INTERNEURON TRANSPLANTATION – A NEW TREATMENT PERSPECTIVE IN DRUG-RESISTANT EPILEPSY

Lazar Cornelia[1], **Timercan Tatiana[1]**
[1]Chair of Biochemistry and Clinical Biochemistry, *Nicolae Testemitanu* State University of Medicine and Pharmacy, Chisinau, Republic of Moldova

Introduction. Nowadays, adequate seizure management represents a challenge, as approximately 30-40% of patients with epilepsy fail to control them. The loss or malfunction of inhibitory interneurons in the cortex and hippocampus causes persistent hyperexcitability. Interneuron transplantation, a minimally invasive approach, aims to restore inhibitory pathways in the epileptic subjects. The purpose of the research was to elucidate the mechanisms by which interneuron transplantation could insure the treatment of epilepsy.
Materials and Methods. 11 scientific articles from the PubMed database, published between 2016-2026, were analyzed.
Results. The treatment of drug-resistant epilepsy represents a challenge for clinicians and common surgical interventions, performed for therapeutic purposes, due to their invasive nature, could be accompanied by complications, such as neurological deficits. Transplantation of gamma-aminobutyric acid (GABA)ergic interneurons was proposed as an alternative treatment for epilepsy refractory to pharmacological therapy. Researchers have identified a significant benefit with spontaneous seizure suppression (up to 84-92%) and reduced mortality in the mouse model of mesial temporal lobe epilepsy (MTLE), Stargazer mouse model of absence epilepsy or models lacking a voltage-gated potassium channel (Kv1.1), where the cells used were derived from medial ganglionic eminence of the ventral telencephalon of the embryo. After transplantation into cortical and hippocampal regions, these cells survived (up to 20-22%), migrated locally from injection site (up to 5 mm) and were integrated into host cerebrum to form inhibitory circuits, and were found to have morphological similarities to native interneurons, but did not proliferate in the host brain. Also, in preclinical research, this intervention was associated with a significant reduction in dentate granule cell dispersion, a pathological feature of MTLE, but the effects were dose-dependent.
Conclusions. Interneuron transplantation is a cell therapy that was tested in various rodent models of epilepsy, demonstrating positive results, but further studies are needed to prove its clinical utility and safety in patients. Currently, the studies are limited due to ethical concerns and potential physiological incompatibility.
Keywords: interneuron, epilepsy, cell transplantation, inhibition