



COINS

Conference of Natural
and Life sciences.

2015

WWW.THECOINS.EU

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ABOUT CONFERENCE

The Coins'15 - 10th international conference of natural and life sciences which gathers both students and scholars to discuss, learn and share their scientific experience, find new partners, meet key experts and enjoy exciting programme.

The Coins is organized for BA, MA students and doctorates who are doing their scientific research and want to present it to a larger audience, get constructive criticism and useful advice. Senior year school students interested in the newest research in the fields of natural and life sciences are also invited to the conference. During scientific presentations it becomes evident what scientific problems are analyzed by young scientists in Lithuania and Europe, and during lectures participants will get acquainted with scientific innovations and perspectives in the fields of Biotechnology, Genetics, Biophysics, Biochemistry, Ecology etc.

The conference will include:

- Presentations of students' research;
- Lectures of well-known and accomplished scientists from Lithuania and abroad;
- Visits to Lithuanian scientific centers and companies;
- Cultural and social activities: Vilnius Tour, Welcome reception, Closing event etc.

The Coins'15 is a scientific student-oriented event based on curiosity, constructive criticism and a wish to improve. It's an open scientific space full of youthful enthusiasm that gathers everyone interested in natural and life sciences.

You can find more information about the conference, lecturers, participants and the whole programme in this publication or on-line : www.thecoins.eu.

SPREAD THE NEWS AND SCIENCE!

FOREWORDS

Dear Colleagues,

It is my real pleasure to welcome participants of the 10th International Student's Conference of Life Sciences (COINS) on behalf of Vilnius University and Faculty of Natural Sciences. This Conference serves few purposes – to present scientific ideas and results, to meet colleagues – both students and advanced researchers - from different scientific areas and countries, to have intensive social life. Fact, that this is already the tenth conference, proves that all these activities are performed at really high level and that is why it is worth to participate!

Welcome to Vilnius, have a productive Conference and good time!

Prof. Osvaldas Rukšėnas
Dean Faculty of Natural Sciences
Vilnius University



I would like to personally welcome each attendee of The Coins 2015, the 10th International Conference of Natural and Life Sciences.

The Coins continues to bring students and scholars together to discuss, learn and share their experience. What is more, the conference provides an exciting and useful networking opportunity.

I am particularly delighted that The Coins is organized by and for BA and MA students, who have changed a role of listeners into a role of active researchers. They are doing research and want to present it to a larger audience and get a piece of specialists' advice. I believe that these active students will be specialists consulting their younger colleagues during this conference in the near future.

Spread the News and Science!
Algimantas Markauskas
Vice President/General Manager
Thermo Fisher Scientific Baltics



Dear participants of The Coins 2015,

It is my great pleasure to welcome you to the International Natural and Life Sciences Conference The Coins 2015. We are proud that students and scientists from Lithuania and foreign countries assemble here, in the capital of Lithuania.

This conference is being organised for the 10th time and I believe that this should continue for a long long time! Why? The answer for that question is very simple. It is all of you. Your desire to show yourself, show your research to a wider scientific community is the dream we are trying to fulfill. The Coins 2015 team will do their best to provide you with this amazing opportunity to get acquainted to well-known scientists, meet new colleagues and have an amazing time together.

I wish you interesting and productive discussions, informative conference and wonderful experience. Enjoy everything and take from this conference as much as you can!

So let us go deeper, seek wider and reach higher during The Coins 2015.

Best wishes,
Ieva Vėbraitė
The Coins coordinator



AMBASSADORS

Prof. Dr. Osvaldas Rukšėnas - Lithuanian neurobiologist, biophysicist ; Dean of Vilnius University Faculty of Natural Sciences, Head of Neurobiology and Biophysics Departments ; Professor of Biomedical Sciences ; President of Lithuanian Association of Neurosciences.



Algimantas Markauskas - "Thermo Fisher Scientific Baltics" General Manager, Vicepresident for Baltic region. Alumni of Vilnius University.

Juozas Rimantas Lazutka - Head of the Department of Botany and Genetics of Vilnius University. Teaching Basic Genetics for undergraduate students in molecular biology and genetics, Genetic Analysis for students in genetics. Leading research projects on prostate cancer.



Jonas Cicėnas

Biochemist, kinase expert at the CALIPHO group, Swiss Institute of Bioinformatics.
Founder of MAP Kinase Resource.



Andrius Uždanavičius

Vilnius University Students' Representation president,
2nd year student of Psychology.

PROGRAMME

MARCH 3, SCIC (SAULETEKIS AV. 5)

09:00-10:00 Registration

10:00-10:30 Opening Ceremony
Speakers: Ambassadors

10:30-11:10 Plenary by **Tadas Jakočiūnas** (Denmark)
GENOME ENGINEERING IN YEAST
USING CRISPR/Cas9

11:10-11:30 **Students presentation**

Plenary by **Edvardas Golovinas** (Lithuania)

Study of Lipid Raft Formation in Cholesterol
- Lipid Monolayers Using Sum Frequency
Generation Spectroscopy

11:30-11:50 **Students presentation**

Plenary by **Alena Kastsenka** (Belarus)

Environmentally Friendly Heat Engines

12:00-13:00 Lunch break

13:00-13:40 Plenary by **Lee M. Graves** (USA)

Studying Kinome Dynamics to Targeted
Therapeutics

13:40-14:00 **Students presentation**

Plenary by **Auste Valinciute** (Lithuania)

Science and the Media : Friends of Foes?

14:00-14:20 **Students presentation**

Plenary by **Aliona Špakova** (Lithuania)

Development of Schmallenberg Virus
Detection System

14:20 - 14:40 **Students presentation**

Plenary by **Zsolt Lakatos** (Hungary)

The Role of Drosophila Atg6/UVRAG-con-
taining Lipid Kinase Complex in
the Regulation of Notch Signaling

14:40 - 15:10

Coffe break

15:10 - 15:50 Plenary by **Daumantas Liekis** (Lithuania)

Theory of innate, social and colonial self-awareness in animals (Animalia)

15:50 - 16:10 **Students presentation**

Plenary by **Benjamin Bartl** (Hungary)

Chronic Elevation of 2-AG Alters Spinal Nociceptor Circuitry in the Mouse Superficial Dorsal Horn

16:10 - 16:30 **Students presentation**

Plenary by **Austėja Diktanaitė** (Lithuania)

Synthesis and characterization of $\text{LiAlMo}_2\text{O}_8$ and $\text{Li}_3\text{AlMo}_3\text{O}_{12}$ ceramics

19:00 - 21:00 Welcome reception

MARCH 4

Company Visits :

Institute of Biochemistry

National Food and Veterinary
Risk Assessment Institute

08:00 Lunch, Coffee break

-

18:00

Thermo Fisher Scientific

The Nature Research Centre

MARCH 5, SCIC (SAULETEKIS AV. 5)

09:00 - 10:00 Registration

10:00 - 10:15 Opening speech

10:15 - 10:55 Plenary by **Jonas Cicénas** (Switzerland)

"Omics" approaches in biomarker development for cancer diagnostics

10:55 - 11:15 **Students presentation**

Plenary by **Linas Tamošaitis** (Lithuania)

Investigation of G-CSF dimers as leads for a prolonged action G-CSF drug variant

11:15 - 11:35 **Students presentation**

Plenary by **Kovács Laura** (Hungary)

Autophagy is Required for Intestinal Stem Cell Maintenance and Hyperplasia Caused by UVRAG Deficiency in Drosophila

11:35 - 12:15 Plenary by **Stephen Minger** (UK)

Innovating Preclinical Drug Discovery and Human Cell Therapy

12:15 - 13:30 Lunch break

13:30 - 14:10 Plenary by **Agnė Vaitkevičienė** (Lithuania)

Cell therapy: how science reach the patient

14:10 - 14:30 **Students Presentation**

Plenary by **Sarolta Toth** (Hungary)

Investigating the Role of Hps1 and Hps4 Proteins in Autophagy

14:30 - 15:10 Plenary by **Oded Shoseyov** (Israel)

Nano crystalline cellulose-protein composites: Super performing biomaterials for tissue engineering and regenerative medicine

15:10 - 15:30 **Students Presentation**

Plenary by **Boda Attila** (Hungary)

The Role of Rab5 and Rab7 GTPases in Autophagy

15:30 - 16:00 Coffee break

16:00 - 16:20 **Students Presentation**

Plenary by **Inga Songailienė** (Lithuania)

Directional R-loop zipping by CRISPR-Cas surveillance complex

16:20 - 16:40 **Students Presentation**

Plenary by **Diana Reznikova** (Belarus)

Influence of Sideritis taurica and Pharmacy
Collection "Sadifit" on Lipid Peroxidation
and Antioxidative Systems in Alloxan - in-
duced Diabetic Rats

19:00 - 21:00 **Vilnius City Tour**

MARCH 6, FNS (CIURLONIO STR. 21/27)

09:00-10:00 Registration

10:00-10:15 Opening speech

10:15-10:55 Plenary by **Albert Gjedde** (Denmark)

The Unmet Challenge of Biologically
Unexplained Neuropsychiatric Symptoms;
Minds Make Molecules, Molecules Make
Sense

10:55 - 11:15 **Students Presentation**

Plenary by **Ivan Reznikov** (Belarus)

A Novel Sorbent on the Basis of Hydrolysis
Lignin for Oil Spill Elimination

11:15 - 11:55 Plenary by **Raminta Venskutonyte**
(Denmark)

Structural studies of ionotropic glutamate
receptors: focus on ligand binding domain
of GluK₃

11:55 - 12:15 **Students Presentation**

Plenary by **Aleksandr Osipenko** (Lithuania)

Targeted labeling of small non-coding RNAs

12:15 - 13:30 Lunch break

13:30 - 15:30 **Poster Presentation Session**

15:30 - 16:30 Coffee break

16:30 - 17:10 Plenary by **Monika Glemžaitė** (Lithuania)

Mammalian Genome Editing Using
CRISPR/Cas Systems

17:10 - 17:30 **Students Presentation**

Plenary by **Anastasiya Volakhava** (Belarus)

The Structural Diversity of RNA Products
of RUNX1T1 Part of the Fusion Oncogene
RUNX1 - RUNX1T1

17:30 - 17:50 **Students Presentation**

Plenary by **Linda Vecbiskena** (Latvia)

In vitro bioactivity and cell response of
calcium phosphate biocomposites for bone
regeneration

18:00 - 18:30 **Awards, Certificates**

21:00 - 00:00 **Closing Event**

SPEAKERS

Genome engineering in yeast using CRISPR/Cas9

Postdoc at Novo Nordisk Foundation Center for Biosustainability (CFB) which is situated close to Copenhagen in Denmark.

Tadas Jakočiūnas (Denmark)



CRISPR/Cas9 is a simple and efficient tool for targeted and marker-free genome engineering. Here, we report the development and successful application of a multiplex CRISPR/Cas9 system for genome engineering in one transformation step in baker's yeast *Saccharomyces cerevisiae*. To assess the specificity of the tool we employed genome resequencing to screen for off-target sites in all single knock-out strains targeted by different gRNAs. This extensive analysis identified no more genome variants in CRISPR/Cas9 engineered strains compared to wildtype reference strains. We applied our genome engineering tool for an exploratory analysis of various numbers of knock-outs, integrations and in vivo assemblies to search for strains with high production of several different chemicals. Our findings illustrate the applicability of this highly specific and efficient multiplex genome engineering approach to accelerate functional genomics and metabolic engineering efforts.

Studying Kinome Dynamics to Targeted Therapeutics

Department of Pharmacology, The University of North Carolina at Chapel Hill, Chapel Hill NC, USA

Lee M. Graves (USA)



Protein kinases are integral components of a large network of cell signaling events mediating reversible phosphorylation and regulation of a myriad of cellular processes. Known collectively as the kinome, studies have established that the kinome is highly dynamic and rapidly perturbed by stimulatory or inhibitory signals. Understanding kinome dynamics is critically important to understanding diseases like cancer where kinase mutations are attributed to cancer initiation and progression. Additionally, elucidating kinome responses to targeted kinase inhibitors may provide mechanistic information regarding the success or failure of these drugs. Our lab is studying kinome dynamics using a mass spectrometry (MS) based analytic approach. This approach known as Multiplexed Inhibitor Beads (MIB/MS) is a kinase enrichment method based on the high affinity capture of kinases on inhibitor beads. We are using MIB/MS to investigate the response of the kinome to targeted kinase inhibitors and to identify kinome changes accompanying the development of drug resistance. Kinome changes are compared in parallel to phosphopeptide data to attempt to link kinase activity to substrate phosphorylation events. The results of these studies will be discussed.

„Omics“ approaches in biomarker development for cancer diagnostics

Biochemist, kinase expert at the CALIPHO group, Swiss Institute of Bioinformatics. Founder of MAP Kinase Resource.

Jonas Cicénas (Switzerland)



Recently extensive efforts have been made to divide cancer patient populations into clusters that are different with respect to relapse, survival and response to therapies.

Hundreds of these putative biomarkers have been studied for that purpose, however very few have actually achieved common clinical use. In part, this lack of progress is a consequence of the astonishing biological diversity of cancers. On the other hand, much of the controversy in the field arises from poorly designed and analyzed clinical studies. As a result biomarker discovery is still an ongoing process, facing several challenges. One of the major challenges in current biomarker discovery field is decreasing amounts of patient material, due to the decreased size of tumors and increased demand for the material. A different challenge is the necessity to analyze a multiple set of biomarkers simultaneously, which requires specific techniques to be developed. Here we will discuss several approaches, which might help to overcome these shortcomings.

Innovating Preclinical Drug Discovery and Human Cell Therapy.

Chief Scientist, Cellular Sciences,
Life Sciences, GE Healthcare

Stephen Minger (UK)



There has been significant interest in the therapeutic and scientific potential of stem cells since reconstitution of the haematopoietic system was first realized by bone marrow transplantation in the 1960s. The isolation of tissue-specific, multipotent stem cells from adult organs and the derivation of pluripotent human embryonic stem cells offer the potential for regeneration of a number of different tissues and organs susceptible to age-related degenerative conditions and traumatic injury. In the not-too-distant future, it will be possible to repair heart tissue damaged by myocardial infarction, to replace neuronal cells lost in Parkinson's and Alzheimer's diseases, to transplant new insulin producing cells for diabetics and myelinating cells for individuals afflicted with multiple sclerosis, and to replace bone and cartilage lost through aging and inflammatory disease. In addition, the generation of specific populations of defined subtypes of human cells has tremendous potential to revolutionize the fields of drug discovery and investigation into the cellular bases of human disease. The newly emerging field of Regenerative Medicine will fundamentally alter clinical medicine and significantly influence our perceptions of aging, health and disease, with a myriad of consequences for society at large.

Cell therapy: how science reach the patient

Director of JSC "Froceth".

Agnė Vaitkevičienė (Lithuania)



Cell therapy is expanding widely due to scientific achievements. Cell transplantation is one of the oldest examples of cell therapy. However today there are many ways of modifying cells for treating diseases and the way from scientific laboratory to the patient has been extended. Each scientist seeks that their research will be used in practice, therefore it is important to have knowledge of how science can reach a patient. This process includes cell banks, advanced therapy medicinal product manufacturing institutions, health care institution, regulating institutions, law, clinical trials, ethical committees and others. Different cell therapy products can have their own way of reaching a patient.

Nano crystalline cellulose-protein composites: Super performing biomaterials for tissue engineering and regenerative medicine

The Robert H Smith Institute of Plant Science and genetics. The Faculty of Agriculture, The Hebrew University of Jerusalem.

Oded Shoseyov (Israel)



A platform technology that brings together the toughness of cellulose nano-fibers from the plant kingdom, the remark-

able elasticity and resilience of resilin that enables fleas to jump as high as 400 times their height from the insect kingdom, and the adhesion power of DOPA, the functional molecule of mussels that enable it to bind tightly under water to organic and inorganic matter from the marine kingdom and all that combined with Human Recombinant Type I collagen produced in tobacco plants; SUPERPERFORMING BIOMATERIALS.

The Unmet Challenge of Biologically Unexplained Neuropsychiatric Symptoms

Department of Neuroscience and Pharmacology, University of Copenhagen

ALBERT GJEDDE (Denmark)



Researchers have little evidence of anything being the matter with the brain in most neuropsychiatric conditions linked to biologically unexplained neuropsychiatric symptoms (BUNS). BUNS are complaints of mental disorder with no foundation in any evident or known abnormality of the central or the peripheral nervous system. In Europe, BUNS are linked to the majority of costs associated with brain and peripheral nervous system disorders. However, while the symptoms are held to define diagnoses of neuropsychiatric diseases for which neuropsychopharmaceuticals are prescribed, the alleged targets of the drugs often have their basis in theory rather than in fact. The diagnoses have proliferated to such an extent that observers refer to a real epidemic of mental unhealth. Here, I propose that renewed research into dendritic spines is necessary to discover the neurological causes of BUNS. I base the need on the emerging evidence of essential contributions of dendritic spines to the neurophysiology of

mental health and to the neuropathology of mental unhealth. Dendritic spines are the postsynaptic recipients of “wired” transmitters released from excitatory terminals in cerebral cortex. Under the control of multiple volume transmitters such as monoamines, the spines serve as highly dynamic depositories of traces of learning and memory. Malfunction of spine mechanisms are now thought potentially to explain a wide range of neuropsychiatric and neurodegenerative disorders, including autism, schizophrenia, and Alzheimer’s disease, and to form possible targets of novel treatments aimed at keeping levels of cyclic AMP below a certain threshold that is thought to be associated with normal cognition and memory consolidation.

Structural studies of ionotropic glutamate receptors: focus on ligand binding domain of GluK₃

Post doc at the Department of Drug Design and Pharmacology, Faculty of Health and Medical Sciences, University of Copenhagen. Works in the group of Professor Jette Sandholm Kastrup.

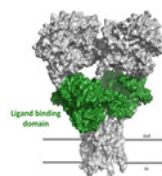
Raminta Venskutonytė (Denmark)



Ionotropic glutamate receptors (iGluRs) are ligand gated ion channels involved in excitatory signal transmission in the central nervous system (CNS). iGluRs have been linked to various CNS disorders, therefore a thorough understanding of their structure and function is needed in search for new treatments. iGluRs are large membrane proteins, consisting of several domains, including the ligand binding domain (LBD) with the specific glutamate binding site. When glutamate binds to the receptor a conformational change occurs and causes the ion channel to

open allowing cation flow across the cell membrane. Within the iGluR receptor family there are 18 different subunits, all of which bind glutamate and share structural features, but have differences in amino acid sequence, pharmacology and kinetic properties [1]. In order to create a compound, which would only target one specific subunit, a detailed understanding of these differences is needed.

The full-length structure of the GluA2 receptor (PDB code 3KG2 [2]). The ligand binding domain is shown in green.



To study ligand-receptor interactions of iGluRs, the isolated soluble LBDs can be used. In our laboratory we study iGluR LBDs by X-ray crystallography to understand how different compounds bind to the receptor, how ligand selectivity is governed, how ligand binding affects protein conformational changes and other structural aspects. GluK3 is an iGluR subunit belonging to the kainate receptor subfamily. During the last two decades more than 300 iGluR LBD structures have been published, however the first structure of the GluK3 LBD appeared only in 2011 [3]. We are continuing the work on the GluK3 LBD since then and have solved more structures in complex with different compounds. These studies contribute to understanding of molecular determinants for ligand specificity at iGluRs and provide insight for further development of novel compounds.

[1] Traynelis, S. F. et al. (2010). Pharmacol. Rev. 62, 405-496.

[2] Sobolevsky, A.I., Rosconi, M. P., Gouaux E. (2009). Nature. 462, 745-756.

[3] Venskutonytė, R. et al. (2011). J. Struc. Biol. 176, 307-314.

Mammalian Genome Editing Using CRISPR/Cas Systems

Junior Scientist in Thermo Fisher Scientific Research and Development center ; was awarded World Intellectual Property Organization (WIPO) Best Young Inventor gold medal.

Monika Glemžaitė (Lithuania)



CRISPR/Cas system and its protein Cas9 are very important in bacterial anti-virus defence system. In recent years scientists have adapted CRISPR system for genome editing in vitro and in vivo. The ability to use Cas9 as a programmable nuclease was demonstrated in various organisms from E. coli to animal and human stem cells. So far plasmid vector or mRNA-based Streptococcus pyogenes Cas9 and guiding RNA systems were successfully used in gene knock-outs or knock-ins. Here we present a novel approach in this area – the potential use of in vitro assembled Streptococcus thermophilus Cas9-RNA complexes for genome editing in mammalian cells and compare its DNA cleavage efficiency to vector-based S. thermophilus Cas9-RNA delivery system.

ORAL PRESENTATIONS

(March 3)

Edvardas Golovinas

STUDY OF LIPID RAFT FORMATION IN CHOLESTEROL - LIPID MONOLAYERS USING SUM FREQUENCY GENERATION SPECTROSCOPY

E. Golovinas, L. Abariūtė, G. Valinčius, G. Niaura

Vilnius University, Lithuania

According to the simplest version of the fluid-mosaic model of biological membrane structure, bilayer lipids form a homogeneous fluid mixture. Strong evidence has now accumulated, however, that cell plasma membranes contain phase-separated domains of different lipid and protein composition. It is well-recognized that the organization of both lipids and proteins plays an important role in cellular membrane regulation and function [1]. One type of domain, sphingolipid and cholesterol-based structures called lipid rafts, has received much attention in the last decade. In this work a combination of surface pressure measurements and sum frequency generation (SFG) spectroscopy - a method of surface-specific second-order vibrational spectroscopy, capable of providing information about orientation and conformation of the molecules at interfaces - was used to study conformational order in Langmuir monolayers prepared from pure lipids and their mixtures to gain insight on whether and how lipid rafts form in model lipid membranes. Results show that cholesterol induces greater ordering of model lipid membranes at lower surface pressures. This may suggest the formation of lipid rafts. References: 1. K. Simons, M. J. Gerl, Nat. Rev. Mol. Cell Biol., 11 (2010) 688-699."

(March 3)

Alena Kastsenka

ENVIRONMENTALLY FRIENDLY HEAT ENGINES

Alena Kastsenka, Aliaksandr Tsitovich

**Luikov Heat and Mass Transfer Institute of the
National Academy of Sciences of Belarus**

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The use of fossil fuels for energy is accompanied by greenhouse gases release, ash, sulfur oxides and other harmful substances emission, waste generation, violation of an earth formation, climate changes. In connection with this the introduction of new heat production technologies, the use of alternative and renewable energy sources to replace fossil fuels combusted is needed. One solution of the problem for the recovery and effective use of solar, wind, moving water, biomass, heat the Earth's interior and the environment is the use of heat pumps.

An alternative to vapor compression heat pumps, which use freons, prohibited to application in 1992 by the Montreal Protocol, are heat engines for solid and liquid sorbents. Adsorption and absorption heat pumps have significant advantage in terms of environmental safety compared with freon vapor compression devices. Sorption heat pumps have high thermodynamic efficiency, good reliability and long service life, environmental cleanliness. The coolants, which are used there: ammonia, water, carbon dioxide does not pollute the environment and have no effect on global warming. There are no moving parts in sorption heat pumps, so they have a low level of noise and vibration.

To increase the competitiveness of sorption heat engines new

scientific and engineering developments are required. The porousmedia laboratory of the Luikov Heat and Mass Transfer Institute of the National Academy of Sciences of Belarus has extensive experience in the study of heat transfer during phase transitions of fluids and adsorption/desorption processes, non-electric vehicles that are capable to transform heat flows and generate heat and cold are developed. The sample of solar refrigerator with standard low-temperature sorbents was developed, tested and delivered to India.

Application of sorption heat pumps in conjunction with heat pipe heat exchangers, steam generators, heat and cold accumulators provides economic benefits and reduce human impact on the environment.

(March 3)

Austė Valinčiūtė

SCIENCE AND THE MEDIA: FRIENDS OR FOES?

Vilnius University, Lithuania

austausta@gmail.com



Mass media can be considered as one of the main tools for public engagement with science. Unfortunately, scientists and the media have a complicated relationship. Scientists often claim that media misrepresents and distorts scientific information, whereas journalists, for example, believe that scientists do not have the right skills when it comes to explaining their work to the general public. Whichever case it might be, media takes an active part in the construction of meanings that science topics undertake in our societies and have a great role in shaping public discourse.

This presentation will give an overview of the status quo in the science and society relationship and discuss its underlying challenges. It will focus on the current public attitudes toward science, the impact of media in their formation and the consequences of this process.

(March 3)

Aliona Špakova

DEVELOPMENT OF SCHMALLENBERG VIRUS DETECTION SYSTEM

**Justas Lazutka, Aliona Špakova, Kęstutis
Sasnauskas**



Institute of Biotechnology, Lithuania

spakova.aliona@gmail.com

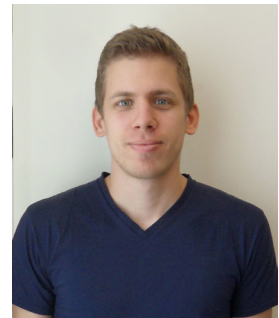
Schmallenberg virus (SBV) was discovered in Germany in 2011. The viral infection has spread in many European countries causing mild clinical signs in adult ruminants. However, SBV can also infect the foetus of animals infected during the early stage of pregnancy. This may lead to abortion, stillbirth or the birth of weak, malformed newborn animals. To develop improved reagents for SBV serology, yeast expression system was used to produce structural SBV nucleocapsid (N), glycoprotein 2 (G2), and chimeric nucleocapsid-glycoprotein 2 (N_G2) proteins. Yeast-expressed SBV N protein was purified under native conditions using sucrose density gradient centrifugation protocol. Other SBV structural proteins were purified under denaturing conditions using nickel ion affinity chromatography column. The antigenic characteristics of purified SBV proteins were tested by Enzyme-Linked Im-

munosorbent Assay (ELISA). According to the results, native SBV nucleocapsid (N) protein has the highest reactivity with bovine serum anti-SBV antibodies and is the most suitable for improved detection system development. Our study provides the evidence of the presence of SBV virus in cattle in Lithuania and Ukraine. To conclude, yeast-expression system is suitable for the synthesis of SBV structural proteins suitable for Schmallenberg virus detection system development.

(March 3)

Zsolt Lakatos

**THE ROLE OF DROSOPHILA
ATG6/UVRAG-CONTAINING LIPID
KINASE COMPLEX IN THE
REGULATION OF NOTCH SIGNALING**



Eötvös Loránd University, Hungary

kripmer@gmail.com

The role of Atg6/Beclin 1 in regulating receptor-mediated endocytosis and thus modulating Notch signaling (and other pathways as well) is controversial according to the literature. Therefore, the aim of this work was to clarify whether Atg6 is implicated in regulating these processes or not.

In this work, several *Drosophila melanogaster* strains were used in which the product of *atg6* gene could be eliminated exclusively in their developing wings. As a result of Atg6 depletion, the wings of the flies became notably distorted.

Abnormal multivesicular and multilamellar bodies were found to be present in the developing Atg6 RNAi wing epidermal cells, which were identified as abnormal late endosomes/endolys-

osomes using plasma membrane-localized HRP-DAB reaction. Thus, endocytosis comes to a halt at the stage of late endosomes which was confirmed with fluorescent markers as well.

Next the localization of Notch and its ligand, Delta in Atg6 depleted cells was examined, and we found that these proteins accumulated in cytoplasmic granules. Since this phenomenon could result in amplified Notch signaling, this presumption was also confirmed by using NRE reporter.

As previous studies suggested, UVRAG and Atg14 might have a role in regulating endocytosis in different complexes with Atg6, UVRAG and Atg14 RNAi flies were examined as well. We found that UVRAG but not Atg14 RNAi phenocopies the effect of Atg6 depletion.

Therefore, the conclusion has been reached that the Atg6/UVRAG-containing complex is responsible for the regulation of Notch signaling through the internalization and degradation of Notch and its ligand, Delta.

(March 3)

Benjamin Barti

CHRONIC ELEVATION OF α -AG

ALTERS SPINAL NOCICEPTOR

CIRCUITRY IN THE MOUSE

SUPERFICIAL DORSAL HORN

Benjamin Barti, Stephen G. Woodhams and István Katona

Hungarian Academy of Sciences - Institute of

Experimental Medicine, Hungary

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Chronic pain afflicts ~5% of the global population, and represents a considerable burden on society. Currently available anal-

gesics lack efficacy, and thus alternative strategies present an important target for pain research. One promising approach is modulation of the endocannabinoid system. Enhancing levels of the endocannabinoid 2-arachidonoylglycerol (2-AG) via blockade of its degradative enzyme monoacylglycerol lipase (MGL) produces CB1 receptor-mediated analgesia in the absence of cannabinoid-like side effects. However, chronic MGL inhibition leads to a loss of this analgesic effect. To investigate the possible mechanism, we studied changes in CB1 expression in spinal cord pain circuitry in mice lacking MGL.

Using immunofluorescence staining, we observed a dramatic region-specific loss of 50% of CB1 staining in the spinal superficial dorsal horn of MGL^{-/-} animals. To determine the cellular localization of this change, we probed spinal cord sections for expression of CB1 in key cell types of the nociceptive circuitry; peptidergic nociceptive primary afferents, inhibitory and excitatory interneurons, and astroglial, microglial cells. Surprisingly, we observed only a small reduction of CB1 expression in axon terminals of the investigated neuronal cell types. However, we did observe significant decreases in some of the cell type specific marker -immunostainings, and an increase in astroglial-labelling in the absence of MGL.

These data suggest that the observed reduction in CB1 results not from a loss of the receptor from specific axon terminals, but rather a fundamental reorganization of excitatory axon terminals within the dorsal horn.

(March 3)

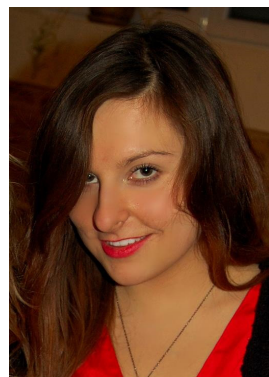
Austėja Diktanaite

SYNTHESIS AND CHARACTERIZATION OF $\text{LiAlMo}_2\text{O}_8$ AND $\text{Li}_3\text{AlMo}_3\text{O}_{12}$ CERAMICS

A. Diktanaite, A. Žalga

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Double molybdates and tungstates of alkaline and trivalent metals with the general formula $\text{AB}(\text{XO}_4)_2$ (A – alkaline metal, B – trivalent element, X – Mo, W) have attracted much attention because most of the members exhibit interesting properties and applications. These compounds have attracted a great deal of interest in recent years because of their simple structure and the ability to undergo ferroelastic phase transitions in wide temperature ranges. Moreover, they exhibit interesting structural and physicochemical properties, and are used as acousto-optic filters, second-harmonic generators and laser crystals. Besides, they exhibit ferroelectric, ferroelastic or even ferromagnetic properties and have been extensively studied for the last 40 years [1, 2]. In this study, the aqueous sol-gel method of synthesis was chosen for the Li-Al-Mo-O nitrate–tartrate gel precursors with the composition of $\text{LiAlMo}_2\text{O}_8$ and $\text{Li}_3\text{AlMo}_3\text{O}_{12}$ ceramics. The crystalline compounds were annealed at 400-700 °C temperature and as-prepared Li–Al–Mo–O nitrate–tartrate gels were investigated by various analysis: thermogravimetry (TGA), differential scanning calorimetry (DSC), X-ray diffraction (XRD), scanning electron

microscopy (SEM) and infrared spectroscopy (FT-IR).

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(March 5)

Linās Tamošaitis

INVESTIGATION OF G-CSF DIMERS AS LEADS FOR A PROLONGED ACTION G-CSF DRUG VARIANT

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Linkers have an indispensable tool in recombinant fusion protein technology since they allow the creation of proteins with a wide array of activities by coupling or decoupling domains. However they can offer other advantages such as improved biological activity, improved pharmacokinetic profiles and expression yields. With the advancement of biotechnology, fusion protein technology will probably play a significant role in drug design and therapeutics. That being said, choosing and constructing a linker for the desired protein fragments can be quite challenging due to several factors – incorrect folding, inefficient expression, bioac-

tivity reduction or instability in vivo. The rational design of linkers therefore remains a challenging yet important problem.

Granulocyte colony-stimulating factor is an important biological drug, which is in the first ten positions of biopharmaceutical sales. This protein selectively stimulates the proliferation and differentiation of committed progenitor cells and activation of mature neutrophils.

The aim of this study was twofold. First of all we attempted to apply the technology of protein linking to GCSF in order to improve its PK/PD profile – the construction, purification, and characterization of GCSF, which were developed by genetic fusion two GCSF molecules through various linkers, is presented. Second, we aimed to elucidate the relation of linker structure and dimer characteristics. For this reason, binding kinetic measurements, in vivo bioassays and PK/PD experiments were conducted.

(March 5)

Laura Kovács

**AUTOPHAGY IS REQUIRED FOR
INTESTINAL STEM CELL MAINTENANCE
AND HYPERPLASIA CAUSED
BY UVRAG DEFICIENCY IN
DROSOPHILA**



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The digestive system is one of the most exposed organs for the damaging effect of the materials from the outside world. Intestinal stem cells ensure the remarkable regenerative capacity of the gut epithelium, as they continuously replace damaged and old

cells. The proliferation of intestinal stem cells is tightly controlled, as abnormal cell division can lead to pathological disorders such as cancer. The proper functioning of autophagy was previously found to be essential for the maintenance of neurons, so I examined the role of autophagic activity in intestinal stem cells in *Drosophila melanogaster*. We detected continuously high levels of baseline autophagy in the stem cells of the gut, and its inhibition by RNAi of core Atg genes reduced the stem cell pool. In contrast, autophagy was not affected by the loss of *uvrag* tumor suppressor function, which has been suggested to control autophagy previously. Importantly, *uvrag* deficiency results in stem cell hyperproliferation. Epistasis analysis experiments showed that hyperplasia induced by loss of *uvrag* is completely blocked by the suppression of autophagy. Finally, the lifespan of adult flies was reduced by inhibition of either autophagy or *uvrag* in intestinal stem cells, possibly due to impaired gut integrity.

(March 5)

Sarolta Toth

INVESTIGATING THE ROLE OF HPS₁ AND HPS₄ PROTEINS IN AUTOPHAGY

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The normal biogenesis of the lysosomes and the proper function of the associated degradation pathways, endocytosis and

autophagy, is essential for maintenance of cellular homeodynamics.

Hermansky-Pudlak syndrome is a genetic disorder caused by mutations of the Hps genes. Hps1 and the Hps4 proteins form the BLOC-3 complex, which is required for the biogenesis of lysosomal-related organelles. The aim of my work was to analyze whether loss of BLOC-3 complex has any effect on autophagic function.

I used Hps1 and Hps4 mutant *Drosophila melanogaster* stocks for my experiments. In fluorescence and electron microscopy we found that the autolysosomes were formed but the autophagic cargo was not completely degraded..

Mon1 protein has a structure similar to Hps1, and is an important regulator of endo-lysosomal maturation. Because the BLOC-3 genes showed weak disturbance of autophagy, we wondered whether there is any redundancy between Hps1 and Mon1. Therefore I made double mutant flies. In contrast to Hps1 and Mon1 single mutants which were viable and semi-lethal respectively, the double mutants showed synthetic larval lethality and stronger defect in endocytosis and autophagy. Additionally, I observed melanotic tissue mass in the double mutant larvae.

In summary, my results show that loss of BLOC-3 leads to decreased level of autophagic degradation as a likely result of abnormal biosynthetic transport to lysosomes. We also discovered a genetic interaction between Hps1 and Mon1, and propose a functional redundancy between these two genes.

(March 5)

Boda Attila

THE ROLE OF RAB5 AND RAB7 GTPASES IN AUTOPHAGY

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The two main degradation pathways, endocytosis and autophagy, are essential for normal cell functioning. Vesicle transport in cells is regulated by Rab GTPases. Rab5 controls early-to-late endosome maturation, whereas Rab7 regulates late endosome-to-lysosome trafficking. During the progression of endosomes, Mon1-Ccz1 heterodimer replaces Rab5 with Rab7, and as a GEF activates Rab7. Thus, Rab7 and Mon1-Ccz1 together form a Rab7 module. The role of Mon1 in endosome-lysosome and autophagosome-lysosome fusion is known in yeast, but a paper published last year suggested that the *Drosophila* homologue is dispensable for autophagy. The connection between Rab5 and autophagy is also contradictory in the literature, so my aim was to clarify the role of these genes in autophagy in *Drosophila*.

Autophagosome-lysosome fusion is inhibited in the absence of any members of the Rab7 module: the number of autolysosomes decreased and autophagosomes accumulated in such cells. In contrast, Rab5 mutant cells contained large autolysosomes, although these were not positive for mCherry-Atg8a, an autophagic structure marker. Double mutants for Rab5 and Mon1 show a similar autophagy defect as Mon1 mutants. According to these results, autolysosomes do form in Rab5 mutant cells under starvation. The absence of mCherry-Atg8a positive structures suggests that Rab5 deletion may interfere with Atg8a-dependent selective autophagy.

Thus, Rab5 has a fundamental role in selective autophagy during formation of Atg8a positive structures, although it is not necessary for starvation-induced non-selective autophagic degradation. In contrast, members of the Rab7 module are required for autophagosome-lysosome fusion.

(March 5)

Inga Songailienė

DIRECTIONAL R-LOOP ZIPPING BY CRISPR-CAS SURVEILLANCE COMPLEX

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Clustered, regularly interspaced, short palindromic repeats (CRISPR) with associated Cas genes comprise an adaptive immunity system in bacteria and archaea. In CRISPR systems foreign nucleic acids are targeted in RNA-dependent sequence specific manner. The immunity is acquired by integrating short (21-72nt) spacers from foreign nucleic acids in CRISPR region. Afterwards, from CRISPR region pre-crRNA is transcribed. Cas proteins form an effector complex with matured crRNA which serves as a guide and ensures the target interference. In Type I CRISPR-Cas systems, invading DNA is detected by a large ribonucleoprotein surveillance complex called Cascade. The crRNA component of Cascade is used to recognize target sites in foreign DNA (protospacers) by

formation of an R-loop driven by base-pairing complementarity. Directional R-loop propagation that is initiated at the PAM and further extends towards the protospacer end has been a long standing hypothesis for DNA targeting by CRISPR-Cas systems (Semenova et al., 2011, Sternberg et al., 2014, Szczelkun et al., 2014). However, a direction independent R-loop formation could not be ruled out. In this work, the hypothesis was investigated applying single molecule and biochemical approaches.

(March 5)

Diana Reznikova

**INFLUENCE OF SIDERITIS TAURICA
AND PHARMACY COLLECTION
„SADIFIT“ ON LIPID PEROXIDATION
AND ANTIOXIDATIVE SYSTEMS IN
ALLOXAN – INDUCED DIABETIC RATS**



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OBJECTIVE:

The present study was undertaken to investigate the antidiabetic capacity of extracts of *Sideritis taurica* and pharmacy collection “Sadifit” on lipid peroxidation and antioxidative systems of rats with alloxan-induced diabetes.

METHOD:

Extracts of *Sideritis taurica* and pharmacy collection “Sadifit” were given to laboratory animals instead of water for 7 days with standard diet. Then 30 male rats were randomly divided

into 6 groups: control, alloxan-induced diabetic, receiving Sideritis extract, receiving "Sadifit" extract, diabetic plus Sideritis extract and diabetic plus "Sadifit" extract treatment groups. Liver samples were taken from all animals and analyzed for superoxide dismutase and catalase activities and malondialdehyde levels.

RESULTS:

Compared to the intact control group, superoxide dismutase and catalase activities in the diabetic group were higher, whereas malondialdehyde levels were significantly higher than those in the intact control group. Due to receiving plant extracts, the antioxidative system and the malondialdehyde levels in the diabetic plus Sideritis and "Sadifit" respectively extracts treatment reached elevated levels of catalase and normal levels of superoxide dismutase and malondialdehyde levels in those in the healthy group.

CONCLUSIONS:

These data demonstrated that the levels of lipid peroxidation of diabetic rats were high, whereas there was a slightly increase in the basal antioxidant enzyme activities. However, extracts of pharmacy collection "Sadifit" and Sideritis tauricamay attenuate oxidative stress by enhancing antioxidant enzyme activities and decreasing lipid peroxidation levels in experimental rats with diabetes.

The authours of my abstract are me and my professor Tatsiana Zyranava.

(March 6)

Ivan Reznikov

A NOVEL SORBENT ON THE BASIS OF HYDROLYSIS LIGNIN FOR OIL SPILL ELIMINATION



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The problem of surface water purification from oil spills is of great concern, as the consequences of a spill is a colossal damage for the biosphere. Oil presence in water resources is caused not so much due to disasters, but because of the spilling during trouble-free situation: during production (eg offshore), during transporting by sea, rivers or pipeline transport, loading and unloading tankers, during tank or wheel sets washing, etc. Overtime, the problem of oil waste products is just increasing.

A new hydrophobized oil sorbent was created on the basis of hydrolytic lignin. Hydrolytic lignin is a large-capacity waste of hydrolysis industry which, not finding wide applications, is stored and occupies large areas in heaps of different woodworking enterprises, including hydrolysis plants in Rechitsa and Bobruisk (both Belarus).

Influence of different sorbent characteristics, including the nature of hydrolyzed lignin, particle size, humidity, etc. and fuel characteristics on oil capacity was investigated. Slight linear decreasing was found, analyzing the effect of sorbent humidity for all investigated fuels. Organosolv lignin showed the worst fuel capacity, whereas hydrolytic and enzymatic lignin demonstrated similar values. The impact of particle size was studied. It was discovered that similar oil capacity remains for an interval of particle size, followed by decreasing oil capacity with small particle sizes.

A monolite layer of oil-sorbent product is formed, as a result of oil sorption. Its strength to inner forces and stability in wind conditions were simulated.

(March 6)

Aleksandr Osipenko

TARGETED LABELING OF SMALL NON-CODING RNAS

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Small non-coding RNAs such as microRNAs (miRNAs) and small-interfering RNAs (siRNAs) are among the most studied biological objects of the last decade. Present in the widest range of eukaryotes, including humans, these small molecules with its numerous functions have high importance in almost all main biological processes. It is not surprising that differences in small RNA levels were determined as potential biomarkers in cancer, neurological and many other diseases. However detection and extraction of these molecules are still challenging to scientists. Here we present novel fast and easy one-step labeling of small RNAs that allows extraction of these molecules and more labile two-step labeling that provides wide selection of different reporter groups, such as biotin and fluorophores. Both methods use synthetic analogues of S-adenosyl-L-methionine and exploit high specificity of methyltransferase HEN1 to double-stranded 21 to 24 nucleotides long RNA molecules, namely mature miRNA/miRNA* and siRNA/siRNA* duplexes, minimizing non-specific detection and/or extraction of DNA or irrelevant types of RNA molecules, such as transfer RNAs or fragments of long RNAs.

(March 6)

Anastasiya Volakhava

THE STRUCTURAL DIVERSITY OF RNA PRODUCTS OF RUNX1T1 PART OF THE FUSION ONCOGENE RUNX1 – RUNX1T1

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The t(8;21)(q22;q22) is one of the most common chromosomal translocations found in acute myeloid leukemia (AML). The resulting fusion protein RUNX1-RUNX1T1 from this translocation has 752 amino acids. However, studies have shown alternative transcripts of RUNX1-RUNX1T1 to be co-expressed alongside the full-length transcript. These transcripts often occur as a result of alternative exon usage or as a result of presence of alternative points of initiation and termination of transcription. They may play a role of additional factors to the full-length chimeric protein, which may enhance or induce the development of leukemia. Therefore, it is very important to pay attention to the study of alternative gene transcripts.

The aim of this work was to study the structural diversity of RNA products of RUNX1T1 part of the fusion oncogene RUNX1-RUNX1T1. To achieve this goal we used such methods as the method of cDNA synthesis; amplification of new RNA products; cloning the fragments into the vector; the method of short hairpin RNA.

As a result, we have optimized the conditions of amplification of new RNA products of RUNX1-RUNX1T1; cloned into the T-vector obtained RUNX1T1 fragments of hybrid oncogene; designed, synthesized and cloned into the pLVTHM vector sequence which encodes a short hairpin RNA to 17a exon of RUNX1T1.

(March 6)

Linda Vecbiskena

IN VITRO BIOACTIVITY AND CELL RESPONSE OF CALCIUM PHOSPHATE BIOCOMPOSITES FOR BONE REGENERATION

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Nowadays, there is a particular interest on inorganic nanofillers of calcium phosphate (CaP) for use as bone graft substitutes [1]. Despite the progress to date, nanostructured CaP bioceramics – especially hydroxyapatite and β -tricalcium phosphate – still have the potential to improve the field of hard tissue engineering. Furthermore, calcium phosphate biocomposites demonstrate the ability to support cell attachment and proliferation in bone-contact applications [2,3]. Along this direction, biomaterial research focuses on the improvement of design features and understanding the interaction between implant surface and biological system [4]. This research developed the biocomposites by the incorporation of inorganic nanofillers of calcium phosphate in natural biodegradable polymer – chitosan – via an electrochemical technique. The physicochemical and biological properties of obtained CaP biocomposites were characterized.

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POSTER PRESENTATIONS

Urtė Sudnickaitė

„Questionnaire study of emergency contraception use among young women in Lithuania“

Ieva Polianskytė, Urtė Sudnickaitė, Neringa Burokienė

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Objective: To find out the motives, frequency and patterns for the use of emergency contraception among various groups of women.

Research Method: A questionnaire based cross-sectional survey was conducted in 2013-2014 year. The questionnaire included 11 questions covering sexual behaviours and contraceptive use. Final analysis included 1058 questionnaires.

Results: 767 (72.8%) women stated that they had not used contraceptive protection during intercourse, 286 (27.2%) women stated that they constantly use protection. 559 (53.4%) women admitted to have used emergency contraception. The motives of emergency contraception use were the following: condom rupture - 246 (35%), forgetting to take a pill - 17 (2.4%), no prior protection - 246 (35%), not feeling assured about protection used - 177 (25.2%), sexual abuse - 16 (2.3%). Women with children used emergency contraception more often than women without children ($p < 0.03$). Women who started having sex <15 years age and between 15-20 years of age used emergency contraception more often than women who started having sex between 21-24 and 25-30 years age ($p < 0.03$). There was no statistically significant difference between the use of emergency contraception in groups of

different age and education.

Conclusions: More than half of the respondents have used emergency contraception. Women who started having sex before 15 years of age, between 15-20 years of age, and women with children tended to use the emergency contraception more often.

Ieva Polianskytė

„Patent ductus arteriosus in premature neonates“

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Objective: to compare patent ductus arteriosus (PDA) pharmacological treatment results and prognosis within groups of neonates of different gestational age, birth weight and additional pathology.

Methods: we performed a retrospective 2009-2012 year case history analysis of neonates diagnosed with patent arterial duct hospitalised in Vilnius University Hospital Santariškių Clinics Childrens hospital, center of neonatology. A total of 95 case histories were included into the research.

Results: pharmacologic treatment was prescribed to 62 (65,3%) and 33 (34,7%) neonates were given only symptomatic treatment. PDA closure was observed in 53 (55,8%) neonates, in 42 (44,2%) subjects PDA closure was not observed. Neonates born before the 30th week of gestation, weighing less than 1000g., with additional pathologies (respiratory distress syndrome, kidney insufficiency, pulmocardial insufficiency, perinatal ischemic encephalopathy) were treated surgically more often ($p < 0,05$). PDA size,

closure rate, significance reliably correlates with necrotizing enterocolitis and kidney insufficiency diagnoses ($p < 0,01$). PDA closure time related significantly with the size of PDA ($p < 0,05$).

Conclusion: PDA closure regarding groups of different gestational age, birth weight or treatment choice did not differ. Extremely premature neonates, with very low birth weight and additional pathologies, newborns treated with indomethacine and ibuprophen, or inbuprophen alone were treated surgically more often. No significant difference of PDA closure was found within groups of neonates of different gestational age, birth weight or treatment choice was observed.

Monika Vinčerauskaitė **„Pupil bowel problems“**

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Background. To examine the 10 - 12 grade students bowel peculiarities: the frequency, nature, accompanying symptoms, food affect.

Material and methods. Anonymous questionnaires were distributed to 150 students. The questionnaire of original 11 questions includes questions about the frequency of bowel movement, nature, food affect for the bowel movement and bowel disorders associated with symptoms, their frequency. Data were processed using SPSS 20.0 statistical software. The difference between the data was evaluated as statistically significant when the significance level of $p < 0.05$.

Results. 148 students participated in the survey: 91 (61.5%) girls and 57 (38.5%) boys. The age was 16 - 20 years (average 17,33

years). 52.8% of the girls evacuate one time per day, 24.2% several times a day, 18.7% every two days, 4.4% less than once every two days. 40.4% of the boys evacuate one time per day, 40.4% several times a day, 17.5% every two days, 1.8% less than once every two days. A bad appetite about 7.7% of girls and 7% of boys have. According to the Bristol scale for a girls typical type I - 6.6%, type II - 13.2% , type III - 57.1%, type IV - 23.1%, type V - 0%; for boys type I - 0%, type II - 12.3%, type III - 43.9%, type IV - 42.1%, type V - 1.8%. Bloating is characterized by 27.7%, 51.4% rarely, does not occur in 20.9% pupil. Usually bloating is common in children who bowels less than every two days (80%) and by Bristol scale is type I (66.7%). Abdominal pain occurs in 12.8%, 50.7% rarely, does not occur in 36.5% pupil. The most common abdominal pain is common in children who bowel less than every two days (40%) and by Bristol scale is the type I (50%). Painful bowel movements characterized by 1.4%, 20.9% rarely, does not occur in 77.7% pupil. Without eliminates doldrums occur in 13.5%, rarely - 17.6%, does not occur in 68.9% pupils. Headache is characteristic 16.9%, rarely - 12.8%, uncharacteristic of 70.3% pupil. Headache is typical for children who bowel less than every two days (60%) and by Bristol scale is type I (50%). The food which often stiffens faeces are flour products by 38.5%, rice - 25%, chocolate - 6.8%, bananas - 5.4%, milk - 2.7%, cocoa - 2.7% and other products 2.7%, none for 16.2% pupil.

Conclusions. The obstipation is characterized in 4.4 - 19.8% girls and 1.8 - 12.3% boys (according to the frequency of defecation and Bristol scale). The most common complaints: bloating, less headache and abdominal pain. These symptoms are more typical in children who bowel less than once every two days and / or according to the Bristol scale bowels in type I. Faeces mostly concremented by flour products by 38.5% and rice 25%.

Monika Vinčerauskaitė

„The diagnostic value of inflammatory cells in the pleural fluid“

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Aim of the study is to evaluate the diagnostic value of inflammatory cells in the pleural fluid . Material and methods. A retrospective analysis of 584 patients with pleural effusion fluids was carried out. The sample consisted of 314 (54 %) male and 269 (46 %) females. According to the fluid reason in the pleural effusion, patients were divided into two groups: neoplasia (n = 196), transudate (n = 83), tuberculosis (n = 65), pneumonia (n = 64), other conditions (n = 64), and undetermined etiology (n = 112). All subjects were studied with regard to the pleural fluid white blood cell count, as well as neutrophils, lymphocytes, eosinophils, basophils, monocytes percentage distribution.

Results. The largest number of white blood cells is in the pleural fluid of pneumonia subject group ($13.7 \pm 24.9 \times 10^9 / L$, $p < 0.05$), while the lowest - in transudate group ($0.8 \pm 0.9 \times 10^9 / L$, $p < 0.05$). In neoplasia, tuberculosis, and other conditions groups pleural fluid white blood cell count was the same. The highest percentage average of neutrophils is in the group of pneumonia (73.9 ± 21.7 , $p = 0.001$). Also, the percentage average of neutrophils in the pleural fluid of other conditions group (24.7 ± 25.2) was higher than in tuberculosis group (11.3 ± 18.1 , $p = 0.011$). Pleural fluid percentage average of lymphocytes in tuberculosis (81.8 ± 20.7), transudate (77.4 ± 19.4), undetermined etiology (76.3 ± 26.4) and neoplasia groups (71.5 ± 26.7) were similar, but higher than in the group of pneumonia (19.7 ± 18.6 , $p < 0.001$) and other conditions

(29.5 ± 3.6 , $p = 0.005$). Pleural fluid percentage average of eosinophils in the other conditions group (13.7 ± 21.9 , $p < 0.005$) was the highest. The average percentage of monocytes, macrophages, basophils was similar in all groups.

Having employed cluster analysis three clusters were distinguished. The first cluster is characterized by an increase in pleural fluid leukocyte count and percentage of neutrophils. The second is with the normal pleural fluid white blood cell count and an increase in the percentage of eosinophils. The third cluster is characterized by the normal pleural fluid white blood cell count and a higher percentage of lymphocytes.

Conclusions. Evaluation of pleural fluid leukocyte common number can help to separate the pleural fluid of transudate and exudate. Increase of percentage number of neutrophils is generally associated with pneumonia, but increase in percentage number of lymphocytes, eosinophils does not significantly to differentiate diagnosis of pleural effusion.

Berta Vištartaitė

„MRI in the diagnosis of Creutzfeldt–Jakob disease: a retrospective study“

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Background. The objective of this study is to identify the value of a head MRI in a clinical diagnosis of CJD and to compare MRI findings with electroencephalogram(EEG), blood and intracerebral

fluid test results.

Methods. A retrospective study of 3 patients hospitalised with severe neurological disorders was performed. 2 males and 1 female patient were evaluated clinically and a diagnosis of a specific dementia was made. The average age of onset was 54.33 years. The average duration of disease was 5.33 months. MRI imaging was used to help selecting clinical diagnosis. The correlation between clinical, MRI, electroencephalogram, blood and intracerebral fluid test findings was analyzed.

Results. All studied cases had a typical clinical course of disease. At the onset a rapidly progressive dementia manifested for all patients (100%) and coordination impairment occurred for 2 of them (66,6%). Later depression of consciousness, progressive loss of cognitive functions developed for all patients (100%), followed by rapidly progressive ataxia and myoclonic hyperkinesia for 2 patients (66,6%). All EEG exhibited generalised slow activity and periodic biphasic and triphasic waves. MRI of the brain predicted pathologic diagnosis in all 3 patients with dementia (100%). Typical MRI findings like hyperintensity in basal ganglia and cortical areas near the midline were observed in all cases(100%). Blood and intracerebral fluid test showed no noticeable changes.

Conclusion. There is significant correlation between clinical, MRI and EEG findings in patients with CJD. All cases were diagnosed related to these findings. MRI of the brain provides useful information in CJD diagnosis, therefore clinicians should include this test in their differential diagnoses of new onset dementia which rapidly manifestates in patients with CJD.

Goda Milinavičiūtė

„The Analysis of Flourina Ted Benzenesulfonamides Binding to Carbonic anhydrase VI Purified from Bacteria E.Coli and Human Saliva“

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Recombinant proteins are produced by laboratory methods of genetic recombination. Nowadays they are found in essentially every biological research laboratory. E. coli is one of the earliest and most widely used hosts for the production of recombinant proteins. However, it is difficult to express large proteins in E.coli. Additionally, E.coli is not the best expression system for S-S rich proteins and proteins that require post-translational modifications [1]. Therefore, it is important to evaluate if the recombinant protein is a suitable model for the analysis of the certain protein found in human.

Our laboratory has been working with recombinant proteins – carbonic anhydrases (CA). They are metalloenzymes that maintain pH homeostasis by catalyzing the reversible hydration of carbon dioxide. There are 12 catalytically active CA isoforms in human differing in expression patterns, tissue localization, cellular distribution and enzymatic properties [2]. CA VI is the only secreted isozyme of the human CA family. CA VI is linked with certain cancers which might be associated with salivary glands [3]. Therefore, it is important to analyze the affinity of sulfonamide inhibitors for CA VI.

Human recombinant CA VI was expressed in E. coli. Also, half-liter of saliva was collected from twenty volunteers. CA VI from these sources was purified by affinity chromatography. The thermody-

namics of interaction between the enzyme and 4-substituted-2,3,5,6-tetrafluorobenzenesulfonamides were determined by the fluorescent thermal shift assay (FTSA). The affinity of the inhibitors designed and synthesized in our laboratory for CAVI from saliva was similar to the affinity for CAVI from E. coli.

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Monika Vinčerauskaitė **„Children’s Multiple Sclerosis peculiarities“**

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Aim of the study is to evaluate the peculiarities of children’s multiple sclerosis etiology, clinical, research and treatment in the Children’s Hospital, Affiliate of Vilnius University Hospital Santariskiu Klinikos.

Material and methods. A retrospective analysis of children hospitalized 2008 - 2013 in branch for multiple sclerosis (MS), the clinical data. Evaluated etiology, clinical, research, treatment and relapse.

Results. In 2008 - 2013 8 patients were hospitalized: 4 girls and 4

boys; total: 39 hospitalizations: 1 time 2 patients, 3 times 2 patients, 4 times 1 patient, 6 times 1 patient, 9 times 1 patient, 12 times 1 patient. A year of disease: in 2008 - 1 patient, in 2009 - 4 patients, in 2010 - 1 patient, in 2013 - 2 patients. The first symptoms occurred from 11 to 17 years (11, 12, 13, 15, 15, 16, 16, 17), the average - 14.4 years. The first attack in 6 of the 8 patients (6/8) was provoked by infectious disease: 5/6 - acute upper respiratory tract infection, 1/6 - gastroenteritis. Two patients are brothers whose mother had MS. The first signs of MS in 6/8 patients were numbness of leg, 4/8 numbness of arm, 2/8 vision disorder, 1/8 facial numbness, 1/8 ataxia, 1/8 dysgeusia. The main symptoms of relapse: 5/6 ataxia, 5/6 numbness of leg, 5/6 numbness of arm, 3/6 numbness of facial, 3/6 vision disorders, 3/6 pelvic disorder, 2/6 torso numbness, 2/6 dysgeusia, 1/6 language disorder, 1/6 hearing impairment. Identify visual disorders: 1/8 color vision disorder, 1/8 - visual field constriction, 1/8 strabismus, diplopia. Auditory potentials disorders: 3/8 - conduction disorders of hearing cord. CSF changes: 6/8 - positive oligoklonan band, 7/8 - increased IgG, 3/8 - increased IgG / albumin ratio. MRI of the brain: the demyelination - 8/8; spinal MRI: spinal cord demyelination - 6/6: the cervical part - 6/6, thoracic - 3/6. 8/8 methylprednisolone for the treatment when were relapse, 3/8 recombinant interferon (Avonex), 1/8 intravenous immunoglobulin (Kiovig) and immunosuppressive mitoxantrone (Onkotrone), 1/8 applied plasma replacement therapy sessions. Disability is given 2/8 patients.

Conclusions. Multiple sclerosis - a rare disease for children (8 cases in 6 years). Disease starts at 11-17 (average - 14.4) years. The first attack is usually provoked by infectious disease (6/8). Usually the first symptom was numbness in the limbs, others - facial numbness, vision, coordination disorders. The disease is diagnosed by MRI and CSF analysis. Exacerbations treated with methylprednisolone. Only 3/8 - get constant immunomodulatory treatment. 2/8 have permanent neurological impairment and disability.

Vytautas Raškevičius

„Comparison of performance of docking, LIE, metadynamics and QSAR in predicting binding affinity of benzensulfonamides“



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The design of inhibitors specific for one relevant carbonic anhydrase isozyme is the major challenge in the new therapeutic agents development. Comparative computational chemical structure and biological activity relationship studies on a series of carbonic anhydrase II inhibitors, benzenesulfonamide derivatives, bearing pyrimidine moieties are reported in this paper using docking, Linear Interaction Energy (LIE), metadynamics and Quantitative Structure Activity Relationship (QSAR) methods. The computed binding affinities were compared with the experimental data with goal to find out the best method for the investigated carbonic anhydrase/inhibitor system. From those tested methods initially only QSAR showed promising results ($R^2=0.83-0.85$ between experimentally determined versus predicted pK_d values.). Possible reasons were discussed and two promising improvements were suggested: one is alternative equation for LIE-like method which was tried out and gave far better results (R^2 between experimentally determined ΔG_{bind} versus predicted ΔG_{bind} was improved from 0.24 into 0.50) and other for docking.

Deividas Sabonis

„Alignment of magnetic solenoid lenses for minimizing temporal distortions of ultrashort electron pulses“

Deividas Sabonis

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As a part of every ultrafast electron diffraction setup magnetic lens systems exist. In magnetostatic fields only the particle's absolute velocity, but not the effective path length is conserved. As a result temporal distortions in electron pulse might appear. Few possible mechanisms responsible for distortions of a magnetic lens were already explained in. It is noticed that misalignment of the lens has a great effect on pulse broadening as well. Furthermore it leads to a spatial shift of the focus point, i.e. the focus point is no longer on the axis of symmetry of the system. Therefore it is important to identify influences of magnetic lens misalignment to the temporal resolution of ultrashort electron pulses. Discussion goes along with the model case of a simple solenoid lens and is supported by numerical simulations. First to our knowledge guidelines for alignment of a magnetic lens are given.

Alina Vaitsiankova

„Correlations between the relative expression level of the genes of alternative splicing and NMD systems and fusion oncogene RUNX1/RUNX1T1 transcripts in Kasumi-1 cells“



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Introduction: Fusion oncogene RUNX1/RUNX1T1, resulting from t(8;21)(q22;q22) translocation, is highly related to acute myeloid leukemia (AML) progression. There is found unusual diversity of alternative transcripts of this oncogene, which may be determined by leukemia-specific expression profile of the genes which regulate alternative splicing (AS) and mRNA surveillance, particularly of NMD (nonsense-mediated mRNA decay) system. The aim of our study was to evaluate the expression level of several alternative transcripts RUNX1/RUNX1T1 and the genes of the AS and NMD genes systems and to identify their possible interdependencies in AML cells.

Materials & Methods: Total RNA was extracted from the Kasumi-1 cells, which are positive for t(8;21)(q22;q22). Further cDNAs were prepared using Oligo-dT and SuperScript III reverse Transcriptase. Quantification of target mRNAs was performed using qPCR with the specific primers pairs. Gene encoding TATA Binding Protein (TBP) was used as the reference gene. Spearman's rank-order correlations were calculated to analyze statistical dependencies.

Results: The relative expression level of the RUNX1/RUNX1T1 transcripts which are terminated in the 17 exon is 3,69 ($\pm 0,91$), in the 17a exon – 0,21 ($\pm 0,04$), in the 15a – 2,34 ($\pm 0,44$), in the 12a – 0,38 ($\pm 0,06$). Transcripts containing 15a-15 exon junction were also found in Kasumi-1 cells (relative expression level – 0,15 ($\pm 0,03$)) despite the fact that these transcripts containing premature translation-termination codon are potential target for NMD system. Also we quantified certain AS (GSPT1, UPF3A, MAGOH, DCP2, DCP1B, SMG1), NMD (PTBP1, RBFOX3, RBM25, SRPK2, SRSF6, TIA1) genes, analyzed correlative relationship with expression of fusion gene alternative transcripts.

Conclusion: It was shown that some of the alternative transcripts, which encode the truncated protein isoforms, are expressed at

a relatively high level. Moreover, significant correlations between the expressions of the alternative transcripts and genes of the AS and NMD systems were identified. These data open new direction in studying factors of aggressiveness of t(8;21)(q22;q22) positive leukemia and search for new therapeutic targets.

Simona Rinkevičiūtė

„The Impact of Mulde (Wenlock: Lower Silurian) Mass Extinction Event on The Ecological dynamics of Ostracodes“

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The Mulde mass extinction (~428 myr ago) was important geological event. Ostracodes - important component of benthic marine communities and allows understanding of the past paleobiological processes.

The upper Homerian part of the Gėluva-118 core section was studied, 23 samples were taken (961,5-1007m). This interval spans ~1myr time period, from the beginning of the Mulde extinction up to the final stages of recovery. The collection of ostracode shells, their taxonomic identification and numerical analyses of frequency changes were performed.

The results revealed, that Mulde bioevent was followed by an increase in numbers of individuals and local taxonomic richness. After ~100 thousand years the maximum in local species diversity was reached. Shannon entropy, evenness the dominance indexes show, that at the beginning of the studied time the high abundances of individuals were associated with the high asymmetry of abundance distributions, with several species dominating. This observation points to the decrease of complexity of ostracode

communities in the initial post-extinction stage. Through Wenlock there was decline in species dominance and there was opposite increase in the entropy and the evenness. This pattern shows that there was steady recovery in the complexity of benthic ecosystems. One of the determinants was the change of eustatic sea level. During high-stands of the sea level there were higher levels of abundance, species richness, complexity of paleocommunities. There is one exception – the initial phase of the recovery.

Dominykas Aleknavičius

„Tritrophic interaction: *Cotesia glomerata*, the natural enemy of the large cabbage white (*Pieris brassicae*), smells volatiles emitted by cabbages (*Brassica oleracea*)“



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Cotesia glomerata L. (Hymenoptera: Braconidae) is a tiny gregarious parasitoid wasp. It can parasitize the Pieridae species caterpillars, but prefers the gregarious large cabbage white *Pieris brassicae* L. (Lepidoptera: Pieridae) as a host (Geervliet et al., 2000). Parasitoids lay their eggs in other insects using them as a sub-

strate; the larvae then feed and develop inside the host-insects, and later kill them (Mastauskis, 1939).

In order to locate their host-insect, parasitoids, while performing long-range host search, use herbivore-induced volatile organic compounds (HI-VOCs) emitted by plants (Heil, 2014). Our research was aimed at finding out which cabbages (*Brassica oleracea* L.) VOCs can the *C. glomerata* smell. To discover that we used gas chromatography electroantennogram (GC-EAG) detection.

We find out that *C. glomerata* females can smell 32 VOCs emitted by Cauliflower (*Brassica oleracea* var. botrytis); males – 17. Also, *C. glomerata* females can smell 22 VOCs emitted by White cabbage (*Brassica oleracea* var. capitata f. alba); males – 12.

Therefore, females can smell more VOCs emitted by cabbages than males. This can be explained by the fact that it is very important for the female to find a cabbage, locate the potential host insect on it, and lay eggs. Meanwhile, males may use cabbage VOCs for long range female search (Bleeker, 2004), because female sex-pheromones spread only over the radius of about 18 cm (Xu et al., 2014).

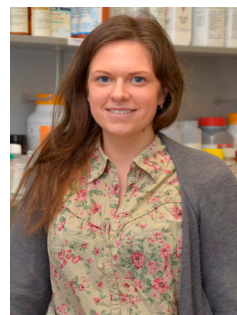
Inga Šileikaitė

„Investigation of metagenomic gene cluster with exposed lipolytic activity“

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The feature of enzymes (biocatalysts) to operate effectively not only inside the cell, but also in vitro is essential for biocatalytic

application of enzymes for various scientific and industrial needs. Therefore, the demand for enzymes with new or specific characteristics is constantly increasing. Currently, in the laboratory is possible to cultivate less than 1 % of the microorganisms found in the nature, which is why only a small part of their genetic diversity can be covered by standard microbiological methods. Metagenomics is one of the modern methods for searching and investigation of new enzymes, thus, reducing the cultivation problem. This method is based on the direct extraction and analysis of total DNA in the environmental samples.

The aim of our work was to detect biocatalysts with lipolytic activity in constructed metagenomic DNA library. We have constructed metagenomic DNA library from sludge which result in 3,500 recombinant clones. Functional analysis on two selective agar growth media (with rhodamine B and tributyrin) revealed several clones with lipase/esterase activity. However, sequencing analysis did not show any lipase/esterase gene, but indicated a cluster of six genes with various catalytic activities. Further investigation of this gene cluster will be presented during poster session.

Sofija Semeniuk

„MAPK role in ethylene biosynthesis in *Arabidopsis thaliana*“

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Mitogen-activated protein kinases (MAPK) are among the most common signaling molecules in plants. They are responsible for



the control of the mitosis, proliferation, gene expression and other intracellular processes and responses in plants. Specifically, *Arabidopsis thaliana* MAPK MPK6 functions by phosphorylating and stabilizing the enzymes of the ACC (1-aminocyclopropane-1-carboxylate) synthase family – these ones act as rate-controlling proteins in ethylene biosynthesis. Ethylene itself is a plant growth hormone, which regulates the processes involved in plant development and also it is actively produced in response to mechanical or chemical wounding. It is known that ethylene in plants is synthesized from methionine and three enzymes are involved in the process of biosynthesis - ACS (1-aminocyclopropane-1-carboxylate synthase), ACC N-malonyl transferase and ACO (1-aminocyclopropane-1-carboxylate oxidase). First, ACS, under the influence of MPK6, converts S-adenosyl-L-methionine into ACC (1-aminocyclopropane-1-carboxylic acid). Next, either ACC N-malonyl transferase converts it into MACC (1-(malonylamino) cyclopropane-1-carboxylic acid) or with the help of ACO ethylene is produced out of it. In this study the role of MPK6 in ethylene biosynthesis pathway has been analysed. The results of this research are focused on the amounts of ACC and MACC, which are produced during ethylene biosynthesis and on the activity of the enzyme ACO measured using gas chromatography in *Arabidopsis thaliana* MPK6 knockout lines comparing to wild type plants.

Raimonda Kubiliūtė

„The alteration of ABCB1 and ABCC1 expression in lipophilic agents induced resistant MX-1 and CX-1 cancer cell lines“

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Multidrug resistance (MDR) is a common cause of cancer chemotherapy failure. Although MDR can develop through a variety of mechanisms, the overexpression of ABC family drug transporters such as P-glycoprotein (Pgp; encoded by ABCB1) and multidrug resistance associated protein 1 (MRP1; encoded by ABCC1), is an established cause of cancer resistance to chemotherapy.

Purpose:The study aims at analysis of MDR mechanisms in lipophilic agents doxorubicin (DOX) and tetraphenylphosphonium (TPP)-induced resistant human breast (MX-1) and colon (CX-1) cancer cell lines.

Methods:The level of ABCB1 and ABCC1 expression was assessed using quantitative real-time PCR (qPCR). DNA methylation status was determined with methylation specific PCR (MSP). A comparison between wild-type and drug-resistant cell lines was performed using gene expression microarrays.

Results: ABCB1 expression was weak in MX-1 wild-type (wt) cells and slightly increased in MX-1/DOX subline, but MX-1/TPP cells showed more than million-fold higher expression of ABCB1 than wt cells. ABCB1 expression was high in CX-1 cells but decreased in CX-1/DOX subline. In both cell lines the expression of ABCC1 was high and increased approximately 2-4 folds in DOX-resistant sublines but remained nearly unchanged in MX-1/TPP cells. In both, wt and DOX-resistant cell lines, ABCB1 gene was partially methylated, while ABCC1 – unmethylated. No considerable difference in methylation of tumor suppressor and pluripotency genes was identified in wt and resistant cell lines. Gene expression profiling by microarrays suggests that drug metabolizing enzymes, in addition to drug transporters, can be involved in cell resistance to DOX.

Roberta Misgirdaitė

„Osteogenic differentiation-related changes in miRNA expression profile of human mesenchymal stem cells“

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Background. Mesenchymal stem cells (MSCs) are the multipotent stem cells of adult human tissues that have the ability to replicate with high proliferative rates and are responsible for the tissue renewal and regeneration. MSCs are capable of differentiating into osteogenic, adipogenic, chondrogenic, and myogenic lineages. MiRNAs, typically 22 nucleotides-long, single-stranded noncoding RNAs, are known to be involved in regulation of cell differentiation, proliferation and development. Furthermore, they play important roles in osteoblast and adipocyte differentiation and function.

Methods. Global miRNA expression profiling of human adipose-derived MSCs (ADSCs) and synovial membrane-derived MSCs (SM-MSCs) was performed by microarray hybridization-based method. Essential pluripotency and differentiation markers were analyzed using 384-well format TaqMan® Human MicroRNA A+B Cards Set v.3.0 (TLDA) in ADSCs that were undifferentiated and differentiated to osteogenic or adipogenic lineages.

Results. Microarray results showed 23 significantly up-regulated miRNAs (miR-4284, miR-20a, miR-1225, miR-2861 and etc.) and 16 down-regulated miRNAs (miR-210, miR-335, miR-27b, miR-140 and etc.) during osteogenic differentiation in both ADSCs and SM-

MSCs. TLDA results showed significantly up-regulated miRNAs (miR-20a, miR-126 and etc.) and down-regulated miRNAs such as miR-335 and miR-210. For more detailed analysis of the finding, differentiation of ADSCs into adipogenic lineage was also investigated by TLDA method. Analysis showed that miR-146a, miR-30b and miR-24 expression was the same as in ADSCs differentiated to osteogenic lineage.

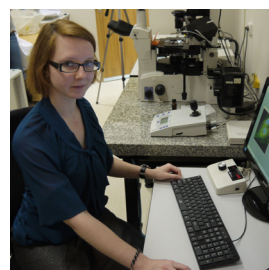
Conclusions. In summary, we identified essential miRNAs, which regulates stemness and differentiation state of human MSCs.

Nadežda Šumilova

„Ras GTPase-activating protein 1 is localized in the cell nucleus“

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The Ras GTPase-activating protein 1 (p120-RasGAP) is a multidomain protein involved in cell proliferation, migration and apoptosis regulation. The main cellular function of p120-RasGAP is to stimulate GTPase activity of a family of GTP-binding Ras proteins and hereby to suppress their signal transduction from extracellular receptors toward intracellular downstream effectors.

For a long time it was anticipated that p120-RasGAP resides and functions only in the cell plasma membrane/cytoplasm compartments. Here we present data showing that p120-RasGAP can also be found in the cell nucleus of different cell lines. Microscopical examination of endogenous and overexpressed p120-RasGAP in live and fixed cells, as well as studies of cell fractionation into sub-

compartments unambiguously show the p120-RasGAP presence in cell nucleus. The p120-RasGAP nuclear translocation dynamics analyzed by FRAP technique will be also presented and discussed. Unexpected nuclear localization of one of the key regulators of Ras family members raises intriguing questions on p120-RasGAP targets and functions in the cell nucleus.

Acknowledgment: work was partly supported by Research Council of Lithuania (grant MIP-033/2014).

Sergey Golenchenko

„Improving solubility of antistaphylococcal protein LysK-PA by fusion with solubility-enhancement tags“

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LysK-PA is a derivative of the staphylococcal phage K endolysin. In comparison with wild type protein, it consists of only two domains – peptidase and amidase and lacks terminal cell wall binding domain. LysK-PA is extremely promising as antibacterial for clinical use, but unfortunately formed in inclusion body in *E. coli* so additional time- and labor-consuming refolding step needed. Moreover, even being solubilized, enzyme tends to aggregate and lose its activity. The aim of this study is improving solubility of LysK-PA. Tri proteins: small ubiquitin-related modifier (SUMO) of *Saccharomyces cerevisiae*, carbohydrate binding module (CBM) of *Thermotoga maritima* and peptidase domain of streptococcal phage B30 endolysin (B30-CHAP) were chosen for this purpose. Tri recombinant constructions were developed: SUMO_tev_LysK-PA, CBM_tev_LysK-PA, LysK-PA_B30-CHAP. Recognition site for TEV-protease was introduced in-between N-terminal tags (SUMO and CBM) and core sequence. Recombinant constructions were

cloned in pET24b expression vector and transformed into E. coli BL21 (DE3) Gold. Expression was induced with IPTG in different temperatures: 20, 25, 28 and 37 °C. Cells were collected followed by disrupting with B-PER II Bacterial Protein Extraction Reagent and supernatant were examined for antistaphylococcal activity (which indicates presence of soluble target protein). Soluble unmodified LysK-PA and SUMO_tev_LysK-PA were found only in 20 °C, so SUMO didn't improve target solubility. The activity of CBM_tev_LysK-PA and LysK-PA_B30-CHAP was observed up to 28 °C. In addition to improving solubility, CBM can simplify protein purification and B30-CHAP may expand antibacterial activity to Streptococcus species. To sum up, solubility of LysK-PA was improved with CBM and B30-CHAP domains, additional benefits of their fusion may be revealed by further examination.

Deividas Ražanauskas

„TMPRSS2-ERG fusion transcript expression and ABCA1 gene promoter methylation in prostate cancer“



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Background: The TMPRSS2-ERG fusion gene is one of the most common chromosomal rearrangements in prostate cancer (PCa). In the numerous studies this rearrangement has been investigated as a potential diagnostic and prognostic biomarker.

Recent data shows that increased level of cholesterol in prostate

cells is associated with the aggressive PCa development. This was linked with ABCA1 – the cholesterol and lipid transporter –promoter hypermethylation.

In this study, TMPRSS2-ERG fusion transcript expression and gene ABCA1 promoter methylation frequency were investigated to determine link of these changes with clinical parameters of PCa. Methods: TMPRSS2-ERG expression was determined using RT-PCR method in 51 PCa tissues. ABCA1 gene promoter methylation pattern was investigated with methylation-specific PCR (MSP) in 51 PCa tissues and 16 noncancerous specimens. Links with clinical variables of PCa were estimated using statistical methods. Results: ABCA1 gene hypermethylation was determined in 5 of 51 (9,8 %) PCa samples. Statistically significant correlation between methylation of this gene and clinical parameters of PCA were not established.

TMPRSS2-ERG expression was identified in 36 of 51 (70,6 %) tumor samples, and no statistically significant correlations with clinical parameters were identified.

Conclusion: In this study, TMPRSS2-ERG expression was not confirmed as a potential prognostic biomarker of PCa. Our study confirmed previous results on infrequent ABCA1 gene promoter methylation in low grade PCa.

Karolis Bernotavičius

„Synthesis of new 4-thiazolidinone derivatives targeting Bcl-2“

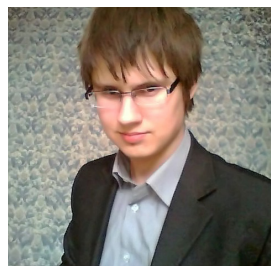
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Introduction: Increased expression of the anti-apoptotic proteins (AAP) is commonly associated with cancer cell survival and resistance to chemotherapeutics [1]. Treating AAP with the new synthetic compounds, potentially could lead to the death of cancer cells without harming healthy ones [1][2].

In this study AAP Bcl-2 was selected as a key target whereas 4-thiazolidinone as a privileged scaffold for compounds based on its broad biological activity [2].

Aim: Based on in silico screening perform the synthesis of new 4-thiazolidinone derivatives targeting Bcl-2.

Methods: The virtual library of ligands created and in silico screening against Bcl-2 was performed by using "Schrodinger software suite". The most potential ligands for synthesis was selected based on their docking results.

Synthesis of the rationally designed 4-thiazolidinone derivatives consist of 3 stages. First Knoevenagel condensation was performed with rhodanine and various aldehydes. Then intermediates were methylated in the position 2. Final compounds were synthesized from various amines and amino acids by performing nucleophilic substitution [3].

The identity of compounds was confirmed by the means UV spectra and elemental analysis, purity by TLC and HPLC.

Results: Initially 877 ligands from 13593 showed moderate affinity towards Bcl-2 ($E \leq -4$ kcal/mol). Further screening lead to identify 96 ligands with high binding affinity ($E \leq -6$ kcal/mol). 21 new compounds were successfully synthesized and the structure and purity were determined.

Conclusions: 21 new compounds were synthesized with the E values between -5,02 and -8,20 kcal/mol towards Bcl-2. Anticancer evaluation is recommended to be performed for potential correlation between in silico and in vitro results.

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Severina Marija Pociūnaitė „Salicylic acid measurements in *Arabidopsis thaliana*“

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Mitogen activated protein kinases (MAPKs) play an important role in signaling cascades in plants as well as in other eukaryotes. MAPK's are associated with cell cycle, developmental processes, abiotic stress, environmental and pathogen responses. Salicylic acid (SA) is one of plant hormones, which is related to plant immune response and pathogen resistance. SA induces systemic acquired resistance (SAR), is connected to hypersensitive response (HR) and acts as a regulatory molecule in different biological

pathways in plants, including MAPK's signaling. Though MAPK's pathways are extensively studied in Arabidopsis plants, there are still a lot of questions concerning SA as a signaling molecule or the outcome of the signaling. Thus, the reason of our study is to select, adapt and employ an efficient and easy method of determination the effect of different MAPK's pathways on SA accumulation under biotic stress in Arabidopsis thaliana using published data. For this experimental stage we are using samples from adult Arabidopsis plants of three different lines (Col-o, NahG and m1) and genetically modified bacteria Acinetobacter sp. ADPWH_lux (Huang et al.). The method is based on measuring accumulated SA amounts by detecting luminescence produced by bacteria. These bacteria produce luminescence in the presence of SA, because a promoter, which is activated by SA is controlling the luciferase gene in bacteria. We aim to measure SA concentration produced by the Arabidopsis plant and determine the actual correlation between SA and MAPK's activation in the future.

Berta Vištartaitė

„Radiologic diagnosis of nonsyndromic craniosynostosis: a retrospective study“

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Background. The objective of this study is to identify the importance of radiological findings and to determine the role of com-

puted tomography(CT) in nonsyndromic craniosynostosis diagnosis.

Methods. A retrospective study of 14 young patients hospitalised with specific morphological changes of the skull was performed. The study consisted of 9(9/14) male and 5(5/14) female patients. The average age of patients was 9 months. The youngest - 3 months and the oldest was 21 months old. All patients (14/14) have undergone CT scans. Final clinical diagnosis was made after reviewing the findings of radiological imaging.

Results. 6(6/14) cases of isolated trigonocephaly, 6(6/14) cases of isolated scaphocephaly and 2(2/14) cases of isolated anterior plagiocephaly were diagnosed. A final diagnosis of craniosynostosis was evaluated based on CT findings and clinical features. All clinical cases demonstrated specific craniofacial deformities and in all CT scans synostotic sutures were observed. MRI, US methods were considered to be not strong modalities for evaluating bony abnormalities and thus cannot be used as the primary method for evaluating craniosynostosis. Also sutural evaluation is inadequate with plain radiography alone, so further investigations should be done.

Conclusion. All patients(14/14) with the diagnosis of craniosynostosis have undergone CT scan. Although CT is related to greater radiation dose, it is the method of choice for evaluating bony abnormalities, so it is important to follow ALARA(dose as low as reasonably achievable) principle. Often you cannot rely on magnetic resonance imaging, ultrasound or plain radiography findings alone, therefore further investigations like CT scan is necessary to help with the making of the diagnosis.

Hanna Nahornaya

**„Production of Antimicrobial Peptide
Esculentin Derivatives As a Part of
Fusion Proteins in E.Coli.“**

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Antimicrobial peptides (AMPs) are promising antibacterial agents. A set of fusion protein tags can be used to improve recombinant AMPs stability and simplify their purification. This study is devoted to cationic AMPs of esculentin-1 family of *Rana esculenta*: esculentin-1b (Esc-1b), and esculentin 1-21 (Esc(1-21)). Esc-1b consists of 46 amino acid residues and has hepta-membered cyclic loop region with a single disulfide bridge at the C-terminus (so-called «Rana-box»). Esc(1-21) consists of 20 N-terminal residues of esculentin-1a and one additional glycine at the C-terminus. Poly-His-tagged small ubiquitin-related modifier (6xHis-SUMO) of *Saccharomyces cerevisiae*, carbohydrate-binding module (CBM9-2) of *Thermotoga maritima* were chosen as the N-terminal fusion partners for esculentin. Recognition site for TEV protease was introduced in between the fusion partner and the target protein. Thus, gene constructions 6xHis-SUMO-TEV-Esc-1b, 6xHis-SUMO-TEV-Esc(1-21), CBM9-2-TEV-Esc-1b and CBM9-2-TEV-Esc(1-21) were cloned in expression vector pET-24b(+) and transformed into *E. coli* BL21-CodonPlus (DE3)-RIPL. Cells were induced with IPTG for 4h at 37 °C. The subsequent analysis of SDS/PAGE electrophoretic data for total cellular proteins revealed the lack of 6xHis-SUMO-TEV-Esc-1b fusion protein expression and low intracellular accumulation of CBM9-2-TEV-Esc-1b protein. At the same time

there was an effective expression of 6xHis-SUMO-TEV-Esc(1-21) and CBM9-2-TEV-Esc(1-21) proteins. One can speculate that Esc-1b has protein degradation signal within its amino acid sequence, but Esc(1-21) hasn't. We are working on precise evaluation of assumed C-terminal degradation signal.

Aidis Tumpa

„Discipline similarities and differences investigation of using 2 different drugs groups (antibiotics and drug that is used for symptomatic treatment of urinary incontinence)“



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Introduction: Failure to comply with the doctor's instructions and inappropriate drug use is a problem, which may result in ineffective treatment or result in life-threatening.

Aim: Compare discipline similarities and differences of 2 patients groups, who use 2 different drugs groups (antibiotics and drug that is used for symptomatic treatment of urinary incontinence)

Methods: To determine whether the drugs are used rationally and that patients adhere to all doctor's instructions was used questionnaire method. A questionnaire form consists of three parts:

1. Common questions; 2. Question for doctor; 3. These questions completed in the end of treatment.

The study was carried in Kaunas medical institutions. The only cri-

teria for selection of patients were age, he had to be over 18 years old. Before the study was obtained authorization from the Biomedical Research Ethics Commission. To get full data from one questionnaire form tooked from 10 to 14 days.

Results: Study included 66 patients: 31 patients in the antibiotic group and 35 patients in drug that is used for symptomatic treatment of urinary incontinence group.

Conclusions: In antibiotic group 18 patients (58.1%) followed the doctor's orders and 13 patients (41.9%) did not followed instructions. In group of drug that is used for symptomatic treatment of urinary incontinence 24 patients (38,6 %) followed the doctor's orders and 11 (31.4 %) did not followed instructions.

Recommendations: Doctors and pharmacists should give more information for patients about drug usage, possible adverse reactions and complications for incorrect use.

Indrė Valiulytė

Promoter methylation of *TES*, *MMP14*, *TFPI2*, *AhR* and *EsR1* genes in CNS gliomas and association with patients clinical data.

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The aim of this work is to identify the frequency of tumor development-related genes promoter methylation in patients with different malignant grade CNS gliomas and connections with patient clinical data and survival. To achieve this purpose, tumor DNA was extracted from frozen tissue and the methylation status was determined by sodium bisulphite modification treatment. TES,

MMP14, TFPI2, AhR and EsR1 genes methylation were performed by using MS-PCR method. MS-PCR products were separated by horizontal electrophoresis and visualized under UV illumination. There were examined 138 patients with different malignant grade CNS gliomas. It was found that promoter methylation frequency in gliomas for TES gene was 57,25% (79/138), for MMP14 - 50% (69/138), for TFPI2 – 23,36% (32/137), for AhR – 28,99% (40/138), for EsR1 – 60,14% (83/138). It was found that TES, MMP14 and AhR genes promoter methylation in I-IV malignant grade gliomas differ significantly. Comparing genes promoter methylation frequency between patient age groups (≤ 60 and > 60 years), TES and AhR promoter methylation was statistically more frequently in elderly patients and MMP14 – for patients, under 60 years ($p < 0,05$). TFPI2 gene showed, that male patients frequently have tumor with methylated TFPI2 gene than males ($p < 0,05$). In patient group that survived ≤ 24 month, frequently methylated were TES and AhR genes and in patient group that survived > 24 months – MMP14 gene ($p < 0,05$). Kaplan-Maier survival analysis showed that TES and AhR genes methylation was associated with shorter patient survival, while MMP14 – with longer survival ($p < 0,05$).
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Augustė-Ona Jančiauskaitė

„5-Fluoruracil-stimulated expression of cytokines IL-1 and IL-6 in vitro“

Augustė-Ona Jančiauskaitė,

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Upstream proinflammatory cytokine interleukin-1 (IL-1) is closely associated with tumor chemoresistance. Also, IL-1 can regulate other proangiogenic cytokines and growth factors, such as IL-6 and VEGF, and is related to E-cadherin-mediated adhesion.

In this study, we used RT-PCR method to investigate IL-1 and IL-1 related IL-6, VEGF, E-cadherin expression in human colon cancer HCT116 and 5-FU resistant HCT116/FU cells after treatment with 5-FU. It was found that 5-FU increases expression of IL1A, IL1B and IL6 in HCT116/FU cells, but not in HCT116. Where was no significant increase in expression of VEGF and CDH1. In conclusion, IL-1 and IL-6 can contribute to development of tumor chemoresistance.

Evelina Merkytė

„The impact of invasive New Zealand mud snail (*Potamopyrgus antipodarium*) on fish diet in Lithuanian lakes“

Evelina Merkytė and lekt. dr. Vytautas Rakauskas, Vilnius University, Faculty of Natural Sciences



Vilnius University, Faculty of Natural Sciences, Lithuania

Introduced species interact both directly and indirectly with native species. We examine direct interactions between the introduced New Zealand mud snail (*Potamopyrgus antipodarum*) and local molluscivorous predators. Of a particular interest from the fisheries management point of view is how introduced *P. antipodarum* can alter benthic fish production in lakes. If *P. antipodarum* possess behavioural defence against predation, they cannot be easily included into fish diet. Consequently, as invaders consume a certain portion of lake primary production, energy flow to higher trophic levels could be reduced. Such effect is more likely to be pronounced where invaders become superabundant and out-compete native species, but do not take their role as prey for predators. Field work results showed *P. antipodarum* dominated in the littoral macroinvertebrate communities in studied lakes. Wild-caught fish diet analysis showed that *P. antipodarum* took part in perch, roach, tench, fresh water bream and white bream diet. The highest prevalence of *P. antipodarum* was found in fresh-water bream and tench diet although it was very diverse in different lakes. However, the number of *P. antipodarum* per fish was very low and the share of *P. antipodarum* in the fish diet was very small for all investigated benthivorous fish species. Moreover, fish feeding selectivity on *P. antipodarum* was negative for all studied benthivorous fish species. Overall, diet analysis of the dominant benthivorous fish species in Lithuanian lakes showed that fish did not significantly consume *P. antipodarum* in invaded lakes. This suggests that benthivorous fish have no potential to regulate *P. antipodarum* populations in hemiboreal lakes.

Gytis Katkauskas

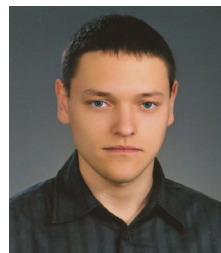
„Synthesis of new 4-Imidazolidinone derivatives targeting BCL-2“

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Introduction: Damage to the BCL-2 gene has been identified as a cause of a number of cancers and resistance to cancer treatments [1]. Studies show that hydantoin derivatives induces DNA damage causing downregulation in the expression of antiapoptotic proteins like BCL-2 [2]. Therefore it was selected as a scaffold for new compound synthesis.

Aim: To synthesize new hydantoin compounds targeting BCL-2 protein based on in silico results.

Methods: In silico evaluation was performed with “Schrodinger software suite”. Compounds showing high XP and docking scores were chosen for synthesis. Synthesis of hydantoin derivatives were performed in 4 stages: Thiohydantoin scaffold synthesis Knoevenagel condensation with various aldehydes Methylation with CH₃I Nucleophilic substitution with amines. The identity of compounds was confirmed by elemental analysis and the means UV spectra, purity determined by TLC and HPLC.

Results: 25 new compounds were successfully synthesized, their structure and purity were determined. Yields of product on various stages of synthesis: 1st stage 81%, 2nd stage 57-88%, 3rd stage 88-92%, 4th stage 47-83%. In silico compound evaluation showed several compounds with moderate binding affinity ($E \sim -5$ kcal/mol), few compounds with high binding affinity ($E \leq -6$ kcal/

mol) towards BCL-2.

Conclusion: 25 new compounds targeting BCL-2 were successfully synthesized. E values varies between -4,78 and -7,10 kcal/mol towards Bcl-2. Further evaluation of anticancer activity is required for potential correlation between in vitro and in silico results.

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Kotryna Kvederavičiūtė

„MAPK and PP2C expression analysis in Arabidopsis thaliana seedlings“

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Mitogen-activated protein kinases (MAPKs) play essential roles in growth-related signaling cascades in all eukaryotes from yeast to human, including plants. Cell cycle and developmental processes

depend on MAPK activities. It is known, that MAPKs and their negative regulators PP2Cs play important role in plant stem cell initiation and differentiation during stomata cell development. The question remains, when and where these central signaling components are expressed during seedling and plant development. The aim of this project is to identify MAPKs and PP2Cs expression during plant development and to determine changes of gene expression during different growth stages or conditions. Results presented here are demonstrating regulation of MAPK and PP2C gene induction in different tissues and in specific cells during different stages of seedling development. Using well-established promoter::GUS reporter approach we were able to detect protein expression in different types of cells using light microscopy. Our results provide new information about specific roles of different MAPKs and PP2Cs during proliferation/differentiation processes and cell signaling processes in plant development.

Lukas Valančauskas

„Analysis of *Arabidopsis thaliana* susceptibility to *Botrytis cinerea*“

Lukas Valančauskas, Kotryna Kvederavičiūtė, Alois Schweighofer and Iritė Meškienė, Institute of Biotechnology, Vilnius University, Lithuania

Institute of Biotechnology, Vilnius University, Lithuania

Mitogen-activated protein kinases (MAPK) are important regulators of plant immune responses. In response to damage induced by pathogens MAPKs transduce the cell signalling to plant responses. MAPKs are controlled by specific phosphatases, which negatively regulate their activity allowing organism to precisely

modulate signal generated from damaging factors and respond to them in controlled fashion. In this study various *Arabidopsis thaliana* lines modulated in MAPK and MAPK phosphatase expression patterns were screened for plant responses to infection by necrotrophic fungi *Botrytis cinerea*. Infection was induced by applying pathogen conidia suspension to mature leaves. Resulting necrotic lesion areas were measured and used as a quantitative indicator of the severity of infection. Received results indicate altered plant responses to infection by *Botrytis cinerea* in different plant lines, thus indicating possible non-redundant function of MAPK phosphatase in signal regulation.

Guna Petaja

„Studies of Hepatitis B virus virion morphogenesis, using alphavirus expression system“

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The hepatitis B virus (HBV) infection is the one of the main causes of liver diseases worldwide. HBV is a para-retrovirus - an enveloped virus with a double-stranded DNA genome that is replicated by reverse transcription of an RNA intermediate, the pregenomic RNA. Only the mature, dsDNA-containing, not RNA-containing capsids are enveloped and secreted as virions, however recent studies show that the majority of HBV virions do not contain any nucleic acid at all.

The aim of this study is to investigate the mechanism of HBV vi-

rion formation.

To examine the relation between genome content and virion formation, the alphavirus expression system SFV1 were used. The following recombinant viruses were successfully produced: HBcD1 - expressing core protein (183 aa) of genotype D1, HBc delta C – a shortened core protein of 144 aa, HBVpgD1 - the full-length pregenomic RNA of genotype D1, 1/L - the viral L envelope protein, Sayw - the viral S envelope protein. The obtained recombinant viruses were used in subsequent capsid/envelope co-expression experiments.

The formation of recombinant HBV capsids/virions was analyzed using Western blotting with native agarose gel electrophoresis, ELISA and immunofluorescence microscopy. The most efficient formation of virions was observed in co-expression experiments using the full-length HBV pregenomic RNA. Thus, the co-expression of viral polymerase or other factors are important for efficient HBV virion formation.

Inga Songailiene

“Structural insights into MnlI sequence specific DNA recognition”

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Type II restriction endonucleases (REases) are enzymes that recognise short 4-8bp DNA sequences and cleave DNA at a fixed po-

sition within or close to them. In this work the mechanism of type IIS REase MnlI N-domain interaction with DNA was investigated. MnlI recognizes an asymmetric 4bp target 5'-CCTC-3' and catalyze DNA hydrolysis 7/6nt downstream of it.

Recently determined structure of MnlI shows that N-domain possesses fold that is common for homing endonucleases (HEases). This fold has not been identified in restriction endonucleases so far. The study shed light on the mechanism how the HEase fold is adapted to recognise short DNA targets.

Cloning, purification of two MnlI N-domain variants and co-crystallization of MnlI-N domain in complex with DNA was performed. The structure of MnlI-N/DNA complex was solved by molecular replacement at 2,4Å resolution. MnlI recognises 4bp target from the major groove side and makes all possible hydrogen bonds to donors-acceptors of DNA bases.

In comparison to HEases, the mechanism of MnlI interaction with DNA has both similarities and differences. Like HEases, MnlI N-domain makes contacts with DNA from the major groove side and introduces DNA bend by ~30°. In contrast to HEases, MnlI uses only one subdomain for the sequence specific DNA recognition and forms all the possible hydrogen bonds to the recognition site.

Rūta Marija Trimonytė

„Human colorectal cancer cell response to oxaliplatin treatment in vitro“

Rūta Marija Trimonytė, Violeta Jonušienė

Vilnius University, Lithuania

Oxaliplatin, platinum-based chemotherapy drug, is widely used as a treatment for advanced and metastatic colorectal cancer. In order to increase the efficiency of chemotherapy, this drug is

usually combined with 5-fluorouracil and leucovorin. However, innate or acquired multidrug resistance remains a serious problem in oncology. It is a main reason for chemotherapy failure and tumor relapse. It is known that oxaliplatin causes cell death by forming DNA adducts, which inhibit transcription and DNA synthesis. However the mechanisms by which cancer cells become resistant to oxaliplatin remain unclear.

The aim of this study was to compare the effects of oxaliplatin to human colorectal cancer HCT₁₁₆ and 5-fluorouracil resistant HCT₁₁₆/FU cell lines. The cytotoxicity of the oxaliplatin was assessed by clonogenic assay. It was shown that HCT₁₁₆/FU cells are more sensitive to oxaliplatin than HCT₁₁₆ cells. This drug has a similar effect on cell cycle in both cell lines. Nevertheless it causes different gene expression profiles of Notch signaling proteins in HCT₁₁₆ and HCT₁₁₆/FU cells.

Kotryna Kvederavičiūtė

„MAPK and PP2C expression analysis in *Arabidopsis thaliana* seedlings“

**Kotryna Kvederavičiūtė¹, Severina Marija Pociuniatė¹, Sofija Seme-
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Institute of Biotechnology, Vilnius University

Mitogen-activated protein kinases (MAPKs) play essential roles in growth-related signaling cascades in all eukaryotes from yeast to human, including plants. Cell cycle and developmental processes depend on MAPK activities. It is known, that MAPKs and their

negative regulators PP2Cs play important role in plant stem cell initiation and differentiation during stomata cell development. The question remains, when and where these central signaling components are expressed during seedling and plant development. The aim of this project is to identify MAPKs and PP2Cs expression during plant development and to determine changes of gene expression during different growth stages or conditions. Results presented here are demonstrating regulation of MAPK and PP2C gene induction in different tissues and in specific cells during different stages of seedling development. Using well-established promoter::GUS reporter approach we were able to detect protein expression in different types of cells using light microscopy. Our results provide new information about specific roles of different MAPKs and PP2Cs during proliferation/differentiation processes and cell signaling processes in plant development.

COMPANY TOUR

Vilnius University Institute of Biochemistry - is a research centre focusing on investigation of biochemical and genetic principles of cell functioning (biocatalysis and cell regulation), design and development of biosensors as well as synthesis of the biologically active compounds.



National Food and Veterinary Risk Assessment Institute - contributes scientific information, scientific and technical support in pursuance of state policy in the areas of food safety and veterinary and communicate on risks.



Thermo Fisher Scientific Inc. - is the world leader in serving science. We help our customers accelerate life sciences research, solve complex analytical challenges, improve patient diagnostics and increase laboratory productivity.



The Nature Research Centre - is a state scientific research institute. The Centre is a public legal entity operating as a state budget institution and performing long-term research and experimental development in ecology, botany, mycology, microbiology, virology, zoology, parasitology and geosciences.



VILNIUS UNIVERSITY

As the oldest and largest of Lithuania's higher education institutions, Vilnius University is an active participant in international scientific and academic activity and embodies the concept of a classical university – the unity of studies and research. Vilnius university has long been an integral part of European science and culture since its establishment in 1579. As one of the oldest higher education establishments in Central and Eastern Europe, it has had a marked influence on the cultural life of Lithuania as well as her neighbouring states.



One of the main aims of the university is to position and distinguish itself in European research and education with top-level research. Vilnius university has taken upon itself the responsibility for maintaining the highest level of research and studies – fulfilling the needs of the state and society for higher education. It has recently and significantly improved the university's infrastructure through active involvement in European structural funds' projects.

Today, Vilnius university has over 22,000 students and over 1,830 teaching and research staff. The university has 12 faculties, 7 institutes, 3 university hospitals and 4 study and research centres. It has the one of the richest libraries in Europe, an astronomical observatory, a botanical garden and the cherished Church of St. Johns'. The university structure also embraces several museums, a dormitory campus, laboratories, workshops, summer resorts and student traineeship bases.

The university enjoys a unique academic atmosphere and academic freedom where priority is always attached to intellect, wisdom and tolerance.

Vilnius university remains young, dynamic, progressive and open to the world's cultural and scientific values.

FACULTY OF NATURAL SCIENCES

The Faculty of Natural Sciences is one of the 12 Vilnius university's faculties. It consists of 9 departments, 11 academic and training laboratories, the gardens of Botany, Museum and Centres of Cartography, Ecology and Environmental Sciences. The staff of faculty and students - are engaged in research and scholarships in diverse sub-disciplines within disciplines offered. The faculty offers several undergraduate programs (biology, molecular biology, genetics, microbiology, ecology and environmental sciences, biophysics, hydrology and meteorology, geology, hydrogeology and geology engineering). Graduate students can enroll in both MSc and PhD programs. Courses, including independent projects, seminars and field courses are on a focus as well. The Faculty of Natural Sciences spans the entire spectrum educational, sports activities. Devoted and motivated students gather in student's organizations, where they have opportunities to explore, study and investigate. The faculty is led by Dean prof. habil. Dr. Osvaldas Rukšėnas. The faculty has 164 academic and 41 research fellows.

VILNIUS UNIVERSITY LIFE SCIENCES CENTER

This unprecedented project aims to create a Life Sciences Center with particular focus on Lithuania's strategic research areas: biotechnology, structural and cell biology, genomics and their industrial applications. The project is managed by the joint effort of Vilnius University and its partners: Vilnius Gediminas Technical University and Vilnius University Institute of Oncology (project code: VP2-1.1-ŠMM-04-V-01-016). These institutions are aiming to create a competitive environment, which would attract foreign investment and world-class scientists. As one of the „Sunrise Valley“ projects, it also has the goal of attracting knowledge and innovation in a form of young and active scientists. Year 2010 marks the start of the LSC project, which is now estimated to finish in 2015. During this five year course the costs are estimated to reach nearly 142 mln. Lt, which will be primarily spent on the new research building and scientific equipment. Over 25 mln. Lt have already been invested in instrumentation, supporting research in key biotech areas: recombinant proteins; monoclonal antibodies; structural biology; computational biology; plant genomics; biocatalyst applications; novel large and small molecules therapeutics; neurophysiology; toxicology; stem cell and cancer research. To accomplish a truly interdisciplinary research, the center will be located in a strategic location with neighboring Vilnius University Library, the faculty of Physics and emerging National Center for Physical and Technological Sciences. The new building will house an animal holding facility, a radioisotope laboratory, facilities for proteome analysis and next-generation sequencing, greenhouse, 73 GRID computing facility as

well as lecture halls in a total area of 24 thousand square meters. A third of this area will be dedicated for educational purposes, which will be used by a nearly a thousand of current undergraduate and graduate students engaged in biological research.



NATIONAL OPEN ACCESS SCHOLARLY COMMUNICATION AND INFORMATION CENTER

SCIC was built in 2013. The striking building, designed by Lithuanian architect Rolandas Palekas, is the largest and most modern library built in independent Lithuania. The building features a variety of amenities – individual and group work spaces, reading rooms, conference halls, a play center for kids, and a leisurely space to grab a cup of coffee and take a break. Through technological, physical and intellectual amenities, the library seeks to fulfill the needs of any visitor. Attraction and functionality of SCIC will be ensured by inviting environment suitable not only for the scientific research, studies, individual work, commerce, cooperation, but for recreation and meeting other

people as well. Representatives of science, commerce and education from various Lithuanian regions will have access to the information resources accumulated in the centre and will be able to use advanced infrastructure: reading rooms, group work rooms, conference hall, individual work cabins and zones for recreation and conversations. The center operates 24/7, with the exception of national holidays, and houses roughly 2 million texts.

The main task of the centre is to provide a lifelong learning and services based on the most advanced IT technologies, to ensure interaction of science, studies and commerce and learn from the best practices around the world.

The building is only the first in a series that Vilnius University has planned for the surrounding "Saulėtekis" area.

The University aims to build a combined business and academic center in the area. The next two buildings planned for the area are



STORY OF THE CONFERENCE

The story of "The Coins" begins in 2004. That year the conference only involved students from Lithuania. At first it was called BioCoin and was concentrated only on Life Sciences. Year after year this event has grown into International Student's Conference.

In 2008 conference changed its content. Topics not only from Life Sciences had been presented but also an interest in Natural Sciences emerged leading to the change of name to "The Coins". In 2010 the conference was even bigger and has attracted more attention from foreign students. Next conference designed just for Life Sciences was held in 2012 as a part of the biggest Baltic region conference "Life Sciences Baltics 2012".

Every year "The Coins" develops into more successful conference, which gathers together science lovers from all over the world. In The Coins 2014 participants had a great opportunity to listen to 12 scientists from Lithuania and abroad.

This event is the ideal place for "Science makers" to meet, share their knowledge, experience and have the possibility to broaden their cultural understanding. Therefore, this years' conference - is another challenge to go deeper, seek wider and reach higher.

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