment strategy for epilepsy is anti-seizures drugs. Since introduction of bromide as anti-seizures drugs in 1857, there are 20 medications approved by the FDA to treat epileptic seizures. These medications generally inhibit the excitatory activity of neuronal network through antagonizing excitatory systems or/and agonizing inhibitory systems. The anti-seizures drugs effectively suppress epileptic seizures in 70 % of patient with epilepsy. However, these anti-seizures drugs have not found to cure epilepsy, and do not stop or interfere with a process by which a healthy brain converts into an epileptic brain—epileptogenesis. In addition, all anti-seizures drugs have some side effects including fatigue, loss of bone density, and even suicidal thoughts and behaviours. Therefore, anti-seizures drugs taken over the course of a lifetime can seriously affect quality of life. Unfortunately, over 30 % of epilepsy patients cannot control their seizures with anti-seizures drugs, a condition known as drug-resistant epilepsy. As a substitute therapy, some drug-resistant epilepsy patients receive surgical interventions, such as an anterior temporal lobectomy, to control seizures. While surgery can effectively relieve seizures and improves health-related quality life in selected patients, surgery also induces side-effects such as memory and learning impairments. In addition, surgery is clearly inappropriate for patients who suffer from generalized epilepsy where there is no single brain area that can be identified as the source of the seizures. Brain stimulation is another substitute therapeutic treatment for epilepsy. A brain stimulation, which is delivered at scheduled, timed intervals, is hypothesized to alter the intrinsic structure of epileptic networks and consequently increase seizure threshold. Common areas targeted by brain stimulations are the anterior nucleus of the thalamus and hippocampus. However, brain stimulation therapy is invasive (e.g. surgery required), serious complications can occur, and patients also have to take anti-seizures drugs. Additional understanding of this technique is still needed to determine the best candidates for brain stimulation therapy and establish ideal stimulation parameters.

Overall, novel approaches for epilepsy are urgently required to address this common and costly disorder. Of particular priority are treatments that are anti-epileptogenesis and treat drug-resistant epilepsy. These novel therapeutical tactics should improve the health quality of life and relieve economical burden of epileptics. To protect human rights of epileptics and eliminate stigma for epileptics, we should improve public knowledge and understanding of epilepsy, repeal discriminative legislation against people with epilepsy and encourage them to search for appropriate therapeutical approaches and fulfil their life target.