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P-15-004

A method to determine the dynamic characteristics of synaptic transmission

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Synaptic transmission (ST) presents the multiphase process involving enormous number of participants. ST investigations are complicated by the fact that many characteristics of this process cannot be measured directly (so-called hidden parameters). Thus, the study of ST requires implicit methods such as mathematical modelling. In this work, we introduce the method to determine the set of ST hidden parameters based both on mathematical modelling and on experimental results. The values in question present the essential parameters of the ordinary differential equations composing the mathematical model of ST. To find the numerical values of these parameters, we use the genetic algorithm of the model fitting which aims to minimize the deviation of the modelled field excitatory postsynaptic potential (fEPSP) from fEPSP recorded in the rat hippocampal slices with the microelectrode technique. To verify model and to obtain more reliable results, we find the sets of the hidden parameters for fEPSPs that were registered under the effect of the various concentrations of inhibitors acting on the different stages of ST: cilnidipine, BAPTA-AM and 6-cyano-7-nitroquinoxaline-2,3-dione. Using bootstrap statistics, we calculate the values of the hidden parameters that allow the model to fit to all experimental conditions optimally: the density of the voltage-dependent calcium channels on the presynaptic bouton ($50.33 \pm 1.06\ \mu m^{-3}$), the maximal conductance of the single N-type voltage-gated calcium channel (7.85 ± 0.21 pS), and that of P/Q-type voltage-gated calcium channel (7.27 ± 0.52 pS), the rate constant of active SNARE complex dissociation ($7.36 \pm 0.33\ ms^{-1}$), the rate constant of the synaptic vesicles transition from the docked state to the inactivated state ($0.073 \pm 0.015\ ms^{-1}$).

P-15-005

Association between CNTNAP2, COX2 and OXTR polymorphisms and autism spectrum disorder: a pilot case-control study in Kazakhstani population

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The association of polymorphism of candidate genes with the risk of ASD in the Kazakhstani population was investigated. Buccal swabs of 27 ASD children and their 23 healthy siblings were used for DNA isolation and genotyping of rs2710102 *CNTNAP2*, rs2745557 *COX2* and rs53576 *OXTR*. The distribution of genotypes corresponded to the Hardy-Weinberg distribution. For rs2710102 *CNTNAP2*, an increased risk of developing ASD was shown for the T allele that was confirmed by the general model (for the TT genotype OR = 1.90; 95% CI = 0.42–8.67; $P = 0.40$–0.57) and by the dominant model (for the CT + TT genotypes OR = 2.48; 95% CI = 0.21–29.23; $P = 0.46$). For rs2745557 *COX2*, an association with ASD was established for the GA and AA genotypes (OR = 1.57; 95% CI = 0.26–9.53; $P = 0.82$ and OR = 1.52; 95% CI = 0.13–18.03; $P = 0.82$, respectively) and for the combination of these genotypes (OR = 1.62; 95% CI = 0.35–7.45; $P = 0.53$). The heterozygous AG genotypes of the rs53576 *OXTR* correlated with an increased risk of ASD according to the general model (OR = 2.08; 95% CI = 0.30–14.25; $P = 0.7$), which was also confirmed by the dominant and recessive models. Thus, the genotypes associated with an increased risk of ASD were TT/CT + TT for rs2710102 *CNTNAP2*, GA/AA for rs2745557 *COX2*, AG for rs53576 *OXTR*. Due to the small number of samples, the obtained results were not significant, however, our data are consistent to the results of other authors on the perspectives of these markers to evaluate the risk of ASD.

P-15-006

Agathisflavone isolated from *Schinus polygamus* (cav.) Cabrera leaves prevents scopolamine-induced memory impairment and brain oxidative stress in zebrafish (*Danio rerio*)

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Agathisflavone, a biflavonoid isolated from *Schinus polygamus* (Cav.) Cabrera leaves has been reported to promote various biological activities such as anti-inflammatory properties, promoting cognition and preventing cancer, antioxidant and antiapoptotic activities. Here, we tested the hypothesis whether anxiety, amnesia, and brain oxidative stress induced by scopolamine could be counteracted in zebrafish model by agathisflavone and tried to ascertain the underlying mechanism. Agathisflavone (1, 3 and 5 μg/l) was administered by immersion to zebrafish once daily for 8 days period. Anxiety and memory impairment was induced with scopolamine (100 μM) and measured with the novel tank diving test (NTT) and the Y-maze test. The identification of the agathisflavone was done by spectroscopy, and the structure of the compound was confirmed by (-) Electrospray Ionisation Mass Spectrometry (ESI-MS). The brain oxidative status and acetylcholinesterase (AChE) activity were also investigated. Agathisflavone from *Schinus polygamus* (Cav.) Cabrera leaves was identified. Also, we demonstrated that agathisflavone significantly reversed scopolamine-induced behavioral score alteration in the NTT and Y-maze tests. Consequently, agathisflavone promoted inhibition of AChE activity and restored the brain antioxidant status. Our results demonstrate that agathisflavone promotes brain antioxidant action and ameliorates scopolamine-induced anxiety and memory deficits in zebrafish. Acknowledgments: This project is funded by the Ministry of Research and Innovation within Program 1 – Development of the national RD system, Subprogram 1.2 – Institutional Performance – RDI excellence funding projects, Contract no. 34PFE/19.10.2018"

P-15-007

A Bcr-Abl inhibitor GNF-2 attenuates inflammatory activation of glia and chronic pain

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GNF-2 is an allosteric inhibitor of Bcr-Abl. It was developed as a new class of anti-cancer drug to treat resistant chronic myelogenous leukemia. Recent studies suggest that c-Abl inhibition would provide a neuroprotective effect in animal models of Parkinson's disease as well as in clinical trials. However, the role of c-Abl and effects of GNF-2 in glia-mediated neuroinflammation or pain hypersensitivity has not been investigated. Thus, in the present study, we tested the hypothesis that c-Abl inhibition

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