Local, viral vector-mediated supplementation of FGF-2 and BDNF prevents spontaneous seizures in an epilepsy model

Michele Simonato

Dipartimento di Medicina Clinica e Sperimentale - Sezione di Farmacologia, Università di Ferrara, Ferrara, Italy

Neurotrophic factors (NTFs) may exert favorable effects on seizure-induced damage. However, it is unclear if damage repair may prevent epileptogenesis (the transformation of a normal tissue in epileptic), and which NTFs should be administered, and how, to obtain damage repair and avoid possible pro-epileptic effects. Here, we used viral vectors to locally supplement two NTFs, FGF-2 and BDNF, when an epileptogenic damage was already in place. These vectors were first characterized in vitro, where they increased proliferation of neural progenitors and favored their differentiation into neurons. Then, they were tested in a model of status epilepticus-induced neurodegeneration and epileptogenesis. When injected in a lesioned hippocampus, FGF-2/BDNF expressing vectors increased neuronogenesis, repaired neuronal damage and prevented epileptogenesis. It is concluded that damage repair prevents epileptogenesis and that supplementing specific NTFs in lesion areas represents a new approach for the therapy of neuronal damage and its consequences.