agonist DOI, selective agonists TCB-2 and 25CN-NBOH on the behavior and the BDNF system were investigated.

Expression of BDNF, TrkB and p75NTR receptors was assessed by real-time RT-PCR and Western-blot analysis. The Morris water maze was used to test spatial learning and memory.

Chronic treatment with TCB-2 and 25CN-NBOH (1 mg/kg, i.p., 14 days) markedly decreased the escape latency in the water maze. 25CN-NBOH also significantly decreased the total distance to platform. Significant desensitization of the 5-HT2A receptors was found after all utilized agonists.

Considerable changes of BDNF, TrkB and p75NTR receptors expression were shown after 5-HT2A receptor chronic activation. Both TCB-2 and 25CN-NBOH markedly increased the BDNF mRNA level in the hippocampus (Hc) and striatum (St). TrkB mRNA level was reduced after 25CN-NBOH in the midbrain (Mb) and was elevated after TCB-2 in St. In the frontal cortex (Fc) TCB-2 decreased the p75NTR mRNA level, while 25CN-NBOH increased it in Hc. It was found, that all agonists elevated the proBDNF protein level in Fc, but DOI and 25CN-NBOH also increased it in Mb. TrkB protein level was decreased after all agonists in Mb, while it was reduced in St only after TCB-2. Both TCB-2 and 25CN-NBOH increased the p75NTR protein level in St.

Thus, considerable effects of the chronic activation of the 5-HT2A receptors on spatial learning as well as on the BDNF system were shown for the first time.

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P00.10

Nigrostriatal dopamine system is implicated in the regulation of genetically-defined aggressive behavior in rats

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The role of dopamine (DA) system in the regulation of aggressive behavior is not well understood. Noteworthy, there is the lack of studies on the genetic models of aggressive behavior. Prolonged breeding of wild Norway rats for a high level of fear-induced aggression towards man or its absent led to development of two strains absolutely different in aggressive behavior – completely nonaggressive rats and highly aggressive rats. The expression of the key genes of dopaminergic (DA) system in the substantia nigra (SN) and striatum (St) and behavioral responses on activation of D2 receptors in genetically defined highly aggressive and nonaggressive rats were investigated.

Expression of tyrosine hydroxylase (TH), DA transporter (DAT), D1 and D2 receptors and catechol-O-methyltransferase (COMT) was assessed by real time RT-PCR and Western-blot analysis. DA turnover was studied by HPLC. Behavior effects of D2 receptor activation by highly selective agonist sumanirole were studied in the handling test and test for intermale aggression.

Significant decrease in TH, DAT and D2 mRNA levels was found in the SN and simultaneously a significant increase in COMT and D2 genes expression was found in the St of highly aggressive rats. The protein level of the D1, D2, DAT as well as COMT was increased in the St of aggressive animals. However, we have not found any changes in DA metabolism. Sumanirole (2.5 mg/kg, i.p. acutely) effectively reduced the severity of defensive aggression and increased the number, latent and total time of social interactions in aggressive rats.

Considerable differences in expression of the key DA genes in the nigrostriatal system between highly aggressive and tame rats were shown for the first time. The data suggested the implication of DA system in the mechanism of aggressiveness and in the development of either aggressive or nonaggressive phenotype.

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P00.11

Auditory pathway and Alzheimer's disease

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Humans and other animals have special organs to receive and to recognize sound in their environment; the ears are the main organ for sound reception, and the auditory cortex translates the auditory waves into meaningful perceptions according to the subject's cognition. Literature indicates that the neural tracts and nuclei of the brain stem and mid brain not only connects the ear to the auditory cortex but also plays an important part in the translation of sound waves into auditory perception. Thus, it is possible that tracking aural pathway function may allow us to identify individuals who are at the risk of developing dementia's such as Alzheimer's disease (AD) in future. Our pilot studies using magnetic resonance spectroscopy (MRS) demonstrates that the inferior colliculi displays degeneration earlier than the noticeable landmark structural changes [as detected via magnetic resonance imaging (MRI)] in the brains of patients with AD. Furthermore, we observed not only biochemical, but also electrical and functional deviations prior to these structural changes, and found that inexpensive technology such as electroencephalography (EEG) can possibly be used for the diagnosis of cognitive decline. What would be necessary is to further explore the association between biochemical, electrical and functional activities in the brain by using MRS, EEG and cognitive tools such as the Mini Mental State Examination (MMSE). This approach may help us to appreciate the link between N-acetyl acetate (NAA) and creatinine ratio in the inferior colliculi, with modified cortex activities e.g. P50 gating, and cognitive test results.

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P00.12

The free energy principle for perception and behavior

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The recent endeavor of the free energy principle (FEP) in neurosciences provides a promising explanatory power for perception, learning, and behavior of biological systems (Friston, 2010). It claims that all living organisms are evolutionally self-organized to tend to minimize 'surprise', which is an information-theoretical measure of the improbability of organisms' environmental niche. The informational FE (IFE) bounds the surprise, and the brain