Editorial

Neural Networks in Neurological and Psychiatric Diseases

In addition to my teaching activities at the Euro Academy in Pößneck (Germany), I have been collaborating with Dr. Rafael Coveñas (Institute of Neurosciences of Castilla and León (INCYL), Salamanca, Spain) since 2002. Our collaboration has been focused on the neural networks involved in neurological and psychiatric diseases. In September 2004, I published my first abstract entitled “Theoretical reflections about the reciprocal influence of neurotransmitters upon each other” that was presented in the German congress on clinical neurophysiology (Jena). Because there is no laboratory technique to develop exactly neural networks, we use the therapeutic effects of CNS drugs exerting an agonistic or antagonistic effect, at a specific receptor, to develop these networks. In physiological brain function, classical neurotransmitters and neuropeptides show a transmitter balance with slight and short-time alterations of the transmitter levels. In psychiatric and neurological diseases, transmitter imbalance occurs, for example in generalized epilepsy, Parkinson’s disease and in two important psychiatric diseases: schizophrenia and major depression. In both latter diseases, the development of improved CNS drugs can be justified by the neural networks. Second-generation antipsychotic drugs have made progress in treating psychotic symptoms by minimizing movement disturbance, the extrapyramidal symptoms. Because one third of depressive patients cannot be successfully treated by available antidepressant drugs, multimodal antidepressant drugs can improve the antidepressant pharmacotherapy. In February 2013, I presented at the 5th ICDDT conference in Dubai an oral presentation about multimodal pharmacotherapy by examining neural networks. Generalized epilepsy is not completely treated by available antiepileptic drugs. The derived neural network in the hippocampus, cerebral cortex, thalamus and hypothalamus was presented in meetings that were hold in Dubai, Salamanca and Munich. Our aim is to enlarge neural networks by considering all the involved classical neurotransmitters and neuropeptides, in order to improve the current pharmacotherapy by using CNS drugs. In 2018, we completely improved the neural network in the extrapyramidal system, because the anti-Parkinsonian pharmacotherapy is not yet satisfactory. As well in this neurodegenerative disease, we suggest a multimodal pharmacotherapy.

In this special edition of the journal Current Pharmaceutical Design, the following reviews are included.

Ana Velasco from the Institute of Neurosciences of Castilla and León (Salamanca, Spain) and co-workers review the current pharmacological treatment of multiple sclerosis [1]. They present the pharmaceutical preparation named GEMSP, which consists of fatty acids, antioxidants, free radical scavengers and amino acids. In first clinical studies, 72% of the patients with multiple sclerosis had a better outcome compared to patients who did not receive this treatment. In this review, the authors show a biochemical analysis of the constituents of GEMSP.

Domenico de Beradis from the Department of Mental Health belonging to the Psychiatric Service of Diagnosis and Treatment (Teramo, Italy) and co-workers present the involvement of glutamatergic drugs in the treatment of major depression. Most antidepressant drugs are re-uptake inhibitors of monoamines, such as serotonin, dopamine and noradrenaline. However, one third up to half of the depressive patients cannot be treated successfully with these available antidepressant drugs [2]. Domenico de Beradis presents NMDA (N-methyl-D-aspartate) antagonists, for example ketamine, which produce a rapid, long-lasting antidepressant effect. Besides, the authors review new glutamatergic drugs, which also show antidepressant properties.

Felix-Martin Werner from the Euro Akademie Pößneck and Rafael Coveñas from the Institute of Neurosciences of Castilla and León update the alterations of neurotransmitters and neuropeptides in the brainstem and hippocampus involved in major depression [3]. They have previously published several reviews about the neural networks involved in major depressive disorder. They included not only monoamines such as serotonin, dopamine and noradrenaline, but also gamma-aminobutyric acid (GABA), glutamate and neuropeptides. The neural networks in the brain centers involved in major depression are up-dated. The mechanisms of action of new antidepressant drugs, for example NMDA and m5Glu (subtype 5 of the metabotropic glutamatergic receptor) antagonists, neuropeptide antagonists and M1 mACh (muscarinic cholinergic receptor) antagonists are explained according to their therapeutic effects and to the neural networks. NMDA antagonists combined with M1 mACh antagonists can produce a rapid and long-lasting antidepressant effect.

Felix-Martin Werner and Rafael Coveñas update the neural networks involved in generalized epilepsy and present novel antiepileptic drugs [4]. The neurotransmitter and neuropeptide alterations in the hippocampus, cerebral cortex, thalamus and hypothalamus are actualized. In a second step, neural networks are up-dated in these brain areas. Novel antiepileptic drugs, for example an allosteric positive modulator of the GABA_B receptor, perampanel (an AMPA (alpha-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid) receptor antagonist) and bivaracetam are described according to their mechanisms of action and therapeutic effects.
It was a great pleasure working with the Director Kazim Baig and for the opportunity to publish in the journal Current Pharmaceutical Design. It was a wonderful experience working with Editorial Assistant Aamer M. Khan at the time of submission and processing of the manuscripts. I would like to acknowledge the contributions of others who took care of editing and processing the manuscripts to obtain the best final quality at the time of publication.

REFERENCES


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