J Neurol Disord 2015, 3:3
http://dx.doi.org/10.4172/2329-6895.S1.003

OMICS International
conferenceseries.com

Riboflavin supplementation improves neurological disability but not spatial cognition mediated with increased gene expression and protein levels of BDNF in the brain and spinal cord in murine model of multiple sclerosis

Mahshid Naghashpour[1], Reza Amani[1], Alireza Sarkaki[1], Ata allah Ghadiri[1], Alireza Samarbafzadeh[1] and Ahmad Rouhizadeh[1,2]
[1]Ahvaz Jundishapur University of Medical Science, Iran
[2]Shahid Chamran University of Ahvaz, Iran

Introduction: Interferon beta-1A (IFNβ-1A) is the major treatment for MS. However, this treatment is not always effective. It has been showed that riboflavin is important in the myelin formation. The interactions between potential effects of riboflavin and IFNβ-1A on neurological disability, learning and memory as well as the gene expression and protein levels of brain-derived neurotrophic factor (BDNF) in the brain and spinal cord of experimental autoimmune encephalomyelitis (EAE) model of multiple sclerosis (MS) were evaluated.

Methods: Fifty-six female C57BL/6 mice at +10 weeks of age underwent EAE induction. Riboflavin at 10 mg/Kg of body weight and/or IFNβ-1A at 150 IU/g of body weight were administrated for two weeks. The mice (n=56) were assigned into7 groups randomly (with 8 in each): sham operated 1 [SO1], PBS; sham operated 2 [SO2], PBS+riboflavin; sham treatment 1 [ST1], EAE+same volume of water (as vehicle of riboflavin); sham treatment 2 [ST2] EAE+sodium acetate buffer (as vehicle of IFNβ-1A); treatment 1 [T1], EAE+IFNβ-1A; treatment 2 [T2], EAE+riboflavin; treatment 3 [T3], EAE+IFNβ-1A+riboflavin. mRNA was quantitated for BDNF using Real-time PCR system. Levels of the BDNF were quantified using the BDNF EMAX® ImmunoAssay System. Spatial learning and memory were assessed using the standard Morris water maze (MWM).

Results: Treatment the EAE mice with combination of the riboflavin and IFNβ-1A improved neurological disability significantly ($P<0.01$) by increasing the gene expression and BDNF level in both brain and spinal cord of EAE mice. T2 Mice treated with riboflavin swam significantly faster than ST2 and T1 mice. T3 mice treated with both riboflavin and INFβ-1A swam significantly faster than ST1 mice on day 4 of the trial ($P=0.003$).

Conclusion: Our findings address the therapeutic effects of riboflavin and highlight the synergistic role of riboflavin with IFN-β1A on neurological disability improvement probably mediated by BDNF levels in the brain and spinal cord in an experimental model of MS.

m.naghashpour@yahoo.com

Cerebrospinal fluid from sporadic amyotrophic lateral sclerosis patients induces mitochondrial and lysosomal dysfunction

Aparna Sharma
NIMHANS, India

Background: Mitochondrial dysfunction is amongst the pivotal mechanisms in the Amyotrophic Lateral Sclerosis (ALS) pathogenesis. It is an early pathological feature in the familial mutant SOD1 transgenic mice, preceding the onset of motor weakness and is also seen in sporadic ALS.

Purpose: To study the mitochondrial damage induced by CSF of ALS patients (ALS-CSF) in Wistar rats.

Introduction: Sporadic pathology accounts for >90% of the cases of amyotrophic lateral sclerosis (ALS). We had previously developed an *in vivo* model of the disease involving intrathecal injection of cerebrospinal fluid (CSF) from sporadic ALS patients into rat pups. Compared to normal-CSF (N-CSF) and untreated control, ALS-CSF induced markers of neurodegeneration in motor neurons. In cultured motor neurons, ALS-CSF induced neurotoxicity, lowered mitochondrial membrane potential and elevated reactive oxygen species (ROS). Quantitative proteomic analysis of sub-cellular fractions from spinal cord of rats injected with ALS-CSF revealed down-regulation of 37 mitochondrial proteins and 4 lysosomal proteins. Many of the down-regulated proteins contribute to respiratory chain complexes and mitochondrial morphology. The lysosomal proteins down-regulated in the model showed lowered enzyme activity, thus validating the mass spectrometry data. Proteomic analysis validated by western blot indicated that ALS-CSF induced the over-expression of the apoptotic protein BNIP3. Ultrastructural alterations were evident in mitochondria of cultured motor neurons exposed to ALS-CSF. These observations indicate that ALS-CSF mediated mitochondrial and lysosomal defects could contribute to the pathogenesis underlying sporadic ALS.

aparnasharma12@gmail.com