Methods: Gabapentin 10, 30mg/kg; diclofenac 5mg/kg(reference drug), vehicle(saline) were injected intraperitoneally before 100µl of 1% carrageenan administration into the right hind paws of the rats. Paw thickness was measured by a gauge calipers(Vernier Calipers) before (0th hour) and in every hour during 6 hours after induction of inflammation. Paw thickness of treated groups were compared with control group with One-way ANOVA. Also paw thickness in 0th and 6th hours were compared within each group with two-way ANOVA. Gabapentin was administered orally for 10 days to evaluate gastric side effect. At the end of 10 day treatment, rats were sacrificed, gastric tissues were removed out, mucus secretion was determined spectrophotometrically.
Results: There was no significant difference between 0th and 6th hours in paw thickness of all groups, except carrageenan group. Carrageenan significantly increased paw thickness in 6th hour compared to 0th hour. All doses of gabapentin and diclofenac significantly reduced paw thickness in 6th hour compared to carrageenan group. Gabapentin 10 and 30mg/kg similar to diclofenac significantly reduced mucus secretion compared to control.
Conclusion: We suggest that gabapentin as an antinociceptive effective agent may also possess antiinflammatory features. Both doses of gabapentin showed antiinflammatory effect and reduced gastric mucus secretion similar to diclofenac.
Key words: gabapentin, carrageenan-induced paw edema, gastric mucus

PT671

The effects and mechanism of action of galangin on spatial memory in the Morris water maze test in rats

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Abstract
Objectives: Cholinergic system is one of the most important neurochemical systems which play role in spatial memory. Inhibition of acethylcholinesterase can mediate to improve cognitive functions via enhancing cholinergic transmission. It was shown that galangin, a flavonoid compound, has acethylcholinesterase enzyme inhibitory activity. The aim of this study was to investigate the effects of acute galangin administration on scopolamine-induced spatial memory impairments in rats.
Methods: The rats were trained in the Morris water maze over five daily acquisition sessions. Twenty-four hours after the last acquisition session, a probe trial was used to evaluate the rats' spatial retention of the location of the hidden platform. During probe trial, the platform was removed from the maze, galangin 50, 100 mg/kg, donepezil 1 mg/kg (reference drug), vehicle were administered 30 minutes before the injections of scopolamine, a muscarinic cholinergic receptor antagonist. Distance to zone (platform) and time spent in escape platform quadrant were recorded and analyzed by using the Ethovision XT version 9.0 (Noldus, Wageningen, Netherlands). Results were statistically analyzed with one-way ANOVA.
Results: Scopolamine decreased the time spent in the escape platform quadrant and increased the distance to zone (platform) during the probe trial compared to the control group ($p<0.05$). Galangin 50, 100 mg/kg and donepezil significantly increased the time spent in the escape platform quadrant and reduced the distance to zone (platform) in scopolamine treated rats ($p<0.05$).
Conclusion: Both doses of galangin reversed the effect of scopolamine. We suggest that galangin may improve memory via acting on muscarinic cholinergic receptors.

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Key words: galangin, spatial memory, morris water maze

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The gliaprotection effect «Ampassea» as possible mechanism recovery of function CNS on the intracerebral hematoma model

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Abstract
The purpose of this study was to assess the impact of the drug Ampassea (AMPS, calcium hydroxy-nicotinoyl-glutamate) (0,1; 3 or 30 mg/kg) on glial homeostasis of the brain cerebral cortex during the experiment of acute disorders of cerebral circulation in hemorrhagic type in male Wistar rats. Rats 1.5 h after the reproduction posttraumatic intracerebral hematoma (PIH) by the method of Makarenko and co-authors (2002) were injected intraperitoneally AMPS within 28 days 1 time per day. Then using the method of morphometry were assessed the quantitative composition and the proportion of pyramidal neurons and types of glial cells (astrocytes, oligodendrocytes, microgliosis) with the definition of the following types of intercellular ratios: the ratio of the total number of astrocytes to microgliosis (PIH1), oligodendrogliomas to microgliosis (PIH2) and astrocytes to the total number of oligodendroglia (PIH3) within the III and V layers of cerebrocortical cytostructure organization of rat brain. It was shown that the GIH led to the change of the glial cells ratio at the expense of increasing the proportion of microglia of 20% ($P<0.05$) compared to intact brain, leading to a change in the value of the glial index. In intact rats, the glial index had values PIH1 = 0,89; PIH2 = 1,07; PIH3 = 0,82. Glial index of experimental rats in acute hemorrhagic stroke was: PIH1 = 0,44; PIH2 = 0,39; PIH3 = 1,12. AMPS at a dose of 30.0 mg/kg decreased the percentage of microgliosis to the control values, which led to the correction of the glial index: PIH1 = 0,64; PIH2 = 0,95; PIH3 = 0,67.

Thus, AMPS (30 mg/kg) contributes to the normalization of glia cellular composition at GIH, suggesting a possible systemic mechanism of positive therapeutic effects of the drug in case of acute disorders of cerebral circulation.

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Pharmacological analysis of nicotine-induced tremor

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Abstract
Tremor is a common movement disorders and manifested as various diseases such as essential tremor, Parkinsonian tremor and drug-induced tremor. We previously demonstrated that nicotine elicited kinetic tremor by elevating neural activity of the inferior olive which is a potential causal site of essential tremor (PLoS one 10, e0123529, 2015), implying that nicotine may share common mechanisms to essential tremor in inducing kinetic tremor. Here, to clarify the pharmacological characteristics of nicotine-induced tremor, we investigated the effects of various anti-tremor agents on nicotine-induced tremor in

mice. Male ddY mice were treated with nicotine (1 mg/kg, i.p.), and the intensity and duration of nicotine-induced tremor was evaluated over 10 min. Anti-essential tremor agents were given 15 min before the nicotine injection. The medications for human essential tremor, propranolol (a β receptor antagonist), diazepam (benzodiazepine receptor agonist) and phenobarbital (a $GABA_A$ receptor stimulant), all significantly reduced the duration and intensity of nicotine-induced tremor. In contrast, neither medication for parkinsonian tremor, trihexyphenidyl (a muscarinic receptor antagonist), L-DOPA (a dopamine precursor) nor bromocriptine (a D_2 receptor agonist) affected nicotine-induced tremor. These results show that nicotine-induced tremor mimics essential tremor not only for the causative site (inferior olive), but also for the responses to anti-tremor agents, suggesting both tremor types share the common tremorgenic mechanisms.

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VGF overexpression mice exhibited several behavioral abnormalities with disruption of brain organization: implication in mental disorders.

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Abstract

Objective: Recently, the number of patients suffered from mental disorders has been increased with increase of stress. The two hit hypothesis proposed that mental disorders, such as schizophrenia, bipolar and depression, may be caused by the damage in both of developmental and adult stage. VGF nerve growth factor inducible (VGF) is a neuropeptide induced by nerve growth factor (NGF), brain-derived neurotrophic factor (BDNF) and so on. It is also known that this peptide is related to brain function in both of developmental and adult stages. Additionally, the expression of VGF is changed in patients with these diseases. However, detailed mechanism of VGF action in brain is still unknown. In the present study, we generated mice in which VGF expression is increased and investigated the roles of VGF in the central nervous system.

Methods: To investigate the role of VGF, we investigated several behavioral phenotypes using several behavioral tests, such as locomotor activity test, open field test, Y-maze test, tail suspension test, forced swimming test, and social interaction test and organization of the brain.

Results: These adult VGF overexpression mice showed (a) hyperactivity in home cage and novel environment, working memory impairment, lower sociality, higher depressive state compared with age-matched wildtype mice, (b) decreased the brain weight without the change of body weight, and (c) increased the lateral ventricle volume compared with wild-type mice.

Conclusion: These results suggest that VGF is implicated in several mental behaviors and the formation of the brain, and this transgenic mice provide good insight to research of mental disorders.

Policy of Full Disclosure: None.

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Modulation by cerebellar D3 receptors of dyskinesia induction in rats

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Abstract

Dopaminergic neurotransmission is mediated by multiple dopamine receptors, D_1 ~ D_5. Dopamine D_3 receptors are highly expressed in the cerebellum; however, their pathophysiological functions are not fully understood. We previously demonstrated that cerebellar D_3 receptors modulate the incidence of extrapyramidal motor disorders (Prog. Neuro-Psychopharmacol. Biol. Psychiatry, 50, 157, 2014). In the present study, we conducted microinjection study to clarify the role of cerebellar D_3 receptors in modulating D_1 agonist-induced oral dyskinesia and L-DOPA-induced dyskinesia in rats. In normal SD rats, the D_1 agonist SKF-38393 dose-dependently elicited vacuous chewing movements (VCM), which was blocked by SCH-23390 (D_1 antagonist) and haloperidol (antipsychotic drug). Microinjection of the preferential D_3 agonist 7-OH-DPAT into lobe 9 of the cerebellum significantly inhibited SKF-38393-induced VCM. The inhibition of VCM by 7-OH-DPAT occurred in a dose-dependent manner and was blocked by simultaneous treatment with U-99194A (D_3 antagonist). In the unilateral 6-OHDA lesioned hemiparkinsonian rat model, chronic L-DOPA treatment elicited intensive dyskinesia including axial, forelimb and orolingual dyskinesia. However, microinjection of 7-OH-DPAT into lobe 9 of the cerebellum failed to alleviate L-DOPA-induced dyskinesia. The present results illustrate the important role of cerebellar D_3 receptors in modulating D_1 receptor-mediated dyskinesia, implying that stimulation of cerebellar D_3 receptors can ameliorate tardive dyskinesia in the treatment of schizophrenia.

PT676

Empathic deficits in a mouse model of autism spectrum disorder

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Abstract

Empathy, a high-level cognitive process, is believed to exist exclusively in humans; however, recent evidence has demonstrated empathy-like behaviors in rodents. The rodent models provide experimental platforms to investigate the neural basis for empathy and help elucidating the mechanisms underlying pathological conditions, such as autism spectrum disorders (ASDs). People with ASD have social impairments and often lack the ability to fully understand emotions in others, however, the neural substrates for the deficits remain largely unknown. In this study, we developed a fear observational system in which a mouse (observer) exhibits freezing behavior, a form of fear responses, through observation of another freezing mouse (demonstrator) that receives repetitive electrical foot shocks. We found that observers showed higher freezing responses when they had received a priming foot shock, suggesting that empathy-based behavior of mice is enhanced by a previous similar experience. Next, we investigated the relationship between neuronal populations that were active during the direct shock experience and observation of the other's shocks in neocortical regions involved in pain coding. To detect neural activities with cellular resolution, we used a biochemical technique called catFISH. The neuronal populations that were active during the priming shock were significantly overlapped with those engaged in the fear observation, indicating that neural networks involved in firsthand and vicarious experiences are shared at the single-cell level. We then examined empathetic behaviors in ASD model mice. The ASD model was produced by intraperitoneal injection of poly(I:C) into pregnant females. In ASD model mice, observational fear was not enhanced by a priming foot shook, and this behavioral deficit was rescued by sub-chronic injection