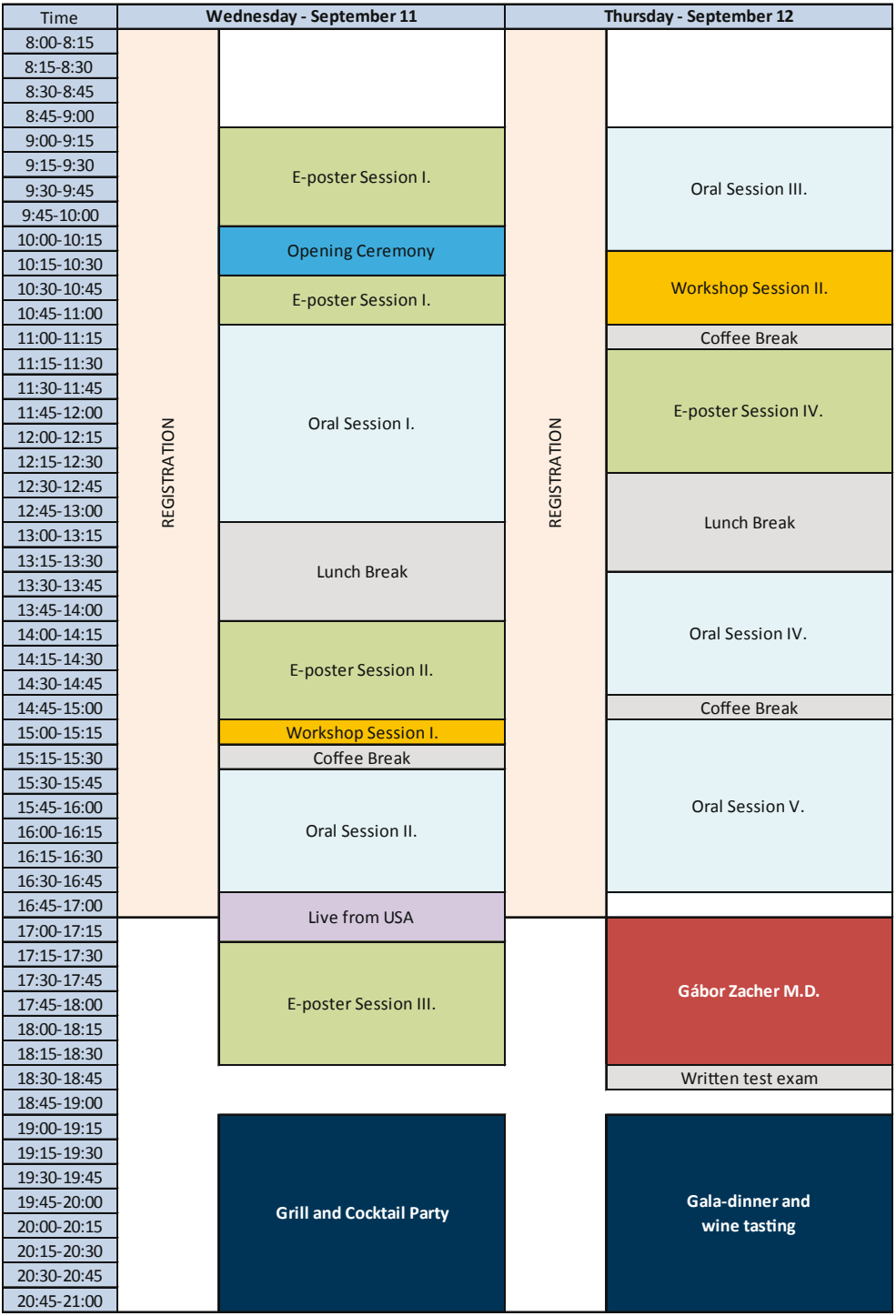
2nd International Doctoral Workshop on Natural Sciences 2013

www.doctoralworkshop.com

Program

NEW SZÉCHENYI PLAN

September 11-12, 2013 - Pécs, Hungary



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Tudományos képzés műhelyeinek támogatása a Pécsi Tudományegyetemen

2nd International Doctoral Workshop on Natural Sciences 2013

Kiadó: dr. Springó Zsolt
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PROGRAM

WELCOME

Dear Participants!

I am very pleased to announce the 2nd IDWoNS. It was delightful that the preceding Workshop received high interest last year and it established a tradition that we want to continue and also to extend this year. This proves that organizing such a meeting is needed for the scientific community. I am pleased that similarly as last year, we received applications from foreign countries.

Interdisciplinarity is more and more important! Since the founding of the University of Pecs in 1367, there has been a number of common goals between laboratories, faculties, and doctoral schools, we hope that the current meeting will help to establish new collaborations. The congress venue is the spacious György Romhányi Aula in Main Building of the Medical School, which will certainly provide an appropriate environment for the Workshop.

I would like to thank the organizing team and Prof. Akos Koller for the support and help I was provided with.

We are also grateful to our supporters and sponsors. From our budget we will hopefully be able to provide all participants with a high-quality conference. Thank you very much for the support.

As we have promised last year at the 2nd IDWoNS will last for two days with well known exhibitors, more posters, speakers such as the popular toxicologist Dr. Gabor Zacher. We also welcome promising TDK students to present their work and we have organized two social programs: Grill Party in the prestigious Monarchia Restaurant and Gala Dinner in the famous Gere Vinery in Villany. Thanks to our general supporters most programs of the Workshop can be also followed online.

I want to thank everyone who helped and contributed to the success of the workshop.

I wish that we will have a successful and productive Workshop.

Zsolt Springó M.D.

President of the Workshop
President
DOSZ Section of Medical Science
Doctoral Student Association of the University of Pécs
Vice President

WELCOME

Dear Ph.D. Students, Dear Participants!

It is my great pleasure to welcome you at 2nd International Doctoral Workshop on Natural Sciences of the University of Pécs. This is the 2nd meeting of such, after the successful first meeting in last year, giving us the hope that it will be an exciting annual tradition at the University of Pécs.

This Doctoral Workshop is unique in many aspects. First, and most it is important to emphasize that the organization is done by the members of the Doctoral Student Association of the University of Pécs, attesting their willingness not just to stand up for the rights and interest of students, but to devote their effort to science. The program they put together is interdisciplinary and international and most of the Faculties of the University are represented by the participants.

The main purpose of this workshop is to learn presenting, questioning, commenting and discussing the scientific data and results obtained in the laboratories.

Thus please, doubt, ask questions, argue and be brave to disagree. Without these activities of the mind, there is no scientific achievement and advancement. Perhaps, this is the most important knowledge you have to obtain during your PhD education! (And also, have fun!).

I wish you all a great meeting!

Akos Koller
Vice Dean for Scientific Affairs
Medical School, University of Pécs
Chief Patron of the Workshop

ORGANIZERS

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Gábor Maász Pharm.D.

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PLENARY SPEAKERS

András Garami M.D. Ph.D.
Ákos Koller M.D. Ph.D. D.Sc.
László Molnár Ph.D.
József Szeberényi M.D. Ph.D. D.Sc.
Demeter Tamás Ph.D M.Sc.

GENERAL INFORMATION

Venue:	University of Pécs, Medical School Romhányi György hall and Conference Room 7624 Pécs, Szigeti út 12.
Date:	September 11-12. 2013
Official language:	English
Registration desk and hours:	In Main Building, Romhányi György Hall 8:00-18:00 every day
Scientific program:	Five plenary lectures, five oral sessions, four E-poster sessions and two Workshop sessions.
Oral presentations:	Presentation facilities: laptop computer, video projector, MS Office PowerPoint. If you are a speaker, please give your presentation material in a MS PowerPoint format to the technical assistant in the lecture hall in the morning before the registration starts. We can only accept CD-ROMs or USB memory stick or flash drives.
E-poster presentations:	Presenters are kindly requested to upload their E-poster files in the morning before the registration period starts. The posters will be displayed during the whole day in Romhányi György Hall.
Awards:	The best oral end E-poster presentations will be awarded.
Ph.D. credit points:	Ph.D. students can earn credit points by passing an optional multiple choice written test exam at the end of the meeting.

Meals: Lunch will be provided to registered participants at the congress venue.

Internet access: Free wireless internet access will be provided during the conference.

Social event: Grill and cocktail party: Monarchia Restaurant and Sörház (13.09.11.)

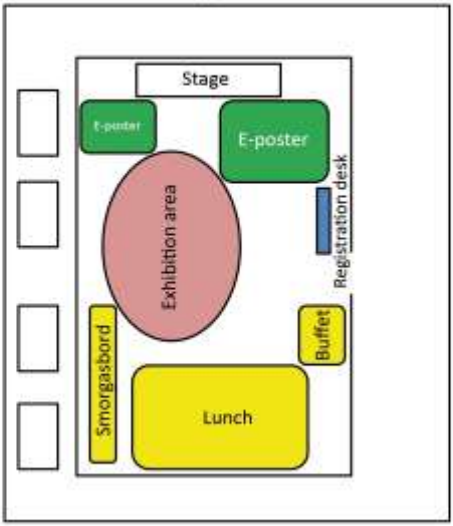
Gala dinner: Gere Attila Winery (Villány, Diófás sq. 4-12.) (13.09.12.)

Exclusive wine tasting.

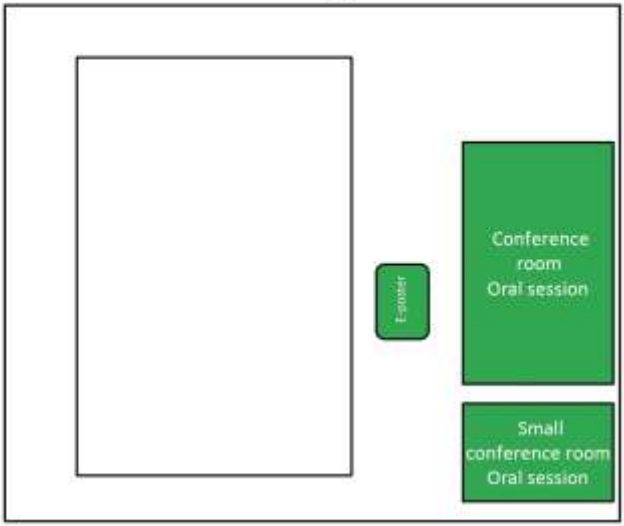
Tentative return time to Pécs is around Midnight, but it also depends on the mood of the participants.


Venue of the Conference
Restaurants, groceries
SCIENCE BUILDING
PTE ÁOK

Main building - Ground floor



Main building - 1st floor



Wednesday – September 11, 2013

8:00 - 17:00 Registration *Dr. Romhányi György Hall*

E-poster Session I. *Dr. Romhányi György Hall*

9:00 - 9:10 Cselik B. *(P-01)*
„Fatness or Fittness": Health-Image and Health Strategy in Elementary Schools

9:10 - 9:20 Jámbor É. *(P-02)*
Schizophrenia regulated salivary proteins in the development of psychosis

9:20 - 9:30 Tenk J. *(P-03)*
Age-associated alterations in acute corticotropin effects on energy homeostasis

9:30 - 9:40 Kuzma M. *(P-04)*
Analysis of capsaicin and dihydrocapsaicin metabolism of the small intestine in the rat by HPLC-FLD

9:40 - 9:50 Hartmann E. *(P-05)*
Nutritional status of very old residents who live in social homes

9:50 - 10:00 Almási A. *(P-06)*
Effect of experimental diabetes and insulin replacement on the intestinal metabolism of 4 - nitrophenol and the activities of UDP - glucuronyltransferase and β - glucuronidase enzymes

10:00 - 10:30	**Opening Ceremony**	*Dr. Romhányi György Hall*
	László Komlósi	*Vice Rector, PTE*
	Attila Miseta	*Dean, PTE ÁOK*
	Ákos Koller	*Vice Dean, PTE ÁOK*
	András Trócsányi	*Vice Dean, PTE TTK*
	József Szeberényi	*Institute director of Department of Medical Biology, PTE ÁOK*
	Dóra Gunszt	*PTE DOK president*

10:30 - 10:40 Mikó A. *(P-07)*
Changes in regulatory effects of neuropeptide Y, ckolecistokinin and melanocortins on energy homeostasis in spontaneously hypertensive rats

10:40 - 10:50 Duga B. *(P-08)*
Analysis of human genomic disorders with array CGH method in Hungary

10:50 - 11:00 Szabó I.
Past, present and future of the posters

Oral Session I. **Chairs: Koller Á., Gunszt D.** *Conference Room*

11:00 - 11:20 **Koller Á.** ***(A-01)***
Effects of ice cream on microvascular regulation

11:20 - 11:35 Szerémy P. *(O-01)*
Investigation of human transporter interactions of antimalarials *in vitro*

11:35 - 11:50 Molnár L. *(O-02)*
How sevoflurane changes cerebral CO_2 sensitivity and systemic arterial stiffness?

11:50 - 12:05 Kohl Z. *(O-03)*
Investigation of ZAP-70 expression in patients with CLL using flow cytometry

12:05 - 12:20 Csányi B. *(O-04)*
Novel *LAMP2* gene mutations causing Danon disease manifested as phenocopies of hypertrophic cardiomyopathy

12:20 - 12:35 Füge K. *(O-05)*
The role of social media tools in gathering health-related and medical information

12:35 - 12:50 Virginás A. *(O-06)*
Characteristics of the perinatal infection in roma women

12:50 - 10:05 Kósa M. *(O-07)*
SERCA1b expression in human neonatal and dystrophic muscles

13:05 - 14:00 *Lunch Break* *Dr. Romhányi György Hall*

E-poster session II. *Dr. Romhányi György Hall*

14:00 - 14:10 Tóth Z. *(P-09)*
Systems toxicology study: effects of the macrolide antibiotic primycin on *in vitro* liver models

14:10 - 14:20 Rapp J. *(P-10)*
Successful induction of *in vivo* vascularization of *in vitro* engineered lung tissues

14:20 - 14:30 Zádori P. *(P-11)*
Spontaneous Thoracic Hernia: Report of Two Cases

14:30 - 14:40 Kovács L.A. *(P-12)*
Application of negative pressure wound therapy in the treatment of chronic leg ulcers – Medical and financial aspects

14:40 - 14:50 Karsai G. *(P-13)*
Forced peptide release achieved by thermogenetic tools

14:50 - 15:00 Szabó I. *(P-14)*
Neurochemical responsiveness and taste sensitivity of neurons in the medial and lateral orbitofrontal cortex of the rat

Workshop Session I. *Dr. Romhányi György Hall*

15:00 - 15:15 Kiss-Tóth Fruzsina dr. – *Merck Kft.*
Merck Millipore for everyday Lifescience

15:15 - 15:30 *Coffee Break* *Dr. Romhányi György Hall*

Oral Session II. **Chairs: Molnár L., Márk L.** *Conference Room*

15:30 - 15:50 **Molnár L.** ***(A-02)***
Identification of neurosecretory brain region and its hormones in earthworms

15:50 - 16:05 Kovács T. *(O-08)*
Wnt4 promotes tissue destruction during lung aging via inhibiting PPARγ expression

16:05 - 16:20 Kovács N. *(O-09)*
The analysis of the reaction between salicylates and hydroxyl radicals

16:20 - 16:35 Raics K. *(O-10)*
The position of W104 in AppA revealed by fluorescence spectroscopy

16:35 - 16:50 Avar P. *(O-11)*
HPLC-MS analysis of capsaicin, dihydrocapsaicin and their metabolites

Live from USA *Conference Room*

16:50 - 17:05 **Tóth P.** ***(A-03)***
Aging-induced disregulation of calcium signaling and myogenic constriction of cerebral arteries in hypertension

E-poster Session III. *Dr. Romhányi György Hall*

17:15 - 17:25 Petrovics D. *(P-15)*
The brains of PACAP-deficient mice - Comparative Proteomics Study

17:25 - 17:35 Ács K. *(P-16)*
Phytochemical characterisation of a mongolian medicinal plant (*Artemisia adamsii* Besser)

17:35 - 17:45 Horváth G. *(P-17)*
The levels of PACAP in the central nervous system altered by environmental enrichment

17:45 - 17:55 Gunszt D. *(P-18)*
Anatomical and physiological changes in regenerated ventral nerve cord of earthworm, *Eisenia fetida*

17:55 - 18:05 Csanaky K. *(P-19)*
Investigations on secreted cytokines and angiogenic factors after induction of differentiation and PACAP co-incubation on HC11 mouse mammary cell culture

18:05 - 18:15 Rozmer Z. *(P-20)*
Different effects of two cyclic chalcone analogues on the redox status of Jurkat T cells

18:15 - 18:25 Szabó I.
Past, present and future of the posters

Evening *Monarchia Restaurant and Sörház*

19:00 - Grill and Cocktail Party

Thursday – September 12, 2013

8:00 - 17:00 Registration *Dr. Romhányi György Hall*

Oral Session III. **Chairs: Garami A., Vámos Z.** *Conference Room*

9:00 - 9:20 **Garami A.** ***(A-04)***
Functions of the TRPV1 channel in the regulation of energy homeostasis

9:20 - 9:35 Varga J. *(O-12)*
PC12 cells expressing a mutant p53 protein are more susceptible to the cytotoxic effects of sodium nitroprusside

9:35 - 9:50 Bátor J. *(O-13)*
Effect of sodium nitroprusside on nerve growth factor induced differentiation of PC12 cells

9:50 - 10:05 Berta G. *(O-14)*
Partial rescue of geldanamycin-induced TrkA depletion by a proteasome inhibitor in PC12 cells

10:05 - 10:20 Fülöp B. *(O-15)*
Kanamycin induced changes in Ca^{2+}-binding protein expression in the inner ear of wild type, heterozygous and homozygous pituitary adenylate cyclase activating polypeptide (PACAP)-deficient mice

Workshop Session II. *Conference Room*

10:20 - 10:35 Jelinek Andor – *Bio-Science Kft.*
IDT Expertise in Oligonucleotide Services

10:35 - 10:50 Dr. Juhász Tamás – *Waters Kft.*
Supercritical chromatography and its fields of applications

10:50 - 11:05 Dr. Kun András – *Auro-Science Consulting Kft. – Nikon*
Is it only a STORM in the spoon? - Single-molecule localisation

11:05 - 11:20 *Coffee Break* *Dr. Romhányi György Hall*

E-poster Session IV. *Dr. Romhányi György Hall*

11:20 - 11:30 Rostás I. *(P-21)*
Complex effects of alpha-MSH during the course of aging

11:30 - 11:40 Vámos Z. *(P-22)*
Subcellular mechanisms of AT1-receptor mediated vasomotor responses change with aging

11:40 - 11:50 Meggyes M. *(P-23)*
TIM-3/Galectin-9 interaction during pregnancy

11:50 - 12:00 Kiss E. *(P-24)*
Wnt signalling in non-small cell lung cancer

12:00 - 12:10 Ivic I. *(P-25)*
During physiological aging the contractile force of arteries increases

12:10 - 12:20 Bánki E. *(P-26)*
Examination of the protective effects of PACAP in rat diabetic nephropathy

12:20 - 12:30 Nagy D. *(P-27)*
Examination of the role of endogenous PACAP in diabetic nephropathy

12:30 - 13:30 *Lunch Break* *Dr. Romhányi György Hall*

Oral Session IV. **Chairs: Hamar J., Szeberényi J.** *Conference Room*

13:30 - 13:50 **Szeberényi J.** ***(A-05)***
Epigenetic Inheritance

13:50 - 14:05 Csetényi B. *(O-16)*
Interleukin-1β microinjection into the cingulate cortex induces homeostatic changes in the rat

14:05 - 14:20	Hormay E. Complex functional attributes of neurons in the cingulate cortex of the rat	*(O-17)*
14:20 - 14:35	Péczely L. Role of ventral pallidal dopamine receptors in conditioned place preference	*(O-18)*
14:35 - 14:35	Nagy B. Metabolic alterations after streptozotocin microinjection into the mediodorsal prefrontal cortex	*(O-19)*
14:50 - 15:00	*Coffee Break*	*Dr. Romhányi György Hall*

Oral Session V. **Chairs: Demeter P., András F.** *Conference Room*

15:00 - 15:20	**Demeter T.** Anger and the Unity of Philosophy	***(A-06)***
15:20 - 15:35	Szolcsányi T. What is placebo effect?	*(O-20)*
15:35 - 15:50	Géczi J. The richer you are, the more damage you cause	*(O-21)*
15:50 - 16:05	András F. On What There Is - Logics of Scientific Realism	*(O-22)*
16:05 - 16:20	Sivadó Á. Medicated explanations - How medical categories affect social scientific endeavors	*(O-23)*
16:20 - 16:35	Győri A. Making moral difference between active and passive euthanasia	*(O-24)*
16:35 - 16:50	Zuh D. The image of Galilei in Phenomenology	*(O-25)*

Main Lecture *Dr. Romhányi György Hall*

17:00 - 18:30 **Gábor Zacher M.D.**
A varázsgombáktól a kémiai terrorizmusig, a toxikológia 10.000 éves kultúrtörténete *(in Hungarian language)*

Test *Conference Room*

18:30 - 18:45 Written test exam for credit points (optional)

Evening *Villány, Gere Attila Winery*

19:00 - Gala-dinner and wine tasting

Thursday – September 12, 2013

13:00 Statutory meeting of DOSZ Section of Medical Sciences president

14:45 Meeting of University of Pécs Doctorandus Committee

A-01

Effects of ice cream on microvascular regulation

Koller Á.

Department of Pathophysiology and Gerontology, University of Pécs, Hungary

Diabetes mellitus (DM, characterized by high level of blood sugar) is a worldwide epidemic disease, affecting the health of millions of people. Its primary target is the cardiovascular system, among others the microcirculation of tissues. The vasomotor mechanisms residing in the endothelium and smooth muscle layers of microvessels ensure the appropriate resistance of these vessels and thus the blood supply and function of organs and tissues. The higher than normal blood glucose levels lead to microvascular diseases. After licking away a supersize ice cream (or hamburger) the glucose level in the blood increases more than double (called hyperglycemia) or in the lack of appropriate level of insulin (a hormone controlling the glucose level) it can be tripled. Longer presence of hyperglycemia injures the regulation of vasomotor function. Disorders of microcirculation and abnormal vascular functions precede morphological changes, micorangiopathy, macroangiopathy and atherosclerosis. In my talk, I will describe the effects of diabetes mellitus (hyperglycemia) on the local regulation of microcirculation, including its effects on the pressure sensitive-myogenic, flow/shear stress and agonists/humoral/metabolic mechanisms. It will be evident that dysregulation of microcirculation in diabetes mellitus leads to a limited ability for the local vasomotor mechanisms to regulate tissue blood flow leading to functional disturbances and later morphological remodeling of vessels.

Support: Hungarian Nat. Sci. Res. Funds (OTKA, T-048376, K71591, K108444), Hungarian SROP-4.2.2.a-11/1/KONV-2012-0024 and -0017, American Heart Association NY State Affiliate (0555897T and 0735540T), NIH (HL-43023, HL-46813).

A-02

Identification of neurosecretory brain region and its hormones in earthworms

Molnár L., Gunszt D., Steib A., Somogyi I., Boros Á., Pollák E.

Department of Comparative Anatomy and Developmental Biology, University of Pécs, Hungary

Hormonal control of reproduction, regeneration and immune response in Eisenia fetida (Annelida, Oligochaeta) has been experimentally demonstrated suggesting that the cerebral ganglion (so-called brain) synthesises certain peptides namely gametogenic factor, the cephalic regeneration inhibitor and thyroid-stimulating hormone. By means of immunohistochemistry occurrence of some vertebrate neurohormone-like compounds, like substance-P, cholecystokinin, pituitary adenylate cyclase activating polypeptide (PACAP) in various neurons of the earthworm brain has also been described.

Recent work focuses on the biochemical and immunocytochemical identification of neuropeptides with sequence homology to periviscerokinins (PVKs), pyrokinins (PKs) and neuromacins in the brain of the earthworm *Eisenia fetida*. By means of affinity chromatography, nanoflow liquid chromatography, and high accuracy mass spectrometry, six peptides were identified in the central nervous system with the common XR(L/I)amide C-terminal sequence. The exact anatomical position of immunostained neurons were determined by means of immunocytochemistry and confocal laser scanning microscopy in whole-mount preparations. A distinct neuron group stained for FPRL- and FVRLamides was situated dorsoposteriorly on the brain - named medial neurosecretory brain region (MNS) - close to the dorsal cerebral blood vessel. Each cell had round or polygonal, medium size soma and a short process that passed into deeper brain region and reached the wall of capillaries identified as the neurohemal region of the brain. Ultrastructural observations revealed that the perikarya contained numerous dense granules that often occurred in clusters separated by granular endoplasmic reticulum cisternae. A few dilatated cisternae of smooth endoplasmic reticulum, well developed Golgi complex and a few autophagous bodies were typically appeared. Cytoplasm was rich in free ribosomes, mitochondria and glycogen rosettes. High number of granules was seen in axon hillock and the end foot of neurons was tightly packed with dense and grey granules. Exocytosis from perikarya seems to be a release

mechanism for only some granules, however most of them released through synapses or was liberated extrasinaptically from neural profiles to the neuropile. Omega profiles, thought to be characteristic of neurosecretory cells, frequently occurred also in end foot of neurons attached to blood vessels. Based on the morphological characteristics of the stained neurons we could propose that medial neurosecretory brain region of the earthworms is the anatomical correlates of pars intercerebralis found in polychaetes and arthropods.

A-03

Aging-induced disregulation of calcium signaling and myogenic constriction of cerebral arteries in hypertension

Tóth P.

A-04

Functions of the TRPV1 channel in the regulation of energy homeostasis

Garami A.

A-05

Epigenetic Inheritance

Szeberényi J.

A-06

Anger and the Unity of Philosophy

Demeter T.

MTA

Anger is in the forefront of theoretical interest in 17th and 18th-century natural and moral inquiry in Scotland: it serves as a standard illustration in the discussion of violent and active passions. As such it receives primary attention in connection with various physiological phenomena like e.g. circulation (William Cullen), animal spirits (George Mead), raging fevers (George Cheyne). In the descriptive and explanatory 'science of man', which can be placed as a middle-range theory mediating between physiological and normative (ethical and theological) considerations, anger is discussed in connection with benevolence, love, and other passions motivating action (David Hume), tempers and various appetites (Francis Hutcheson), art and poetry (Lord Kames). In normative contexts it is discussed, in a typically condemning manner, among moral faults (again in Hutcheson), in the context of corrupting of the mind and demolishing religious humility (George Turnbull), but sometimes it is painted with more appelaing colours as necessary for virtues and self-preservation (also in Turnbull). Besides exploring the intellectual traditions that inform these theories (like Cartesianism, Stoicism, experimental philosophy, mechanical and vitalistic natural philosophies), in this paper I'll argue that these discourses are not independent of one another, quite the contrary: various moral and natural discourses penetrate each other, linking moral philosophies to contemporary medical theories, and *vice versa*, lending medical theories moral significance.

Therefore the discourses of anger in this period are eminently suitable to illustrate the thesis that there is an intimate and remarkable connection between the discourses of natural and moral philosophy in this period. This thesis has significance in the context of present-day historiographies of both science and philosophy that are inclined to treat their canon separately. By exploring the interconnections of various discourses of anger, I wish to show the fundamental unity of natural and moral philosophies. As I'll argue, the discourses of anger in these different fields are congruent and not independent: these discourses penetrate each other in a rather intricate manner: physiological theories are influenced by psychological and normative considerations (as exemplified in the works of George Cheyne

and George Mead), the science of man is informed by physiological considerations and more or less explicit normative agendas (as exemplified in Turnbull, Hume, Adam Smith and Thomas Reid). Finally I will argue that all these theories, physiological and moral, had the potential to be exploited for ideological purposes in the turbulent times at the turn of the 17th and 18th century.

O-01

Investigation of human transporter interactions of antimalarials *in vitro*

Szerémy P.[1], Magnan R.[2], Jani M.[2], Jakab K.[2], Márki-Zay J.[2], Krajcsi P.[2]

[1]*SZTE ÁOK Biokémia Intézet*
[2]*SOLVO Biotechnology Inc.*

Options to control spread of malaria are increasingly limited due to emergence of parasites resistant to widely used antimalarials, therefore, discovery of novel antimalarials appears crucial as ever. However, animal experiments are too expensive and laborious for the pharmacokinetic characterization of large number of compounds. The fate of administered drugs may largely depend on their interactions with transporter proteins, which are present in all major pharmacologically relevant barriers. Furthermore, transporters are key determinants of antimalarial drug resistance of plasmodiums as well. The aim of this study was to examine whether the high-throughput (HTS) cell and membrane-based transporter assays can be applied to characterize the transporter interactions of candidate antimalarials.

Reference antimalarials, such as artemisinin, chloroquine, mefloquine, quinine, etc, have been tested for their interaction with the ABC-transporters MDR1, MRP1 and BCRP using the Solvo PredEasy ATPase kits and the interaction with the SLC family members OCT1 and OCT2 uptake transporters in cell-based assay. Measured IC_{50} and EC_{50} values were correlated with the clinical observations on the tested antimalarials.

In case of Amodiaquine, Hydroxychloroquine, Primaquine, Pyrimethamine, Proguanil, Artemisinin, Artesunate, Atovaquone, Clindamycin, Halofantrine, our data are the first proof for transporter interaction of these clinically important drugs. Artemisinin is a substrate for MDR1, chloroquine is inhibitor of the MDR1 and substrate for the MRP1 and BCRP, mefloquine is substrate for the MDR1 but at higher concentrations is a not specific inhibitor of all the transporters and quinine is substrate for the MDR1. These results corresponded exactly to the clinical data on the antimalarials tested.

We conclude that the membrane- and cell-based HTS in vitro assays can be applied to facilitate the ADME characterization of candidate antimalarials.

This research was supported by NKTH-ANR ADDMAL grant.

O-02

How sevoflurane changes cerebral CO_2 sensitivity and systemic arterial stiffness?

Molnár L.[1], Juhász M.[2], Molnár C.[2], Fülesdi B.[3]

[1]*Debreceni Egyetem Orvos- és Egészségtudományi Centrum*
[2]*DEOEC-Aneszteziológiai és Intenzív Terápiás Tanszék*
[3]*Debreceni Egyetem Orvos- és Egészségtudományi Centrum*

The scientific issue: How different CO_2 concentrations affect cerebral vasoreactivity and the resistance and stiffness of systemic arteries during sevoflurane anesthesia?

Patients and methods: The study involved 24 otherwise healthy (ASA I) patients who underwent varix or inguinal hernia operations. Cerebral circulation was assessed in the middle cerebral artery (MCA) with transcranial Doppler ultrasound, while radial artery was examined with SphygmoCor device to obtain information about systemic arteries. The examination was repeated four times: at first prior to the operation, then 20 minutes after induction of anesthesia at 40 mmHg end-tidal CO_2 concentration ($ETCO_2$) and 5-5 minutes after reaching 35 and 30 mmHg $ETCO_2$. The minimal alveolar concentration (MAC) of SEV was adjusted to 1.0 during operations.

Results: The mean arterial pressure (MAP) and its diastolic component in the aorta (AoDiast) have reduced significantly after the induction of anesthesia, while the augmentation pressure (AP) and the heart rate corrected augmentation index (Alx 75) were significantly higher compared to the preoperative values. Changes in $ETCO_2$ had no influence on these parameters. Mean blood flow velocity (MBFV) measured in the MCA was unchanged whilst pulsatility index (PI) has decreased significantly following the induction of anesthesia. MBFV has reduced and PI has elevated significantly each time after $ETCO_2$ was altered.

Conclusions: The CO_2 reactivity of the cerebral vessels is intensified at 1.0 MAC of sevoflurane. SEV leads to dilatation of the systemic resistance vessels, which results in reduction of diastolic blood pressure. Meanwhile, the nearly constant systolic blood pressure and the elevated Alx 75 indicate an increase in arterial stiffness. Cardiac afterload remains unchanged, while the fall in diastolic blood pressure may decreases coronary artery perfusion causing an imbalance between myocardial oxygen supply and demand.

O-03

Investigation of ZAP-70 expression in patients with CLL using flow cytometry

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It has been shown in a subgroup of patients with CLL that the malignant B-lymphocytes express ZAP-70 kinase, which, normally, has a critical role in T-cell receptor signaling. This phenomenon has been associated with inferior clinical outcome and prognosis. Although several studies identified ZAP-70 as a good prognostic marker, its quantitative measurement is still not standardized, nor is its potential function or role in the pathogenesis of CLL fully understood.

Our goal was to establish a reproducible method for detecting the ZAP-70 expression in patients with CLL using flow cytometry, and to examine if there were any structural differences in the molecule found in the malignant B-, and normal T-cells.

We used the peripheral blood of previously diagnosed CLL patients and of healthy donors as normal control. We first performed a cell surface labeling with anti-CD5 and anti-CD19 antibodies. Then we added a lysing solution to clear our samples of erythrocytes, and fixed the remaining cells using 4% paraformaldehyde. We permeabilized the cells with a solution containing 0.1% saponin. To detect ZAP-70 expression we used anti-ZAP-70-ALEXA 647 or anti-ZAP-70-PE, which recognized different epitopes of the ZAP-70 molecule. Next, we analyzed our samples using a flow cytometer. We identified the pathologic B-cells according to their CD5-CD19 double positivity and then measured the detectable fluorescence on the wavelength of both fluorochromes attached to the anti-ZAP-70 antibodies. As control, we also measured the fluorescence in the T-cells of our healthy donors.

According to our experiments done so far, it seems possible that the ZAP-70 molecule expressed in the tumorous B-cells is structurally different from that found in normal T-cells, as some patients showed positivity with either one or the other antibody, while the normal T-cells were positive with both antibodies, just as expected. In the future we plan to confirm the ZAP-70 expression of the aforementioned patients using other methods (eg.

Western-blot, PCR). We would also like to continue our flow cytometric analysis on a much greater number of patients.

O-04

Novel *LAMP2* gene mutations causing Danon disease manifested as phenocopies of hypertrophic cardiomyopathy

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Background: Danon disease is a rare X-linked inherited disease manifested primarily in young men. It is characterized by massive, mainly concentric left ventricular hypertrophy, skeletal muscle dystrophy and mental retardation, with explicit left ventricular hypertrophy on ECG and sings of pre-excitation. The skeletal dystrophy may be asymptomatic, but increased serum levels of CK, GOT and LDH may be present. The disease is characterized by rapid progression into restrictive/dilated phase and high level of mortality.

Objectives: Two young male patients, diagnosed as having hypertrophic cardiomyopathy at age 12 and 14 years, were analysed. Both had hypertrophic cardiomyopathy characterised by marked, mainly concentric left ventricular hypertrophy (maximal left ventricular wall thickness 38 mm and 28 mm) and left ventricular outflow tract obstruction. Laboratory findings showed elevated serum levels of creatin-kinase (CK), transaminases and lactate-dehydrogenase (LDH), while proximal skeletal muscle atrophy, and pseudohypertrophy in deltoid and triceps muscles were described in one case on neurological examination. Mild mental retardation was noted in both cases.

Methods: Based on clinical grounds, Danon disease was suspected in both cases and genetic analysis was carried out. Genetic analysis was performed on DNA extracted from peripheral blood. All the 9 exons of

the *LAMP2* gene, comprising the whole coding sequence, were amplified by polymerase chain reaction, and were direct sequenced.

Results: In the first patient a G-A transition was detected (c.1099G>A) in exon 8 of the gene, which changes the tryptophan coding TGG codon to a stop codon (TAG) at codon 321 (p.Trp321stop) (nonsense mutation). In the second patient one nucleotide (C) insertion was found (c.1111insC) in exon 8, too, resulting in a full frame shift. Restriction analysis also proved the presence of the mutations. Both mutations were in present in hemizygous form, and neither were reported before and therefore they are novel mutations.

Conclusions: Two novel *LAMP2* gene mutations were detected in patients with Danon disease.

O-05

The role of social media tools in gathering health-related and medical information

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Introduction: As the Internet is becoming a core constituent element of modern Western life-style, it has transformed the scope of effective marketing tools as well, providing space for social media sites to be an extensive platform for highly specialized information and indirect marketing activities. Our aim in this research work was to map the most important new social media tools, evaluate their features that provide appropriate channels for the specific information transfer and recognise the implication these media tools may have in the field of health-related and medical information gathering by patients

Method: After extensively studying scientific literature on social media tools and their role in marketing, we carried out on-line content analysis via specifically chosen websites. 27 different sites were examined to recognize the most important features of types of social media tools and another 45 sites were analysed to distinguish the characteristics of health-related and medical content at the social media environment available in Hungarian language. Research was carried out in 2010 and 2012.

Results: The most important social media tools used for marketing purposes are the recently emerging social networking sites, blogs and microblogs, on-line forums, e-mails and mailing lists, video-sharing sites, collaboratively edited information sites and applications for wireless devices. Considering these tools as ways to provide health-related and medical information, they have great potential to minimize the information asymmetry between doctors and patients, while sharing experience between patients may decrease depression and anxiety, and also help improve quality of life in case of chronic diseases. However, identifying the source of information available at these sites may be highly challenging, which questions the authenticity and trustworthiness of the data and materials these media tools provide. Furthermore, interpreting medical advices offered on such sites may also cause – in some cases, even fatal – misunderstanding, which is a serious threat in the spread of social media sites as the source of health-related information. Patients' medical data may leak out while using the abovementioned tools, thus it is recommended to be carried out with a high level of caution.

Conclusion: Employment of these instruments as the source of health-related and medical information is not widely spread in Hungary yet, as the collaboratively edited information sites and on-line forums are considered to be the most popular from the abovementioned tools. However, the routine of collecting medical information on-line is not at all expected to replace personal medical consultation with and expert, it may only complete it.

O-06

Characteristics of the perinatal infection in roma women

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Introduction: The Roma are the second largest ethnic minority in Romania, the most socially and economically disadvantaged minority. There is a lack of studies on perinatal infection in roma women .The study aimed at determining the prevalence of perinatal infection among roma pregnant women and risk factors for colonization.

Materials and methods: total of 300 pregnant women were enrolled in this study - from August 1, 2012 to March 31, 2013 at a tertiary care hospital

in Targu-Mures, Romania- divided into two groups: 170 roma women and 130 romanian women (control group).Women were screened for bacterial colonization on admission for premature rupture of membranes and delivery. Insemination sample were collected from maternal cervix.

Results: The average age of roma patient was 22 + 5, respectively 28 + 6 of the control group. There was a significant difference in socioeconomic status of the two groups. The presence of risk factors was similar. The prevalence of negative test result in the roma and the control group were 82 % and 54 %, respectively. (**p** 0.158). GBS colonization was recorded in 60 (20%) women: 20 (12 %) roma and 40 (31 %) control and E coli carriage was 10(6 %.) roma and 20 (15%) control.

Conclusion: However the majority of roma people had a low socioeconomic status with deficient pregnancy follow up, significant differences between the groups in the rates of the perinatal infection were not observed. Further clinical trials are needed to confirm these findings.

O-07

SERCA1b expression in human neonatal and dystrophic muscles

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Introduction: The sarcoplasmic reticulum calcium ATPase SERCA1 has two isoforms. SERCA1a is responsible for fast twitch muscle relaxation while SERCA1b is the neonatal isoform. We have previously identified the presence of SERCA1b in regenerating and neonatal skeletal muscle of rodents and the functional role was indicated by increased whole muscle mass and cross sectional area after its inhibition by siRNA during muscle regeneration.

Aims: The object of our study was to investigate the expression of SERCA1b in fetal/infant human muscles; is it the sole SERCA1 isoform, or is it coexpressed with SERCA1a? What is the SERCA1a-SERCA1b ratio in case of coexpression? We have designed similar experiments with muscles of patients suffering from the degenerative-regenerative Duchenne muscular dystrophy and myotonic dystrophy type 2.

Materials and methods: Fetal and infant samples were taken post mortem from 4 different muscles of 5 subjects (varying from intrauterine exits to 8 weeks old newborns), biopsies were investigated for pathologic muscles (both with permissions of the Ethical Committees of University of Szeged, Hunagry and University of Leuven, Belgium). Sarcoplasmic protein fractions were used for Western blotting, and immunohistochemistry was done on frozen sections.

Results: Limb muscles of intrauterine dead feti and born prematures with corrected gestational age before 40 weeks contained SERCA1b. However only SERCA1a, and no SERCA1b could be detected in mature infant muscles and in diaphragms regardless of age. Among the dystrophies DM2 but not DMD muscles expressed the neonatal isoform. The antibody against SERCA1b has also been tested for immunohistochemistry on cryosections of post mortem muscles but it gave non-specific signal.

Conclusions: SERCA1b is present during human muscle development, therefore it may have a similar role as in rat limb muscles. However the time course of SERCA1b expression differs in development of human and rat diaphragm. The presence of SERCA1b in DM2 could be the result of the recently described regeneration in this condition, while its absence in DMD can be due to the exhaustion of the regeneration process and the preceding steroid therapy.

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O-08

Wnt4 promotes tissue destruction during lung aging via inhibiting PPARγ expression.

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The continuous increase of elderly population will put an enormous pressure on social and medical care in the near future. Therefore expanding the healthy lifespan or decreasing the occurrence of the age related diseases are the biggest challenges for developed countries.

While the aging of other organs are studied widely, the molecular background of lung senescence is hardly known. In the aging lung, the lung capacity decreasing and the formation of new alveoli slow down even in the absence of diseases.

For the lung regeneration ATII cells are one of the most important facultative progenitor cells. They are supported by the lipofibroblasts. The normal function is a PPARγ dependent mechanism. The loss of the number of lipofibroblast will cause destruction of ATII cell network, which will lead to different age related diseases such as COPD or IPF.

Recent studies suggest the role of Wnt molecules in aging. It was already proven that Wnt proteins have role in different fibrotic and inflammatory processes, like COPD and IPF. But we still don't know, are there any connections between these two processes?

In our studies 1 month and 24 months Balb/C mice lungs were compared first with computed tomographic technique. On the recordings is clearly seen the enlargement of the alveoli, and it was also proven with microscopic sections with Hematoxylin-Eosin staining.

To investigate the molecular pattern of lung, first epithelial and non-epithelial cells were separated; by EpCAM1 positivity and gene expression analysis were performed. Because for the normal lung regeneration PPARγ and ADRP are essential, they expression were measured with quantitative real time PCR, beside Wnt molecules.

Our studies have shown that Wnt4 are increased in epithelial and non-epithelial cells, which based on literature, can decrease the PPARγ

expression, which will lead to the loss of normal lung function and cause COPD in elderly.

O-09

The analysis of the reaction between salicylates and hydroxyl radicals

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As a result of the increased activity of cyclooxygenase, NAD(P)H oxydase and myeloperoxidase enzymes in the inflamed tissue the amount of reactive oxygen species in inflammatory conditions are extremely high. Further transformation of the superoxide anion generated in the reaction catalyzed by the NAD(P)H oxydaze enzyme leads to formation of hydrogen peroxide. The reaction of this substance with transition metal cations eg. Fe^{2+} (Fenton reaction) results in the production of hydroxyl radical. The formed reactive hydroxyl radicals are able to rapidly react with the nucleofil center of cellular macromolecules and/or antioxidants, drugs and other xenobiotics containing an aromatic ring.

We examined the hydroxyl radical scavenging ability of salicylic acid and its hydroxylated derivatives using two in vitro methods (Fenton and Udenfriend incubation). We investigated the effect of various conditions to the composition of the reaction products. A validated HPLC-DAD method was developed for determination of salicylic acid and its derivatives produced in its first hydroxylation reaction.

Structure analysis of the secondary products generated in the Fenton and Udenfriend reactions of the hydroxylated products was also performed.

MALDI-TOF analysis was carried out to confirm the molecular structure of the products. We applied these model systems (Fenton's and Udenfriend's system) to study the mechanism of non-enzyme-catalyzed hydroxylation reaction of salicylic acid in vivo.

O-10

The position of W104 in AppA revealed by fluorescence spectroscopy

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AppA is a BLUF protein which serves as a transcriptional anti-repressor found in Rhodobacter sphaeroides. Similarly to other flavoproteins the absorption of the photon is may be followed by an electron transfer cascade, but the same time the hydrogen-bond network around FAD undergoes to a reorganization which is crucial for the formation of the light adapted state of the protein.

There are several different X-ray structure for AppA, which show the position of W104 at a different place: in the original crystal structure from Anderson et al W104 was located closer to the flavin forming a hydrogen bond with Q63. A different – shorter length – AppA structure has shown a structure with W104 farer from the flavin partially exposed to the solvent. In order to explain this controversial findings there are models where the "W104 in" position can be assigned to the dark state and the "W104 out" position to the light state of AppA.

In order to clarify the location of W104 we made several mutants and performed fluorescence anisotropy, fluorescence anisotropy decay and FRET measurements. Exchanging the tryptophan at W64 to phenylalanine caused that we could excite selectively the W104 tryptophan. For a hydrogen bonded tryptophan (dW64F) we observed a slower rotational correlation time than in a partially solvent exposed case (lW64F).

As flavin is a good acceptor for tryptophan we measure the distance of W104 from FAD by the means of fluorescence resonance energy transfer (FRET) in the dark and light adapted state of AppA.

O-11

HPLC-MS analysis of capsaicin, dihydrocapsaicin and their metabolites

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We have developed a HPLC-MS method for determination of capsaicinoids. We worked in a cooperation, where experiments were designed to study the biotransformation of capsaicinoids in the small intestine of rats. The intestinal metabolism of capsaicin and dihydrocapsaicin produced two metabolites. They have been separated from each other and from the original molecules by HPLC then identified by a hybrid quadrupol-orbitrap MS. Identification of the unknown metabolites has been carried out by MS/MS experiments gaining structural information from fragmentation data and masses.

O-12

PC12 cells expressing a mutant p53 protein are more susceptible to the cytotoxic effects of sodium nitroprusside

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Nitric oxide (NO) is a well-known gas neurotransmitter that is involved in both physiological and pathological processes. It regulates cellular events by indirectly increasing the level of the second messenger cGMP, by post-translational modification of proteins called nitrosylation or by binding to transition metals. The p53 tumor suppressor protein is an important regulator of the cell cycle, apoptosis, DNA repair and other cellular processes. We investigated the role of the p53 protein in the NO-induced apoptosis of wild-type PC12 and p143p53PC12 rat phaeochromocytoma cell lines. A dominant negative mutant p53 protein, that carries a mutation in its DNA binding domain, is expressed in the latter cell type. Sodium nitroprusside (SNP) was used as NO-donor. Cell viability assays revealed that 400 μM SNP is cytotoxic for both cell lines, however, p143p53PC12 cells exhibited higher sensitivity to SNP treatments. All the examined cellular changes could

be detected earlier and were more prominent in cells with the mutant p53 protein. These are alterations in the phosphorylation status of certain proteins such as stress kinases, the α subunit of the eukaryotic translational initiation factor 2 (eIF2α) and the p53 protein; proteolytic cleavage of protein kinase R, drop in the level of the Bcl-2 protein, release of cytochrome c from mitochondria and activation of caspase-9 and -3. We conclude from our results that toxic-dose SNP treatments induce stronger activation of the intrinsic apoptotic pathway in the p143p53PC12 cell line, consequently leading to greater susceptibility to NO-induced apoptosis.

O-13

Effect of sodium nitroprusside on nerve growth factor induced differentiation of PC12 cells

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PTE ÁOK Orvosi Biológiai Intézet

Nitric oxide (NO) is a mediator of a diverse array of inter- and intracellular signal transduction processes. The aim of the present study was to analyze its possible role as a second messenger in the process of neuronal differentiation of PC12 pheochromocytoma cells. Upon NGF treatment wild-type PC12 cells stop dividing and develop neurites. In contrast, a PC12 subclone (designated M-M17-26) expressing a dominant-negative mutant Ras protein keeps proliferating and fails to grow neurites after NGF treatment. Sodium nitroprusside (SNP), an NO donor, was found to induce the p53 protein and to inhibit proliferation of both PC12 and M-M17-26 cells, but failed to induce neuronal differentiation in these cell lines. Key signaling pathways of NGF-induced differentiation (the ERK and Akt pathways) and the phosphorylation of CREB transcription factor were not affected by SNP treatment. It is thus concluded that NO is unable to activate signaling proteins acting downstream or independent of Ras that are required for neuronal differentiation.

O-14

Partial rescue of geldanamycin-induced TrkA depletion by a proteasome inhibitor in PC12 cells

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In this work we tried to identify mechanisms that could explain how chemical inhibition of heat-shock protein 90 reduces nerve growth factor signaling in rat pheochromocytoma PC12 cells. Geldanamycin is an antibiotic originally discovered based on its ability to bind heat-shock protein 90. This interaction can lead to the disruption of heat-shock protein 90-containing multimolecular complexes. It can also induce the inhibition or even degradation of partner proteins dissociated from the 90 kDa chaperone and, eventually, can cause apoptosis, for instance, in PC12 cells. Before the onset of initial apoptotic events, however, a marked decrease in the activity of extracellular signal-regulated kinases ERK 1/2 and protein kinase B/Akt can be observed together with reduced expression of the high affinity nerve growth factor receptor, tropomyosine-related kinase, TrkA, in this cell type. The proteasome inhibitor MG-132 can effectively counteract the geldanamycin-induced reduction of TrkA expression and it can render TrkA and ERK1/2 phosphorylation but not that of protein kinase B/Akt by nerve growth factor again inducible. We have found altered intracellular distribution of TrkA in geldanamycin-treated and proteasome-inhibited PC12 cells that may, at least from the viewpoint of protein localization explain why nerve growth factor remains without effect on protein kinase B/Akt. The lack of protein kinase B/Akt stimulation by nerve growth factor in turn reveals why nerve growth factor treatment can't save PC12 cells from geldanamycin-induced programmed cell death. Our observations can help to better understand the mechanism of action of geldanamycin, a compound with strong human therapeutical potential.

O-15

Kanamycin induced changes in Ca^{2+}-binding protein expression in the inner ear of wild type, heterozygous and homozygous pituitary adenylate cyclase activating polypeptide (PACAP)-deficient mice

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Pituitary adenylate cyclase activating polypeptide (PACAP) is a peptide with well-known neuroprotective and neurotrophic effects. Recently, we have shown that it protects cochlear cells against oxidative stress induced apoptosis *in vitro*. We also found that PACAP-deficient animals show significantly higher expression of Ca^{2+} binding protein (parvalbumin, calretinin and calbindin) in the hair cells of the inner ear, but there are no data about the consequences of the lack of endogenous PACAP in different ototoxic insults such as aminoglycoside, e.g. kanamycin-induced toxicity.

In this study we examined the effect of a single dose of ototoxic kanamycin treatment (1mg/g) on Ca^{2+} binding protein expression in hair cells of wild type, heterozygous and homozygous PACAP-deficient mice. We treated 5-day-old mice with kanamycin and 2 days later we examined the Ca^{2+} binding protein (parvalbumin, calretinin) expression of the hair cells with immunohistochemistry. Control animals received physiological saline.

We found stronger expression of Ca^{2+}-binding proteins in the hair cells of control heterozygous and homozygous PACAP-deficient mice compared to wild-type animals. Kanamycin induced a significant increase in Ca^{2+}-binding protein expression in wild type and heterozygous PACAP-deficient mice, but the baseline higher expression in homozygous PACAP-deficient mice did not show further changes after the treatment.

Elevated endolymphatic Ca^{2+} is deleterious for the cochlear function, against which the high concentration of Ca^{2+}-buffers in hair cells may protect. We suggest that the lack of endogenous PACAP is a pathological condition for the hair cells, leading to a compensatory increase in Ca^{2+}-binding protein expression. That provides evidence for the important protective role of PACAP in the inner ear, and further investigations are

necessary to examine the exact role of endogenous PACAP in ototoxic insults.

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O-16

Interleukin-1β microinjection into the cingulate cortex induces homeostatic changes in the rat

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Aims: IL-1β is an important primary cytokine taking part at several levels of the homeostatic regulation partly via cyclooxygenase (COX) mediated mechanism.

The cingulate cortex is known to have important function in the maintenance of homeostatis. Extracellular single neuron recordings of our research group proved that IL-1β responsive neurons exist in this cortical area.

The present experiment was designed to elucidate the effects of direct cingulate cortex administration of interleukin-1β (IL-1β) on the homeostatic regulation of male Wistar rats.

Method: In these experiments, before and after a single bilateral microinjection of IL-1β into the cingulate cortex (with or without the pretreatment of the COX inhibitor paracetamol), short- (2h), medium- (12h) and long-term (24h) food and water intakes and 2h body temperature were measured.

Results: Decreasing tendency of the medium-term food and water intakes could be observed after the IL-1β microinjection. The cytokine treatment evoked a significant increase in body temperature ($p<0.05$,

ANOVA), and the pretreatment with paracetamol was able to eliminate the hyperthermic effect of IL-1β.

Conclusion: Our present findings are the first results about the role of IL-1β in the regulation of feeding and metabolism in the cingulate cortex. Further research is needed to obtain more information about the cytokine-mediated regulatory processes in the limbic forebrain.

Ajinomoto 51064/2009, SROP-4.2.1.B-10/2/KONV-2010-0002, SROP-4.2.2/B-10/1-2010-0029, and the Hungarian Academy of Sciences.

O-17

Complex functional attributes of neurons in the cingulate cortex of the rat

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Aims: The cingulate cortex, as a part of the limbic neural circuitry, plays important role in the central homeostatic control. It has intimate interrelationships with several glucose-monitoring (GM) neuron containing limbic forebrain structures already known for their involvement in the central regulation of feeding and metabolism. Because of the scarceness of information on GM cells in the cingulate cortex, the main goal of the present experiment was to investigate whether GM neurons exist in this brain area, and if they do, to characterize their endogenous and exogenous chemical sensitivities.

Method: To examine the chemosensory responsiveness of these cells, extracellular single neuron activity was recorded in adult male anesthetized Wistar and Sprague-Dawley rats by means of tungsten wired multibarreled glass microelectrodes, during 1) microelectrophoretic application of various chemicals (D-glucose, norepinephrine, dopamine, GABA, acetylcholine and glutamate), 2) intraoral injection of solutions of the five primary taste qualities (sucrose, NaCl, HCl, QHCl and monosodium-glutamate (MSG)) and orange juice as a complex taste, and 3) intragastric infusions (NaCl 60 and 150 mM, D-Glucose 60 mM and MSG 60 mM)

Results: Approximately, 15% of the neurons displayed activity change to local microelectrophoretic administration of D-glucose. Both glucose-

inhibited, also known as glucose-sensitive (27%), and glucose-excited, also known as glucose-receptor (73%) neurons were indentified. The ratio of GM neurons with firing rate change to microelectrophoretically applied catecholamines was three times higher compared to that of the glucose-insensitive (GIS) cells. Almost half of the tested neurons (48%) showed responsiveness to at least one of the five taste qualities. The proportion of taste sensitive GM units was higher than that of the GIS cells. In case of intragastric infusions, approximately 20% of the tested neurons displayed activity changes to NaCl (60mM) and MSG.

Conclusion: Our investigations provided evidence for the existence of GM neurons in the cingulate cortex of the rat. These neurons appear to integrate compex chemical information of various sources. The difference between catecholamine responsiveness of these GM and GIS cells substantiates the distinguished and complex roles of GM neurons in the central regulation of feeding, feeding-associated learning and metabolism.

Ajinomoto 51064/2009, SROP-4.2.1.B-10/2/KONV-2010-0002, SROP-4.2.2/B-10/1-2010-0029 and the Hungarian Academy of Sciences

O-18

Role of ventral pallidal dopamine receptors in conditioned place preference

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PTE ÁOK Élettani Intézet

The conditioned place preference paradigm is a widely used method to investigate the rewarding effect of different chemical substances. Dopamine is one of the most relevant drug among those having positive reinforcing effects. The main source of the dopamine in the brain is the mesolimbic and mesocortical dopaminergic system (MLDS/MCDS) arising from the ventral tegmental area (VTA). These systems innervate numerous cortical and subcortical brain regions. One of these structures innervated by the MLDS is the ventral pallidum (VP) situated in the basal forebrain. It has been shown, that VP plays a role in electrical and chemical self-stimulation, furthermore, place preference evoked by the dopamine reuptake inhibitor cocain in the VP, and its acquisition can be blocked by 6-Hydroxydopamine lesion. The

VP contains both D1 and D2 subtypes of dopamine receptors, which differ in their locations, densities and signaling pathways.

By means of stereotaxic method, cannulae were implanted bilaterally into the VP of male Wistar rats for local injections of the drugs. We investigated the effect of D1 selective dopamine receptor agonist SKF38393 and D2 selective dopamine receptor agonist quinpirol in conditioned place preference paradigm. Various behavioral parameters including the time spent in the target quadrant, number of crossings of the target quadrant, velocity of animals and total distance traveled have been recorded. Effects of the two agonists have been compared and analyzed. According to our findings, the D2 dopamine receptor agonist quinpirol but not the D1 dopamine receptor agonist SKF38393 can induce place preference in the VP. To clarify the specificity of the agonists, further investigations are required with antagonist.

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O-19

Metabolic alterations after streptozotocin microinjection into the mediodorsal prefrontal cortex

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Introduction: The mediodorsal prefrontal cortex (mdPFC), a major constituent of the forebrain limbic circuitry, is implicated in the regulation of motivated behaviors such as food intake. Our previous results provided evidence for the existence of special chemosensory cells, the so-called glucose-monitoring (GM) neurons in the mdPFC. Previous studies reported that intracerebral microinjection of streptozotocin can specifically destroy the GM neurons of various brain areas causing severe deficits of feeding, inducing taste perception alterations, and metabolism.

Aim: The aim of our present study was to examine metabolic effects of local intracerebral microinjection of STZ into the mdPFC.

Methods: The standardized glucose tolerance test (GTT) was performed after a 12 h food deprivation of 29 male, Wistar rats. Intraperitoneal injection of 20% D-glucose solution (0.2 g/100 g bw/ml) was administered at the 20th min following the intracerebral microinjection of STZ or saline (acute GTT) and then 4 weeks later (subacute GTT). Relevant plasma metabolites (total cholesterol, HDL, LDH, triglycerides, uric acid) were determined 30 min after the STZ or saline microinjection by a photometer.

Results: Pathological alterations of blood glucose levels and a definite glucose intolerance of the STZ treated animals became obvious in the acute GTT. Two hours after the i.p. injection of the glucose solution, blood glucose level of the STZ treated animals was significantly higher than that of the rats in the control group (control: 6.95 mmol/l ± 0.14 mmol/l, STZ 8.6 mmol/l ± 0.51; $p < 0.05$). In the subacute phase, there was no significant difference between the blood glucose concentrations of rats of the STZ treated and control groups, and the blood glucose curves of both groups remained in the physiological range throughout the test. Total cholesterol, HDL, LDH and uric acid plasma concentrations of the STZ treated and control groups did not show any significant difference. At the same time, however, significantly decreased plasma triglyceride levels were detected in the STZ microinjected animals.

Conclusion: The present findings support our hypothesis that the GM neural network play essential role in the preservation of homeostatic balance. Damage to these chemosensory neurons may elicit and maintain complex feeding and metabolic diseases.

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O-20

What is placebo effect?

Szolcsányi T.

PTE, ÁOK, Magatartástudományi Intézet

Placebo effect is a well-known phenomenon attracting the interest of both physicians and non-physicians. In addition, the number of evidence-based studies examining the mechanisms responsible for placebo effects has steadily increased in the recent decade. Still, the conventional understanding of placebo effect is based on confused and contradictory ideas. In my lecture I will clarify the notion of placebo effect, and I will present some considerations found in the current literature as well as some empirical findings that can contribute to the better understanding of what placebo effect is.

O-21

The richer you are, the more damage you case. Introduction to a Climate-Change study

Géczi J., Fekécs I.

Pannon Egyetem MFTK Antropológia és Etika Tanszék

The phenomena of global warming, its effects and possible consequences have been tematized by european institutional education, just as our national higher education had done so. At the same time, research of pedagogy indicate the importance of both life long learning and learning strategies and practices not related to educational institutions. Research also indicates the uncertainity of educations' efficiency, while signalling possible routes for development. The familiarity of the topic varies widely among people with different world views, sociological background, education and those engaged in different economic activities. Our study, which is pedagogical with a sociological basis and with an ethic character, aims to determine the relationship of a characteristic layer of society of a region in the country, and to investigate how their senibility, ethic approach and incentive can be raised.

The basis of our study originates from the cultural history of the climate: from the beginnings of climate change, the relationship toward it and it's conseuences can be arranged into historical patterns. (Behringer, W., 2007). Those cultural-historical overviews, which were given birth along with the emergence of transdisciplinary human ecology also showcase important aspects of the problem, trying to give insight into attitudes and mental relationships.
The history of mentality indicates that contemporary attitudes and mental approaches have historical antecedents which in turn have great influence of current beliefs. (Brague, R. 1994,.Chaunu, P. 1982. Vámos Á. 2001; Zsolnai J. 1996)

The study's broader context within the social sciences is future-analysis. Among its important questions the following are found: how much do people care about the future, to what extent are they pessimistic or optimistic, what is their average future-philosophy like, what do they expect of the future within the context of their own lives, the future of their country and the future of humanity. Also of importance are wether how well are they informed, how much do they trust science and to what extent they feel responsible, how the image of the future, the image of man, the scale of values and world views fit together (Galtung 1976, Malaska 1994, Bell 2003). By today, the multidisciplinary branch related to climate change had become an important part of Future study, which can be a valuable starting point for our research.

The novelty of the study is that it presents ethical and pedagogic aspect on the same level, and it also explores whether there is a relationship between attitudes toward climate-change and contemporary, national attitudes and mentalities, also the factors determining these, and if there is a relationship, in what way it can be described.

There are two research groups involved within this study, both functioning on The MFTK of Pannon University. Collegues of the pedagogy institute are students of József Zsolnay, professionals who have been working for decades in the field of research and development. The collegues of the ethics departement are developers of 'Ethics, people and society' within the national curriculum and directors of related research. Their transdisciplinar studies make possible the observation of ethical, cultural, and religious history along with antrhopological aspects.

O-22

On What There Is – Logics of Scientific Realism

András F.

Pannon Egyetem

I borrowed the title from Quine's classic study, who sees an integral connection between the historical and modern forms of appearance of the problems of realism, from logical point of view. Realism is committed to the mind-independent existence of the world investigated by the sciences. Is such a commitment defensible? The realist commitment is best clarified in contrast with positions that deny it. In order to be clear about what realism in the context of the sciences amounts to, I understand it in terms of two dimensions: a semantic and an epistemological dimension. In my presentation I examine the logic dictionary of this traditional dilemma.

O-23

Medicated explanations - How medical categories affect social scientific endeavors

Sivadó Á.

MTA BTK Filozófiai Intézet

Ian Hacking argues that certain social institutions create ways to be persons through the constitution of social kinds. A crucial part of this process is the medicalization of phenomena (i. e. psychiatric disorders) that gives way to new dimensions of personhood and new categories for scientific investigation. This categorization, however, raises a number of questions regarding social scientific explanations, most importantly their causal nature and their relations to explanations usually proposed by the natural and life sciences. This presentation attempts to address the most fundamental one of these: can explanations based on medical categories satisfy the requirements of genuine scientific explanations?

O-24

Making moral difference between active and passive euthanasia

Győri A.

Pécsi Tudományegyetem Bölcsészettudományi Kar

There is a conventional distinction between active and passive euthanasia in biomedical ethics. It is a generally accepted view that there is an important moral difference between them, therefore active euthanasia is always forbidden, and passive euthanasia is permissible in some cases. I am going to reconstruct the main arguments of the american philosopher James Rachels, who held that there is no such a difference between the two forms of euthanasia: "[...] there is no morally important difference between killing and letting die; if one is permissible (or objectionable), then so is the other, and to the same degree." (Rachels, 1986.) If we cannot make the traditional distinction based on the inner properties of the two acts, then what will define which one of them is preferable?

O-25

The Image of Galilei in Phenomenology

Zuh D.

PTE BTK

The image of Galileo Galilei in 20th century continental philosophy (and phenomenology) is allegedly negative: he is meant to be the key example of how natural science intentionally forgot its roots with everyday intuition. I want to correct and refine these headlines in two points: 1) the depicted image of Galilei is not the reflection of some biased and vague cencepts but of a specific Central-European Weltanschauuung numerous early 20th century intellectuals shared; 2) the main theory behind this image (Edmund Husserl's philosophy of knowledge) loaded with historical errors still sounds plausible without its the historical undertones.

P-01

„Fatness or Fittness": Health-Image and Health Strategy in Elementary Schools

Cselik B.

PTE ETK

Introduction: The main focus of our reasearch is to observ the functions of the ongoing helath strategy in elementary education. I analyzed the data collected from the institute, interpreted the results, and examined some possibilities of operative planning that lead to strategy aims, that are the experience based short-term aims. Finally I interested to have a good health education program can be successfully transferred to other institutions.

Hypothesis: We suppose that already in elementary school it is importatnt to being health related education in order to have it as a skill at adult age. We believe that efforts of an enthusiastic group of teachers, through health related education, can lead to successful design and realization stragy. We further hypothesize that with regular data collection we could be able to predict if we are heading to the right direction and see what needs to be modified. Feltételeztük továbbá, hogy egy már jól bevált egészségnevelő programmal sikert lehet elérni más intézményekben is.

Purpose of the Study: 1. With a follow up sutdy it was the aim to obtain a wide picture of nutrition and the physical activity related habits of the students. 2. To explore the changes of the healthy lifestyle of students. 3. To prove that it is worth inventing health related education strategy even basic level. 4. To show that all strategy works everywhere only if participants are interested int he realization of the program. 5. To provide recommandations for future steps.

Subjects: Nine hundred and forty-five elementary school students, age 11-14 years from five elementary school participated in the study. From the topics of health related education strategy only physical activity and life style related points were analyzed.

Methodology: Subjects voluntarily filled out questionnaire that contained both multiple choice questions and questions requiring written answer. The questionnaire wasq prepared based on mine 2009 questionnaire with special respect to nutrition and physical activity. The questions were related to the aspects of health and physical activity, and the internal and external enviroment of the students and the geographical area. We also investigated

the nutrition habits and their individual opinions about: what kind of food they think to be healthy; what are their nutrition habits; and weather they require more sport activities in school. We also measured their BMI.

Results: In conclusion it can be stated that we achived positive results regarding nutrition and physical activity habits. We found that student have sufficient knowledge about the importance of health and physical activity. The sport activity itself is judged positively. For some reasons, however, they practically do not realize them. Health education, beside the contribution of the family, schools could develop and refine health conscious behavior with higer chance in early elementary school age. Similar numbers of items of domestic and international measurements of BMI compared with regard to much better results have been achieved. To reach the aims of health related education it is important to develop helath consciousness. This requires a beneficial relationship between the educators and the children as well as a good example of healthy lifestyle from the teachers themselves.

P-02

Schizophrenia regulated salivary proteins in the development of psychosis

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Background: Schizophrenia is a severe and debilitating neuropsychiatric disorder with an increasing lifetime risk. Elucidate the unknown etiology could help to mitigate both personal and social loss of values.

Objective: Cerebrospinal fluid (CSF) and blood as human body fluids have become generally used in proteomic studies of schizophrenia. However, human saliva also contains informative components, proteins, that are useful as diagnostic biomarkers.

Method: In this study MALDI TOF/TOF MS was used for identification of schizophrenia regulated salivary proteins, which can be found in schizophrenic human post-mortem brain tissue, as well. Eighteen schizophrenic patients (paranoid type) were compared to healthy controls.

Results: The identified biomarkers can be classified into the following biological processes: metabolism, oxidative stress, cytoskeletal, synaptic and signalling pathways which may confirm the theories about the development of psychosis.

Conclusion: In contrast to CSF and blood sampling, saliva collection is a non-invasive, simple, safe, stress free and painless technique. Human saliva includes several molecular biomarkers for aiding the diagnosis of schizophrenia.

P-03

Age-associated alterations in acute corticotropin effects on energy homeostasis

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PTE ÁOK Kórélettani és Gerontológiai Intézet

Introduction: In the background of age-related obesity and of aging anorexia complex age-related alterations in the catabolic [food intake (FI) reducing, metabolic rate (MR) enhancing] and anabolic (FI enhancing, MR-reducing) peptide systems may be assumed. Corticotropin-releasing factor (CRF) is an important hypothalamic catabolic mediator downstream of leptin and melanocortins. Our previous studies revealed age-related shifts in the catabolic responsiveness to intracerebroventricular (ICV) CRF infusion in rats: the weakest responsiveness was detected in the middle-aged, the strongest in the oldest group.

Methods: We hypothesized that anorexigenic and hypermetabolic responsiveness to acute ICV CRF administration change with different dynamics during aging. Responsiveness of young adult, younger and older middle-aged, aging and old (3-, 6- and 12-, 18- and 24-month, respectively) male and female Wistar rats to acute ICV CRF injection (0.3 ug) was analyzed regarding parameters of energy balance. Anorexigenic effects were tested in an automated FeedScale system during 120-min re-feeding following 24-h fasting. Oxygen consumption (MR) was measured by indirect calorimetry (Oxymax). Colon (Tc) and tail skin temperature (Ts) were recorded by thermocouples in non-deprived animals.For statistical analysis of the data repeated-measures ANOVA was used.

Results: Acute CRF injection suppressed FI and increased MR and Tc. In males both anorexigenic and hypermetabolic effects declined with aging. Females showed significant anorexigenic responsiveness in all age-groups.

***Conclusion*:** In the background of gender differences variations in body weight/body composition and endocrine factors (e.g. anorexigenic estrogen effects) may be assumed.

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P-04

Analysis of capsaicin and dihydrocapsaicin metabolism of the small intestine in the rat by HPLC-FLD

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A sensitive and selective HPLC-FLD method has been developed for determination of capsaicin (*trans*-8-methyl-*N*-vanillyl-6-nonenamid) and dihydrocapsaicin (8-methyl-*N*-vanillylnonan-amide) in samples generated in rat small intestine luminal perfusion experiments. Extrahepatic metabolism – including intestinal metabolism - may also significantly influence the disposition of the xenobiotics. These experiments were designed to study the biotransformation of capsaicinoids and the luminal appearance of their metabolites in rat proximal jejunum which was perfused with isotonic medium containing 100 µM Capsaicin natural. The chromatographic separation was performed at room temperature on a ZORBAX Eclipse® XDB-C8 column using isocratic elution with a mobile phase consisting 0.05 M orthophosphoric acid solution and acetonitrile (60:40, v/v; pH 3.0) with a flow rate of 1.5 ml/min. Fluorescence detection was performed at excitation and emission wavelengths of 230 and 323 nm, respectively. The method was evaluated for a number of validation characteristics (selectivity, repeatability and intermediate precision, LOD,

LOQ and calibration range). The limit of detection (LOD) was 2 ng/ml and the limit of quantification (LOQ) was 10 ng/ml for both capsaicin and dihydrocapsaicin. The method was linear over the concentration range 10-500 ng/ml. The method was successfully applied to the investigation of the intestinal metabolism of capsaicin and dihydrocapsaicin and the luminal appearance of capsaicinoid metabolites in rat jejunum perfusates. Identification of the structure of the metabolites was based on MS/MS analysis.

P-05

Nutritional status of very old residents who live in social homes

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Rationale: The prevalence of malnutrition depends on criteria and number of criteria used. It is between 15% and 60% in Europe. Nutritional screening has to be simple and quick to perform, e.g. the Malnutrition Universal Screening Tool (MUST). Our aim is to present the main outcomes of the nutritionDay (nDay) study and the results of MUST survey done at the same time in the group of residents older than 80.

Methods: All the residents who gave informed consent were assessed with the standardised questionnaires for nursing homes provided by the nDay office and the MUST questionnaire. Data are presented as mean and standard deviations and 95% confidential intervals where applicable.

Results: Altogether 840 residents (17.7% were men) was mean age 86.0±4.1 years, and they spent on average 55.3±68.3 months in the social home. Demographic and anthropometrical data did not differ between the two surveys. Approximately once a month is screened the 53.9% of the residents and never is assessed 13.7% of them. 11.9% of the surveyed people were malnourished according to the BMI, and 3.4% of them according to weight loss. Using the MUST criteria, 17.0% of the residents have high risk of malnutrition. Different severity of cognitive function was in significant ($r=0.33$, $p<.001$) relation with the MUST score. Only 8.8% of the residents received any kind of artificial nutrition support. 23.3% of the

residents ate less than half of the portions. They presented the following reasons for this: the food was not properly made in 41.3%; the food was not served in proper time in 17.4%.

Conclusion: Any kind of nutritional screening is done rarely, and the estimation of malnutrition is inaccurate. The prevalence of malnutrition in Hungarian nursing homes is in accordance with international data. Most of the patients with high risk of malnutrition did not receive the proper nutritional therapy, and the declined food intake was due to cooking and timing problems.

P-06

Effect of experimental diabetes and insulin replacement on the intestinal metabolism of 4 - nitrophenol and the activities of UDP - glucuronyltransferase and β - glucuronidase enzymes.

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Extrahepatic, including intestinal metabolism, may also significantly influence the disposition of the xenobiotics. A very important aspect of intestinal metabolism is its location at the site of entry of exogenous compounds since the metabolites of drugs formed in the small intestine can be excreted by the enterocytes back into the intestinal lumen. 4 - nitrophenol (PNP) is excreted almost exclusively as its glucuronide (PNP-G) and sulfate (PNP-S). Because of this simple and well characterized metabolic profile, the PNP is widely used as a model substrate to evaluate the influence of drug therapy, disease, nutrient deficiencies and other physiologically altered conditions on conjugative drug metabolism in animal studies both *in vitro* and *in vivo.*

In our experimental model, male Wistar rats were treated with streptozotocin (STZ) and 500 μM PNP solution was perfusated through the proximal jejunal part of the small intestine. Samples were taken from the intestinal perfusate and from the bile. A group of the animals remained to be control, while the STZ treated animals represented a diabetic group of rats,

which have got rapid- and long-acting insulin replacement. Because of the PNP-G was found to be the dominant metabolite, the activities of the UDP-glucuronyltransferase (UGT) and the β-glucuronidase enzimes were also investigated. The metabolites were quantitated with a reversed phase HPLC method and the enzyme activities were measured by UV-Vis spectrophotometer.

STZ elevated the excretion of the PNP-G and PNP-S in the intestinal perfusate, and both kind of insulin reversed the effect of the STZ at the PNP-G, while the effect of STZ on the luminal excretion of PNP-S was not compensated by insulin. The activity of the glucuronyltransferase was elevated in the small intestine. These alterations can be completely and partly compensated by rapid- and long-acting insulin, respectively. STZ caused an elevation in the enzyme activity of the small intestine, and the increase was reversed of both kind of insulin. Experimental diabetes elevated the quantity of PNP-G in the small intestine, and this enhancement was only reversed by rapid-acting insulin. These results show that the appearance of PNP-G in the small intestine, can be only partly connected with the activity of the UDP-glucuronyltransferase.

This study was supported by the Faculty of Medicine Research Fund (PTE ÁOK KA No:340389/10/01)

P-07

Changes in regulatory effects of neuropeptide Y, ckolecistokinin and melanocortins on energy homeostasis in spontaneously hypertensive rats

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PTE ÁOK Kórélettani és Gerontológiai Intézet

Spontaneously hypertensive rats (SHR) were developed for the study of essential hypertension. They have lower food intake (FI) and body weight (BW) than that of age-matched controls. Their BW does not reach that of controls even on a high-fat diet. We assumed a dysregulation of energy balance, an enhanced efficacy of anorexigenic and diminished effects of orexigenic peptides in the background. To test our hypothesis we studied the FI-associated effects of major orexigenic (neuropeptide Y [NPY]) and anorexigenic (alpha-melanocyte-stimulating hormone [alpha-MSH],

cholecystokinin [CCK]) peptides and those of a selective melanocortin antagonist (HS024) in SHR rats. Methods: Food intake of 3- and 6-month old male SHR and normotensive Wistar rats (NT) was measured in an automated FeedScale system upon an intracerebroventricular (ICV) alpha-MSH-injection (5 ug, spontaneous nocturnal FI), during an ICV HS024-infusion (1 ug/h, 7 days), upon an ICV NPY-injection (5 ug, induced increase in daytime FI) and upon an intraperitoneal CCK-injection (5 ug, daytime refeeding following 48-hour fasting). BW was measured daily manually. Results: The alpha-MSH-injection reduced the FI of SHR rats more efficiently (50% reduction instead of 30%). HS024 started to increase FI and consequently BW in the NT group already from the 1stday, in SHR animals only from the 3rd. FI of SHR was inhibited by CCK more efficiently (47% vs. 34%). Orexigenic effect of NPY was smaller in SHR rats than in age- or BW-matched NT groups. Conclusion: SHR rats showed enhanced responsiveness to melanocortin and CCK, a diminished one to NPY injections. The HS024 infusion inhibited endogenous melanocortin-effects only with delay. Accordingly, BW regulatory disorder of SHR rats may be explained by enhanced efficacy of anorexigenic peptides and diminished efficacy of orexigenic ones.

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P-08

Analysis of human genomic disorders with array CGH method in Hungary

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PTE ÁOK Orvosi Genetikai Intézet

Introduction: In the past few decades the study of genomic disorders, caused by copy number changes of genomic regions, has gotten more interest. After the completion of the Human Genome Project, the creation of databases and libraries led to the development of new techniques, such as microarray based array CGH. The resolution of this technique is much higher than that of previously used methods. This allows the detection of previously unknown genomic disorders.

Aims: Our goal was to examine patients suffering from complex developmental disorders where traditional methods could not confirm phenotype. Up until now traditional diagnostic methods in Hungary could not detect pathogenic differences, which is why we added aCGH to routine diagnostics.

Method: We examined 18 well selected patients with complex developmental disorders. We used Agilent SurePrint G3 Human 8x60K oligo arrays to detect the copy number aberration. Evaluation of the data was made using Agilent G2565CA microarray scanner. Data analysis was performed with Agilent Cytogenomics software.

Results: Copy number aberrations were found in only six patients, in whom we found 1 to 6 Mb deletions at different positions. This is a 33% hit rate as opposed to 14% found in literature. These deletions result in the elimination of several genes which could explain the clinical symptoms. In the future we plan on examining these samples with NGS which could give us a more detailed look into the genetics behind complex developmental disorders.

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P-09

Systems toxicology study: effects of the macrolide antibiotic primycin on *in vitro* liver models

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Humans are exposed to thousands of potentially bioactive compounds e.g. chemicals from daily routine and the environment, drugs and food additives. Today mainly animal experiments are used in the pre-clinical drug safety studies to identify risks to human health, however that raising not only

ethical, but biological interpretation questions too. Recently using *in vitro* cellular models in risk assessment could overcome these difficulties.

The emerging area of systems toxicology is a special application of "omics" technologies in combination with conventional toxicology measurements to investigate complex and specific interactions at molecular level caused by exposures.

We completed the first real-time profiling of short and long term exposure on human cells of a bioactive macrolide, called primycin. To investigate the effect of the treatment two- and three dimensional *in vitro* liver models (mono- and co-cultured hepatoma and human fibroblast cells) were created. To characterise the transcriptomic changes of the different cultures, cutting edge genomics approaches, digitaltranscriptome profiling (SAGE-seq) and human genome affymetrix microarray were applied. The analysis of gene expression data revealed modulation of several pathways related to the inflamatory and immune modulatory processes.

P-10

Successful induction of *in vivo* vascularization of *in vitro* engineered lung tissues

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Lung diseases are some of the most common medical condition worldwide, they account for a significant cause of morbidity and mortality. Many disorders do not have specific cure, for patients diagnosed with end-stage lung disease, lung transplantation is the only solution. One potential approach is the use of engineered tissues in the transplantation process. Tissue engineering has been a quickly developing field of biotechnological research in the past couple of years, but the efficient induction of capillary blood vessel network in *in vitro* created tissue types remained a mystery. Irrespectively of the tissue type, the efficient blood supply is an essential criteria for making viable tissues as nutrients, oxygen, etc. reach the tissue through the blood vessel system. Without sufficient capillary network the implantation and survival of an engineered tissue is limited.

Our primary aim was to set up complex human three dimensional lung tissues that following implantation into a host body would be quickly and sufficiently vascularized for increased viability.

Three dimensional (3D) lung tissue model was set up using human non-cancerous small airway epithelial cells (SAEC) and normal lung fibroblasts (NHLF). To investigate the process of vascularization of the implanted engineered tissue, the tissue aggregates were implanted subcutaneously into the back or into ears of immunodeficient mice. Vascularization was monitored using non-invasive SPECT/CT, histology using hematoxylin eosin (HE) and immunofluorescent staining to differentiate mouse and human-derived tissues in the implants.

Three dimensional lung tissues were created using SAEC and NHLF cells. The implantations were performed successfully and increased perfusion was observed at the implantation site. HE staining confirmed the presence of the implanted tissue in the ears of test animals. Immunohystochemistry using specific antibodies identified mouse derived endothelial tissues in the 3D human tissue complexes.

In the presented work three dimensional tissue complexes were set up from cell types which are representing the two major cell types of the lung: cells with epithelial and mesenchymal origin. We theorized that the third and extremely important cell type the endothelial cells are not needed during in vitro tissue engineering, as endothelial cells would grow into the engineered tissue once implanted into the host. Using mice as test animals, we succeeded showing that vascularization is possible in such circumstances. Induction of vascularization was observed by means of enhanced perfusion at the implantation site and the presence of mouse-derived endothelial cells in the implanted human tissue constructs. These findings suggest that the 3D complex can connect to the host vascular system after implantation.

P-11

Spontaneous Thoracic Hernia: Report of Two Cases

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Lung hernia is defined as a protrusion of the lung beyond the normal confines of the thoracic cavity, thorough an abnormal defect of the thoracic wall lined by pleura. The first case was described by Roland in 1499, since then sporadic case reports were reported. It is a rare clinical entity with approximately 300 cases reported in the international literature. The authors present two cases of spontaneous thoracic herniation, a unique rarity in the international literature. The Multislice Spiral CT findings along with the secondary multiplanar and three-dimensional volume rendering reconstructions provided the exact diagnosis and facilitated the surgical planning. The surgical correction of the thoracic wall led to the complete recovery of the patients. The condition deserves attention despite of its rarity due to the high prevalence of chronic pulmonary obstructive disease as a major risk factor.

P-12

Application of negative pressure wound therapy in the treatment of chronic leg ulcers – Medical and financial aspects

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Objectives: Non-healing leg ulcers present serious public health and socio-economic issues. Rationally combining aetiological and conservative treatments with innovative methods would be beneficial in improving effectiveness of wound treatment, thus reducing its financial impacts. The authors demonstrate the efficacy of an innovative method using Negative Pressure Wound Therapy (NPWT).

Methods: The authors present cases of dermatological patients with severe, chronic leg ulcers of various aetiologies resistant to conservative therapy (Patient-1: fasciitis necrotisans; Patient-2: ulcer associated with chronic venous insufficiency; Patient-3: pyoderma gangrenosum), thus comparing the costs of conservative treatment (social insurance subsidies for bandages) and NPWT (not financed by social insurance) in each patient. (1USD$=225 HUF, Hungarian Forint)

Results: Social insurance subsidies for bandages/patient (USD) in treatment period: Patient-1.: $1324; Patient-2.: $15495; Patient-3.: $412. Cost of NPWT/patient and proportion of social insurance subsidies for bandages/patient: Patient-1.: $1405 (106%); Patient-2.: $667 (4.3%), Patient-3.: $778 (188.9%). The cost of NPWT is relatively high, however, NPWT-treated leg ulcers have healed, which can be attributed to NPWT stimulating wound healing.

Conclusions: Treatment of the disease causing the leg ulcer – aetiological treatment combined with NPWT – is beneficial in wound healing, reducing the overall cost of wound care, shortening the time of wound healing, improving the patient's quality of life. Application of NPWT in specialized centres and financing by the public health system is recommended for cases not responding to conservative treatment in Hungary.

P-13

Forced peptide release achieved by thermogenetic tools

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Background: Peptidergic interneurons are now in the focus of interest, since they can communicate through gap junctions, chemical synapses and volume transmission. In our previous study we have characterized the morphology and the distribution of synaptic marker proteins in the Crustacean cardioactive peptide (CCAP) producing cells. Fine structure analysis showed that CCAP can be released through chemical synapses

and more frequently extra -synaptically by volume transmission. Although the attack point of synaptic transmission is spatially restricted, peptide signaling through open chemical synapses or volume transmission can diffuse tens of micrometers in the neuropile affecting a variety of cells. The strength of the peptide signal depends on the number of receptors being activated, the duration and concentration of the peptide reaching the receptor.Thus there are a number of modulating effects for peptides reaching the receptor, such as dilution in the extracellular space, digestion by peptidases or physical barriers such as glial processes segmenting the neuropile. We were interested which of this mechanisms are involved in the CCAP signaling.

Results: We genetically expressed a green fluorescent protein variant (Venus) tagged to a peptide and the transient receptor potential cation channel subfamily M member 8 (TRPM8) cold/menthol sensitive ion channel in the CCAP producing neurons. Incubating the larvae at 18°C the CCAP neurons depolarize which leads to peptide release. This can be detected by the loss of Venus fluorescence after certain time of incubation. To decide, whether the loss of fluorescence is due to dilution, pH or peptidase activity, we also carried out immunohistochemistry against Venus. Our data showed that, after loss of Venus fluorescence, Venus immunoreactivity can be detected at the same location and there is no sign of diffusion.

Conclusion: We demonstrated that CCAP release can be manipulated and detected by applying genetic tools. We could investigate the spatial and temporal changes in the peptide release associated to previously identified pre-, post- or mixed synaptic surfaces. However it is still unclear, whether the loss of Venus fluorescence is due to the extracellular milieu or peptidase activity and if the remaining Venus immunoreactivity is in the extracellular space or the peptide is taken up by closely located neuronal/glial processes.

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P-14

Neurochemical responsiveness and taste sensitivity of neurons in the medial and lateral orbitofrontal cortex of the rat

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Aims: The orbitofrontal cortex (OBF) – important prefrontal brain region for the processing of reward and punishment – is known to play integrative role in the central regulation of feeding and metabolism. Previous results demonstrated that the glucose-monitoring (GM) neurons here are important constituents of this neural circuitry. Our main goal in the present experiments was to characterize the endogenous (neurochemical) and exogenous (taste) chemical sensitivities of these chemosensory cells.

Methods: In the present study, extracellular single neuron activity was recorded in the medial (mOBF) and lateral OBF (lOBF) of male Sprague-Dawley (SD) rats by means of tungsten wire multibarreled glass microelectrodes, during ***microelectrophoretic administration*** of various chemicals, as well as ***intraoral stimulations*** with the five primary gustatory qualities and orange juice as complex taste solution.

Results: One fifth of all neurons tested in the mOBF proved to be elements of the forebrain GM neural network, while in the lOBF 40% of the cells changed their activity in response to the microelectrophoretic administration of D-glucose. Of the tested chemicals, acetylcholine was found to be the most likely to alter neuronal activity in both regions (mOBF: 80%; lOBF: 90%), whereas 40% of the examined cells changed in firing rate to microelectrophoretic application of DA in these regions. More than half of the neurons were inhibited by GABA (mOBF: 56%; lOBF: 75%). NA elicited activity changes in half of the neurons in the lOBF, while in a quarter of them in the mOBF.

In the mOBF, 60% of neurons tested changed their activity during gustatory stimulation with sour, umami and bitter taste solutions and orange juice, while in the lOBF this proportion was 50% in case of monosodium-glutamate, and 40% in case of the other previously mentioned solutions. In both regions, sour stimulation associated firing rate changes were recorded in one third of the examined cells, and sweet stimuli induced responses of a quarter of the neurons tested.

Conclusion: Theneurochemical responsiveness was higher or same in the neurons of the lOBF compared to the mOBF, while exogenous chemical sensitivity showed a reversed pattern in these two regions. Our data demonstrate that both areas of the OBF are key structures in the integration of signals arising from the endogenous and exogenous environments.

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P-15

The brains of PACAP-deficient mice - Comparative Proteomics Study

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Pituitary adenylate cyclase activating polypeptide (PACAP) has been first isolated from ovine hypothalami. Since its discovery, the distribution of PACAP has been shown to be widespread in vertebrate species. The highest concentration of PACAP has been shown in the central nervous system. PACAP deficient mice display several structural, biochemical and behavioral alterations compared to wild type mice. Mice lacking endogenous PACAP have increased vulnerabiliy to different stressors and toxic insults and they also have accelerated aging. Our aim was to investigate the differences in peptide and protein composition of the brains of PACAP deficient and wild type mice using SDS-PAGE based proteomic analysis.

Brains from PACAP deficient mice were removed, and different brain areas (cortex, hippocampus, diencephalon, mesencephalon, brainstem and cerebellum) were separated. Brain pieces were weighed, homogenized and further processed for electrophoretic analysis. Our results revealed several

differences in diencephalon and mesencephalon. The protein bands of interest were cut from the gel, samples were digested with trypsin and the tryptic peptides were measured by MALDI TOF MS. Results were analysed by MASCOT Search Engine. Among the altered proteins, several are involved in metabolic processes, energy homeostasis and structural integrity. ATP synthase and tubulin beta 2A were expressed more strongly in PACAP knockout mice. In contrast, the expression of more peptides/proteins markedly decreased in knockout mice, like pyruvate kinase, fructose biphosphate aldolase A, glutathion S transferase, peptidyl propyl cis-trans isomerase A, gamma enolase, aspartate amino transferase. In the presented work we are aiming to find functional correlations regarding the observed changes. For example, the markedly decreased expression of glutathione S transferase might partially account for the decreased antioxidant and detoxifying capacity of PACAP deficient mice. Our results provide novel insight into the altered biochemical processes in mice lacking endogenous PACAP.

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P-16

Phytochemical characterisation of a mongolian medicinal plant (*Artemisia adamsii* Besser).

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Several herb belongs to the *Artemisia* genus are used as a medicinal plant, for example the whole herb and leaves of wormwood (*Artemisia absinthium* L.) are official in the Hungarian Pharmacopoeia (Ph. Hg. VIII). The main active constituents of the genus include sesquiterpene lactones, bitter substances, tannins and essential oil. *Artemisia adamsii* Besser mostly occurs in Mongolia, but the whole herb has been used as a stomachic agent in Traditional Chinese Medicine (TCM) for ages. Nowadays few phythochemical results about this plant have been published.

Therefore, the aim of our study was the phytochemical evaluation and the determination of the main components of *Artemisia adamsii*.

The herb was collected in Mongolia (nearby Ulanbator) in 2011 June. The plant was identified by a biologist, Dr. Tserennadmid Rentsenkhand (National University of Mongolia). From the air-dried herb the essential oil was isolated by water-steam distillation. GC-MS and GC- FID technique was used for detection of main component and percentage evaluation of the essential oil. With spectrophotometric method (official protocol is in Ph. Hg VIII) we also determined total flavonoid content.

The amount of essential oil was 0.56 ml calculated reference to 100 g of air-dried drug. The colour of the essential oil was pale-yellow. Futhermore, with the GC technique we could identify the following components: eucalyptol (15.2%), α-thujone (64.4%) and β-thujone (7.1%). The total flavonoid content was 0.51%.

For the future, we are planning to examine the antibacterial and antifungal activity of the essential oil which can be useful for the practical pharmaceutical science.

P-17

The levels of PACAP in the central nervous system altered by environmental enrichment

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Pituitary adenylate cyclase activating polypeptide (PACAP) is a pleiotropic and multifunctional neuropeptide is widely distributed throughout the body. It is involved in the regulation of various physiological and pathophysiological processes. Numerous studies have shown that PACAP is involved in the development of the central nervous system, and has neuroprotective effects. Environmental enrichment has also demonstrated to be protective in various injuries. A few studies have suggested that trophic factors are involved in the protective mechanisms exerted by environmental enrichment. The interaction between PACAP levels in the brain and environmental effects has not yet been studied. The aim of the present study was to measure PACAP levels from different brain areas in rats and investigate whether environmental enrichment has any influence on PACAP levels.

Wistar rats were divided into two groups: control group and environmental enrichment group. PACAP27 and 38– like immunoreactivity was measured with a specific and sensitive radioimmunoassay in brain samples. Enriched environment has the most beneficial effects in newborn animals, and these rats have the highest rate of neuroplasticity, so we examined them first. The second part of the experiment was to investigate two groups of adult rats: newborn enriched and adulthood enriched animals, both group were examined in adulthood.

Environmental enrichment started at birth led to decreased levels of PACAP in several areas of the brain (brain stem, cerebellum and different

areas of the telencephalon). When animals were kept in enriched environment after birth, then put back under regular circumstances and 3-6 months later checked for their PACAP levels, we found it also decreased. But when the rats were kept under regular circumstances and then in adult age we put them into environmental enrichment for a week, their samples showed higher PACAP levels.

Environmental enrichment causes changes in the PACAP levels of the central nervous system. The perinatal effect of environmental enrichment seems to decrease the level of PACAP, and it shows the same pattern in adulthood as well, but the only adult exposure to enrichment in adulthood leads to increases in PACAP immunoreactivity.

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P-18

Anatomical and physiological changes in regenerated ventral nerve cord of earthworm, *Eisenia fetida*

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Some earthworm species have enormous capability to renew their lost ventral nerve cord ganglia. In this process, commonly named "neuroregeneration", certain neural and non-neual structures (e.g. intact parts of the central nervous system, neoblasts, some coelomocytes) and several chemical substances (e.g. hormones, neurotransmitters, growth factors) are believed to be involved.

Applying radioimmunoassay (RIA) the amounts of the neuractive pituitary adenylate cyclise-activating peptide (PACAP) was determined in both intact and regenerating VNC ganglia showing that the concentration of both

PACAP27 and PACAP 38 increased during the regeneration. By means of SELDI-TOF Mass Spectrometry the up-regulation of distinct peptide groups, characterized by 1-5 kDa mass intervals, was also shown in regenerating ganglia, suggesting that certain neuropeptides play a key-role in the mediation of the renewing of the extirpated ganglia.

Parallel morphological and histochemical examinations revealed the main steps of the regeneration: (1) inflammatory response in severed segments mediated by coelomocytes; (2) reorganization of nerve processes and perikarya in the injured ganglion; (3) migration and proliferation of blast cells that form regeneration blastema attached to the severed body parts; and (4) differentiation of blast cells to specific tissue cells like neural tissue cells, further development of cell connections between old and newly formed structures.

In the first step certain types of coelomocytes, characterized by high acid phosphatase content and phagocytotic activity, could play key-role because injured tissues were infiltrated with coelomocytes that clear away tissue debris and damaged structures further protect the wound against microbial infections elaborating antimicrobial substances. Next steps conduct the renewing of VNC ganglia that are thought to be absolutely identical with the amputated ones, both in structure and pattern. Focusing on the gross anatomy of the renewing VNC ganglia and the pattern of their GABAergic landmark structures normal and abnormal regenerating processes were identified. If the body was cross-cut at the segment border where connectives of VNC ganglia are situated the anatomy of both renewed segments and their ganglia showed the same characteristics that the removed ones. When the plane of transection crossed the chaetae row, where the neuron rich part of VNC ganglion was identified, seemingly normal segments renewed in which the shape and pattern of most internal structures like dissepiments, midgut and metanephridia showed the same characteristics as in amputated ones except for the first 1-4 regenerated ganglia in which frequently seen various malformations like less or more than three pairs of segmental nerves and, compared to intact ganglia, marked changes in both the number and pattern of GABAergic landmark neural structures. Behind these distorted ganglia all the regenerated ones showed the same characteristics as ablated ganglia/structures.

These findings show that transected VNC mediates normal segment regeneration in all cases; however its normal renewing depends on the site of transection suggesting that growing neural processes as landmark

structures and extent of their damage have strong influence on genetically and neurochemically determined epimorphic regeneration of earthworms.

P-19

Investigations on secreted cytokines and angiogenic factors after induction of differentiation and PACAP co-incubation on HC11 mouse mammary cell cultures

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The mammary cell differentiation is regulated by hormones, growth factors, cytokines/chemokines and angiogenic proteins. PACAP has effect not only on cell survival and proliferation, but on differentiation of various cell lines. The high PACAP-like immunoreactivity in the milk and its changes during the lactating period raise the question of the possible effect of PACAP on the differentiation of mammary epithelial cells. In this study, differentiation was hormonally induced on HC11 mouse mammary epithelial cells, and the effect of PACAP on differentiation and release of cyto- and chemokines as well as growth factors was investigated. Differentiation was proven by appearance of milk protein β-casein and pAkt, pSTAT5, pp38MAPK expression. PACAP did not modulate the expression of β-casein and phosphorylation state of the examined pathways. Differentiation significantly decreased the secretion of IP-10, RANTES and EGFR-ligands, such as EGF and amphiregulin. The changes of these chemokines may reflect altered homing properties in different stages of mammary gland development, while the changes of EGFR-ligands the switch from proliferative to lactating stage. PACAP decreased the release of EGF and amphiregulin from non differentiated cells, which can be interesting in the view of extracellular signal related transactivation of EGFR, and this finding may even have potential value of oncological perspectives.

P-20

Different effects of two cyclic chalcone analogues on the redox status of Jurkat T cells

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It has been previously shown that the equitoxic doses of the two cyclic chalcone analogues *E*-2-(4'-methoxybenzylidene)- (**A**) and *E*-2-(4'-methylbenzylidene)-1-benzosuberone (**B**) with cytotoxic activity have different effect on cell cycle progress of the investigated Jurkat cells. It was also found that the compounds affect the cellular thiol status of the treated cells and show intrinsic (non-enzyme-catalyzed) reactivity towards GSH under cell-free conditions. In order to gain new insights into the cytotoxic mechanism of the compounds effects on the redox status and glutathione level of Jurkat cells was investigated. Detection of production of inracellular ROS in Jurkat cells exposed to **A** and **B** was performed using the dichlorofluorescein-assay. Compound **A** did not influence the ROS production after 1 and 4 h exposure, in contrast chalcone **B**showed to reduce the ROS level. The two compounds had different effects on cellular glutathione status. Compound **A** increased significantly the oxidated glutathione (GSSG) level showing an interference with antioxidant defense. On the contrary, chalcone **B** enhanced free glutathione level, indicating antioxidant activity. The different effect of the two compounds on the cellular redox status might contribute to the different tumor cytotoxicity. To investigate the chalcon-GSH conjugation reactions under cellular conditions in Jurkat cells, a combination of a RP-HPLC method with electrospray ionization mass spectrometry (ESI-MS) was performed. Chalcone-GSH adducts could not be observed either in the cell supernatant or the cell sediment, showing a different mechanism of action under cellular conditions. The investigations provide further details of dual – cytotoxic and cytoprotective (chemopreventive) – effects of the cyclic chalcone analogues.

P-21

Complex effects of alpha-MSH during the course of aging

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PTE ÁOK

In the course of aging we may observe well-defined changes in the regulation of energy homeostasis. The middle-aged population tend to gain weight and develop obesity, while old people show anorexia. Alpha-melanocyte-stimulating-hormone (alpha-MSH) is a neuropeptide with coordinated catabolic actions: it decreases food intake (FI) and increases metabolic rate (MR), leading to weight loss. Our previous results demonstrated that the anorexigenic effects of central alpha-MSH injections showed age-related shifts: strong effects in young, diminished efficacy in middle-aged and very pronounced responsiveness in old rats.

Our aim was to analyse the age-related changes in the complex effects of alpha-MSH on energy homeostasis.

Core temperature (Tc) and heart rate (HR, indicating MR) of male Wistar rats of different age-groups (2-months juvenile, 3-4 months young adult, 12-months middle-aged and 24-months aged) were registered during an intracerebroventricular (ICV) 7-day alpha-MSH infusion (0.1 µg/µl/h) in a biotelemetric system. BW and FI were measured daily. In similar rat groups thermoregulatory effects of an ICV alpha-MSH injection (5 µg) were analyzed. Core and tail skin temperatures (Ts, indicating heat loss) were registered by thermocouples. Oxygen consumption was recorded in metabolic chambers of an indirect calorimeter. Repeated-measures ANOVA was used for statistical analysis.

Infusion-induced decrease of FI and BW was weakest in the 12- and most pronounced in the 24-month-old rats. No change of Tc was seen in juvenile, modest daytime rise occurred in the young and old rats, both day- and nighttime values increased significantly in middle-aged animals. Tachycardia developed only in the 2 older groups. Alpha-MSH-induced hyperthermia was strongest in the young adult age-group. Juvenile animals showed weaker responses, middle-aged rats none at all. Alpha-MSH-induced hyperthermia became significant again in old rats.

Middle-aged rats appear to be insensitive to the anorexigenic but not the metabolic effects of alpha-MSH, their slight weight loss may be attributed to MR-rise. On the other hand, FI and BW are particularly sensitive to MC-s in

aged rats. Thermoregulatory responsiveness to an alpha-MSH injection show similar age-related pattern to that observed in connection with anorexigenic melanocortin effects. The effects of alpha-MSH on different parameters of energy balance do not change parallel to one another during aging.

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P-22

Subcellular mechanisms of AT_1-receptor mediated vasomotor responses change with aging

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Introduction: Previously we have shown that the Ang II-induced arterial contractions and AT_1R mRNA expressions exhibit a bell shape curve as a function of age. In the present study we hypothesized that subcellular signaling pathways activated by AT_1-receptor stimulation show similar pattern.

Methods: In rat carotid arteries signaling molecules, such as β-$arrestin_2$, CPI-17, Rock2, p-MYPT were measured and quantified by Western blot in newborn (8day (d)), young (2months (m), adult (16m) and aged (24m). The antibody-antigen complexes were visualized by means of enhanced chemiluminescence (dens%). After scanning, results were quantified by NIH Image J program.

Results: The expression level of β-arrestin-2 decreased from 8d to 24m (8d: 75±6; 24m: 10±4 dens %). The level of Rock2 increased from 8d to 2m, than decreased to the age of 24m (8d:17±3, 2m:47±5; 24m:14±3 dens%). The level of CPI-17 also decreased from 8d to 24m old rats (8d: 46±6, 2m: 43±5 16m: 16±4, 24m: 5±3, dens%), however the p-MYPT factor level increased from 8d to 2m, than decreased to the age of 24m (8d: 19±5, 2 m:75±7, 24m:3±2 dens%).

Discussion: These findings suggest that aging substantially affects the expression of β-arrestin$_2$, CPI-17, Rock2, p-MYPT in the arterial wall and that their interaction is likely responsible for the functional availability of AT_1-receptors thus the observed age dependent angiotensin-induced vasomotor responses. These findings can have important impact on our understanding on the regulation of vascular resistance by local and systemic renin angiotensin system.

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P-23

TIM-3/Galectin-9 interaction during pregnancy

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Problem: Considering allograft rejection as a basic feature of the immune system, the human pregnancy is an immunological paradox where the semi-allogeneic fetus is not rejected. Multiple mechanisms are involved in peripheral and local tolerance induction that prevents fetal rejection while maintaining competent immune surveillance and protection. The T-cell immunoglobulin domain and mucin domain (TIM) family is a relatively newly described group of molecules with a conserved structure and important immunological functions. A growing body of evidence supports the critical role of different TIM molecules as modulators of the immune response in transplant tolerance. TIM-3 is expressed in a variety of immune cells. Identification of Galectin-9 as a ligand for TIM-3 has established the Galectin-9/TIM-3 pathway as an important regulator of Th1 immunity and tolerance induction. The aim of our study was to investigate the possible role of Galectin-9/TIM-3 pathway in the immunoregulation during pregnancy.

Methods of study: 30 healthy pregnant women [first trimester (n=10); second trimester (n=10); third trimester (n=10)] and 15 non-pregnant controls were included in this study. We measured the surface expression of TIM-3 by cytotoxic T cells, NK cells and NK cell subsets and Galectin-9

expression by regulatory T cells by flow cytometry. We analyzed the cytokine production and cytotoxicity of TIM3+ and TIM3- CD8 T and NK cells of non-pregnant and healthy pregnant women at different stages of pregnancy by flow cytometry. Serum Galectin-9 levels were measured by ELISA.

Results: Compared to non pregnant individuals, regulatory T cells Galectin-9 expression show higher level as pregnancy proceeds, which is in line with the data obtained analyzing sera for soluble Galectin-9. The numbers of NK and cytotoxic T cells and their TIM-3 expression do not change between the first, second and third trimesters of pregnancy. Cytotoxic T cells, NK cells and NK cell subsets expressing TIM-3 molecule show altered cytokine production and cytotoxicity during pregnancy compared to non pregnant state.

Conclusion: Our results indicate that Galectin-9 expressing regulatory T cells, TIM-3+ cytotoxic T cells and NK cells could play an important role in the maintenance of healthy pregnancy.

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P-24

Wnt signalling in non-small cell lung cancer

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Lung cancer is unaltered considered as a leading cause of cancer related mortality worldwide, accounting for more than one million deaths per year. In spite of the several therapeutic approaches the five-year survival rate is still very disappointing. The majority of lung cancer types belong to non-small cell lung cancers. The two main subtype of non-small cell lung cancer representing adenocarcinoma and squamous cell carcinoma shows different therapeutic response. Given the disappointing survival rates associated with NSCLC and to develop more effective therapeutic methods the better

understanding of lung cancer molecular pathways is extremely important. Several literatures indicate that the Wnt signalling pathway has crucial determinative and controlling role in the lung carcinogenesis. During our experiments we investigated the expression of Wnt signalling molecules associated with lung carcinogenesis. TaqMan array analysis confirmed a differential molecular background of NSCLC subtypes involving up regulation of canonical Wnt molecules (Wnt7b) in adenocarcinomas and increased expression of non-canonical signalling molecules (Wnt5a, Wnt11) in squamous cell carcinomas. Our further experiments on immortalized human lung carcinoma cell lines indicate that the non-canonical wnt signalling molecules have important role in lung cancer development and also in modifications of tissue microenvironment. Our studies might provide opportunity to highlight molecular pathways involved in lung carcinogenesis which might help development of curative therapies in the future.

P-25

During physiological aging the contractile force of arteries increases

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Introduction: Regulation of peripheral vascular resistance is important to modulate systemic blood pressure. There are few studies however, addressing the age dependent changes in the ability of arterial smooth muscle to generate contractions.

Hypothesis: We hypothesized that aging increases the contractile ability of arteries. To test our hypothesis we have used isolated carotid arteries of rats and activated them with potassium chloride (KCl) known to elicit contraction of arteries without endothelial and/or receptor mediation, allowing us to assess the contractile capacity of smooth muscle.

Methods: Carotid arteries from newborn (8 days: 8d), young (2 months: 2m), adult (6 months: 6m, 12 months: 12m), aged (24 months: 24m) and senescent (30 months: 30m) rats were isolated and their isometric tensions were measured by a DMT Myograph. To assess the contractile ability of smooth muscle of vessels KCl (60mM) was used. Systemic blood pressure

of rats was measured in the carotid artery of anesthetized rat. Transversal paraffin sections were prepared with hematoxylin/eosin staining.

Results: We have found 3 phases in KCl-induced contractions as a function of age: phase 1) it increased from newborn until the age of 2 month (8d: 1.9±0.2mN, 2m: 4.7±0.4mN), phase 2) there was no change in the magnitude of contraction from 1 month until adult age of 12 months (6m: 5.0±0.1mN, 12m: 6.0±0.3mN) and phase 3) it increased from 12 months until 30 months (24m: 10±0.8mN, 30m: 11.8±0.5mN, respectively). Mean arterial blood pressure increased until 6 months of age, than it decreased slightly to 24 months of age. The thickness of smooth muscle layer increased with age (from 24.1 +- 0.76 µm to 56.4 +- 0.77 µm).

Conclusions: These data suggest that during physiological aging the total contractile ability and thickness of the smooth muscle layer of arteries increases, which could be due to the cumulative, rather than increased level of blood pressure.

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P-26

Examination of the protective effects of PACAP in rat diabetic nephropathy

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Introduction: Diabetic nephropathy is the leading cause of end-stage renal failure and accounts for 30-40% of patients entering renal transplant programmes. Pituitary adenylate cyclase activating polypeptide (PACAP) is

a neuropeptide consisting of 38 amino acids. Its nephroprotective effect was proved in numerous in vivo and in vitro studies. The aim of our study was to investigate the effect of PACAP in diabetic nephropathy.

Methods: Diabetes was induced by a single intravenous injection of streptozotocin (65mg/kg) in male Wistar rats. PACAP-treated animals were administered intraperitoneally 20μg PACAP every second day. Kidneys were removed after 8-weeks survival and a complex histological analysis was performed. Expression of inflammatory cytokines was determined by semiquantitative cytokine array and Luminex immunoassay. Levels of glutathione were measured using colorimetric analysis. Western blot was performed to evaluate the levels of pro- and antiapoptotic factors, NFKB, TGFβ and collagen IV.

Results: Histological analysis revealed severe diabetic nephropathy in kidneys of untreated diabetic animals (glomerular PAS-positive area expansion, tubular damage, Armanni-Ebstein phenomenon, vascular hyalinosis). PACAP-treatment significantly diminished the damage. Diabetic kidneys showed strong cytokine activation compared to their healthy controls. PACAP was effective in counteracting the changed cytokine expression pattern (e.g. L-selectin, TIMP-1, CINC-1), moreover, it elevated the decreased level of GSH in diabetes. PACAP increased the level of antiapoptotic factors, while decreased that of the proapoptotic ones. Diabetes led to increased expression of NFKB, TGFβ and collagen IV, which were attenuated by PACAP-treatment.

Conclusion: To conclude, PACAP is effective in ameliorating diabetic nephropathy. These results raise the opportunity for the use of PACAP as a possible therapeutic or preventive method in treating renal complications of diabetes.

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P-27

Examination of the role of endogenous PACAP in diabetic nephropathy

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Introduction: Hypophysis adenylate cyclase activating polypeptide (PACAP) is a neuropeptide exerting cell protecting effects by inhibiting several apoptotic and inflammatory processes. All its three receptors (PAC1, VPAC1/2) are expressed in the kidney. Previous studies proved, that the extent of damage - for example caused by ischemia/reperfusion – is significantly greater in PACAP knockout mice, than in their wild type mates. The aim of the present study was to investigate the role of endogenous PACAP in diabetic nephropathy.

Materials and methods: Mice were randomly divided into 4 groups: intact or diabetic $PACAP^{+/+}$ and intact or diabetic $PACAP^{-/-}$. Diabetes was induced by a single intraperitoneal injection of streptozotocin (200mg/kg). After 10 weeks survival, histological analysis was carried out on the kidneys. Alterations in the expression of cytokines and angiogenetic factors, which have a remarkable role in the pathogenesis of diabetic nephropathy, were examined by semiquantitive cytokine and angiogenesis array. Western blot analysis was performed to measure the level of the pro- and antiapoptotic factors.

Results: Histological analysis showed changes typical to diabetic nephropathy in kidneys of both PACAP knockout and wild type diabetic animals, however lesions were significantly more severe in PACAP knockout mice. Increased expression of several cytokines (RANTES, TIMP-1, MCP-1) was observed already in intact knockout kidneys, while others were decreased or remained stable. Diabetes induced the expression of almost all the cytokines, which was further increased in the PACAP knockout animals (IFNγ, TNFα, interleukins). Levels of angiogenetic factors were markedly elevated in diabetic $PACAP^{+/+}$ animals, while changes observed in diabetic PACAP knockout mice also proves a more progressed disease. Western blot analysis confirmed our previous results.

Conclusion: The present study revealed more advanced histological changes, increased expression of proinflammatory cytokines and enhanced apoptosis in PACAP$^{-/-}$ mice compared to the wild type animals. This raises the possible renoprotective role of PACAP in diabetic nephropathy.

PTE-MTA "Lendület" Program, Arimura Foundation, OTKA K104984, TÁMOP 4.2.2.A-11/1/KONV-2012-0024, TÁMOP 4.2.4.A/2-11-1-2012-0001 „Nemzeti Kiválóság Program", OTKA PD 109644, PTE ÁOK KA 34039 04/2013.

O-01

Gene expression levels of different drug transporters in human NSCLC cell lines

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Drug transporters are membrane proteins involved in all aspects of drug up-take and function. As such they are potential therapeutic targets. In recent years an enormous progress has been made in understanding the role of drug transporters in kidney, intestine, liver and brain. In contrast, little is known about the role of drug transporters in the lung. Even less is known about drug transporters in pulmonary diseases and their potential role in developing resistance to therapy.

Our first results have been gained with qPCR from 2D cell cultures of lung adenocarcinoma (A549 and H2122) and squamous cell lung carcinoma (H157 and H520) cell lines. A marked decrease of Organic Cation Transporter SLC22A3 gene expression in squamous cell carcionoma and of Organic Anion Transporter Polypeptide SLCO4C1 gene expression in adenocarcinoma have been detected. Further experiments are on their way to confirm the above data in primary tumour samples and investigate the functional role of the above transporters in lung epithelium.

O-02

Electronic device for preventing hearing-loss

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Background: The nowadays wide-spreading MP3 and MP4 players, powerful Class-D headphone amplifiers can cause hearing-loss due to the continuous high sound pressure level.

Challenge: To prevent hearing-loss, to create a simple electronic module which can raise the sensation of volume, without raising the sound pressure level (SPL), and without modifying the tone and sound character.

Brief description: The invention is related to the medical and health sciences.

It is a simple electronic module, which modeling the distortion of human ear, and produce natural sound experience with low sound pressure level (SPL). The device can raise the sensation of volume with low SPL and without changing the full range frequency response. The amplification method affects advantageously the SPL/Sound Perceptional ratio.

Selected Applications: The module can be used advantageously in hearing aids, because it can bring back the sensation of higher frequencies. The module can be used in every electronic device, where the sound amplification is desired (headphone amplifier, sound amplifier, PA-systems)

Development status: Development of prototype is finished. We are planning medical examination and tests in humans, to determine the best adjustments. We have to determine also the transfer function of human ear in non-linear basis.

IP Status: Patent pending.

Key words: hearing-loss, hearing-aid, ear distortion, non-linear transfer function, sensation of volume

O-03

Pro-apoptotic and pro-survival effects of sodium nitroprusside in PC12 cells expressing a dominant inhibitory RasH protein

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Toxic concentrations of the second messenger nitric oxide cause cellular stress leading to cell death. Ras proteins, possible targets of nitric oxide induced nitrosylation may act as mediators in nitrosative stress. To analyze the possible involvement of Ras proteins in nitric oxide cytotoxicity, a PC12

rat phaeochromocytoma cell line expressing a dominant negative Ras mutant protein was used in this study. Cytotoxic concentrations of the nitric oxide donor sodium nitroprusside activated several pro-apoptotic mechanisms (stimulation of the stress kinase pathways mediated by JNK and p38MAPK, inhibition of the translation initiation factor eIF2α, induction and phosphorylation of the p53 protein) and inhibited Akt-mediated anti-apoptotic signaling, independent of Ras function. Simultaneously, Ras-dependent stimulation of the pro-survival ERK pathway was also observed, followed by an increased activation of the caspase-9/caspase-3 cascade in cells with impaired Ras function. It is thus concluded that nitric oxide stimulation of multiple signaling pathways contributes to the cell death program, while concomitant activation of the Ras/ERK pathway provides a certain degree of protection.

Support: INTAS (51022), GVOP-362.1-2004-04-0172/3.0 and SROP-4.2.2/B-10/1-2010-0029.

Key words: nitric oxide, sodium nitroprusside, PC12 cells, Ras, apoptosis

O-04

Role of hemokinin-1 in murine adjuvant-induced joint and lung inflammation

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Hemokinin-1 is encoded by preprotachykinin C (Tac4) gene predominantly in immune cells and acts mainly at neurokinin 1 (NK1)

receptors. We analysed its role in chronic arthritis and pulmonary inflammation using gene-deleted ($Tac4^{-/-}$, $NK1^{-/-}$) mice.

Complete Freund's adjuvant (CFA) was injected intraplantarly and into the tail root. Paw volume was measured with plethysmometry and touch sensitivity with aesthesiometry throughout a 21-day-period. Semiquantitative histopathological scoring of the tibiotarsal joints and the lungs was performed on the basis of characteristic inflammatory changes. Interleukin 1-beta (IL-1β) in the joint homogenate was determined with ELISA, NK1 receptor expression in the lung with RT-PCR.

Inflammatory mechanical hyperalgesia was significantly smaller from day 11 in $Tac4^{-/-}$ and $NK1^{-/-}$ animals compared to C57BL/6 wildtypes, but oedema was not altered. IL-1β concentration and inflammatory histological changes in the joint and lung were reduced only in the $Tac4^{-/-}$ group. Pulmonary NK1 receptor expression was downregulated in CFA-treated wildtypes, and more severe inflammation developed in $NK1^{-/-}$ animals.

Hemokinin-1 increases hyperalgesia in the later phase of chronic arthritis through NK1 receptors and plays a predominant role in histopathological alterations and cytokine production via a presently not identified target. NK1 receptor plays a protective role in the immune-mediated airway inflammation.

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Key words: hemokinin-1, neurokinin 1 receptor, joint and lung inflammation

O-05

Oxidative stress in Sprague-Dawley healthy rats that underwent hyperbaric oxygenation

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Oxidative stress is caused by an imbalance between the production of reactive oxygen species and a biological system's ability to readily detoxify the reactive intermediates or easily repair the resulting damage.

The aim of this study was to investigate whether intermittent hyperbaric oxygenation (HBO) causes an increase of oxidative stress in male and female rats and whether there are differences in the amount of stress between the sexes.

Healthy male (N=6) and female (N=6) Sprague-Dawley rats 10 weeks old were housed doubly in shoebox style cages with free access to standard rat chow and tap water, maintained on a 12:12 hour light: dark cycle. The animals were divided into control group and HBO group. Rats from the HBO group were treated in a hyperbaric chamber with 100% O2 for two hours a day during four consecutive days.[1] On the fifth day, arterial blood samples were collected to determine Ferric reducing ability of plasma (FRAP) and Thiobarbituric Acid Reactive Substances (TBARS; based on reaction of malonilaldehyde (MDA) with thiobarbituric acid). Student t-test was used for statistical analysis.

Male control rats have significantly higher FRAP than female controls (FRAP mM ♀ 0.05±0.03, ♂ 0.16±0.02, $P<0.001$), while there was no difference in TBARS between sexes in the control group (TBARS μM ♀ 0.56±0.37, ♂ 0.27±0.08, $P=0.132$). Four days of HBO therapy did not cause any significant changes in FRAP or TBARS in male rats compared to male controls, whereas TBARS were significantly higher after HBO therapy in female rats compared to female controls with no changes in FRAP.

The results of this study may indicate that male rats have higher level of oxidative stress in control conditions, while four days of HBO therapy caused increase of oxidative stress only in female rats. Further studies are needed to conclusively interpret differences in maintaining oxidative balance between sexes in control conditions and during exposure to HBO therapy.

Support: This study was partially supported by grant of Ministry of Science, Education and Sports, Croatia, #219-2160133-2034 and USPHS NIH GM31278 (to JRF).

Key words: oxidative stress, HBO therapy, FRAP, TBARS

O-06

„Fatness or Fittness": Health-Image and Health Strategy in Elementary Schools

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The main focus of our research is to observe the functions of the ongoing health strategy in elementary education. I analyzed the data collected from the institute, interpreted the results, and examined some possibilities of operative planning that lead to strategy aims, that are the experience based short-term aims. Finally I interested to have a good health education program can be successfully transferred to other institutions.

We suppose that already in elementary school it is important to being health related education in order to have it as a skill at adult age. We believe that efforts of an enthusiastic group of teachers, through health related education, can lead to successful design and realization strategy. We further hypothesize that with regular data collection we could be able to predict if we are heading to the right direction and see what needs to be modified.

1. With a follow up study it was the aim to obtain a wide picture of nutrition and the physical activity related habits of the students. 2. To explore the changes of the healthy lifestyle of students. 3. To prove that it is worth inventing health related education strategy even basic level. 4. To show that all strategy works everywhere only if participants are interested int he realization of the program. 5. To provide recommendations for future steps.

Subjects: Nine hundred and forty-five elementary school students, age 11-14 years from five elementary school participated in the study. From the topics of health related education strategy only physical activity and life style related points were analyzed.

Subjects voluntarily filled out questionnaire that contained both multiple choice questions and questions requiring written answer. The questionnaire was prepared based on mine 2009 questionnaire with special respect to nutrition and physical activity. The questions were related to the aspects of health and physical activity, and the internal and external environment of the students and the geographical area. We also investigated the nutrition habits and their individual opinions about: what kind of food they think to be

healthy; what are their nutrition habits; and weather they require more sport activities in school. We also measured their BMI.

In conclusion it can be stated that we achieved positive results regarding nutrition and physical activity habits. We found that student have sufficient knowledge about the importance of health and physical activity. The sport activity itself is judged positively. For some reasons, however, they practically do not realize them. Health education, beside the contribution of the family, schools could develop and refine health conscious behaviour with higher chance in early elementary school age. Similar numbers of items of domestic and international measurements of BMI compared with regard to much better results have been achieved. To reach the aims of health related education it is important to develop health consciousness. This requires a beneficial relationship between the educators and the children as well as a good example of healthy lifestyle from the teachers themselves.

O-07

Hydrogen-sulphide (H_2S)-induced CGRP-release and cutaneous vasodilatation are mediated by Transient Receptor Potential Ankyrin 1 (TRPA1) receptors

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Capsaicin-sensitive sensory neurons express Transient Receptor Potential Ankyrin 1 (TRPA1) and Vanilloid 1 (TRPV1) receptors. TRPA1 is activated by allylisothiocyanate (AITC), causing the release of vasoactive neuropeptides like calcitonin-gene-related-peptide (CGRP). H_2S is suggested to act on capsaicin-sensitive sensory neurons. We investigated the involvement of TRPA1 receptors in H2S-evoked CGRP-release from sensory nerves in vitro and microcirculatory changes in vivo.

Sensory nerve terminals of the isolated rat tracheae were stimulated by AITC or the H_2S-donor NaHS, CGRP-release was measured by radioimmunoassay. The TRPA1 antagonist HC-030031 or TRPV1 antagonist BCTC were tested on this response. AITC- or NaHS-evoked

vasodilatation in the mouse ear was measured by laser Doppler imaging in TRPA1 ($TRPA1^{-/-}$) and TRPV1 gene-deleted ($TRPV1^{-/-}$) mice compared to their wildtypes. Pharmacological inhibition was performed with HC-030031.

NaHS evoked a concentration-dependent CGRP-release, which was inhibited by HC-030031, but not by BCTC. NaHS also increased cutaneous circulation, which was ameliorated by HC-030031. Blood flow of $TRPA1^{-/-}$, but not the $TRPV1^{-/-}$ mice showed significantly smaller increase in response to NaHS compared to the wildtypes.

It is concluded that H_2S induces CGRP-release from sensory nerves and induces cutaneous vasodilation via TRPA1 receptor activation. In contrast, TRPV1 receptors are not involved in these processes.

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Key words: TRPA1 receptor, hydrogen-sulphide, CGRP

O-08

Immobility stress – How has the health-related fitness status changed in the Hungarian young adults in the last decades?

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Extrapolating the negative trend observed in the performance of college/university students in the recent years, serious social problems can be expected in terms of health status in adult Hungarian population.

The aim of this study was to test the physical fitness of undergraduate students, and to compare the results to the data of representative nation-wide research (N=8345) carried out by MEFS in 1995 focusing on the changes in the last fifteen years.

A total of 432 student volunteers (mean age: 21.19±2.19 years) have performed 9 tests of Eurofit Fitness Test Battery. Based on the anthropometric results mean height and weight are greater by men and women as well (181.2±6.41cm, 78.27±16.02 kg and 168.1±6.86 cm, 61.58±10.43 kg, respectively) as a consequence of the secular trend, while

the body fat percentages are less in both sexes (16.16±6.51% and 25.31±5.77%).

The better performance in the Eurofit tests (handgrip strength: R^2=0.829 p<0.001; functional arm strength: R^2=0.511 p<0.001) might be explained with the increased bone and muscle mass and the reduced body fat percentages. However the results in all other motor tests worsened despite significant positive correlation (p<0.001) between the better performance and the observed anthropometric changes in the consecutive generations.

Key words: physical fitness, university students, Eurofit

O-09

Polarity and single cell anatomy of peptidergic CCAP neurons in the *Drosophila melanogaster* larva

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For understanding neural organisation the basic idea presently is that the brain's wiring is somewhat similar to the wiring in an electronic device, i.e. information exchange takes place at the site of physical contacts, and the specificity of these contacts defines the network. Underlying these studies revealing synaptic connectivity in the nervous tissue is a major goal right in neuroscience. Peptidergic circuits represent a limited number of neurochemically similar but functionally different cells, therefore in the precise control all the single neurons have its own importance. As to these putative “synchronizer” neurons, a clear polarity is implicitly assumed, it is easy to predict the direction of information flow once pre- and postsynaptic compartments are identified. To analyse distribution of these compartments, genetically expressed various dendritic and vesicle markers were mapped on a selected peptidergic neuron population using CLSM. Though this approach is suitable for studying small groups of neurons, in our case overlapping structures involved in a circuit made it impossible to identify the polarity of individual cells. Applying a novel genetic tool(flip-out) we could

control the expression of the reporter protein in the investigated neurons. Thus, we could refine morphological identification for further physiological studies.

O-10

MAdCAM-1 independent lymphocyte homing to GALT of Nkx2.3-/- mice

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Nkx2.3 transcription factor is involved in the regulation of mucosal addressin cell adhesion molecule-1 (MAdCAM-1) expression, which plays a pivotal role in lymphocyte homing to gut-associated lymphoid tissues (GALT). Also, Nkx2.3 sequence variants have been identified as susceptibility trait for inflammatory bowel diseases. Although Nkx2.3-/- mice have no endothelial MAdCAM-1, Peyer's patches (PP) and mesenteric lymph nodes (mLN) still develop. We investigated the molecular components of homing to the GALT in Nkx2.3-/- mice.

The phenotype of PP HEVs in Nkx2.3-/- and wild-type mice were studied by immunofluorescence. The kinetics of homing to GALT was tested by adoptive cell transfer. The expression of mRNA for addressin proteins and the posttranslational glycosylation enzymes was determined by qPCR. The involvement of MAdCAM-1 or PNAd in the GALT homing was studied in vivo using antibody-mediated blockade.

PPs and mLNs of mutant mice showed an enhanced staining for luminal PNAd, and also increased production of mRNA for several PNAd backbone proteins and modifying enzymes. Adoptively transferred lymphocytes could effectively home to PNAd+ GALT HEVs, which process could be blocked by MECA-79 anti-PNAd mAb injection. Although the gut and GALT in Nkx2-3 deficient mice at neonatal age contain MAdCAM-1-positive vessels, in the gut mucosa with organized lymphoid tissues HEVs gradually replace MAdCAM-1 with PNAd.

These data indicate that in the absence of endothelial MAdCAM-1 in Nkx2.3-/- mice PNAd controls homing to GALT, thus HEV function is maintained, although with different adhesion molecule expression patterns.

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4.2.1.B-10/2/KONV-2010-0002, Developing the South-Transdanubian Regional University Competitiveness

Key words: Nkx2.3, MAdCAM-1, HEV

O-11

Fabrication of a new, solid contact Mg^{2+} ion-selective electrode, and its application in Scanning Electrochemical Microscopic corrosion studies

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A new type of magnesium ion-selective microelectrode and its application as potentiometric tip in Scanning Electrochemical Microscopy (SECM) will be reported. Instead of the conventional liquid internal contact, the new electrode uses a solid contact. A stable contact potential was achieved by covering a d=33 μm carbon fibre with PEDOT conducting polymer. Because of this, the resistance is considerably lower than that of a conventional electrode. Owing to the low resistance, micro-spatial distribution of Mg^{2+} ions from a corroding metal source in aqueous environments can be monitored at adequate scanning speeds. Using the new electrode as SECM tip, galvanic corrosion of a Mg/Fe galvanic pair was studied. As it is well known, in such a galvanic pair, magnesium acts as a sacrificial anode, preventing iron from undergoing oxidation, while being dissolved in the electrolyte. Magnesium ion concentration distribution in two dimensions was recorded over the corroding magnesium anode. Resistance, response time, sensitivity, and the overall quality of the images recorded with the two types of electrodes were compared. The solid contact electrode outperforms the liquid contact electrode in every aspect, making it a better tool for corrosion studies.

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O-12

Wnt signalling in non-small cell lung cancer

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Lung cancer is the leading cancer type and the most frequent cause of cancer-related mortality worldwide. Statistics show that Hungary is considered the world leader in lung cancer related mortality. Unfortunately, current therapy is still inadequate, and the 5-year survival rate for lung cancer remains poor. In order to develop more effective therapies, it is important to obtain a better understanding of molecular biology of lung cancer. The role of Wnt signalling in cancer was first suggested 20 years ago with the discovery of Wnt-1 as an integration site for mouse mammary tumour virus (MMTV) in mouse mammary carcinoma. Wnt signalling plays a crucial role in developmental processes of the lung and also in lung tumorigenesis. Focusing on the role of Wnt signalling in lung cancer development the aim of this study was to determine the expression level changes of non-canonical Wnts in lung carcinomas and morphologically normal lung tissue samples.

O-13

Receptive field properties of colour selective neurones in the cat lateral geniculate nucleus

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Colour vision in non-primate mammals is based on two types of cone photoreceptors: the medium-long wavelength sensitive "green"- and short wavelength sensitive "blue" cones. Accordingly, several non-primate

mammals show dichromatic colour vision. However, the neural pathway carrying "blue-yellow" chromatic opponent responses has been unknown in these animals. In search of such a pathway, we characterised a population of colour opponent blue-ON cells in neuronal recordings from the dorsal lateral geniculate nucleus (LGN) of anaesthetised cats (n=7). We found several points of similarity to previous descriptions of primate blue-ON cells. In particular, they showed co-extensive "blue"- and "green"-cone driven receptive field centres often with additional surround inhibition from both cone types. Compared to non-colour opponent cells, blue-ON receptive fields were about 2.7 times larger and preferred lower temporal frequencies. Finally, cat blue-ON cells were found in layers of the LGN thought to be homologous to the primate koniocellular system. Our results imply that these cells are part of a "blue-yellow" colour opponent channel that is the evolutionary homologue of the blue-ON division of the koniocellular pathway in primates.

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O-14

The functional test of Wnt proteins

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The Wnt molecules regulate many signaling pathways including proliferation, tumour suppression, tumour promotion and ageing. Although they are highly investigated, their specific function is still elusive. In previous experiments the physiological, and dexamethasone (steroid) induced thymus ageing were examined in vivo, and in vitro using TEP1 cells. In our studies it was demonstrated that Wnt4 mRNA expression is downregulated during both physiological and steroid induced ageing. Simultaneously, the pre-adipocyte differentiation marker such as PPARg is upregulated. Wnt4, in our experiments was however, able to reduce PPARg upregulation.

To test the specific function of Wnt4, an experimental test system was

set up in collaboration with Professor Karl Willert in UCSD. As there is still no Wnt specific test system available to distinguish the effects of various Wnt molecules, our quantitative real time PCR and luciferase based assay system has a great commercial potential and aids clarification of the ageing process.

O-15

Effect of the molecular environment on the complex formation of a crown ether derivative with alkali metal ions

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Crown ethers are a kind of host molecules which are capable of binding metal cations selectively. To get deeper insights about the complexation mechanism at molecular level, in our recent work complex formation of 'flexible' dimethyl-pyridino-18-crown-6 (M_2P18C6) or 'rigid' dimethyl-diketo-pyridino-18-crown-6 (M_2K_2P18C6) host molecules with potassium ions in methanol were investigated by UV spectroscopy. Results show the formation of stable complexes of the flexible or rigid crown ether derivatives with potassium ion. However, negative entropy change has been detected when M_2P18C6 forms complexes with potassium ions while entropy increasing was obtained when M_2K_2P18C6 associates with potassium ions. The results suggest that enthalpy value hardly changes, while the entropy increases with decreasing the permittivity of the solvents. This may be attributed to the change of organized structure of alcohol molecules around the crown ether-cation complexes. Results are applicable in the development and design sensitive and selective chemical sensors.

O-16

Vitamin D status in Hungary – novel evidence for supplementation

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The prevalence of vitamin D deficiency has recently been recognized in different parts of the world, even affecting healthy populations. Vitamin D is necessary for maintaining appropriate calcium and phosphate homeostasis in the body and for ensuring appropriate functioning of many tissues, organs and cells. Therefore in adults, deficiency of vitamin D can lead not only to osteomalacia, but is also associated with higher risk of cardiovascular diseases, diabetes or cancer.

Possible causes of vitamin D deficiency in a healthy population include decreased cutaneous synthesis and an inadequate intake of vitamin D.

The aim of this presentation is to review the available literature in connection with nutritional supply (6 studies, 8428 participants) and status (4 studies, 6659 participants) of vitamin D in Hungarian subjects of different age groups and to evaluate the epidemiology of vitamin D deficiency in Hungary.

We would like to point out, that vitamin D supplementation is not only important in infancy, it is essential also in later life, especially in the period from late autumn to early spring, when skin synthesis is considered as not effective. The goal of supplementation should be to reach and maintain the recommended ranges (30-80ng/ml) of total 25(OH)D concentration.

O-17

Do we have evidence that the prevalence of childhood overweight and obesity is plateauing?

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During the last decades a rapid growth of the prevalence of obesity has been experienced worldwide. Numerous large-scaled international intervention studies aimed to reduce the prevalence of childhood obesity.

Hungary has also participated in several such epidemiological studies.

The aims of the present review are the folowing: 1.) to give an overwiev of the trend of obesity during the recent years, 2.) to examine what are the possible causes of this trend.

We reviewed electronical online database (Pubmed) with the search term prevalence/trend/epidemiology of childhood obesity.

We found relevant data of eight countries. In 4 countries there is a continuing increase in the prevalence, but in 4 countries a decrease or plateauing was observed. Explaining this new and unexpected phenomenon, presently there are 3 main hypotheses: beside the saturation equilibrium-, and self selection hypothesis the third one considers it as a result of intervention success.

In favour of maintaining and reinforcing this favourable tendency in the prevalence of obesity there is an urgent need to clarify underlying factors, in order to reduce the consequent non-communicable diseases either in childhood or in adulthood.

Keywords: prevalence, overweight, obesity, intervention studies

O-18

Influence of hyperbaric oxygen treatment on vascular gene expression in healthy Sprague-Dawley rats

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Hyperbaric oxygen treatment (HBOT) involves exposure to 100% oxygen under high pressure (higher than 1 bar). It is well established treatment in many conditions including wound healing, burnings, multiply sclerosis, gangrene, sepsis and others. The mechanism of hyperbaric oxygen therapy is yet unknown. The aim of this pilot study was to determine the influence of HBOT on expression of several genes important in vasomotor function in aorta and cerebral blood vessels of 14 weeks old healthy male Sprague Dawley rats. Rats were not treated (control) or treated with 100% oxygen pressurized to 2 bars, for two hours consecutively for 4 days. On 5th day rats were sacrificed. The relative

expression of mRNA was determined by real time PCR. Results showed significant upregulation of CYP4A1 gene in aortas, and CYP4A3 gene in cerebral blood vessels in treated group, compared to controls. Also, the tendency of increased expression in iNOS, eNOS, COX and CYP450-epoxygenase and other CYP450 hydroxylase genes in aortas and cerebral blood vessels were noticed. The tendency of decreased expression in aortal PGI2 and cerebral blood vessel TA2 mRNA was present. These results suggest that HBOT led to upregulation of genes that are important in production of vasodilators and vasoconstrictors.

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Key words: hyperbaric oxygen treatment, gene expression, vasomotor function

O-19

Transient Receptor Potential Vanilloid 1 (TRPV1), but not Ankyrin 1 (TRPA1) ion channels mediate mustard oil-induced hyperalgesia in mice

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TRPV1 and TRPA1 are calcium-permeable non-selective cation channels predominantly expressed on primary sensory neurones. Besides capsaicin and mustard oil (allylisothiocyanate, AITC), TRPV1 is stimulated by noxius heat, while TRPA1 by cold. We investigated thermo- and mechanosensation, as well as AITC-induced hyperalgesia using gene-deficient mice.

Acute inflammatory response was induced by immersing the paw or the

tail into AITC. The plantar heat threshold was determined with the increasing-temperature hot plate and of the tail with increasing-temperature water bath. The plantar mechanonociceptive threshold was determined with aestesiometry.

There was no difference between the plantar thermo and mechanonociceptive thresholds. In contrast, on the tail significantly higher thermonociceptive threshold was detected in TRPV1$^{-/-}$, but not in TRPA1$^{-/-}$ mice. AITC-evoked thermal hyperalgesia was significantly diminished in TRPV1$^{-/-}$, but not in TRPA1$^{-/-}$ mice. Tail withdrawal latency to acute AITC stimulation was significantly longer in both gene-deleted strains.

It is important to investigate TRPV1 function in thermosensation on different body regions, since it regulates heat sensation in tail, but not in the paw. AITC was shown to be a potent TRPA1 agonist, but we showed its involvement only in nocifensive behaviour. However, TRPV1 is essential in both its nociceptive and hyperalgesia-inducing actions.

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Key words: TRPV1 and TRPA1 receptor, noxious heat threshold, thermal and mechanical hyperalgesia, mustard oil, AITC

O-20

Aging-induced structural changes in arteries. Role of collagen and laminin isoforms

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Aging greatly affects the structure of the blood vessels in order to adapt to - among other things - the changes in the hemodynamic environment. Thus, we investigated rat carotid arteries from young and old rats regarding the changes in their structural components.

That aging induces substantial changes in the morphology and components of the arterial wall.

Carotid arteries were isolated from young (1 month: 1m), adult (12 months: 12m) and senescent (29 months: 29m) rats. Cryosections were taken from different age groups and immunofluorescence staining for cellular and extracellular matrix components of the vessel wall was employed to determine the structural characteristics of vessels. Measurements were divided in two groups: biomechanical and morphological measurements. All measurements and analyses were performed using the Volocity image analysis program.

Changes in the biomechanical characteristics of carotid arteries from young to old: wall thickness (1m: 33±1.63µm,12m: 46±1.89, 29m: 66.72±3.19µm, $p>0.05$), number of nuclei per section (1m: 128.18±9.89, 12m: 193±8.30, 29m: 268±19.85, $p>0.05$), artery volume surface (1m: $209.33\pm3.47\times10^{4}\mu m^{2}$, 12m: $296\pm4.35\times10^{4}\mu m^{2}$, 29m: $317.204\pm8.76\times10^{4}\mu m^{2}$,$p>0.05$), artery wall surface (1m: $79.154\pm3.94\times10^{4}\mu m^{2}$, 12m: $144.65\pm7.65\times10^{4}\mu m^{2}$, 29m: $201.88\pm7.26\times10^{4}\mu m^{2}$, $p>0.05$) increased significantly with age. Changes in the intensity of extracellular matrix components of carotid arteries from young to old: smooth muscle actin (1m: $2.79E^{+07}\pm4.94E^{+06}$, 12m: $4.52E^{+07}\pm9.95E^{+05}$, 29m: $6.96E^{+07}\pm9.48E^{+0}$), elastin (1m: $1.45E^{+07}\pm9.22E^{+05}$, 12m: $.35E^{+07}\pm9.95E^{+05}$, 29m: $2.80E^{+07}\pm1.01E^{+06}$), Meca32 (1m: $1.85E^{+07}$, 12m: $2.53E^{+07}$, 29m: $3.09E^{+07}$), Nuclei (1m: $1.50E^{+07}\pm1.12E^{+06}$, 12m:

1.40E^{+07}±9.54E^{+05}, 29m: 1.32E^{+07}±8.24E^{+05}), Laminin Pan (1m: 1.53E^{+07}, 12m: 2.35E^{+07}, 29m: 2.92E^{+07}), Laminin g1 (1m: 2.33E^{+07}, 12m: 8.41E^{+07}, 29m: 1.19E^{+08}), Laminin a2 (1m: 1.90E^{+07}±1.41E^{+06}, 12m: 2.75E^{+07}±1.23E^{+05}, 29m: 2.79E^{+07}±7.99E^{+04}), Laminin a5 (1m: 1.50E^{+07}±2.23E^{+06}, 12m: 6.02E^{+07}±8.46E^{+06}, 29m: 6.88E^{+07}±9.74E^{+06}), Laminin b2 (1m: 2.01E^{+07}, 12m: 3.15E^{+07}, 29m: 3.56E^{+07}), Colagen I (1m: 3.30E^{+07}, 12m: 4.01E^{+07}, 29m: 8.71E^{+07}), collagen III (1m: 3.01E^{+07}±2.43E^{+06}, 12m: 8.12E^{+07}±2.57E^{+06}, 29m: 9.78E^{+07}±2.66E^{+06}), Colagen IV (1m: 1.52E^{+07}±9.45E^{+05}, 12m: 2.58E^{+07}±1.56E^{+06}, 29m: 4.38E^{+07}±1.57E^{+06}), Fibronectin (1m: 1.95E^{+07}, 12m: 4.01E^{+07}, 29m: 4.64E^{+07}), Integrin b1 (1m: 1.55E^{+07}, 12m: 1.86E^{+07}, 29m: 2.54E^{+07}), Integrin b3 (1m: 2.38E^{+07}, 12m: 4.32E^{+07}, 29m: 5.64E^{+07}), Integrin a7 (1m: 2.16E^{+07}, 12m: 2.25E^{+07}, 29m: 2.80E^{+07}), increased significantly with age. The most substantial change was found in collagen III, Laminin g1 and SMC.

The data suggest that aging results in substantial structural changes in the vascular wall. Vessels size increases with age and is associated with increases in extracellular matrix components, especially the fibrillar collagen content (collagen type III), which is several times higher than that of the laminins which increase evenly with age.

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P-01

Cocaine- and amphetamine-regulated transcript (CART) peptide immunoreactivity in feeding- and reward-related brain areas of CCK-1 receptor-deficient rats

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Cocaine- and amphetamine regulated transcript (CART) peptide is expressed in brain areas involved in the control of appetite, drug reward and homeostatic regulation and it has an overall anorexigenic effect. Recently, we have shown that CART peptide immunoreactivity was significantly reduced in the rostral part of the nucleus accumbens and in the rostro-medial nucleus of the solitary tract in adult CCK-1 receptor deficient obese diabetic Otsuka Long Evans Tokushima Fatty (OLETF) rats compared to Long Evans Tokushima Otsuka (LETO) lean controls. It has remained to be unclear, however, whether altered CART expression is caused by the primary deficiency in CCK-1 signaling or is related to the obese and diabetic phenotype of the OLETF strain which develops at a later age. Therefore, in the present study, CART-immunoreaction in feeding-related areas of the brain was compared in age-matched (6-7 weeks old) non-obese, non-diabetic OLETF rats and in LETO controls. Intensity of CART immunoreaction was unchanged in the areas related to control of food-intake and reward in the young OLETFs compared to young LETO rats. Our findings suggest that factors secondary to obesity and/or diabetes rather than impaired CCK-1 receptor signaling may contribute to altered CART expression in the OLETF strain.

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the PTE-ETK Scientific Committee to S.A.

Key words: central food intake regulation, cholecystokinin receptor, obesity, type-2 diabetes, reward system

P-02

Pituitary adenylate cyclase activating polypeptide (PACAP) decreases locomotor behavior in female rats

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PACAP is a multifunctional and pleiotropic neuropeptide. Recent studies point to PACAP as an emerging therapeutic agent in various neuropathological conditions, therefore, it is very important to test how PACAP treatment affects general behavior. A few studies have shown that central administration of PACAP alters locomotor behavior. No data are available on the general behavioral effects of systemic PACAP treatment. Furthermore, most studies are performed in male animals. However, there are a few studies showing that certain effects of PACAP are gender-dependent, as we have previously shown in a rat model of Parkinson's disease, where PACAP treatment could significantly decrease behavioral deficits in male animals, but not in females. Therefore, the objective of the present study was to investigate whether PACAP affects the open-field behavior of male and female rats 1 and 10 days after the treatment. Animals were injected a single dose of 100 ug PACAP38 intravenously. Open-field testing was performed 1 day before, 1 and 10 days after the treatment. Five minutes were recorded in the open-field and behavioral parameters were evaluated. We found that systemic PACAP injection did not cause any significant alteration in locomotor behavior of males at either time-point. However, the same PACAP treatment led to a significant decrease in activity in females. Furthermore, the time spent in the center was also decreased in females, indicating increased anxiety. Interestingly,

the same altered behavior was observed even 10 days after the treatment. In summary, our results show that a single systemic PACAP administration leads to behavioral changes only in female rats. This study also points to the importance of testing the physiological effects of PACAP in both genders, since the effects might be significantly different.

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Key words: PACAP, locomotor activity, gender difference, rat

P-03

Actions of PAC1, VPAC1/VPAC2 receptors on cell bodies and peripheral terminals of primary sensory neurons

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Pituitary adenylate cyclase activating polypeptide (PACAP1-38) acts on G protein-coupled receptors: specific PAC1 receptor and VPAC1/VPAC2 receptors. We used selective agonists (maxadilan for PAC1, $Ala^{11,22,28}$VIP for VPAC1 and BAY 55-9837 for VPAC2 receptor), and PACAP6-38 as PAC1/VPAC2 and MAXA65 as PAC1 receptor antagonist. Our aim was analysing the actions of different forms of PACAP peptides and agonists/antagonists on sensory neural responses *in vitro*. $[Ca^{2+}]$i, as the specific response in cultured rat trigeminal neurons was measured by microfluorimetry, while radioimmunoassay was used to determine the release of calcitonin gene-related peptide (CGRP) from stimulated peripheral sensory nerve terminals of the isolated rat trachea.

Slowly increasing $[Ca^{2+}]_i$ indicating Gq protein-coupled receptor activation was detected both after PACAP1-38 and PACAP6-38 administration. Maxadilan, MAXA65 and their combination (100 nM, 1μM), as well as BAY 55-9837 addition also had the same effects. Maxadilan,

MAXA65 and BAY55-9837 significantly increased its electrical field-stimulation-induced outflow. Ala[11,22,28]VIP had no effect on [Ca2+]i and CGRP-outflow.

Our conclusion is that both PAC1 and VPAC2 receptor agonism stimulates cell bodies and stimulation-evoked response of the terminals of primary sensory neurons, while VPAC1 has no effect in these processes. Interestingly, peptide fragments acting as antagonists in other models, behave as agonists in these systems.

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P-04

Examination of PACAP38 in different milk and infant formula samples and PAC1-receptors in mammary gland

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We have provided evidence that pituitary adenylate cyclase activating polypeptide (PACAP) is present in the milk in concentrations much higher than in the respective plasma samples. We showed PACAP38-like immunoreactivity (LI) in sheep mammary gland samples with radioimmunoassay (RIA) and detected PAC1-receptor expression in the lactating udder biopsies by immunohistochemistry. The aim the study was to investigate the changes in PACAP38 levels in human milk during

lactation with RIA. In the second part of the study we examined the presence of PACAP38 in cow milk and cow milk-based commercial infant formulas. Finally, we compared the presence of PAC1-receptors in lactating and non-lactating udder biopsies of sheep and normal human mammary gland samples with immunohistochemistry. PACAP38-LI did not show significant changes within the examined 10-month-period of lactation after delivery, but a significant increase was observed after that period compared to the levels of the first 6 months. The cow milk and the cow milk-based infant formula showed similar PACAP38-LI. The non-lactating udder biopsies and the human breast samples showed the same PAC1-receptor expression, but it was significantly increased in lactating samples. The increased presence of PAC1-receptors in lactating mammary gland samples also indicates the important roles of PACAP in the lactation.

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Key words: PACAP, milk, mammary gland, RIA, immunohistochemistry

P-05

Quantitative magnetic resonance imaging of intervertebral disc damage by laser irradiation

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Nearly 70% of the population over age 40 is affected by some lumbar pain or a discus hernia. Percutaneous techniques continue to grow for the various treatment options addressing spinal ailments.. Our aim is

thedetection of the impact of percutaneous laser disc decompression by quantitative methods.

We delivered a laser light energy using 980 nm and 1470 nm beam at the same amount into four freshly butchered, ex-vivo bovine lumbar spine discs (six discs each) for partial vaporization of the nucleus pulposus. Thismodeling of decompression was done with all specimens at room temperature. Quantitative magnetic resonance imaging was performed before and after the laser procedure (T1 weighted, T2 weighted, and ADC-map). Following the imaging studies, histopathological work was conducted to demonstrate morphological tissue changes in the harvested vertebral discs.

There were no significant changes on T1, T2, ADC-map with 1470 nm laser when we considered the surrounding tissue around the laser tip, but the ADC changes were significant when the whole nucleus pulposus was examined. T1 decrease and T2 increase occured at the vaporization zone. The histopathological examination demonstrated carbonization and steam bubble formation in the background of T1 and T2 changes. No significant ADC changes were observed with 980 nm laser test.

We showed the laser impact foremost by quantitative methods in nucleus pulposus. Our results and the method after further evaluations, may be applied to human procedures, which may help to control the PLDD (Percutaneous Laser Disc Decompression).

Key words: diode laser, intervertebral disc ablation, MRI, percutaneous laser disc decompression (PLDD)

P-06

Differences in physical and psychological performances among male handball players by positions

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Handball players must have excellent motor abilities, tactical and technical knowledge and psychological parameters to serve efficiently in the field.

Aim of the study was to create a test battery to find possible differences

among player positions.

Two elite handball teams participated in this study. We measured the anthropometric characteristics, aerobic capacity (20m shuttle run), running speed (30m dash), throwing strength (medicine ball) and lower limb strength with serial vertical jump test (n=22). Distributive attention, choice reaction time and stability were measured in the second testing session (n=15).

Wings reached the best performance in running speed (4.33±0.19s), aerobic capacity (63.96 ml/kg/min) and serial vertical jump test (50.61±4.15cm). Significant differences were found between wings and backs in aerobic capacity (p=0.008), running speed (p=0.008), serial vertical jump (p=0.047). Goalkeepers had the best result in throwing test (23±0.14m). Backs presented excellent results in cognitive functions. There were no significant differences among positions in choice reaction time test. Mean time was the shortest for leg stimuli: 654.9±52.52ms. In stability there was no significant difference between the dominant (2.04±0.49s) and not dominant legs (2.05±0.44s) among players.

Data obtained from our study are very useful for coaches in handball training, especially in the preparatory season.

Key words: handball, motor abilities, cognitive functions

P-07

Enzyme- and lectin-histochemical characterization of cellular compartments in the primary and secondary lymphoid organs of the zebrafish (Danio Rerio)

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The thymus, head-kidney and the spleen are haematopoietic organs of zebrafish. Haematopoiesis primarily takes place in the head-kidney of adult fish. Innate (granulocytes, monocytes) and adaptive immune cells (lymphocytes) are produced in this organ.

In the lack of zebrafish leukocyte specific monoclonal antibodies, we decided to investigate zebrafish haematopoietic cells by enzyme- and

lectin-histochemical approaches.

Cellular composition of isolated kidney and spleen tissues was further analyzed by flow cytometry and light microscopy. Activity of different enzymes (non-specific esterase, acid phosphatase, alkaline phosphatase) was determined on cytospins. Isolated haematopoietic cells were characterized with PNA (peanut agglutinin)-lectin staining for flow cytometry. Moreover, lectin histochemistry were performed on spleen and kidney sections.

Robust acid phosphatase activity was observed only in myeloid cells. Haematopoietic cells were distributed into erythroid, myeloid and lymphoid populations by flow cytometry. We observed the highest PNA positivity in myeloid cells, less positivity was found in lymphoid population, while erythroid cells were exclusively negative. In addition, PNA-staining of spleen sections confirmed the results obtained by flow cytometry.

Our preliminary data is supportive to characterize zebrafish haematopoietic cells in morphological point of view.

P-08

The effect of the sympathetic nervous system and dehydration on salivary lactate concentration

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Measuring of salivary lactate (SL) level is a possible new method to determine training efficiency.

The aim of this study was to investigate the correlation between salivary and blood lactate (BL) concentration in athletes (SG) and non-athletes (NG)

after maximal exercise, and to determine the possible differences in RR-variability and total body water on SL.

Sixteen volunteers (22.80±3.18yrs) performed a maximal Astrand treadmill test. Before and after the exercise saliva and blood samples were collected and SL content was assessed with spectrophotometric analyses. BL concentration was measured from fingertips with a portable lactimeter. Anthropometric characteristics, body composition (total body water –TBW-, body fat percent) and physiological parameters (RR-variability, HR) were assessed before the test.

In SG we registered two SL peaks at different time points (SG: 1 min and 8 min, NG: 4 min and 12 min) in NG group we found high individual differences among subjects. Pearson correlation analyses between BL and SL concentration showed significant correlation in both groups. We noted relationships between several measured parameters (SL - TBW, SL - RR-variability, maximal SL - maximal heart rate during exercise).

According to our results hydration status and the function of autonomic nervous system affect post-exercise salivary secretion.

P-09

Plant tissue based biosensor with improved sensitivity. Dopamine determination under optimalized working conditions.

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Amperometric enzyme sensor prepared with reaction layer made of banana tissue slice is nicknamed „bananotrode”. Owing to the enzyme content of banana tissue the electrode could be used for selective measurements of polyphenolic compounds, like dopamine. Good stability and cost efficient fabrication would permit broad scale of application in different areas of chemical analysis. The dynamic range of this biosensor, however often does not match the concetration range needed. In our studies efforts were made to increase the sensitivity of bananotrode. A model of the reaction layer of it was made and the concetration profiles of different species involved in catalytic reactions were investigated using scanning chemical microscopy (SECM). Dynamic voltamogramms recorded with flow injection analytical (FIA) apparatus were used to find the optimal

electrode potential for detection. Considerable enhancement of sensitivity of this biosensor could be achieved using optimal reaction layer thickness, and eletrode potential, together with the measuring technique of periodically interrupted amperometry (PIA) worked out in our earlier studies. Local, instantenous concentrations of dopamine and dopamine quinone were detected vertically moving the micro size measuring tip of the SECM inside the banana tissue, while the model electrode was exposed to stirred sample solution.

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P-10

Theoretical investigation of the ion diffusion on graphene surface controlled by external electric field

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Our earlier works related to the investigations of carbon nanomaterials. The non-covalent interactions between carbon nanotubes and aromatic molecules have been described. Furthermore, we have reported a new method, how to generate graphene-CeO_2-sapphire layer. This system with electrochemical modifications could be a potential surface of ion diffusion controlled by external electric field. In this work the interaction between alkali ions and graphene surface with the absence and the presence of external electric field applied perpendicular to the graphene surface was investigated. Results show, that the electric filed push close the positive charged ion to the graphene surface, where the Coulomb repulsion results higher energy barriers on the diffusion pathways. These effects are applicable in the design of electronic devices designed to nanoscale.

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P-11

We spending money for health with pleasure, but what about expensive food? The price of olive oil and the consumers' opinion

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A self-administrated questionnaire was used and asked 1000 Hungarian about their patterns of olive oil consumption.

Only 10.2% of the respondents did not agree with the statement "Olive oil consumption is useful to preserve our health, but its price is not appropriate", 19.8% agreed with it, 70.1% agreed with it absolutely. Nine percent said that the price is appropriate and 56.9% that it is too expensive. "Expensive but it's worse it" answered 33.5%. There was only one person who said that it is cheep, but his financial situation was "well below the average" – according his own opinion.

The correlation between the financial situation and the statement "olive oil consumption is useful to preserve our health, but its price is not appropriate" was significant and moderately strong ($r=0.23$; $p<0.001$). 67.2% of the people with average or better financial situation agree with this statement.

P-12

In vivo eletrochemical H_2S detection

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H_2S (hydrogen sulfide) is a naturally occurring gas, that is toxic and flammable in high concentration. This gas is a result of bacterial anaerobe digestion or volcanic gas, and can be found in spring water, eg. Hungarian Harkány water. The toxicity of H_2S is as high as the hydrogen cyanide, so it is very useful to measure the H_2S concentration in solution, gas.

The human body produces small amount of H_2S (by the decomposition of sulfur containing proteins, amino acids) and uses it as a signaling molecule. In different tissues of living animals sometimes the concentration is about 20 µM.

It is generally accepted, that H_2S has important roles in modulating different, physiologically important biochemical processes similarly to other, fast diffusing molecules like NO, CO or H_2O_2. The electrochemical detection has advantages, like cheapness, portability, robustness. That is why the electrochemical sensors are often gain application in experimental life sciences for measurement or follow of local concentration of important species in vivo.

Our group have been developed hydrogen sulfide sensor for voltammetric electroanalytical measuring method. Using amperometry, on constant potential the change of current intensity is measured in time. The current change is proportional to the concentration change of the material in a sample. Our sensors detect the H_2S in ppm range. Applying it in vivo experiment, H_2S diffusion was detected through the mice skin.

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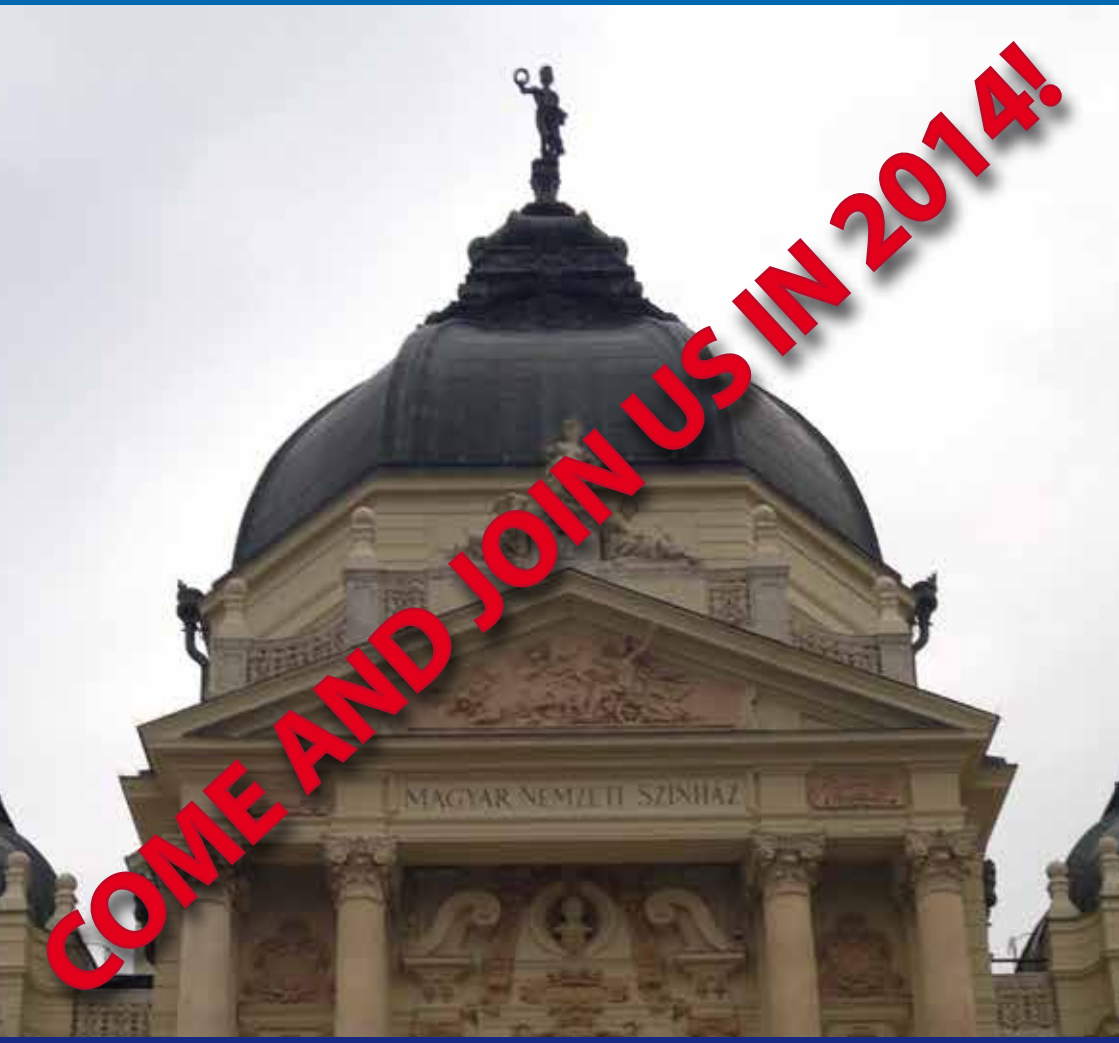

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