ANNALS OF GENERAL PSYCHIATRY

MEETING ABSTRACT Open Access

A model that might better explain the effects of addiction substances on the nervous system: the CoBBGlum model

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From 1st International Congress on Neurobiology and Clinical Psychopharmacology and European Psychiatric Association Conference on Treatment Guidance
Thessaloniki, Greece. 19-22 November 2009

Background

The effect of addictive substances on brain's utilizing mechanisms of glucose for neuronal functions are poorly understood. To identify novel neurobiological mechanisms of addiction (precisely on brain glucose metabolism), we developed a model that incorporates the β-cell and the fishbone models of glucose metabolism and examined the role of various psychostimulants (alcohol, cocaine, heroine) on the functions of the model. The abbreviation "CoBBGluM model" means Convergence (incorporation of the β-cell and the fishbone models) model of Blood-Brain Glucose Metabolism.

Materials and methods

Peer reviewed literatures from Elsevier and Pubmed from the year 1940 to August, 2009 on the effect of various doses of alcohol on the blood glucose level and cognitive functions, including associated theories and hypotheses and models of glucose metabolism were also examined.

Results

The CoBBGlum model is based on the notion that the main regulators (leptin and insulin) of blood-brain glucose metabolism work synergistically, rather than individually. Addictive substances adversely affect the blood-brain glucose transport system both by their stimulating and toxic related action on the control mechanisms of leptin and insulin (by inhibiting its action and/or up and down regulatory mechanisms). The metabolic byproducts, including adducts of alcohol, for example might acquire the properties of transmitter of electrons across mitochondrial membranes. This is the etiopathogenetic basis of most addictive-diseases-associated neurodegenerative disorders. Pathogenic effects on the main glucose regulators might occur independently and/or dependently of each other, but subsequently leading to a total equilibrium disorder of the CoBBGluM model.

Conclusions

Adequate therapies for addictive diseases (that affect the nervous system) lie on the full understanding of the CoBBGluM model, since it serves as a classical tool for explaining the role of addictive substances in the nervous system.

Published: 22 April 2010

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doi:10.1186/1744-859X-9-S1-S220
Cite this article as: Osain and Alekseevic: A model that might better explain the effects of addiction substances on the nervous system: the CoBBGlum model. *Annals of General Psychiatry* 2010 **9**(Suppl 1):S220.

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