TÜRK NÖROLOJİ DERGİSİ TURKISH JOURNAL OF NEUROLOGY

Kognitif III - Uluslararası Kognitif Nörobilim Sempozyumu /
Cognitive III - International Cognitive Neuroscience Symposium

Türk Nöroloji Dergisi 2006; Cilt:12 Sayı:4 Ek:3 Sayfa:68

09:20-10:00

Electrically Deficient Neurodevelopment in Animal Models: Molecular Yin to Neurological Yang for Solving Cognitive Syndromes of Human Development

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Electrical activity plays a critical role in establishing a healthy brain with normal cognitive function. This fact has been known for decades, and it can be argued that the need to stimulate the developing brain to achieve a normal cognitive outcome has been known for centuries. Yet the basic science of major cognitive disorders that may be caused by abnormally low levels of electrical activity during brain development is poorly understood. Examples of such disorders include fetal alcohol spectrum and schizophrenia, which together affect about 2% of the population. Despite the millions of impacted individuals and the high cost, both economically and socially, nothing approaching a cure has been found for these or other related syndromes.

Successful intervention for brain disorders can be developed by using animal models to identify biotargets for clinical investigation. The first acute stroke therapy, recombinant tissue-type plasminogen activator (rt-PA, a thrombolytic), was discovered in this manner. Therefore, our research elucidates mechanisms for electrically deficient neurodevelopment in animal models, thus identifying candidate biotargets for cognitive syndromes of human brain development. The molecules that we have identified to date include class I MHC, beta2-microgrobulin, mNAT1, ARD1, NARG2, NARG3, and connexin 36. Our most recent discoveries demonstrate that N-methyl-D-aspartate (NMDA) receptors protect developing neurons from developmental cell death, and regulate the expression of electrical synapses.

KAYNAKLAR

1. Corriveau, R.A., Shatz, C.J., and Nedivi, E. (1999). Dynamic Regulation of cpg15 During Activity-Dependent Synaptic Development in the Mammalian Visual System. J. Neurosci. 19(18): 7999-8008.
2. Sugiura, N., Patel, R.G., and Corriveau, R.A. (2001). NMDA Receptors Regulate a Group of Transiently Expressed Genes in the Developing Brain. J. Biol. Chem. 276(17): 14257-14263.
3. Sugiura, N., Adams, S.M., and Corriveau, R.A. (2003). An Evolutionarily Conserved N-terminal Acetyltransferase Associated with Neuronal Development. J. Biol. Chem. 278(41): 40113-40120.
4. Adams, S.M., de Rivero Vaccari, J.C., and Corriveau, R.A. (2004). Pronounced Cell Death in the Absence of NMDA Receptors in the Developing Somatosensory Thalamus. J. Neurosci. 24(42): 9441-9450.
5. Sugiura, N., Dadashev, V., and Corriveau, R.A. (2004). NMDA receptor-regulated gene 2 encodes a novel nuclear protein that is expressed during development. Eur. J. Biochem. 271(23-24): 4629-4637.
6. Arumugam, H., Liu, X., Colombo, P.J., Corriveau, R.A., and Belousov, A.B. (2005). NMDA Receptors regulate Developmental Gap Junction Uncoupling Via CREB Signaling. Nat. Neurosci. 8(12):1720-6.