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ORAL PRESENTATIONS

O1

Modeling ‘post-stroke depression’ in a mouse model

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Numerous emotional and behavioral disturbances including depression, mania, bipolar disorder, anxiety disorder, apathy, and pathological crying occur following stroke.

Despite their clinical importance these emotional disturbances have scarcely been characterized in animal models. Here we tested whether brief ischemic episodes induce ‘post stroke depression’ and other behavioral disturbances. In two separate experiments 129/Sv mice were subjected to 30 min-occlusion of the left and right middle cerebral artery (MCAo) followed by reperfusion. A widely used SSRI, ciproamil or vehicle was used to treat animals starting at day 7 after MCAo until the end of the experiment. Approximately 14 weeks later, mice were subjected to several behavioral tests for assessing locomotion, anxiety and depression. Also lesion volumes were determined and brain monoamine and amino acid levels were measured.

We observed that left but not right MCAo animals develop a despair-like, anhedonic and anxious phenotype. Ciproamil treatment normalized the observed phenotypes. In the left MCAo group primary lesion size assessed by NeuN staining was significantly reduced in animals that had received ciproamil treatment. Microglia density as assessed by Iba1 staining was significantly reduced as and effect of ciproamil treatment. Furthermore, ciproamil treatment ameliorated secondary retrograde degeneration in the substantia nigra and ventral tegmental area. Neurochemical analyses via HPLC revealed a significant increase in norepinephrine, and a significant decrease in dopamine and homovanillic acid levels which were also reversed via ciproamil treatment.

Our results indicate that 30-min IMCAo may represent an animal model for modeling “post stroke depression” and ciproamil is a candidate drug for treating stroke even at late time points.

Keywords: stroke, depression, anxiety, citalopram, ciproamil

O2

Neuropsychological tests (NPTS) and event-related potentials (ERPs) records in scuba divers

Uslu A [1], Caglar O [2], Ergen M [1], Keskin-Ergen Y [1], Bayraktaroglu Z [1], Gurvit H [3], Demiralp T [1], Cimsit M [2]

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Recreational SCUBA (self contained underwater breathing apparatus) diving is becoming more popular everyday, both in Turkey and overseas. However, there are certain risks associated with SCUBA diving. Most diving injuries are related to the behaviour of the gases and pressure changes during descent and ascent. The nervous system and cognitive functions are frequently involved in dive-related complications and fatalities. Permanent

neuropsychological changes such as memory disturbances have been found in professional divers, even in those who have never had decompression illness (DCI). The changes are probably the result of intravascular silent gas bubbles insufficient to cause acute symptoms. The aim of the present study was to investigate the association between Event-Related Potentials (ERPs) of the brain, Neuropsychological Tests (NpTs) performance and exposure indices in experienced air SCUBA divers who had no history of neurological DCI. In this study, forty five right-handed male healthy volunteer (range 25-45 years) were employed. Subjects were divided into three groups as Divers I, Divers II and Control (had no diving experience). Each group consisted of 15 subjects. ERPs and NpTs performances of the groups were compared. All participants were screened with Physical Examination and Diving Anamnesis in a session prior to NpTs and ERPs testing. ERPs were recorded while the subjects performed auditory oddball and visual Continuous Performance Test (CPT). Delayed Recall Performance of Divers II group was worse than those of Control and Divers I groups in Rey–Osterrieth Complex Figure Tests ($p=0.045$). Total True Score Performance of Divers I group was better than performance of Control and Divers II groups in Tower of London Tests ($p=0.013$). In Go condition of CPT, P200 amplitudes of Control group was higher than those of Divers I and Divers II groups ($p=0.024$). P300 latency of Divers I and Divers II groups was significantly prolonged in comparison with the Control group, in Go condition of CPT paradigm ($p=0.047$). There was no significant differences amplitude and latency in the auditory oddball paradigm and in NoGo condition of visual CPT paradigm between groups. These findings suggest that exposure to hyperbaric environment could have lead to some cognitive decline, and ERPs, and NpTs may help early detection of those dysfunctions.

Keywords: SCUBA Divers, Neuropsychological Tests (NpTs), Event-Related Potentials (ERPs), P200

O3

Retrieval of ‘helplessness’ experience in BALB/C and C57BL/6J mice

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Aim: The aim of the present study is to examine the ability of two strains, BALB/c and C57BL/6j mice, to retrieve “helplessness” experience in a new conflict situation.

Metod: As two different mouse strain, adult BALB/c and C57BL/6j mice (12 weeks) were used. “Helplessness” experience was assessed by freezing behaviour displayed in the illuminated part of the modified one trial step-through passive avoidance paradigm following shock application (1 mA, 2 sec duration) in the dark section of the apparatus. Data was expressed as percentages of retrieval test time (5 min) (means \pm SEM).

Results: Results demonstrated that BALB/c mice spent approximately 50 % of testing time, and C57BL/6j mice spent approximately 20% of testing time, in freezing behaviour elicited in the testing section of the passive avoidance apparatus in immediate and delayed (24 h later) retrieval trials. In addition, BALB/c mice were more able to sense the time aspect of episodic-like memory retrieval, with respect to experience of “helplessness” (“recent” versus “later”), than were C57BL/6j mice. The Freezing scores of BALB/c mice obtained in immediate retrieval trial were significantly higher than freezing scores obtained during delayed retrieval trial. Both strains have intact avoidance conditioning, expressed as similar percentages of mice that did not enter the shock section in retrieval trials. There was no difference

between strains with respect to the exhibition of the conditioned freezing in the Pavlovian conditioning paradigm.

Conclusion: Our results provide evidence that BALB/c mice have greater ability to retrieve the episodic-like memory of a unique emotion (“helplessness”) in a new conflict situation than do C57BL/6j mice.

Keywords: BALB/c, C57BL/6 mice; Episodic memory; Passive avoidance; Pavlovian fear conditioning; Freezing; Helplessness.

O4

Adult rats with neonatal MK-801 treatment become less sensitive to innate anxiety and conditioned fear stimuli

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Aim: We examined the effects of neonatal N-methyl-D-aspartate (NMDA) receptor blockade on responses of anxiety evoked by novel and conditioned fear stimuli in adult age.

Methods: Neonatal rats were injected with MK-801 (0.25 mg/kg, s.c., twice daily) or with saline from postnatal days (PND) 10–20 for ten days. Anxiety and fear related behaviors were examined in light/Dark Box (LDB), elevated plus-maze (EPM) and in step-through passive avoidance apparatus (PAA).

Results: When compared to saline-treated rats, adult rats neonatally treated with MK-801 showed significantly prolonged latency to enter the darkness and increased time spent in lighted section of LDB. In these animals, frequency of head dipping behavior open arm and rearing in closed arm increased in EPM. In PAA, adult rats with neonatal MK-801 treatment showed decreased percentage of freezing in immediate and delayed test.

Conclusion: NMDA receptor blockade in neonatal period make adult rat less sensitive to innate anxiety and conditioned fear stimuli.

Keywords: NMDA, MK-801, Anxiety, Conditioned fear, Rat

Present study is supported by TÜBİTAK (SBAG-3595)

O5

Molecular determinants of the synaptic and extrasynaptic clustering of GABA (A) receptors

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How GABAA receptors (GABAARs) are clustered in the specific domains of cell membrane is not well understood. In order to address this question, we expressed the GFP-tagged $\gamma 2$ and δ -GABAAR subunit chimeras in the hippocampal cultures and analyzed the membrane segregation of GABAARs with the help of immunocytochemistry and confocal microscopy. We found that the synaptic targeting of $\gamma 2$ -containing GABAARs does not depend on the TM3-TM4 domain (intracellular loop) of the subunit. This was actually surprising since it is a deviation from the general trend of intracellular loop dependent clustering of acetylcholine receptors and glycine receptors both of which belong to the same gene family with GABAARs, and thus it suggests that synaptic targeting of GABAARs might be mediated by a mechanism fundamentally different than these receptors’.

On the other hand, we found that the TM3-TM4 domain of the subunit is either a factor for the extra-synaptic clustering of the δ -containing δ GABAARs (active mechanism) or alternatively that this loop region may not contain any information at all on receptor targeting, and subunits with this domain may simply lack sufficient “information” to be placed in synapses (passive exclusion). By comparing the subunit TM3-TM4 loop amino acid sequences across the whole span of vertebrate evolution, we discovered that the loop was remarkably conserved addressing that the loop’s tertiary

structure is important for some function(s) of δ -containing GABAARs including extrasynaptic targeting. Conclusively these data suggest that synaptic and extrasynaptic targeting of GABAARs might be mediated by conceptually different mechanisms.

Keywords: GABAA receptor, synaptic, extra-synaptic, $\gamma 2$ -subunit, δ -subunit

O6

Roles of chemokine and chemokine receptors on Alzheimer’s disease pathogenesis

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Alzheimer’s disease (AD) is the common form of demans syndromes characterized by progressive impairment in memory, judgment, decision making, orientation to physical surroundings and language.

One of the characteristic pathological features of Alzheimer disease is a robust inflammatory response associated with extracellular deposition of amyloid β - protein. Chemokine and chemokine receptors may interfere with the pathogenesis of a large number of inflammatory diseases. Chemokines belongs to a rapidly expanding family of cytokines, the primary function of which is control of the correct positioning of cells in tissues and recruitment of leukocytes to the site of inflammation.

The aim of the study was examined whether DNA polymorphisms at the genes encoding chemokines MCP-1, RANTES, IL-8, and chemokine receptors CCR2 and CCR5 were associated with the pathogenesis of AD.

DNA samples were obtained from 17 AD patients and 60 elderly healthy controls. Allel and genotype frequencies of MCP-1 -2518 A>G, RANTES -28 C>G, IL-8 -251 A>T, CCR2 -64 V>I and CCR5 - $\Delta 32$ polymorphisms were detected by PCR-RFLP method. Also ApoE polymorphisms of these groups were detected.

There were no significant differences in the distribution of RANTES, IL-8, CCR2 and CCR5 genotypes in AD patients when compared to controls ($p > 0,05$). Genotype frequency of G allel was observed 11.8% of patient with AD and 45% of controls. Two of the AD patients were heterozygote for G allel (11,8%), while 22 of the control group were heterozygote (36,7%) and 5 were homozygote (8,33%). Genotype frequency of -2518 A/G was significantly different between AD patients and controls ($p < 0,05$).

-2518*G was found to be associated with increased levels of MCP-1 protein and high level of the protein plays a role in the pathogenesis of the disease. In an Italian population, MCP-1-2518 GG genotype and G allel were associated with AD but this situation is just the opposite for Turkish population.

Keywords: Alzheimer’s disease, inflammation, chemokines, chemokine receptors, polymorphism

O7

Parkinson’s disease and IL-8 -251A/T polymorphism

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Parkinson’s disease (PD) is one of the most prevalent neurodegenerative disorders and is characterized by the progressive loss of dopamine neurons in the substantia nigra. Evidence has been accumulating over the last decade to indicate that the brain has an active endogenous immune system and that chronic inflammation of the brain may play a crucial role in neuronal death. In support of this theory, proinflammatory cytokines are markedly up regulated in the brain or the cerebrospinal fluid in patients with PD.

IL-8 is also known as CXCL8 and belongs to a specific group of cytokines known as chemokines. The cells of the brain, and in particular neurons, are believed to possess a wide range of chemokine receptors. Chemokines facilitate leukocyte migration and positioning, promote angiostasis and angiogenesis, and stimulate leukocyte degranulation.

DNA samples were obtained from 30 PD patients and 60 elderly healthy controls. Allel and genotype frequencies of IL-8 -251 A>T polymorphism was detected by PCR-RFLP method.

Genotype frequency of T allel was observed to display a highly significant decreased ($p<0,01$) within the patients with PD (63.3%) compared with the healthy aged controls (88.4%). Frequencies of A and T allels of the patients with PD were 53.3% and 46.7% respectively, while controls were 31.7% and 68.3%. We considered a statistically significant at $p<0,01$ difference between the PD patients and control group.

The -251*A allel has been associated with increased IL-8 production. There was a significant decrease in the frequency of the TT genotype within the cohort of patients with PD, accompanied by a significant increase in the frequency of the AT genotype. The decrease in the low IL-8 producer TT genotype in the cohort of patients with PD would indicate that this genotype may confer a level of protection against the onset of PD or influence disease pathogenesis. The similar results were found between Irish population and this study.

Keywords: Parkinson's disease, inflammation, chemokines, IL-8 polymorphism

O8

Targeted brain delivery of CASPASE-3 inhibitory containing CHITOSAN-PEG-BIO-SA/OX26 nanoparticles crosses blood-brain barrier and provides neuroprotection in cerebral ischemia

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The inhibition of the caspase-3 enzyme is reported to increase neuronal cell survival following cerebral ischemia. The peptide Z-DEVD-FMK is a specific caspase inhibitor, which significantly reduces vulnerability to the neuronal cell death. However this molecule is unable to cross the blood brain barrier (BBB). Thus the development of an effective delivery system is needed to provide sufficient drug concentration into the brain to prevent cell death. Using the avidin (SA)-biotin (BIO) technology, we describe here the design of chitosan (CS) nanospheres conjugated with polyethyleneglycol (PEG) bearing OX26. OX26 is an antibody whose affinity for the transferrin receptor may trigger receptor-mediated transport across the BBB. Our previous study revealed that these novel nanoparticles appear to be promising carriers for the transport of the anticaspase peptide Z-DEVD-FMK into the brain. The purpose of this study was to prepare Z-DEVD-FMK loaded CS-PEG-BIO-SA-OX26 nanoparticles and to evaluate in-vivo efficiency of this nano-carrier system in decreasing infarct volume. CS-PEG-BIO nanoparticles were prepared according to the procedure previously described by our group. Various concentrations of Z-DEVD-FMK were incorporated into CS-PEG-BIO nanoparticles. Fluorescence labeled CS-PEG-BIO-SA-OX26 nanoparticles (1mg in 200µL saline) were injected intravenously to Swiss albino mice before ischemia/reperfusion. Intraluminal filament model was used to induce ischemia and filament was pulled-back to get reperfusion. After 2 h of ischemia and 24 h of reperfusion the infarct volume was calculated. Z-DEVD-FMK was successfully associated into the nanoparticles and the incorporated amount of the peptide was increased from 200 ng/mL to 800 ng/mL. Treatment with nanoparticles loaded with 200 ng/mL (33.2±7.1 mm3) and 800 ng/mL (25.9±8.7 mm3) were significantly decreased infarct volumes compared to control group (50.3±10.8 mm3, contains nanoparticles without OX26 that can not cross the BBB) ($p<0.05$). These data demonstrate that the Z-DEVD-FMK loaded CS-PEG-BIO-OX26/

SA nanoparticles sufficiently penetrate through BBB to efficiently inhibit the caspase-3 activity after cerebral ischemia and provide neuroprotection.

Keywords: Cerebral ischemia, mice, caspase-3, nanoparticles, blood-brain barrier, neuroprotection.

O9

Trauma healing model: nerve regeneration

Yuksel M [1], Elcin E [2], Karasu Benli AC [3], Selvi M [4], Sarikaya R [5], Sepici-Dincel A [6], Diker S [7], Ozkul A [8], Erkok F [2]

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Aim: The aim of the present study was to develop an alternative model to the widely used experimental spinal cord injury (SCI) model by using *Astacus leptodactylus* Esch. 1823. In the model the selected organism was preferred due to high regeneration capability, ease of availability and lack of vertebra support to the ventral nerve cord.

Method: Ventral nerve cord injury to the experimental group was made by an incision after ice anesthesia; no cut was made to the control group. Immediately after hemolymph collection from all animals, total cell count (THC) was made every day after injury and once every week for 7 weeks. Biochemical parameters; glucose, t.protein and calcium were measured in Hitachi-912 autoanalyzer (Roche kits); chloride, sodium and potassium were done in Medica Electrolyte Analyzer, USA, by ion selective method and magnesium was in Cobas Mira Analyzer. The t.protein profiles were also done by cellulose acetate electrophoresis. Histopathological examination of the ventral cord was carried out using standard and modified methods. Both histopathological and biochemical studies were done at the same time intervals.

Results: Macroscopic examination of the incision site showed melanization during the first two days showing inflammation reaction. On the third week expected necrosis was found at the uropod region in twenty percent of the animals. Histopathological evaluation showed mineralization and axonal regeneration. No differences were observed in THC of control and experimental groups at all time intervals. While all biochemical parameters, except t.protein, started to increase on day 2 and reached highest levels on day 3; calcium, chloride and sodium values returned to normal on day 50. The t.protein values were found to decrease on day 3, and started to increase on day 7; remained high thereafter.

Discussion: In conclusion, biochemical, hematological and histopathological evaluation of the SCI method developed as an alternative, showed that it can be applied experimentally since regeneration is rapid and it provides for successful follow-up of the regeneration.

Keywords: Astacus leptodactylus, nevre regeneration, histopathology, hemolymph biochemistry

O10

Assessment of the outcomes of cerebral blood flow measurements after electrical stimulation of upper right incisor tooth in rabbits

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Aim: The cerebral vessels are innervated by sympathetic, parasympathetic, and sensory nerves. A sensory innervation of the cerebral vessels originating in the trigeminal ganglion has been described in a number of species by several investigations. It has been shown that the electrical stimulation of the trigeminal ganglion causes an increase of cerebral cortical blood flow (CCoBF). The aim of the present study was to determine the effects of dental electrical stimulation the CCoBF in rabbits.

Method: A stimulating electrode was located in the upper right incisor tooth of rabbits and trigeminal ganglion was stimulated orthodromically via the infraorbital nerve. Variations in the cortical CCoBF were evaluated by laser-Doppler flowmetry. In experiment group, CCoBF increased together with the beginning of electrical stimulation (5 V, 0.5-ms impulse duration, square-shaped, 10-Hz frequency).

Result: The right and left hemisphere CCoBF values of stimulation period at 15 s, 30 s, 45 s, 60 s, 75 s, and 90 s were significantly higher than those of baseline and 105 and 120 s ($p < 0.05$). The maximum increase in right and left CCoBF was 15.6% and 15.1% respectively. In post-stimulation period, the right CCoBF decreased gradually and returned to the baseline values at 120 s. In experiment groups, the CCoBF values of right hemisphere were comparable that of left hemisphere ($p > 0.05$).

Conclusion: This study demonstrated that the electrical stimulation of the trigeminal nerve's infraorbital branch via dental pulp increases the cortical right and left CCoBF under physiological conditions.

Keywords: *Electrical stimulation; Dental pulp; Trigeminal nerve; Cerebral blood flow; Cerebral vascular innervation*

O11

Association of the serotonin transporter promoter length polymorphism (5-HTTLPR) with anxiety and academic performance

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The neurotransmitter serotonin (5-hydroxytryptamine, 5-HT) plays an important role in neurodevelopment, functioning and plasticity of the brain. It is also involved in sleep, mood, anxiety and altered neuroendocrine function. The serotonin transporter promoter length polymorphism (5-hydroxytryptamine transporter length Polymorphism 5-HTTLPR) in serotonin transporter gene (SLC6A4) has been implicated in numerous psychiatric disorders. The insertion/deletion polymorphism of the serotonin transporter (5-HTT) gene, the polymorphic site is in the promoter region upstream of the transcription start and occurs in two variants, long (L) of 16 repeat units and short (S) of 14 units. Repeat size affects gene expression, production of 5-HTT mRNA and serotonin uptake.

The aim of this study was to explore the association among the anxiety, academic performance and the allelic polymorphism of the 5-HTT gene. This cross-sectional study has been conducted on the student of Kafkas University attending to Education School: 35 1th grades and 28 4th grades, total 63 students. Data were gathered using an interview form, State Trait Anxiety Inventory (STAI-I and STAI-II) and Employees Selection Examination (KPSS) results only for 4th grades students. Data and blood samples were obtained synchronically from the all participants two days ago from KPSS. The DNA was extracted and genotyped for the 5-HTTLPR.

The study group was divided into two group based on education levels and age: 1th grades and 4th grades. After genotyping the 5-HTTLPR, five different genotypes were observed namely, 9 L/L(14.3%), 31 L/S (49.2%), 23 S/S (36.5%), 1 L/XL. L/XL genotype was not included in the genotype frequency calculations because of their low observed frequencies. Anxiety scores tended to be higher in S/S student of 4th grades compared with the other genotypes in the same group ($p=0.155$ for state and $p=0.464$ for trait anxiety). The results of the genotypes and scores in the KPSS obtained by

teacher candidates who are attending 4th grades indicated that the KPSS scores of the students with L/L genotype were higher the others ($p=0.771$).

The test stress is an environmental factor that provoked the anxiety. Reaction of the students towards test anxiety can play a role their academic performance. Genetics alone is not sufficient to explain anxiety disorders that are observed, but that the environmental makes a contribution to the ultimate phenotype. In the evaluation of education process both environmental and biological factors will have a very important role in improving effective strategies for the student personality services, as well as in developing and planning curriculum.

Keywords: *Anxiety, SERT polymorphism, academic performance*

O12

Effects of matrix metalloproteinase inhibition on short- and long-term plasticity of perforant pathway/dentate gyrus synapses in urethane anaesthetized rats in-vivo

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Purpose: The goal of this study was to test the hypothesis that regulation of MMPs is a requisite for efficient hippocampal-dependent learning in perforant pathway/dentate gyrus synapses.

Materials and Methods: The acute experiments were carried out on 18 adult male Wistar rats weighing 290-320 g fed with tap water and purina rodent chow. In each recording session, rats were anesthetized with urethane and the head was fixed in a stereotaxic head-holder. After the skull was exposed, a bipolar stimulating electrode was placed in the lateral perforant path and a glass micropipette recording electrode filled in the dentate gyrus. aCSF or MMP was infused by a second glass electrode fixed along with recording electrode. Active and reference electrodes were connected to amplifier using a head-stage. Stimulation electrode was connected to the output of isolator connected with stimulator. The high frequency stimulation protocol was applied to evoke long term potentiation.

Results: Infusion of FN439 was resulted in a clear inhibition of fEPSP and PS in early phase. After infusion finished HFS protocol caused significantly less potentiation of dentate synapses subjected to FN439 when compared to those of synapses subjected to aCSF.

Conclusion: Acute application of FN-439 to anesthetized rats significantly inhibited the formation of LTP, providing in vivo experimental data to support the above postulation.

Keywords: *LTP, in-vivo, matrix metalloproteinase, FN-439, dentate gyrus.*

O13

The investigate of the level of attention with electrodermal activity in the nurses who exposure circadien sleep rythm change

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Aim: Electrodermal activity (EDA) is an electrical activity of ecrin sweat gland (sudorific) stimulated by sympatic nervous system and related dermal, epidermal (nonsudorific) tissues. EDA reflects the nervous systems which are related to emotional sweat. It is known that the activity of sweat gland increases in emotional situations such as high activation, attention rise or stress. The aim of the study is to find out whether sleep deprivation affects the emotional sweat which the indicator of central nervous system otonom activity level and possible attention changes.

Methods: The study was carried out at 15 nurses who work without sleeping at night and 15 nurses who work in the daytime. The volunteers were chosen among healthy nurses at an average age of 30, $23 \pm 4,11$ and without any health problems. All of the measurements was applied at 9,00 am. The level of emotional sweat was measured with electrodermal activity. In this method, Ag/AgCl electrodes were put on persons' thumbs and forefingers of their dominant hands by using agar gel. The skin resistance was measured and

analyzed through MP30 system. Epworth Scale which evaluates the awakesness state of persons was applied to the nurses after the record. Cortisol and ACTH hormone levels were analyzed in blood for investigate sleep circadian rhythm changes.

Results: It was found that there was no statistical difference ($p>0.05$) at the skin resistance level between the groups. Moreover, in the comparison of hormone values of the groups, the cortisol levels was higher in working at night group than at the daytime ($p<0.05$).

Conclusions: No change was found out in the attention levels of the nurses whose circadian sleep rhythm was altered. This situation is thought to be related to the fact that the nurses responsible for the night service raise their attention level to the highest point. The reason of higher level of cortisol in working at night group may reflect that cortisol isn't having an effect on the attention but to reflect the high-level stress.

Keywords: Electrodermal activity (EDA), Attention, Circadian rhythm, Sleep, Nurse.

O14

Sex differences in gray and white matter in healthy young aged 20–25 years: a planimetric study

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Sex-related variations in human brain structure have been studied broadly in a number of investigations. The most consistent observation is that men have larger brain volumes than women. Different approaches to gray and white matter measurements in magnetic resonance imaging (MRI) have been studied.

The study examined sex-related differences in gray (GM) and white matter (WM) in 20–25 year old healthy individuals. T2-weighted MRI scans were acquired in 12 subjects and optimized planimetry method was applied to detect GM and WM difference between men and women. Total GM, total WM, and total brain volumes (TBV) were segmented by using MR image-based computerized semi automated software. Sex effect was then assessed. The volumes of WM, GM and TBV were compared between the genders using independent t-test. The differences of the estimated volumes obtained by two dimensional views (coronal and axial plane) were compared using unpaired t test.

The difference between the genders and side (left, right) were not statistically significant ($P>0.05$). Also, there is a strong correlation with the gray-white ratio ($r=0.78$). Quantitative analysis of %GM and %WM volumes can improve our understanding of brain atrophy; this knowledge may be valuable indistinguishing atrophy of disease patterns from characteristics of the normal process. Also, the method described here for gray matter and white matter volume calculation is reliable and valid.

Keywords: Total brain, White matter, Gray matter, Magnetic resonance imaging, Planimetry.

O15

Contractile response of neurons to axotomy in culture

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Many changes have been described in neurons after their axons are severed. While some changes are restorative, others may lead the cell to death. In this study, we show that when outgrown axons from cultured mouse primary sensory neurons are cut with a laser beam, the cell bodies contract. Primary sensory neurons were isolated from dorsal root ganglia of young adult mice and cultured in glass-bottom culture dishes. After 48 hours in culture, outgrown axons were precisely cut with a UV laser at 100

micrometer distance from the soma. The whole process was performed under physiological temperature and pH and images were digitally recorded.

The first group of experiments were conducted in normal or calcium-free media, in the presence of a general myosin inhibitor 2,3-butanedione monoxime (BDM, 50mM) or actin inhibitor swinholide (500 nM). Some experiments were carried out with L-type calcium channel blocker nifedipine (10 uM). Intracellular calcium stores were blocked with dantrolene (20 uM) or depleted with thapsigargin (20 uM) prior to axotomy in other experiments. Changes in the surface area of the axotomized neurons were digitally analysed. Results showed that neuronal size decreased following axotomy in normal medium by about 4,5% in 3 min and upto 15% in 60 min time ($p<0,05$ initial size vs. sizes at 3rd and 60th min). This decrease was due to contraction as in calcium-free and BDM or SWH-added media no significant change in cell size was detected ($p>0,05$ initial size vs. size at 3rd min). While Inhibitor of L-type calcium channels prevented earlier phase of contraction, elimination of calcium release from internal stores did not affect the contractile response.

The results suggest that neurons react to axotomy with contraction based on actin-myosin interaction which is triggered by influx of extracellular calcium through L-type calcium channels and through cut end and that release of calcium from internal stores does not significantly participate in this response.

O16

Morphology and innervation of the human cremaster muscle in relation to its function

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The electromyographic properties of the cremaster muscle (CM) are quite different from other skeletal muscles. It shows excessive spontaneous discharges, and the motor unit shape and firing frequency of the CM muscle differ from that of limb muscles. In this study, CM of six adult cadavers and six orchioectomy specimens were used to reveal the detailed histology of the muscle and provide an anatomophysiological explanation for these unusual electromyographic properties.

Routine histochemical stains revealed the CM was composed of several distinct bundles of smooth and striated muscle fibers within connective tissue. The smooth muscle fibers which were more profuse than previously known and were not arranged in layers, but widely dispersed between striated muscle fibers. Bielschowsky silver staining technique, anti-neurofilament and anti-synaptophysin immunostaining showed the presence of multiple motor end-plates observed as a series of small dots or lines running along the striated muscle fibers and several nerve endings on a single muscle fiber. Myosin immunostaining confirmed the CM is a slow-twitch muscle, and lpha-actin smooth muscle immunostaining confirmed the presence of a large number of smooth muscle fibers. There were also small multipolar neurons forming nerve plexuses between smooth muscle fibers. Anti-GFAP immunostaining confirmed the presence of glial cells similar to astrocytes. In conclusion, the findings of this detailed anatomical study showed the CM, widely known as a striated muscle, contains a large number of smooth muscle fibers, and the spontaneous electromyographic discharges are due to the presence of multiple motor end-plates and dense innervation.

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POSTER PRESENTATIONS

P1

Tramadol-agnatine interaction and investigation of possible mechanisms in experimental acute pain model*

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A central analgesic agent tramadol has been declared to act by partially opiategic, noradrenergic and serotonergic mechanisms. Although ongoing

studies show that some other mechanisms may also involve in the effect of tramadol, but the precise mechanism has not been determined yet. On the other hand, agmatine, suggested as a new neurotransmitter in the brain has been showed that to elicit antialloodynic and antihyperalgesic effects in the neurophatic pain and to enhance morphine antinociception.

The aim of the present study was to investigate the possible effects of agmatine and agmatine-tramadol combination on nociception by using the tail-flick method, an acute analgesic test in mice. We also evaluated the mechanism of the potentiating effect of agmatine on tramadol-induced antinociception by pretreatment with nitric oxide modulators such as L-arginine and L-NAME and NMDA receptor blocker MK-801.

Male Balb/c mice were used in all experiments. The antinociceptive effect was determined in mice by using tail-flick test. Drugs were administered in 30 min interval. Tail-flick test was performed 30 min after the last drug injection. Tail-flick latencies (TFL) were record as second and the results were expressed as the mean \pm SEM. One-way analysis of variance followed by a post-hoc Student Newman-Keuls test was used for the statistical analysis.

Tramadol and agmatine significantly increased the TFL of mice when compared to the control group. Agmatine enhanced the antinociceptive effect of tramadol. L-arginine and L-NAME did not change the TFL of agmatine, but L-arginine decreased whereas L-NAME enhanced the antinociceptive effect of agmatine + tramadol combination. MK-801 pretreatment did not changed the TFL of agmatine, tramadol or agmatine-induced potentiation of the tramadol effect.

Our results demonstrate that agmatine combination with tramadol produces an antinociceptive enhancement and this effect does not seem to be mediated via nitregeric system or NMDA receptors. Administration of agmatine-tramadol and/or agmatine-tramadol-L-NAME combinations may also provide an effective therapeutic strategy for future medical treatment of pain.

* This study was presented as the Master thesis of Soner Mete.

Keywords : *Agmatine, Acute pain, Nitregeric System, NMDA, Tramadol*

P2

New investigations on analgesic action of carvacrol

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Carvacrol is a syntetic and also a natural compound widely found in plants like Lamiaceae family, and as an oxygenated monoterpene, it has chemical similarity to thymol. Since carvacrol constituted major compound in plant extracts, carvacrol was suggested to play major role in pharmacological actions of previous tested plant extracts. The aim of this study was to investigate dose dependent analgesic actions of commercially available pure carvacrol on mice. In vivo mechanical (tail-clamp) and thermal (tail-immersion) methods were used in this study. Commercially purchased pure carvacrol (100 mg/kg i.p. diluted in sunflower oil) was observed no analgesic activities on our test groups. Since carvacrol constituted major compounds of previously reported pharmacologically active plant mixtures, our hypothesis was rejected by the results of our latest investigation. As a conclusion, we suggest application of carvacrol was not active alone but may have significant contributions on the previously observed central actions of plant mixtures.

P3

Analgesic activity of lotus corniculatus var. albinus

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Aim; *Lotus corniculatus var. albinus* (Fabaceae) is a plant native to Turkey. All parts of the fresh plant are poisonous, containing cyanogenic glycosides but they are completely innocuous when dried. The plant has several ethnopharmacological use including febrifuge and anti-inflammatory activities. It is known that antiinflammatory and antipyretic agents may also show analgesic activities. In addition, antidepressant activity of the plant methanolic extract has been studied recently in our laboratories. Nowadays, there are many reports indicating the anagesic effects of antidepressants. In

the present study, we aim, thus, to investigate the analgesic activity of the extract.

Method; Swiss albino mice (both sexes, 25-30g) were used for this study. Analgesic activities were measured by tail-clip, tail-immersion, hot plate and acetic acid-induced writhing tests.

Results; Both in tail clip and tail immersion tests, reaction times were increased and in writhing tests numbers of abdominal writhing induced by acetic acid were decreased by the application of the extract (100 and 250 mg/kg, i.p) in dose dependent manner. However, there was not any significant effect in hot plate test.

Conclusion; This results suggests that the analgesic activity is related to the spinal mechanisms excluding supraspinal pathways. Decrease in the number of abdominal writhing indicates that the analgesic activity is also related to the peripheral mechanisms besides spinal mechanisms. As a possible source for the development of new analgesic drugs, this is the first report for the analgesic activity of *Lotus corniculatus* extract. However, further studies are necessary to explain the mechanism of the analgesic action.

Keywords: *Lotus corniculatus, analgesia, tail clip, tail immersion, hot plate, writhing test*

P4

Sympathetic skin responses from neck region in unilateral migraine headache

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Purpose: To investigate sympathetic nervous system function in unilateral migraine headache (MH) on neck region.

Method: Twenty one healthy volunteers and 37 patients with unilateral MH were studied by evoking bilateral neck sympathetic skin responses (N-SSRs) with electrical stimulation of the median nerve in attack, post attack and interval periods.

Results: There was not any difference in the mean latencies and maximum amplitudes of the symptomatic and the asymptomatic sides ($p > 0.05$ for both amplitude and latency) in attack, post attack and interval periods. When compared to the controls, N-SSRs of patients had significantly smaller amplitudes in attack and interval periods ($p < 0.05$ for both intervals). In post-attack period, there was not any difference in the amplitudes of the N-SSRs of patients and controls, indicating a relative hyperfunction in the recovery period when compared to those in the attack period.

Conclusion: These findings indicate that there is a sympathetic hypofunction on the neck region in attack and interval periods regardless of the side while this hypofunction subsides in the post-attack period.

Keywords: *Migraine, Neck, Sympathetic skin response*

P5

Relationship between duration of cell phone use and headache in students of AIBU

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Purpose: Limited number of studies showed that cell phone use can cause subjective symptoms such as headache. This study aims to investigate the relationship between cell phone use and migraine and non-migraine headache in university students.

Method: It was aimed to reach all of the students in AIBU (n: 10715) despite the fact 68.2 % was reached (n: 7311). 210 students did not accept to participate in the study. Demographic information was collected from the students who were given Beck Depression Inventory (BDI) by trained psychologists. 711 students having 21 or more than 21 points from BDI and 226 students using psychotropic drugs were excluded from study. As a result the study sample

consisted of 6080 students. The headache symptom, which was the dependent variable, was questioned through asking whether it was migraine or non-migraine. Duration of cellular phone use was categorized into two variables such as five and less than five years or over five years. Duration of cell phone use, sex and age were assumed as predictors of headache. Regression analyses were conducted to examine the predictors of headache symptom. Study was confirmed by AIBU Medical Faculty Ethic Committee.

Results and Conclusion: When the dependent variable was the headache symptom (migraine and non-migraine together), only being female predicted the headache among the independent variables such as duration of cell phone use, gender and age ($p < 0.05$). However, when the dependent variable was the migraine headache; using cell phone over five years, being female and older age predicted the migraine ($p < 0.05$).

* This study is funded as Scientific Research Project by A.I.B.U.

Keywords: Headache, Cell Phone, Migraine

P6

The effects of intracerebroventrally administered endogenous opioid peptide antagonists on exercise performance

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It is known that endogenous opiates are elevated during physical exercise and seem likely to be assigned a significant role in the integrated hormonal and metabolic response to exercise. It may also be possible that the exercise performance might be increased via the attenuation of pain perception by an increase of endogenous opioids during exercise. However, it has not been investigated yet, how the opioid peptides contribute to exercise performance at the central nervous system level. Here with this study, it has been searched that whether the inhibition of central opioid peptide receptors has an effect on exercise performance or not.

Wistar Albino rats which were treated with naloxone (50 μg in 10 μl physiologic saline solution) and naltrindole (50 μg in 10 μl physiologic saline solution) intracerebroventrally, were exercised till exhaustion. Time to exhaustion was recorded, blood glucose and lactate levels were determined before and after exercise.

Naloxone and naltrindole treatments had no effects on exhaustion time of exercised rats ($p > 0.05$). In all groups, blood lactate levels were increased ($p < 0.05$), and the blood glucose levels were decreased after the exhaustive exercise ($p < 0.05$); however the decrease in blood glucose levels statistically significant in naltrindole group ($p < 0.05$) after exhaustive exercise when compared to the other groups.

In conclusion, it has been suggested that the central endogenous opioid peptides have no effect on exercise performance. Delta opioid receptors, however, might have a role in regulation of glucose metabolism during the exhaustive exercise.

Keywords: Exercise, Endogenous Opioids, Delta Opioid Receptors

P7

Determination of the hemispheric asymmetry in the sportsmen with electrodermal activity (EDA)

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EDA is defined as the electrical activity of eccrine sweat glands, recorded by the skin electrodes. Since eccrine sweat glands are innervated by sympathetic cholinergic fibers, EDA is used to determine of sympathetic nervous system activity and attention level. Right and left brain hemispheres are different in every person. That is why everybody has different characteristics and abilities. The relationship between EDA and hemispheric asymmetry has been shown by different studies. In this study, determination of the hemispherical asymmetry in the sportsmen with EDA is aimed.

EDA was recorded with MP30 system from the thumbs and index fingers of both hands of the sportsmen ($n=20$) and healthy persons ($n=20$), whom hemispheric differences were determined by Anette Test and Hemispheric Dominance Test. Skin resistance levels (SRL) were recorded during the “tonic phase” for 2 minutes without any stimulation. “Phasic phase” were also recorded during Raven Standard Progressive Matrices Test.

SRL values weren't different between the groups both right and left hand comparison ($p > 0.05$). When right and left hand SRL values were compared within the group, right hand SRL values was differently high ($p = 0.02$) in the control group, whereas it was not different in the sportsmen ($p = 0.2$).

In our study, the hemispherical asymmetry that was investigated via evaluation of the sympathetic activity with EDA is disturbed in sportsmen. It was concluded that sports may improve both hemisphere.

Keywords: Electrodermal activity (EDA), sportsmen, hemispheric asymmetry.

P8

The different effects of 4-aminopyridine on ventral and dorsal root axons

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Rat motor and sensory nerve fibers may responses differently to the potassium channel-blocking agent, 4-aminopyridine (4-AP). In this study we examined the electrophysiological properties of rat ventral and dorsal root axons with 4-AP and compound action potentials (CAP's).

Male Wistar rats were sacrificed by rapid carotid exsanguinations' under ether anesthesia. Lumbar (L-4) ventral and dorsal roots were excised with laminectomy and immediately placed in a modified chilly Krebs solution saturated with 95% O_2 , and 5% CO_2 . To evaluate effect of 4-AP on the roots, CAP's were recorded in a modified sucrose gap chamber in vitro. All experiments were performed at 20-22 $^{\circ}\text{C}$.

The total duration of CAP obtained from the ventral root was prolonged 4-AP and the return to baseline was delayed. The duration of CAP of the dorsal root more broadened than ventral roots at least two fold. The CAP of the dorsal roots developed a distinct hump when return to baseline. This phenomenon was not observed in ventral roots. The latency of ventral and dorsal root were 256 ± 24 and $508 \pm 69 \mu\text{s}$, conduction velocity 20.4 ± 2.4 and $10.8 \pm 1.4 \text{ m/s}$, respectively.

In this study we showed that 4-AP has entirely different effects on rat motor and sensory axons. The differential effect of 4-AP on motor and sensory fibers may be due to differences in ratio of myelinated-unmyelinated axons and its diameters. In addition there may be differences node or paranode's potassium-sodium channels diversity in ventral and dorsal roots.

Keywords: Ventral-Dorsal Root, Action Potential, 4-Aminopyridine, Sucrose-gap

P9

Investigation of human soleus motor neuron synaptic potentials triggered by muscle spindle IA afferents

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Hoffmann (H) reflex is commonly used for investigation of modulation in the synapses between Ia afferents and motor neurons. Peristimulus time histogram (PSTH) is the classical method for illustrating such alterations. PSTH is constructed by counting the number of motor unit action potentials (AP) after periodic stimulation of Ia afferents. This study aims to generate H-reflex responses on human soleus muscle and compare the results obtained with PSTH and peristimulus frequencygram (PSF) methods. PSF method is believed to be superior to PSTH, and avoid possible errors in determination of neural pathways.

Experiments were conducted on 20 – 80 years old male and female subjects that do not have any known neurological disorder. The subjects were laid face down on a physiotherapy table, and their left tibial nerve were stimulated electricity at the popliteal fossa. In each experiment, about 600 stimuli were applied randomly every 1-2 s. The recordings were taken with both by surface electromyogram (SEMG) and as single motor unit potentials.

Our current findings suggest that PSF gives superior results compared to PSTH in determination of excitative and inhibitive neural pathways. For example, PSF demonstrates that the silent period that was “shown” to take place after the H-reflex created by Ia excitative postsynaptic potentials (EPSP) is actually a continuation of the EPSP. Further experiments will be conducted.

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Keywords: Motor units, age, H-reflex, soleus muscle, peristimulus frequencygram

P10

Effects of serotonin on the frog type-I mechanoreceptive fibers

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Aim: Slowly-adapting Type I mechanoreceptive fibers are associated with Merkel cells in the periphery by forming Merkel cell-neurite complexes. Mechanotransduction in Merkel cell-neurite complexes is still not entirely understood, but it is thought to involve chemical transmission from the Merkel cell to the mechanoreceptive neurite. We studied the effects of serotonin, a possible candidate as a chemical messenger.

Method: Single-unit electrophysiological responses were recorded from the dorsal cutaneous nerves of the common water frog's (*Rana ridibunda*) skin perfused in a tissue bath. Mechanical stimulation was applied at suprathreshold levels by von Frey hairs calibrated at 0.16, 0.4, 1, 1.4, and 2 g-forces. Three concentrations of serotonin were tested: 10 μ M (n=10), 100 μ M (n=10), 1000 μ M (n=6). The responses were analyzed as spike rates.

Results: The spike rate increased as a linear function of the stimulus level at baseline and all tested concentrations. Additionally, serotonin had significant effects on the spike rate in general. Spike rate increased significantly at 10 μ M (p=0.029) and at 100 μ M (p=0.044) in a dose-independent manner, but decreased at 1000 μ M (p<0.001) compared to the baseline. Recovery was obtained at each concentration.

Discussion: Although the results are consistent with the literature, the dose-independent increase in spike rate at low serotonin concentrations and the decrease in spike rate at high concentrations suggest that serotonin may be interfering with the action of a different messenger. In the future, we will test if the response can be decreased below baseline by using serotonin-receptor antagonists.

Keywords: somatosensory, touch, tactile fiber, cutaneous afferent, mechanoreceptor

P11

Investigation of cutaneous reflexes in human first dorsal interosseous (FDI) motor units

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The aim of this study is to investigate whether the muscle reflexes to pain due to electrical stimulus (cutaneous silent period - CSP) is actually an inhibition. Classical methods used to investigate human synaptic potentials contain significant errors. In our study, we have used peristimulus frequencygram (PSF) that utilizes the firing frequency of motor neurons, and has been shown to give more reliable results than peristimulus time histogram (PSTH) in brain slices. The subjects were asked to keep their FDI muscles in a tension level creating a motor unit firing frequency of approximately 10Hz (which

corresponds to approximately 1% of the maximum voluntary contraction) by providing visual and audio feedback. The electrical stimulation was applied as 0.2ms pulses. The perception threshold was determined at the back of hand, from the area corresponding to the 8th dermatome. Using visual analogue scale, electrical stimulation was applied to create a pain of 4 – 6 / 10 intensity, and surface EMG and single motor unit recordings were taken from the FDI muscle of the same hand. The cutaneous reflex was examined using PSTH, PSF and cumulative sum (CUSUM) methods. Using PSF, it was found that CSP was longer than that was reported with PSTH, and a late response that was previously reported as an excitation (using PSTH) turned out to be a continuation of the inhibition.

Using PSF, it will be possible to investigate synaptic potentials by examining electrical potentials created by stimulation of motor neurons, and to construct error free neuronal maps between the sensory neurons and the motor neurons.

Motor units, reflex, pain, silent period

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P12

Frequency analysis of surface EMG for understanding reflexes

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Hoffmann(H) reflex is commonly used for studying the changes in synapses of Ia sensory fibers with the motor neurons. One of the methods used in these studies, surface EMG is based on motor unit spike density following a stimulus. Because this method contains significant errors, a new method, PSF (peristimulus frequencygram) has been proposed. PSF is an invasive technique using single motor unit EMG (SMU), and explores firing frequency of the motor neuron action potentials after a stimulus. Current study aimed to create a new method to determine the central neuronal pathways noninvasively by using surface EMG (SEMG) to measure H-reflex on human soleus and tibialis anterior muscles. Experiments were conducted with 20 – 80 years old male and female subjects without any known neurological disorder.

The subjects were laid face down on a physiotherapy table, and their left nervus tibialis were stimulated by electricity applied to popliteal fossa activating the muscle spindle Ia fibers. In each experiment, about 600 stimuli were applied randomly every 1-2s. The recordings were taken both by SEMG and SMU. SEMG recordings were transferred to MATLAB7.0, processed (DC removal, 20-500Hz bandpass filter, rectified, 40Hz low pass filter) and divided into \pm 1500ms segments corresponding to each stimulus. Later, 1000ms Hamming window was moved 10ms over segments to perform frequency analysis of each stimulus and its average. Unfinished results support the assumption that frequency analysis of the SEMG, like the PSF, is more powerful than currently used methods in determination of neuronal pathways.

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Keywords: Power analyses, EMG, reflex, human, neural networks

P13

Effects of teeth clenching on hand grip force and soleus H-reflex*

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Introduction and Aim: People clench their teeth automatically when performing intense effort requiring activities. Recently a possible correlation of oral motor function with motor function in other body parts was reported. In this study we aimed to investigate the impact of teeth clenching (TC) on

forearm muscle strength and soleus Hoffmann (H) reflex by using standard and reliable methods.

Methods: We measured hand grip force by hand dynamometer (Biopac®) and strength of TC by EMG activities of the masseter muscles. H-reflex was elicited in the soleus muscle by stimulating the tibial nerve (LabVIEW®). Four experimental protocols were applied to each subject (n=19, male): H; H-reflex, RG; hand grip and H-reflex, CRG; TC before hand grip and H-reflex, CCG; TC before and during hand grip and H-reflex. The maximal bite force required for feedback was recorded first. The subject is given random tasks to clench or not to clench and is asked to exert his maximum hand grip strength. Entire stimulus-response curve for the H-reflex was evoked during each task. Hand grip force recorded at RG condition was accepted as 100 and the percent ratio of increases in force at other conditions were calculated. Student's t test was used to evaluate the difference between groups and $p < 0.05$ was considered as statistically significant.

Results and Conclusion: TC increased the hand grip force and the facilitation tendency of the H-reflex. Hand grip force increased 13.1% at CRG and 29.6% at CCG conditions ($p < 0.005$). When CCG was compared with CRG the increase in grip force was significant ($p < 0.05$). The amplitude of the H-reflex increased in 10, decreased in 3 and unchanged in 6 subjects at CCG condition.

When increased muscle force is needed, automatically performed teeth clenching has an important physiological role for general muscle force and stability of stance.

*This study was founded by TUBITAK [SBAG-HD-102 (105S514)]

Key words: Hoffmann reflex, teeth clenching, grip strength

P14

Modulation of jaw reflexes in human

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In literature, all investigations on the human masticatory system have used static conditions where the jaws do not move. In this study, we aimed to bring out whether the modulation of the synaptic potential from periodontal mechanoreceptor (PMR) input to motoneurons that innervate jaw muscles changes during simulated mastication. During experiments, healthy adult volunteers masticated after they bit into impression material mounted on two fixed bite bars. During this simulated mastication, each time the mandible went through 14 mm of jaw separation, we delivered various strengths of taps to the upper right incisor.

Responses of the jaw muscles were examined using spike triggered averaging of the electromyogram (EMG). To compare the results, static tests were also performed using similar EMG levels to the ones obtained during the opening and closing phases as the jaw crossed 14mm threshold. Once the experiment had been performed, local anaesthetic solution was administered to the upper and lower central peri-incisal periodontium and the incisive papilla, and all procedures were repeated. Thus contribution by the PMRs was blocked and only the contribution of the muscle spindles was determined.

This study has shown what the reflex response will be to larger stimuli while the reflex evoked by weak stimuli decreased during both jaw opening and closing. According to our findings, weak stimuli generate decreased reflex responses, while the responses to larger stimuli do not decrease during mastication. This indicates that the reflex responses are increased to protect the teeth and supporting structures if the encountered force is large.

This project is generously supported by the Marie Curie Chair Project of the European Union (GenderReflex; MEX-CT-2006-040317) and TÜBİTAK (107S029 - SBAG-3556).

Keywords: Trigeminal, periodontal, mastication, jaw muscles, EMG

P15

The electrophysiological effects of imidacloprid and alpha-bungarotoxin on sciatic nerves of frog (*Rana ridibunda*)

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Imidacloprid which is widely used for insect warfare is a neonicotinoid insecticide. This insecticide has neurotoxic effects and causes damage in nervous system.

In this study, the effects of imidacloprid and α -bungarotoxin, on frog sciatic nerve parameters of compound action potential were investigated. Three groups of imidacloprid (n=8) were composed with three different doses (1x10-6M, 1x10-5M, 1x10-4M). The effects of imidacloprid were investigated alone and in combination with α -bungarotoxin which is a nicotinic acetylcholine receptor (nAChR) antagonist. As a control group the sciatic nerves were not exposed to insecticides. The effects of imidacloprid (1x10-6M), were investigated in combination with α -bungarotoxin in concentration of 1x10-5M in a different group. The measurements of insecticides or control groups were taken on the 0th, 30th, 60th, 90th, 120th minutes. Action potential records were obtained by BIOPAC MP 100 Acquisition system and action potentials amplitude, area, latans and duration were investigated. It was observed from the obtained results that imidacloprid reduced action potential amplitude between %10-45, area between %20-33, latans between %4-20 and duration %4.

On the other hand α -bungarotoxin inhibited the effects of imidacloprid by %80. The effects of imidacloprid increased with higher imidacloprid doses. These effects of imidacloprid were inhibited by α -bungarotoxin which is a nAChR antagonist, so imidacloprid can act the communication between neurons by neuronal nAChRs.

Keywords: Imidacloprid, α -bungarotoxin, Rana ridibunda sciatic nerve, action potential.

P16

Ethanol-induced contraction

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Objective: In the present study we aimed to investigate the possible role of Ca²⁺ on contractions induced by ethanol (164 mM) in isolated gastric fundal strips of mice.

Method: Experimental pharmacological methods were used in the present study. Isolated gastric fundal strips were mounted in an organ bath filled with Tyrode solution. The bathing medium was continuously gassed with 95% O₂ and 5% CO₂. The temperature was maintained at 37 °C. Data were recorded isometrically.

Results: Ethanol (164 mM) produced dramatic and reproducible contractions in isolated gastric fundal strips of mice. These contractions were significantly inhibited by verapamil (10-500 M), a blocker of L-type Ca²⁺ channels, in a concentration dependent manner. Similarly, ruthenium red (10-100 M), a blocker of intracellular Ca²⁺ channels (ryanodine receptors), and cyclopiazonic acid (CPA; 1-10 M), a blocker of Ca²⁺-ATPase, dramatically inhibited these contractions in a concentration dependent manner.

Conclusion: The experimental results suggest that L-type Ca²⁺ channels, intracellular Ca²⁺ channels (ryanodine receptors) and Ca²⁺-ATPase may play a role on contractions induced by 164 mM ethanol in isolated gastric fundal strips of mice. In other words both extracellular and intracellular Ca²⁺ may have a role on these contractions.

Keywords: Ethanol, contraction, gastric fundus.

This study was supported by The Scientific and Technical Research Council of Turkey (TUBITAK) (SBAG-HD-244, 107S290).

P17

Elektromechanical delay between human triceps surae and ankle system

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The time lag between the electrical stimulation of a muscle and the force development in the related joint can be examined in two phases: the time interval from the application of the stimulus to the incidence of electrical activity at sarcolemma (pre-motor time, PMT), and the time interval from the incidence of electrical activity to the force development (electromechanical delay, EMD). Although in the literature, due to the diversity of the experimental methods used, EMD has been reported in a large range (10 – 120 ms), the reliability of some of these methods are questionable. Current study aims to compare the EMD values between men and women by a dependable method, and to determine whether these values change after muscle fatigue. Instead of visual or audio stimulation, the two commonly used stimulation techniques in the literature, supramaximal electrical stimulation to tibial nerve was applied, and EMD was measured directly referencing the muscle motor wave (M-wave).

Five male and five female subjects from different age groups were tested so far. The electromyographs were taken by surface electrodes placed on triceps surae, and the force measurements were recorded by isometric transducers. For the measurement of EMDs, the tibial nerve was stimulated while the subjects maintained different levels of tension in the triceps muscle voluntarily. Although not conclusive, the preliminary results indicate that EMD changes are directly related to the level of tension in the muscle, and there is no significant difference between the EMD values of men and women. Further experiments will be conducted.

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Keywords: Electromechanical delay, M-Wave, MVC, fatigue, gender

P18

'Octopus': EEG/ERP bioelectromagnetic source imaging network #1 - online applications

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In multi-channel EEG systems aiming data acquisition for topographic analysis of ERPs, the tasks of,

1. Sampling of signals coming from the amplifier,
2. Realtime playback and associated triggering of complex stimuli,
3. Sophisticated user interface for averaging and similar computations,

are quite hard to handle on a single computer, without sacrificing the realtime/deterministic nature of the system. The development of an open-source software/hardware system in which these tasks get processed by separate computers communicating over network has been thought to be useful, whose commercial counterparts appear to be quite expensive.

In our project, mentioned tasks have been distributed to separate computers communicating over 100 Mbit/s Ethernet infrastructure and TCP/IP client-server model. Acquisition (ACQ), and stimulation (STIM) systems are lower-specification "realtime" systems running Debian/GNU Linux OS. Synchronized with the stimuli it generates, STIM triggers ACQ over parallel port, and ACQ delivers triggers and 128-channel sample data to the faster operator computer over network using a data structure. The Qt/X11 application running on operator computer used for displaying data, can also send proper commands to ACQ and STIM. The kernel-space back-end modules and front-end communication-relay daemons on ACQ and STIM, and operator computer user interface are coded using C and C++ languages, in a multi-threaded fashion. The underlying 128-channel EEG amplifier has been previously designed in our laboratory.

Although Octopus project is being developed reflecting our interest concerning source localization of directional hearing, its probable use for other electrophysiologic research has been preserved. The project is planned to be opened to public development under GNU/GPL license.

P19

'Octopus': EEG/ERP bioelectromagnetic source imaging network #2 - offline applications

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In Bioelectromagnetic Source Imaging, there exist a number of challenging tasks besides the acquisition of Event-Related EEG data, which are:

1. Computation of boundary meshes of different tissues from an MRI data set,
2. Determination of dipole model related to the examined neurophysiological task,
3. Computation of potentials at tissue boundaries, using realistic head and dipole models,
4. Inverse-problem computations using measured 3D electrode locations and ERP-data,

In order to address these tasks, some offline tools has been developed in Octopus project, to assist in source localization process.

The octopus-classifier tool does the semi-automated segmentation/tissue classification of scalp, skull, CSF, gray and white-matter regions from a whole-head volumetric MRI set, using an optimized k-means segmentation algorithm, after which topologically separate regions are tagged as tissues by the user by additive 3D flood-filling. The results are saved to disk as 3D voxel sets. Octopus-bounder tool makes use of an iterative process in which a predefined icosahedron/simplex based spherical mesh model is pushed by a 3D force-field making minima at tissue-surface voxels. This way, the deformed scalp, skull and cortex meshes can be saved to disk for further use in forward-model computations. Octopus-forward tool uses Boundary-Element Method to compute potential values over the meshes generated in octopus-bounder by the given dipole model taking tissue conductivities into account. Our last tool, octopus-localizer is still being developed, and focuses on inverse-problem solutions over an Opteron based parallel-computing environment using given electrode coordinates/potentials, leading to dipoles associated with the neurophysiological task examined.

P20

Alterations in the expression of the apurinic/aprimidinic endonuclease-1/redox factor-1 (APE/REF-1) and dna damage in the caudal region of acute and chronic spinal cord injured rats treated by embryonic neural stem cell

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The oxidative mechanisms of injury-induced of neurons within the spinal cord are not very well understood. We used a model of thorax nerve-spinal cord injury in the rat to induce neuron degeneration. In this spinal cord injured model, unilateral avulsion of the spinal cord causes oxidative stress on neurons. We tested the hypothesis that apurinic/aprimidinic endonuclease (or redox effector factor-1, APE/Ref-1) regulate this neuronal oxidation mechanism in caudal region of spinal cord, and that DNA damage is an early upstream signal. The embryonic neural stem cell therapy significantly decreased DNA-damage levels in both of study groups' vs the acute and chronic injured animals.

Meanwhile, mRNA levels of APE/Ref-1 significantly increased after embryonic neural stem cell therapy in acute and chronic injured animals when compared to A-sham and C-sham. Our data has demonstrated that increase of APE/Ref-1 mRNA levels in the caudal region of spinal cord correlates closely with the DNA damage after traumatic spinal cord injury.

Keywords: Spinal cord injury, Stem cell transplantation, DNA damage, APE protein, Ref-1 protein

P21

Regulation of cocaine and amphetamine regulated transcript (CART) mRNA levels in paraventricular nucleus of hypothalamus following forced swim stress

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Our previous immunohistochemistry, in situ hybridization and Western Blot studies showed that corticosterone and forced swim stress regulate hypothalamic CART peptide and mRNA levels.

This study aimed to evaluate the effects of forced swim stress (FST) on CART mRNA levels in hypothalamic paraventricular nucleus (PVN) of male and female (in or near estrus) Sprague Dawley rats. There were 4 study groups: male control (n=6), female control (n=6), male stress (n=6) and female stress (n=6). In forced swim stress test, male and female rats were forced to swim on two consecutive days, in a glass cylinder for 15 and 6 minutes, respectively. Stress groups were decapitated on the second day, 10 minutes after the stress procedure. All rats were decapitated on the same day. Brains were dissected and stored at -80°C. Brain sections involving hypothalamus were collected with cryostat and in situ hybridization procedure was performed to measure CART mRNA levels in PVN. Radioactively labeled CART mRNA levels were quantified using a computerized image analysis system. Our results will elucidate if CART expression in hypothalamic PVN is regulated by FST procedure and if this regulation is sexually dimorphic.

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Keywords: CART, stress, hypothalamus

P22

The effects of 7-nitroindazol on trace element levels of various tissues in chronically immobilized rats

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Purpose: In our study we aimed to investigate the effects of intraperitoneally (i.p.) applied 7-NI on trace element distribution in brain tissue, liver and spleen in rats exposed to chronic immobilization stress.

Method: We used Wistar albino male rats weighing in a range from 250 to 300 gr. Animal subjects were divided into three groups: those that didn't receive any procedure (n=9); those exposed to 30 minutes of immobilization stress each day for 15 days, administered 0.5 ml i.p serum physiologic 30 minutes prior to being placed into cage (n=8); and those exposed to 30 minutes of immobilization stress per day for 15 days, administered 30 mg/kg 7-NI i.p. 30 minutes prior to being placed into cage (n=9). Zinc (Zn), copper (Cu), and iron (Fe) levels of tissues taken from frontal lobe, temporal lobe, brain stem, liver and spleen has been measured with flame atomic absorption spectrometry (FAAS).

Results: Fe levels of frontal lobe, temporal lobe and brain stem in 7-NI + chronic immobilized group was higher when compared with the other groups. While Cu levels of brain stem in immobilized groups was higher than the control group, there were no changes detected in terms of Cu levels of temporal and frontal lobes. Significant reduction was detected in 7-NI+ chronic immobilization group, when compared with the other two groups, in relation to Zn levels of brain stem, temporal and frontal lobes.

Conclusions: No changes in the Cu levels but a decrease in Zn levels of the brain tissues of rats after 7-NI administration may show that 7-NI does not affect the release of corticotrophin releasing factor under chronic

immobilization stress conditions. On the other hand, in the 7-NI+chronic immobilized group, increased levels of Fe in all tissues except spleen may support the idea that NO uses Fe as a receptor.

Keywords: Immobilization stress, iron, copper, zinc, rat, nitric oxide.

P23

The functional effect of endogenous imidazol(in)e receptor ligand on corticostriatal synaptic transmission

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Imidazoleacetic acid-ribotide (IAA-RP) is an endogenous ligand at imidazol(in)e receptors (IRs) that are present in many brain regions including the striatum. The aim of this study is to investigate the functional effect of IAA-RP on corticostriatal synaptic transmission.

Corticostriatal slices were prepared from 2-4 weeks old rats. A stimulating electrode was placed for extracellular recordings in the striatum. IAA-RP (10 µM), Efaroxan (50 µM), Rauwolcine (100 nM), and Bicuculline (1.2 µM) were added to the perfusion solution.

We have previously shown that IAA-RP induced a depression of the field potentials in the striatum. IAA-RP was applied after GABAA receptor-antagonist Bicuculline. It did not prevent the depression induced by IAA-RP. Efaroxan, a combined α -2 and 11-R antagonist, blocked the synaptic depression induced by IAA-RP when applied together with IAA-RP, where α -2 receptor antagonist Rauwolcine did not affect IAA-RP-induced synaptic depression.

Taken together, these data support a role for IAA-RP in modulating corticostriatal synaptic transmission, possibly through I-R activation located presynaptically on glutamatergic corticostriatal fibers that may lead to a change in the striatal direct output pathway via IR-mediated inhibition. IAA-RP effect is not mediated by GABAergic transmission. The results support previous data that IAA-RP may function as an endogenous neurotransmitter.

P24

Progesterone regulates aromatase (CYP19A1) expression in hypothalamic neurons via progesterone receptor

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Aromatase, the key enzyme for estrogen biosynthesis, is extensively distributed in the vertebrate brain in which it regulates most reproductive behavioral functions. Within the neuroendocrine system, aromatase and progesterone (P4) are crucial for the sexually dimorphic development of the fetal brain and the regulation of gonadotropin secretion and libido in adults. The regulation of aromatase expression in the brain, however, is not well understood. The aromatase (Cyp19a1) gene is selectively expressed in distinct neurons of the hypothalamus through a distal brain-specific promoter I.f that is located ~40 kb upstream of the coding region. Here, we investigated a short feedback effect of P4 on aromatase mRNA expression and enzyme activity using estrogen receptor (ER) α positive or negative mouse embryonic hypothalamic neuronal lines that express aromatase via promoter I.f.

Progesterone, in higher concentrations, inhibits and in lower concentrations, stimulates aromatase mRNA levels in hypothalamic neurons. The inhibitory effect of progesterone was reversed by its antagonist. Knockdown of PR eliminates progesterone-dependent inhibition of aromatase mRNA and enzyme activity. Taken together, progesterone enhances binding of PR

to specific regions of the I β promoter of the Cyp19a1 gene and regulates aromatase mRNA expression and enzyme activity in hypothalamic neurons.

Keywords: Aromatase, brain, hypothalamus, neuron, progesterone, progesterone receptor.

P25

Identification of katanin P60 interacting neuronal proteins

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Aim: Identification of Katanin p60 interacting proteins in neuronal cells.

Katanin has important functions in cytoskeletal dynamics through its microtubule severing activity. Although long microtubules are stationary, short microtubule fragments severed via katanin achieve motility so they are able to contribute into cytoskeletal organizations. These short and motile microtubules are exceptionally essential for allowing(enabling?) new neuronal branching. Katanin protein consists of two domains; p60 catalytic domain and p80 regulative domain. P80 directs p60 to its activity site, where p60 forms hexameric structure and severs microtubule by ATP hydrolysis. Nevertheless, yet no other protein interaction is identified for this function.

Method: In this research Yeast Two Hybrid System is used to identify new interacting proteins since it is the only method for discovery of novel protein interactions. "Clontech Matchmaker Yeast Two Hybrid™" kit is used for the study, and new p60 interacting proteins are selected from Clontech™ fetal human brain cDNA library. Katanin p60 gene is fused to DNA binding domain of transcription factor of reporter gene and cDNA library is fused to activation domain of same transcription factor. Each construct is transformed in different mating types of *S. cerevisiae* and then strains are mated. Then the diploid yeast cells are selected through reporter gene activation.

Result: 60 new proteins are identified by reporter gene activation in diploid yeast cells. Now we are focused on confirmation of these novel interactions.

Commentary: Katanin is a critical protein in microtubule dynamics and neuronal cytoskeletal organization via microtubule severing activity. Accordingly, elucidation of katanin p60 interacting proteins is highly important in terms of revealing diverse roles of katanin in neurons and identification of other interacting proteins in the signal transmission cascade.

Keywords: microtubule, katanin, yeast two hybrid

P26

Identification of phosphorylation sites of PEA3 transcription factor by site – directed mutagenesis

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The members of ETS – domain family are important transcription activators or repressors, which share 95% identical DNA binding domain (ETS domain) and demonstrate 50% amino acid identity overall. All these family members activate or repress the transcription through their ETS – motif promoter. ETS – domain transcription factor family is thought to have a crucial role during development and oncogenesis. Pea3 transcription factor belongs to the Pea3 subfamily of this super-family with two other proteins; ERM and ER81. Pea3 is primarily suspected to activate transcription through the MAPK cascade, like other members of ETS family. The purpose of this experiment is to find out the exact phosphorylation site(s) for the activation or inhibition of the protein by mutating S/T-P motifs, and examine the effect of these phosphorylation site mutants on the transcriptional activity of Pea3. To that end, we have scanned various phosphorylation motifs and generated S>A mutations in some of these motifs. We hope this will give us insight about the exact upstream signals and cascades involved in the activation of Pea3. In a previous study performed in our lab, it was observed

that Pea3 protein induces neuronal differentiation in PC12 cells via MAPK cascade. This work will permit us to understand the molecular level of this differentiation mechanism as well as even the Pea3-mediated metastasis mechanism in detail.

Keywords: ETS – domain family, Pea3, MAPK cascade

P27

Effects of insulin and hypericum perforatum L. Extract on pathological changes induced by experimental diabetes in the rat brain

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Aim: Diabetes causes structural changes like cerebral atrophy, subcortical and brain stem lesions in animals. These changes are related with insulin deficiency.

Hypericum perforatum L. extracts have been reported to have neuroprotective and therapeutic activities in neurodegenerative diseases.

The aim of this study was to examine the effects of insulin and the extract application on structural changes in the brain of diabetic rats.

Methods: Diabetes was induced by 60mg/kg streptozotocin. Diabetic rats were applied with 2 IU day/kg insulin or 125 and 250 mg/kg doses of extract (i.p). After 6 weeks, brain tissue samples were taken and fixed in 10% neutral formaldehyde and followed the routine procedure. Tissues were cut in 5 microne thickness, stained with Hematoxylin-eosine and examined in light microscope (NikonE600). UIII photograph attachment were used for microphotography.

Results: Any lesion wasn't seen in control group, while neuronal swelling and degenerations were observed especially in temporal lobes, close to brainstem, of diabetic animals. In insulin treated group, slight degenerative changes were established in temporal and prefrontal lobe neurons of one animal. In 125 mg/kg-extract group, slight neuronal degeneration in temporal lobe of one animal and in 250 mg/kg-extract group, a slight neuronophagia center in the same area of one animal were seen.

Conclusion: In this study, it was demonstrated that, the extract is effective to repair diabetes-induced structural degenerations and insulin is more effective than the extract. In the extract groups, 250 mg/kg is more effective than 125 mg/kg, especially reducing the neuronal degenerations on temporal area.

Keywords: Diabetes mellitus, structural changes, Hypericum perforatum, insulin

P28

Simple and rapid method for purification of bovine kidney cortex glutathione reductase

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Glutathione reductase (GR, NADPH: oxidized glutathione oxidoreductase, EC 1.6.4.2) is an essential enzyme for the glutathione-mediated detoxification system due to the reduction of glutathione disulfide. GR from the kidney cortex of bovine is purified 28028-fold with a yield of 43% and specific activity of 592 U/mg by means of two subsequent chromatography steps using 2' 5' ADP-Sepharose 4B and DEAE-Sepharose fast flow columns and heat denaturation step. The purity of the enzyme was proven by sodium dodecyl sulfate-polyacrylamide gel electrophoresis. The molecular weight of the enzyme was calculated as 117 kDa by gel filtration and be composed of two identical subunits that have an apparent molecular mass of 56±2 kDa. By chromatofocusing, one peak of activity was detected and it revealed a single isoenzyme of glutathione reductase in bovine kidney cortex, with a pI of 6.8. Optimum temperature and pH was found to be 55 °C and 7.2 respectively. The activation energy of the reaction catalyzed by the enzyme was 9.62 kcal/mole. Our results are consistent with previous studies.

Acknowledgment: This work is a part of the project (0701101011) supported by Hacettepe University Scientific Research Unit.

Keywords: Glutathione reductase, purification, chromatofocusing, optimum pH and temperature

P29

Kinetics of bovine kidney cortex glutathione reductase

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Free radicals are generated from regular biochemical and physiological reactions in the cell are involved in the etiology of many diseases; cancer, cardiovascular and pulmonary disorders. Glutathione reductase (GR, NADPH: oxidized glutathione oxidoreductase, EC 1.6.4.2) plays an important role in the defence of the cell from the harmful effects of free radicals. Glutathione reductase is a homodimeric flavoenzyme which belongs to the family of NADPH-dependent oxidoreductases and is present in many pro- and eukaryotic organisms. The function of the enzyme is to reduce the oxidized glutathione (GSSG) to glutathione (GSH) by NADPH dependent mechanism. The studies of the reaction mechanism of GR suggested that GR acting according to both Ping Pong and sequential mechanism dependence of substrate concentrations; this type of mechanism named as branched mechanism. In this study, kinetic characterization of bovine kidney cortex glutathione reductase was also investigated and $K_m\text{NADPH } 0,018\text{mM} \pm 0,003$ and $K_m\text{GSSG } 0,065 \pm 0,005$ mM were determined. According to statistical analysis of the kinetic data, the branched mechanism is a suitable model since the loss function is less than the other mechanisms.

Acknowledgment: This work is a part of the project (0701101011) supported by Hacettepe University Scientific Research Unit.

Keywords: Glutathione reductase, kinetics, Ping Pong, branched mechanism

P30

Neuroprotective effect of aminoguanidine on iron-induced neurotoxicity

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Iron is commonly used a metal to induce neuronal hyperactivity and oxidative stress. Iron levels rise in the brain in some neurodegenerative disorders such as Parkinson's and Alzheimer's diseases. A body of evidence indicates a link between neuronal death and nitric oxide. The present study was performed to investigate whether nitric oxide produced by inducible nitric oxide synthase involved in iron-induced neuron death.

For this purpose rats were divided into four groups: control, iron, aminoguanidine and iron+aminoguanidine. Animals in iron and iron+aminoguanidine groups received intracerebroventricular FeCl₃ injection (200 mM, 2.5 µl). Rats belonging to control and aminoguanidine groups received the same amount of saline into the cerebral ventricles. All animals were kept alive for ten days following the operation and animals in aminoguanidine and iron+aminoguanidine groups received intraperitoneal aminoguanidine injections once a day (100 mg/kg/day) during this period. After ten days, rats were perfused intracardially under deep urethane anesthesia. Removed brains were processed using the standard histological techniques. The total numbers of neurons in hippocampus of all rats were estimated with the unbiased stereological techniques.

Our findings showed that aminoguanidine significantly decreased total (left and right) neuron loss from 43.4 % to 20.3 %. Treatment of aminoguanidine alone did not affect hippocampal cell number with respect to control group values.

Results of the present study suggest that aminoguanidine may attenuate the neurotoxic effects of iron by inhibiting inducible nitric oxide synthase.

Keywords: Iron, Nitric Oxide, Aminoguanidine, Hippocampus, Stereology.

P31

Neuroprotection by 7-nitroindazole against iron-induced hippocampal neurotoxicity

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Iron plays an important role in maintaining normal brain function. In some neurodegenerative disorders including Parkinson's and Alzheimer's disease, iron levels rise in the brain. It is known that higher iron levels induce neuronal hyperactivity and oxidative stress. A body of evidence indicates a relationship between neuronal death and nitric oxide (NO). The aim of present study was to evaluate the effects of NO produced by neuronal nitric oxide synthase (nNOS) on iron-induced neuronal death.

Animals were classified into four groups: control, iron, iron+7-nitroindazole and iron+vehicle. Rats in iron, iron+7-nitroindazole and iron+vehicle groups received intracerebroventricular (i.c.v.) FeCl₃ injection (200 mM, in 2.5 µl). Rats belonging to control groups received the same amount of saline into the cerebral ventricles. All animals were kept alive for ten days following the operation. Animals in iron+7-nitroindazole group received intraperitoneal 7-nitroindazole (30 mg/kg/day) injections once a day during this period while the rats belonging to vehicle group received daily intraperitoneal injection of peanut oil. After ten days, rats were perfused intracardially under deep urethane anesthesia. Removed brains were processed using the standard histological techniques.

The total numbers of neurons in hippocampus of all rats were estimated with the unbiased stereological techniques. Results of present study show that 7-nitroindazole decreased mean neuron loss from 43 % to 11 %. Treatment of peanut oil alone did not affect iron-induced hippocampal cell loss with respect to iron group values.

Findings of our study suggest that 7-nitroindazole may have neuroprotective effects against iron-induced hippocampal neurotoxicity by inhibiting nNOS.

Keywords: Iron, Nitric Oxide, 7-Nitroindazol, Hippocampus, Stereology.

P32

Influence of acute indoxacarb intoxication on lipid peroxidation and antioxidant system

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Aim: Çukurova region is the main artery of Turkish agriculture. However, continuously increasing use of pesticides has been causing irreversible damages on nature, mainly for human and animals. One of the widely used agricultural pesticides in this region is indoxacarb. Indoxacarbs show their effect blocking the sodium channels and some nicotinic receptors on the insects. As a result of this toxic effect on nervous system, lipid peroxidation in neuronal cells/antioxidant balance is changed and thus, some adverse reactions occur. In this study, the influence of the acute intoxication of indoxacarb on the lipid peroxidation in neural tissues and antioxidant enzymes was investigated.

Material-Method: In our study, totally sixteen female frogs were used. After all the frogs were sacrificed, sciatic nerve was isolated from them. Eight of the isolated neurons were defined as control group and the other eight formed the working group. Neurons in the working group were incubated in 10 mM indoxacarb solution for one hour. Control group was not treated with indoxacarb at all. In order to determine the lipid peroxidation in the sciatic nerve tissues of both groups, malondialdehyde (MDA) levels were investigated. For antioxidant activity, catalase (CAT) levels were determined.

Results: When the increase in the MDA and catalase levels of the group received insecticide was compared with that of control group, it was found to be statistically significant ($p < 0.05$).

Conclusions: While intoxication of sciatic nerve with indoxacarb is increasing lipid peroxidation, to compensate this situation, antioxidant system involves, reducing the oxidative stress.

Keywords: Sciatic nerve, indoxacarb, oxidative stress, antioxidant system

P33

The role of imidazoleacetic acid-ribotide (IAA-RP) on corticostriatal synaptic transmission

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Recently the 1-4 isomer of imidazoleacetic acid-ribotide (IAA-RP) has been proposed as a neurotransmitter which may serve in the regulation of general sympathetic drive. IAA-RP has been identified as an endogenous ligand at imidazol(in)e receptors (IRs) that are present in many brain regions including the striatum, pallidum and substantia nigra. The goal of this study is to identify the role of (IAA-RP) on corticostriatal synaptic transmission.

Corticostriatal slices were prepared from 2-4 weeks old rats. Coronal 350 µm thick sections were cut from one hemisphere blocked 30° obliquely. Extracellular recordings are made from the hemislices through the striatum. IAA-RP (10 µM), glutamate receptor antagonist 6-cyano-7-nitroquinoxaline-2,3-dione (CNQX) (20 µM) and amino-5-phosphonovaleric acid (APV) (50 µM) were added to the perfusion solution.

Bath-applied IAA-RP reversibly induced a depression of synaptically mediated component of the field potentials recorded in the striatum by stimulation of cortical axons. The slope of field extracellular postsynaptic potentials (fEPSPs) was reduced to 78.36±10.12% with IAA-RP. The blocked response by CNQX+APV confirmed that the response resulted from glutamatergic synaptic transmission. Also paired-pulse facilitation (PPF) was increased after application of IAA-RP indicating a presynaptic effect.

As a result, these data suggest that (1) IAA-RP depresses corticostriatal synaptic transmission, and (2) it acts through a presynaptic mechanism.

P34

Potential regulation of SMN gene transcription through the ETS motif

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The survival of motor neurons (SMN) protein is a gene product that is affected in the neurodegenerative disorder spinal muscular atrophy. SMN is a part of the SMN complex that plays an essential role in the assembly of snRNP in motor neurons. SMN has the ets-binding motif on its promoter which may make it a target for Elk-1, which is a member of Ets family transcription factors characterized by an evolutionarily conserved DNA binding domain. Elk-1 is a nuclear target of RAS-MAP kinase signaling pathway and is implicated in the regulation of variety of cell functions including growth, survival, apoptosis, development, differentiation and oncogenic transformation. The purpose of this preliminary study was to clone the smn promoter and analyze whether the smn gene could be controlled by Elk-1 transcription factor. To investigate this, smn promoter region is being amplified from the human genomic DNA, to be subsequently cloned into pGL2 vector. SHSYSY cells will then be co-transfected with the smn-Luciferase reporter construct along with either VP16- or EN- fusions of Elk-1 to mimic constitutive activation or dominant repression, respectively, and the transcriptional activation will be monitored by a luminometer. We hope that this could potentially identify SMN as a target for Elk-1- mediated regulation.

Keywords: SMN, Elk-1, luciferase assay, neuronal survival

P35

Is there any effect of using round and square platforms in Morris water maze reference memory study on result?

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The Morris water maze is one of the commonly used tools in learning and memory studies. As the size and the water depth may change from study to study, platforms used can also be different in size and shape. In this study, we aimed to determine whether the round or square platforms have effect on rats' performance in Morris water maze.

Sixteen 85-days-old Wistar Albino genus male rats were used in the present study. Rats were randomly divided into two groups and half of the group underwent the reference memory study in the Morris water maze with the round platform (RP group) and other half with the square platform (SP group). Surface area of both platforms was equal. For the first 4 days, platform finding time of rats, on the 5th day, after platform was removed, time they spent on the area where the platform previously located, on the area double size of the platform, and on the quadrant where the platform previously located were recorded. In comparing the first day and the 5th day values, independent t-test and to analyze the 2nd, 3rd and 4th day values, repeated measurements ANOVA test were used. In the first, 2nd, 3rd, 4th days, no significant difference was observed among the groups in platform finding time. Changes among the days didn't show any significant difference in respect of groups (p=0,349). On the fifth day, it was found that the time that RP group spent on the area where the platform previously located (p=0,010), on the area double size of the platform (p=0,031), and on the quadrant where the platform previously located (p=0,049) was longer than SP group.

According to the results, although the platform finding time does not show any changes with the shape of the platforms, on the day when the platform was removed (probe trial) it was thought to be beneficial that the shape of the platform should be considered in evaluating reference memory performance.

Keywords: Morris water maze, round platform, square platform, reference memory

P36

Free access to oral nicotine modifies strategies in a water maze place learning task in male and female rats

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In water maze (WM) experiments, rodents learn to escape from water by climbing up to a platform (place learning) and use different and sexually dimorphic strategies to solve this problem. Our earlier studies have shown that male rats prefer spatial while female rats prefer visual stimuli. Furthermore, when rats were treated with nicotine (0.04 mg/kg, base) during WM experiments, this sexually dimorphic pattern was reversed in nicotine treated females which also used a spatial strategy.

The present study was designed to evaluate place learning strategies in adult male and female rats Sprague Dawley rats which had free access to uninterrupted oral nicotine for 24 weeks since adolescence, compared with controls. Experimental groups consisted of male and female minimum and maximum nicotine preferring and rats which received only water under the same conditions (n=12 in experimental and n=8 in control groups, total n=64). WM experiments followed the same procedure as our previous studies (e.g. Kanit et al., 1998). Briefly, the platform (visible or hidden) was at the same place during 12 days of acquisition; the place of the platform was changed during the probe trial and a choice between visual (new location) or spatial (old location) strategy was presented to the animals.

The parameters evaluated were: swim speed, latency, path length to reach the platform and, during the probe trial, time spent in the old quadrant. Since swim speed was different in nicotine treated groups (p<0.05), path

lenth was used in evaluating data. During acquisition, days ($p<0.001$), sex ($p<0.005$) and nicotine ($p<0.05$) emerged as significant main effects and a significant sex x nicotine interaction ($p<0.05$) was observed. Significant group differences were depicted during the probe trial ($p<0.05$). The strategy preferences of the control groups were in accordance with our earlier studies: males used spatial and females used visual strategies ($p<0.005$). However rats which had free access since adolescence behaved differently from their respective controls ($p<0.05$) and used spatial strategies.

Our results show that problem solving strategies of female rats are modified when they have access to oral nicotine at their own preference since adolescence.

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Keywords: Nicotine, water maze, sex differences, cognitive strategy

P37

Effects of ketamine on novelty –induced anxiety –related behaviors in two mouse strain, BALB/C and C57BL/6

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Aim: Subaesthetic doses of dissociative anesthetics such as ketamine, MK-801, and phencyclidine can produce behavioral symptoms ranging from psychotic episodes, mood alteration, cognitive disturbances and hallucinations in humans. Ketamine interacts with N-methyl-D-aspartat (NMDA) receptors and influence monoamines such as dopamine, noradrenalin, serotonin in the nervous system. The present study was examined the effects of subaesthetic dose of ketamine on anxiety-related behavior in two mouse strain, BALB/c and C57BL/6 in which have different responses on anxiety situation.

Method: Adult mice received intraperitoneal 10 mg/kg ketamine (0.1mL/10 g body weight) 15 min before the behavior test. Control mice received serum physiologic in the same volume. Novelty induced anxiety were tested in an open field. Animals were placed peripheral part of the open field apparatus and behavioral responses to novelty were recorded for 10 min. Data were analysed by using Mann Whitney U test.

Results: When compared with saline treatment in BALB/c mice, subanaesthetic dose of ketamine increased center time and decreased peripheral time ($P<0.05$) with increases in crossing square in center and peripheral part of the open field ($P<0.01$). When compared with saline treatment in C57BL/6 mice, ketamine decreased frequency of center crossing and crossing square in both center and peripheral part of the apparatus ($P<0,01$). In these animals, center time decreased and peripheral time increased compared to the saline-treated C57BL/6 mice ($P<0,05$). Ketamine treated C57BL/6 mice showed decreased free rearing ($P<0,05$) and wall rearing ($P<0,01$).

Conclusion: Results showed that subanesthetic dose of ketamine (10 mg) produced an anxiolytic effects in BALB/c mice but anxiogenic effect in C57BL/6 mice. Anxiolytic effects of ketamine in BALB/c mice could be dependent on an increase in serotonin in the brain. Anxiogenic effect of ketamine in C57BL/6 mice can be due to ketamine induced NMDA receptor blokade. Ketamine-induced halucination and psychosis in humans could be explain by innate differences in fear attitude.

P38

The effects of natural fluctuation of estrous cycle on novelty induced anxiety-related behaviors in rats

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Aim: Although, it is recognized that ovarian steroids can modulate brain mechanisms of learning, memory and perceiving novel object recognition, however, particular influences of the ovarian steroid status on behavioral strategy responses to novelty have not been evaluated yet.

Materials and methods: The present study was investigate the influence of estrous cycle in adult female Wistar rats on the responses to emergency novelty by using an open field (OF). Estrous cycle phases were determined by vaginal lavage 1hour before open field test. Animal open field behaviors were examined in three phase of estrous cycle, estrus, diestrus and proestrus. Mice were placed peripheral part of the open field apparatus and behavioral responses to novelty were recorded for 5 min. Data were analysed by using Mann Whitney U test.

Results: OF test showed that when compared to proestrus and diestrus phases, female rats in estrus phase preferred to use active coping strategy. They spent significantly longer time in the center of the apparatus ($P<0.05$) and showed upward exploration to the extra-maze cues, expressed as increased free fears ($P<0.05$) and locomotion was increased in center and peripheral part of the apparatus. There is no significant difference in open field behavior of rats in diestrus and proestrus phases.

Conclusion: The present study provides evidence that ovarian steroid status influences behavioral coping strategy in novelty-induced anxiety and perceiving cues related with novelty.

Keywords: natural fluctuation, estrous cycle, novelty, female wistar rat

P39

Nicotine does not produce conditioned place preference in adult rats which had free access to oral nicotine since adolescence

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To evaluate individual differences in nicotine preference, our research group is presenting rats with choice of oral nicotine and water and grouping the rats according to their preferences. In a study we presented at last year's USBK meeting, we had studied nicotine-induced conditioned place preference (CPP) in rats which had free access to nicotine for six week periods during adolescence and adulthood (3 months interval) and found that nicotine did not induce CPP in male and female rats which had prior oral nicotine exposure. The aim of the present study was to study CPP in rats which had uninterrupted nicotine exposure from adolescence through adulthood, after a three week withdrawal period to overcome the possible influence of tolerance. The apparatus used to study CPP in rats consisted of chambers paired with nicotine (0.2mg/kg base, s.c.), saline and a neutral chamber. Rats were initially allowed to explore all three chambers for 30 minutes to depict preference. In 8 conditioning sessions that followed, rats were placed in appropriate chambers for 15 minutes after injections (nicotine was paired with the non-preferred chamber). During the final assessment, doors between the chambers were opened and time spent in each chamber was monitored for 30 minutes. CPP experiments were carried out in 4 groups of adult male and female Sprague Dawley rats (n=8 for each group, total n=64): Minimum and maximum nicotine preferring rats, naïve rats, and rats which received only saline during conditioning sessions. Our results show that nicotine induced CPP only in naïve male rats ($p<0.01$). In accordance with our previous studies, nicotine did not induce CPP in naïve female rats. Our results show when rats are exposed to uninterrupted nicotine since adolescence through adulthood, nicotine does not induce CPP even after the effect of tolerance has faded.

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Keywords: Nicotine, CPP, addiction, sex differences

P40

Neuroethical perspectives with regards to a family with incidences of von Hippel-Lindau syndrome

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VHL-S is an autosomal dominant multicancer syndrome diagnosed by clinical, neuroradiological and genetic findings. We present the neuroimaging evidence and propose to discuss the consequent interventions and the possible conflicts/challenges that might have arisen from the neuroethical perspective.

30 y.o. female (A) presenting progressive hearing loss, intermittent vertigo/tinnitus (with onset dating back to four years), and later onset 11th cranial nerve paresis, has had multiple operations for cerebellar and spinal hemangioblastomas, two and four years ago, respectively. Following neuroimaging (CT & MRI), endolymphatic sac tumor (ELST)(figure1) was detected and an unsuccessful angioplasty was performed. Other members of the family were screened likewise and the 23 y.o. sister (B) presented a smaller version of ELST(figure3) and cerebellar/spinal hemangioblastomas(figure 2) without any clinical findings. Radiotherapy (gamma-knife) treatment was given twice and she has not presented any notable radiologic progression since then. Accordingly, no surgical treatment was planned.

Owing to advanced technology and abundant use of neuroimaging techniques, non symptomatic tumors like ELST and cerebellar & spinal hemangioblastomas can be detected at early phase and treated successfully to favor the patient at often times. Likewise, incidental findings/anatomical variations can also be detected in absence of clinical findings. However, it should be of great concern not to harm the patient directly or indirectly.

Decision making for any treatment or intervention following neuroimaging-based diagnosis in such cases should be thought twice and handled with multi-disciplinary/professional considerations for the welfare of the patient in his/her whole lifetime.

The pro's and con's of neuroimaging should be carefully questioned and discussed to avoid possible conflicts and disadvantages to emerge in psychosocial development; school, profession, task and spouse choices and chances as well as health insurance policies and even law case practices in one's life.

Keywords: Brain MRI, incidental findings, neuroethics, neuroimaging, VHL syndrome

P41

Using case presentation as a memory-based learning model in basic science education

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Aim: Episodic memory and semantic memory are two types of declarative memory. Episodic memory is defined as conscious collection of personal experiences and resides largely in the hippocampal region, semantic memory resides in the neocortex. A huge amount of information to be understood and memorized by students is one of the problems in learning basic science. Studies in the process of learning and memory showed the fact that when an individual participates generation an item or knowledge, it is better recalled than when it is merely read. In a memory-based model of education, an external agent can assist formation of declarative memories to enhance understanding and recall. The present study examine how to establish episodic memory for better integration of semantic knowledge about basic science given in a lecture. For this aim, we used lecture-based case presentation as an external agent.

Methods: Case presentation was used as an interactive method in a lecture given Cukurova University Medical Faculty second year students. The specific elements of case history and case-related questions were given during lecture to create attractive position to students for focusing on explanation and discussion. A student talk about their solution related to case was used to force them to establish episodic memory. The written opinions of students about case presentation were taken.

Results: Open-ended survey result showed that 90% of student considered case-stimulating discussion in a lecture provide better understanding for basic science and should be increased. Only 10% of student complained crowded with agreement in benefits of case.

Conclusions: Implantation of case with effective questions in a lecture facilitates integration semantic knowledge. It is important to investigate neuronal mechanisms underlying case stimulating learning in which widely used to improve basic medical education.

Keywords: Episodic memory, Education, Memory-based model, Case stimulating learning

P42

'Brain & Behavior Science and Health' intensive interactive course for 11th grade students in one most privileged urban and one least privileged ghetto high school: A longitudinal study of the impact of this experience on the students' perceptions, impressions, expectations and neuroscience knowledge

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Background, Rationale, Aim: IBAW has been observed extensively in Turkey since 1998. Recently, we have targeted the 11th year students to promote neuroscience-related research, education and health service to be seriously considered as a career, just before the overwhelming years of preparation for the highly competitive national selection and placement exams for the universities (SCUEPE).

Concerned about the regional socio-culturo-economic inequity, we designed / conducted an optimally standardized "brain & behavior course" content and methodology in two marginal high schools in Izmir; the Izmir Science High School (ISHS) graduating the top scoring students at the SCUEPE and the Kadifekale (an insecure, high unemployment, crime and substance addiction rating ghetto) Bestepeler High School (KBHS) enrolling the least privileged students coming from the families who have immigrated from Southeastern Anatolia in the last two decades.

We aimed to determine the initial level of brain and nervous system awareness, related impressions and expectations, and to detect the misconceptions; expose the students to a well structured, highly standardized, visually enhanced, moving and interactive learning atmosphere; and assess the differences from the initial levels immediately after, and at 6 months from this experience.

Population: Randomly chosen 30 boys and 30 girls of age 14-17 in each co-ed class.

Course Content: Basic neuro -anatomy, -histology, -transmission, major horizontal and vertical neuro-systems, and selected topics like learning-memory, addiction, stress, psychosis, and depression.

Methodology: Pp presentations and discussions.

Assessment Tools: A 25 item questionnaire and a 25 MCQ test applied just before (pre), immediately after (post), and at 6 months (end) months following the experience.

Statistics: T tests (paired and independent samples).

Findings, Results: According to the so far evaluated pre and post1 data: Significant difference in achievements: 1) of all students (post-pre; p=0.000); 2) in the pre (p=0.001) and post (p=0.000) favoring the ISHS, respectively. No gender effect on pre and post achievements. ISHS and KBHS students' improvements (short-term learning effect) at post scores: Mean increase of 11 and 7, respectively.

Conclusion: Strong evidence for the favorable long-term / persistent effects of the privileged earlier life socio-educational experience exceeding the readiness / high motivation effects of the lesser privileged in general.

Future Steps: Analyses of the post and end tests and all of the questionnaires to interpret the effects of time, school, age and gender.

Approved by the State Dept. of National Education and supported by Ege University, Neuroscience Society of Turkey, and Turkey Chapter of SfN.

Keywords: BAW, memory, conceptual learning, facilitation, earlier life socio-educational effects

P43

The evaluation of the cognitive performance, hand preference and motor development of male and female, healthy children and the children with mental retardation at the age of 4-7

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Aim: The aim of this study is to compare the hand preference, sex difference, motor development and cognitive functions of healthy children, at the age of 4 and 7, who are having nursery education and the children with little and average mental retardation who are having rehabilitation education.

Methods: The children were tested one by one and alone. After measuring their height and weight, AGTE was applied. Their general, cognitive and social intelligences, thin and gross performances were evaluated by means of AGTE. Their head sizes and length of second and fourth fingers of both hands were measured, then D2/D4 ratios were calculated. Their hand, foot and eye preferences were determined with the questionnaire which evaluates lateralization. Finally, preparing a special computer programme, their visual and auditory performances were evaluated.

Results: No difference was found between the visual and auditory performances of healthy children and the children with mental retardation ($p>0.05$). Significant difference was found between the head sizes of the groups ($p<0.05$); however, any other structural differences were not found. While a relationship was found between the thin and gross and auditory performances of male and female participants, their visual and auditory reaction times were not different. In the comparison of left-handed and right-handed participants, no difference was found between their general, cognitive, social intelligence, auditory and visual performances.

Conclusions: According to the results of the study, it is thought that the mental retardation is not a factor that affects visual and auditory performances. It was found out that the sex difference was not important for the visual and auditory performance measurement tests in terms of the reaction times. That is, there is not a significant difference between the speed of male and female participants in responding to visual and auditory stimulus.

Keywords: *Mental retardation, Hand preference, Motor development, Cognitive performance, AGTE*

P44

Peroxyntirite formed during ischemia-reperfusion may induce early BBB opening by nitrating tight junction proteins

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It was previously demonstrated that peroxyntirite formed during ischemia/reperfusion played an important role in activation of matrix metalloproteinase-9 (MMP-9) on vascular wall and opening of the blood-brain barrier (BBB) (Stroke. 2000;31(8):1974, Stroke. 2004;35(6):1449-53). In this study, our aim is to investigate the subcellular distribution of peroxyntirite within structures forming the BBB via 3-nitrotyrosine (3-NT) immunoreactivity. Focal cerebral ischemia (2h) and reperfusion (3-6h) was induced by intraluminal filament method on Swiss albino mice (25-30g). 3-NT immunoreactivity was densely present in end-feet and vascular endothelium and, showed close colocalization with tight junctions, which were identified by claudin-5 immunoreactivity. On 3D confocal images, claudin-5 immunofluorescence was not diffuse, but showed a punctuate pattern in coronal sections of microvessels and, a linear and trabecular pattern that run along the long axis of microvessels in longitudinal sections. Interestingly, part of the 3-NT immunoreactivity closely paralleled claudin-5 staining, suggesting that peroxyntirite may play a role in early BBB opening by nitrating the tight junction proteins before activation of MMPs which occurs after 6 hours of reperfusion (Stroke. 2004 May;35(5):1169-74). The nitration of tight junction proteins will be further

characterized with microvessel isolation, western blotting at different time points of ischemia/reperfusion and immunoprecipitation for 3-NT.

Keywords: *ischemia-reperfusion, blood-brain barrier, tight junction, matrix metalloproteinase 9, claudin 5*

P45

The effects of ABT-491 administration on visual evoked potentials in rat model of hypoxic ischemic brain injury

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Hypoxic ischemic brain injury (HIBI) is one of the most common causes of brain injury and sudden death during neonatal period. Recently, some experimental studies demonstrated that ABT-491, a platelet activating factor (PAF) antagonist, prevents apoptosis and neurodegeneration in HIBI. In the present study, we aimed to investigate the effects of ABT-491 on visual evoked potentials (VEP) in rat model of hypoxic ischemic brain injury. 57 male Wistar newborn rats were used in this study. Animals were divided into three groups randomly. HIBI was formed on postnatal 7th day according to modified Levine-Rice model in 1st (n=18) and 2nd (n=20) groups. Third group (n=19) served as sham group. After HIBI, ABT-491 (0.4 mg/kg) was applied intraperitoneally to rats in the 1st group (ABT group) and saline was administered to the rats in the 2nd group (Saline group). On postnatal 16th weeks, VEPs were recorded via Ag-AgCl disc electrode that was placed on the occipital region under ketamine (80 mg/kg) and xylazine (8 mg/kg) anesthesia in the sound attenuated and electromagnetic shielded room. The amplitude and latency values of VEP responses were measured. Obtained data were evaluated using One Way ANOVA. There were no significant differences in latency values of VEP responses among the three groups. It was found that P2-N2 and N2-P3 wave amplitudes were smaller in ABT and saline groups than sham group ($p=0.001$). It was concluded that HIBI does not affect latencies of VEP responses but caused a decrement in amplitudes of VEP responses and this change could not be ameliorated with ABT-491.

Keywords: *Hypoxic ischemic brain injury, Apoptosis, ABT-491, Visual evoked potential*

P46

Vasculature of the rat sciatic nerve: contribution of the inferior gluteal artery

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Purpose: The nutrient arteries supplying the peripheral nerves came from either the adjacent axial artery or the fasciocutaneous or muscular arteries. They formed anastomotic channels in the epineurium and penetrated it to form a continuous longitudinal artery. Sciatic nerve in the thigh is nourished by two main blood vessels, popliteal and inferior gluteal arteries. In the present study we aimed to study vascular patterns of rat sciatic nerve supplied from the inferior gluteal artery.

Methods: Vascular supply of the rat sciatic nerve from the inferior gluteal artery was studied on 100 sides of 50 rats. The sciatic nerve was approached by splitting of the gluteal and femoral muscles. The sciatic nerve vascularization was examined by using a stereomicroscope with fiber optic illumination.

Results: We found four different patterns. The patterns were: one branch coming from lateral side (Type 1) (43/100, 43%), one branch coming from lateral side than divided superior and inferior branches (Type 2) (39/100, 39%), two branches coming from lateral side (Type 3) (14/100, 14%), one branch coming from lateral and one branch coming from medial side (Type 4) (4/100, 4%).

Conclusion: We think that such vascularization patterns should be kept in mind in peripheral nerve surgeries and understanding of the vasculitic neuropathies.

P47**A methodological study to simulate vasculitic neuropathy in sciatic nerve**

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Purpose: The peripheral nerves are affected frequently in vasculitides, which might be explained by the breakdown of the blood–nerve barrier at the level of epineurial vessels, in contrast with endoneurial vessels. In the present study we aimed to find a precise method to simulate vasculitic neuropathy.

Methods: A total number of 40 male rats were used for this study. The animals were divided into four groups (Control, Sham, Group 1, Group 2). In Group 1, epineurial vessels contributing to the formation of the vasa nervorum of the sciatic nerve were ligated from their origination (from inferior gluteal and popliteal arteries). In group 2, the vasa nervorum around the sciatic nerve was stripped.

Results: Histological analysis of the sciatic nerve samples revealed oedematous appearance was observed in Group 1. Additionally, in Group 2, subperineurial demyelination was observed.

Conclusions: We showed that ligation of the epineurial vessels from their origination did not create a sciatic nerve degeneration. Therefore we think that the method used in the Group 2 might be used for simulation of the vasculitic neuropathy

P48**Damage of the epineurial vessels: new vessels originating from adjacent structures**

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Purpose: Local vascular pathologies on peripheral nerve trunks can be compensated by dense vessels and also by well-developed collateral branches. In our study, we aimed to study neovascularization of the epineurial vessels after stripping of the vasa nervorum.

Methods: A total number of 40 male rats were divided into 4 groups (control, sham, Group 1, and Group 2). Epineurial vessels contributing to the formation of the vasa nervorum of the sciatic nerve were stripped approximately one cm (narrow stripping) and two cm (wide stripping) in Group 1 and 2, respectively. The stripped part of the sciatic nerve was inspected and photographed by stereomicroscope for three weeks by seven days intervals.

Results: In the present study we found that neovascularization depends on severity of the stripping. Neovascularization was originated from the branches of the new longitudinal vessels in Group 1. However, new longitudinal arteries and muscular perforators gave off new branches around the sciatic nerve in Group 2.

Conclusion: Due to the new vessels originated from the muscular perforators, wide stripping resulted more damage than the narrow stripping in the sciatic nerve. This should be kept in mind in understanding of the vasculitic neuropathies and microenvironment after the vascular damage of the nerve.

P49**Neuroprotective effect of citicoline in peripheral nerve crush injury**

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Scientific researches report that citicoline (CDP-choline) has therapeutic effect in various neurodegenerative and neurovascular disorders. However, the possible neuroprotective effect of citicoline in peripheral nerve crush injury has not been enough discussed yet. Thus, the purpose of this study was to examine whether or not citicoline has neuroprotective effect in the experimental peripheral nerve injury.

Thirty two adult male Wistar rats were randomized into four groups: the sham-operated group, which underwent only skin incision and i.p. saline

injection, and the sciatic nerve crush groups, which received crush on the left sciatic nerve and administrated i.p. citicoline (50 and 250 mg/kg/day, 7 day) or saline (control group). Nerve conduction velocities were measured in both sciatic nerves by using an extracellular electrophysiological technique. Also functional recovery was evaluated by using sciatic functional index (SFI).

In the electrophysiological studies, the mean sensory and motor nerve conduction velocities (SNCV and MNCV) in both legs were recorded using EMG and in vivo electrodes, respectively. Although SNCVs were significantly reduced in the injured legs, these values were improved seven days after citicoline treatment. In vivo measurements showed that citicoline treatments were enhanced MNCVs in crushed sciatic nerve. There were no statistically significant differences between MNCV values in the right and left legs ($p > 0.05$) after the citicoline treatment. Citicoline treatment improved functional recovery in comparison with control group. SFI values were statistically significant between citicoline-treated and control/sham-operated groups ($p < 0.001$) after the crush injury.

These results suggest that citicoline enhances functional recovery and conduction velocities in peripheral nerve crush injury.

Keywords: *Citicoline, Peripheral Nerve Crush Injury, Nerve Conduction Velocity, Sciatic Functional Index*

P50**Comparative investigation of volumes of cerebellar fossa, cerebellum and foramen magnum for males and females with stereologic methods**

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Sizes of cerebellar fossa, cerebellum and foramen magnum is important for diseases like cancers or adult Chiari malformation. In this study, we aimed to show the relations between volumes of fossa cerebellaris, cerebellum and foramen magnum and compare the volume differences and changes that comes with aging for male and female individuals.

37 female and 34 male healthy individuals transverse images are scanned on cerebellar CT images (mAs 200, kV 130). These images were 3mm cross-section consecutive transverse CT images. We estimated volumes of cerebellar fossa, cerebellum and foramen magnum using stereological methods. We compared results for males and females statistically, also analysed changes with age. We estimated foramen magnum volume $31,13 \pm 1.72$ mm³ for females and $33,54 \pm 1.73$ mm³ for males. Males' foramen magnum volume was higher but it wasn't statistically significant. We estimated cerebellar fossa (including both sides) volume 113.98 ± 13.30 cm³ for females and 126.36 ± 12.39 cm³ for males. Cerebellar fossa volume was significantly higher for males ($p < 0.01$). We estimated cerebellar volume (including both hemispheres) $113,04 \pm 13.52$ cm³ for females and $124,91 \pm 12,58$ cm³ for males. Cerebellum volume was significantly higher for males ($p < 0.01$). The volume decreases with aging by men ($p < 0,05$), but not by women. There was a negative correlation between the volume of cerebellum and the age of males. With increasing age, males cerebellar volume decreased ($r = -0.466$). The mean decrease of the volume of cerebellum was found as 0.94 ± 0.28 cm³ for females and 1.39 ± 0.37 cm³ for males. There was no correlation between the volume of fossa cerebellaris and foramen magnum.

Volumes of cerebellar fossa, cerebellum and foramen magnum are in important in cancers and Chiari malformation. For intracranial cancers, brain cancers are seen in infratentorial regio approximately with %25-30 incidence for adult patients. Importance of foramen magnum size in cerebellar herniation is implied at many articles in literature before. Many morphometric studies of the brain has given us new insights in the field of functional neuroanatomy and neuropsychiatric diseases. Findings of our study will be used for the standard useful in studying cerebellar function and cerebellum associated disorders in the future of our country.

Keywords: *volume, stereology, cerebellar fossa, cerebellum, foramen magnum*

P51

Physiological approach to differences to high functions like hand preference, verbal skills intelligence, visual and hearing reaction time and mental rotation in right handed pre-post menstrual cycle women and male

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Objective: To investigate the valves which were known as high functions like hand preference, verbal intelligence, visual and hearing reaction time and mental rotation in right handed women who were in follicular and luteal phase of menstrual cycle and male.

Method: Twenty-seven right handed medical student aged 19-22 years from both sexes were enrolled in this study. Hand preference was detected by Edinburgh Handedness. Verbal skill, visual and hearing reaction time and mental rotation were measured by "finger tapping". All measurements were performed in the same place and time period. Measurements were performed two times for each women in follicular and luteal phases of menstrual cycle.

Data were evaluated with SPSS program.

Results: There was not a statistically significant differences between in right handed males and females in follicular and luteal phase of menstrual cycle in the verbal skills.

Motor reply data was significant different between right and left hands in all subjects in the favor of the right side ($p < 0.005$). There was not a statistical significant in visual, and hearing reaction time and mental rotation values between in male and female who are on follicular and luteal phase of menstrual cycle.

Conclusion: Verbal perception problem solving skills were not changing in subjects with high intellectual levels between

male and women in pre-post menstrual period.

Keywords: Follicular phase, luteal phase, female, male menstrual cycle, hand preference, brain, high function.

P52

Motor recovery following embryonic neuronal/glial restricted precursor cell transplantation in spinal injury induced rats is more profound in the female than the male

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Sex hormones modulate synaptic activity and neural plasticity directly or indirectly by various molecular, cellular and systemic mechanisms. We aimed to investigate the sex-dependent differences in histological and functional recovery following spinal unilateral hemi-section injury (SUHSI) and embryonic neuronal/glial restricted precursor cell transplantation (E-NRP/GRP CT). 45 female (F) and 45 male (M) Sprague Dawley adult rats were grouped randomly as 1) naive control, 2) sham, 3) spinal injury (SI), 4) SI + E-NRP/GRP-CT, 5) SI + basal culture medium (BCM). SUHSI was induced by aspiration at C3-4. 13-14 d.o. rat embryo spinal cord-derived stem cells were processed by NRP basal media and incubated with BFGF & NT3 for 7-10 days. A collagen matrix soaked with these cells was used for surgical filling. 7 d antibiotic and 3-14 d cyclosporine A administration, and 2 w daily

vesical maneuvering were applied. In post- SI+E-NRP/GRP-CT d 7, 14 and 28, open field locomotor (BBB = Basso, Beattie and Bresnahan) assessment (two way ANOVA, Mann-Whitney U post-hoc tests) was followed by euthanasia and preparations for Nissl staining and immunocytochemistry. The BBB results: 1) Very significant loss of function following SI, regardless of sex and treatment ($p < 0.01$), 2) Significant functional improvement following SI + SCT in d 28 ($p < 0.05$), 3) Significantly higher scores in F than M rats ($p < 0.05$). Our histological data and the resultant correlations as well as our foreseen experimental designs will elaborate possible mechanisms underlying the time course and the sexual dimorphic features of the notable restoration gained by E-NRP/GRP-CT.

Approved by E.U. Animal Ethics Committee and supported by E.U.F.M. Research Fund 2004/010.

Keywords: BBB open field locomotor test, embryonic neural/glial restricted precursor cell, experimental spinal injury, neural plasticity, sexual dimorphism

P53

Analysis of nicotine preference in male and female rats with free access to continuous oral nicotine from adolescence through adulthood

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Initiation of tobacco use in adolescence aggravates the problem of dependence in adulthood. In a study we had presented at last year's USBK meeting, we provided rats with free access to oral nicotine during adolescence and adulthood (5-10 and 23-28 weeks of age, respectively). The aim of the present study is to test individual differences in nicotine preference in rats presented with a free choice of uninterrupted nicotine for 24 weeks starting at adolescence. Male and female Sprague Dawley rats obtained from Ege University Experimental Animal Breeding Facility were used; all procedures were approved by the Institutional Ethics Committee. A total of 88 female and male rats were separated from their mothers at one month of age and individually housed; nicotine was self administered via "two bottle free choice" method with 24 h free access. Nicotine consumption was recorded. Control rats received only water from both bottles. The taste of nicotine was masked by saccharin, which was also used in water. To depict individual differences, nicotine consumption data was analyzed by Ward test. Results showed that rats were divided into 3 different groups (maximum, median and minimum) both during adolescence and adulthood. Rats were able to discriminate nicotine from water and showed individual differences in nicotine consumption both as adolescents and adults. Group means showed that nicotine consumption was higher in adolescent rats than adults ($p < 0.001$). Furthermore, there was a correlation between preference patterns during adolescence and adulthood; this correlation was significant for females ($p = 0.014$) and was close to significant levels in males ($p = 0.055$). Compared with our earlier study where nicotine was presented with an interval of 3 months, adolescent nicotine preference was more effective in predicting adult patterns of dependence with uninterrupted nicotine exposure. In accordance with our earlier findings, female rats were more sensitive to nicotine during adolescence.

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Keywords: Nicotine, addiction, sex differences, adolescence, oral nicotine self administration



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Tables. Each table should be given on a separate page. Each table has a short, descriptive title. Tables are numbered in the order cited in the text. Abbreviations are defined as footnotes at the bottom of each table. Tables should not duplicate data given in the text or figures.

Figures and Legends. The complete sets of original figures must be submitted. Legends should be in the present tense (e.g., 'Illustration shows ...'). Subjects' names must not appear on the figures. Labels should contrast well with the background. Images should be uniform in size and magnification. Illustrations should be free of all identifying information relative to the subject and institution. Line drawings should be professional in quality. Written permission for use of all previously published illustrations must be included with submission, and the source should be referenced in the legends. Written permission from any person recognizable in a photo is required. Legends must be double spaced, and figures are numbered in the order cited in the text. Submit color prints only if color is essential in understanding the material presented. Label all pertinent findings.

Case Reports

By June 1st, 2008, we will no longer feature case reports. You can submit your case reports to our sister journal *International Journal of Anatomical Variations (IJAV)*. Besides the area of neuroanatomy, IJAV (www.ijav.org) welcomes case reports in gross, radiologic and surgical anatomy as well as clinical anatomy.

Letters to the Editor

Letters to the Editor may be used to describe in an extremely brief manner either an observation of interest to our readers, an opinion relative to the NEUROANATOMY, or constructive observations or criticisms of published material. Letters should be no more than two pages and should be submitted with a brief title. A maximum of four references may be included. Letters are published at the discretion of the journal and are subject to editing.

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Publishers and authors who wish to have their titles considered for review should send review copies to M. Mustafa Aldur, MD-PhD, Neuroanatomy Journal, Department of Anatomy, Hacettepe University Faculty of Medicine, Ankara 06100, Turkey. Unsolicited book reviews are not considered for publication.