Profile of anticonvulsant activity and neuroprotective effects of novel and potential antiepileptic drugs – an update

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Abstract:
Although neuroprotection is effective only against certain aspects of a complex cascade of pathological events during the development and course of epilepsy, it might be a promising option in the treatment of this disease. Some new data on the pathophysiology of epilepsy raised some hopes that the epileptogenesis process can be prevented. A question arises whether it is possible to make the epilepsy develop in a milder, easier to treat and non-progressive way without cognitive decline and drug-resistance. Moreover, once the epilepsy has already been triggered, there is as yet no conclusive evidence that the harmful effects of seizures on the brain can be reduced. So a great deal of further evaluation of antiepileptic drugs (AEDs) is required. Many similarities exist between cerebral ischemia and epilepsy regarding brain-damaging and autoprotective mechanisms that are activated following the injurious insult. Therefore, drugs that are effective in minimizing seizure-induced brain damage may also be useful in minimizing ischemic injury. Most AEDs have been tested in animal models of focal or global ischemia and some were already tested in humans for a possible neuroprotective effect. The existing data are rather scanty and insufficient but it appears that only drugs that have multiple mechanisms of action have some potential in conferring a degree of neuroprotection that could be clinically applicable to stroke patients. In this review, we focus on evidence of neuroprotective properties of novel and potential AEDs, based on animal experimental models of neurodegeneration. In conclusion, some of the newer AEDs show promise as possible neuroprotectants in epilepsy and acute ischemia but more studies are needed before clinical trials in humans could be undertaken.

Key words:
antiepileptic drugs, neuroprotection, neurodegeneration, animal model of seizures, mode of action, antiepileptic drug.