

Questionnaire

Summary of the main activities of a scientific Organisation of the Slovak Academy of Sciences

Period: January 1, 2007 - December 31, 2011

I. Formal information on the assessed Organisation:

1. Legal name and address

Institute of Molecular Physiology and Genetics
Slovak Academy of Sciences
Vlárská 5, SK-833 34 Bratislava
Slovakia

2. Executive body of the Organisation and its composition

Directoriat	name	age	years in the position
director	doc. Ing. Olga Križanová, DrSc.	52	2009
deputy director	doc. RNDr. Ľubica Lacinová, DrSc.	53	2002
scientific secretary	RNDr. Viera Boháčová, CSc.	48	2011

3. Head of the Scientific Board

doc. RNDr. Ľubica Lacinová, DrSc. 2008 – 2011

4. Basic information about the research personnel

- i. Number of employees with a university degree (PhD students excluded) engaged in research and development and their full time equivalent work capacity (FTE) in 2007, 2008, 2009, 2010, 2011 and average number during the assessment period

- ii. Organisation units/departments and their FTE employees with the university degree engaged in research and development

Research staff	2007		2008		2009		2010		2011		average	
	No.	FTE	No.	FTE	No.	FTE	No.	FTE	No.	FTE	No.	FTE
organisation in whole	45,0	27,7	48,0	30,1	39,0	29,1	34,0	27,2	32,0	24,5	39,6	27,7
Laboratory of Biophysics	4,0	2,3	4,0	1,8	4,0	1,8	4,0	2,1	0,0	0,0	3,2	1,6
Laboratory of Biochemistry of Transport Systems	6,0	3,2	6,0	2,4	5,0	2,9	5,0	4,4	0,0	0,0	4,4	2,6
Laboratory of Cell Morphology	4,0	3,7	3,0	2,6	3,0	2,8	2,0	2,0	0,0	0,0	2,4	2,2
Laboratory of Electrophysiology	4,0	2,0	4,0	2,5	3,0	3,0	3,0	2,0	0,0	0,0	2,8	1,9
Laboratory of Biochemistry and Cytochemistry	6,0	2,4	9,0	4,5	6,0	5,0	6,0	5,0	0,0	0,0	5,4	3,4
Laboratory of Genetics	4,0	2,2	4,0	3,1	4,0	3,1	4,0	3,0	0,0	0,0	3,2	2,3
Laboratory of Protein Chemistry	4,0	2,9	5,0	3,3	4,0	2,9	2,0	2,2	0,0	0,0	3,0	2,3
Laboratory of Molecular Biophysics	8,0	5,0	6,0	4,3	3,0	1,5	1,0	1,0	0,0	0,0	3,6	2,4
Laboratory of Intracellular Ion Channels	3,0	2,0	4,0	3,0	5,0	4,1	5,0	3,3	0,0	0,0	3,4	2,5
Laboratory of Ion Channel Function	2,0	2,0	3,0	2,6	2,0	2,0	2,0	2,0	0,0	0,0	1,8	1,7
Department of Cell Physiology and Genetics	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	11,0	9,8	2,2	2,0
Department of Muscle Cell Research	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	9,0	6,8	1,8	1,4
Department of Transport Protein	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	12,0	7,9	2,4	1,6

5. Basic information on the funding

- i. Total salary budget¹ of the Organisation allocated from the institutional resources of the Slovak Academy of Sciences (SAS) in 2007, 2008, 2009, 2010, 2011 and average amount for the assessment period

Salary budget	2007	2008	2009	2010	2011	average
total salary budget (millions of EUR)	0,400	0,430	0,460	0,467	0,443	0,440

6. URL of the Organisation's web site

<http://www.umfg.sav.sk>

¹ Objem mzdových prostriedkov bez odvodov do poisťovní so započítaním sumy miezd pracovníkov THS, ktorú organizácii poskytne ETO Úradu SAV. Rozpočet v Sk prepočítajte na eurá podľa konverzného kurzu 1€ = 30,126. (Podobne aj v ďalších tabuľkách.)

II. General information on the research and development activity of the Organisation:

1. Mission Statement of the Organisation as presented in its Foundation Charter

Scientific orientation is focused on the molecular basis of elementary physiological functions, with main orientation on cardiac muscle physiology, membrane transport and genetics. Modern methods of research now utilized at the Institute often have been introduced as first or unique in our country (microelectrode techniques, voltage clamp, patch clamp, planar lipid bilayers, isolated single skeletal and cardiac muscle cells, cell culturing, optical methods of intracellular ion detection, electron microprobe analysis of elemental compositions in cellular compartments, fast freezing techniques for electron microscopy, PCR techniques, monoclonal antibody production, radioisotope techniques, etc.). The Institute introduced the method of DNA fingerprinting in Slovakia and it is currently being used in forensic practice. The Institute, although established as pure basic research facility, engages also in education, mainly at undergraduate and graduate level. Institute is publisher of the physiologically oriented journal - **General Physiology and Biophysics (GPB)**.

General Physiology and Biophysics is well-established international journal. Journal publishes predominantly original research articles concerned with general physiology, biophysics and biochemistry at the cellular and molecular level with percentage of published review articles being approximately 5%. Number of submitted manuscript from 2007 to 2011 (64-91-106-111-141) as well as percentage of rejected manuscripts (36-56-54-54-66) is increasing. Its' 5-year impact factor 1.159 is the second best among journals published by Slovak Academy of Sciences. WoS h-index of GPB is 30, the third best in SAS. It is notable that both journals with higher h-index are being published for 15 years longer. During evaluated period journal joined DOI database and started publish "online first" unedited accepted manuscripts. Complete archive of articles published since 1982 is accessible on the web. Articles older than 1 year are free.

2. Summary of R&D activity pursued by the Organisation during the assessed period, from both national and international aspects and its incorporation in the European Research Area (recommended 5 pages, max. 10 pages)

Research activities of the Institute are oriented in two main directions: events related to transport through cellular membranes, its' structural determinants and regulations with endogenous and exogenous factors; genetic determinants of human heritable diseases. As analysed diseases are often consequences of defect transmembrane transport, both branches of institutional research are closely intertwined. Principal investigators, usually heads of research groups or laboratories are responsible for individual projects. Nevertheless, individual researchers cooperate closely on specific topics not only in the frame of Institute, but also with research groups from other institutes. For better research coordination laboratories were concentrated into three departments in 2011.

Department of Cell Physiology and Genetics consists of Laboratory of Intracellular Ion Channels, Laboratory of Biochemistry of Transport Systems and Laboratory of Genetics. The main focus of the department is on the basic research of the role of IP₃ receptor calcium release channel, intracellular chloride channels, sodium calcium exchanger, catecholaminergic modulation and H₂S gas transmitter in cell physiological and pathological conditions. Aim of this basic research is to understand biological effects of the above mentioned compounds and processes, which could lead into the application research with possible implementation in medicine.

The main published results obtained during 2007-2011 are the following:

- Characterisation of the electrical properties of the intracellular single chloride channels and their modulation by ATP, H₂S and several endogenous compounds. The results may indicate an involvement of the chloride channels in apoptosis and H₂S signalling pathway what may explain several physiological effects of H₂S. The results were acknowledged by FEBS Journal, which invited us to write a review article about the chloride channels (Tomaskova and Ondrias, FEBS L., 2010).
- The observation that H₂S is able to release NO from endogenous nitroso-compounds, brain homogenate and living cells. This phenomenon may be partially or fully responsible for the biological effects of H₂S in neuromodulation, cell division, apoptosis, cardiac regulation, cardioprotection, neuroprotection, ischemia-reperfusion, hypertension, vasorelaxation and erection.
- The observation that pretreatment of albumin, cysteine, N-acetylcysteine and lipids with H₂S resulted in binding of sulphur to these compounds creating thus new-modified sulphur compounds that released NO from nitroso-compounds directly and/or through released H₂S. From the results we hypothesised a coupled sulphide-nitroso signalling pathway, in which H₂S plays a main role. We assumed that the NO release from nitroso-compounds directly by H₂S or indirectly by the H₂S-induced sulphur-bound compounds represents coupled sulphide-nitroso signalling, which may explain some of the numerous biological effects of H₂S that are shared with NO. The results were acknowledged by Current Pharmaceutical Biotechnology journal, which invited us to write a review article about the H₂S biological effects (Tomaskova et al. Curr. Pharm. Biot. J., 2011).
- The observation that aqueous garlic, onion and leek extracts were able to release NO from nitroso-glutathione. This has lead to the proposal that NO-releasing properties of the extracts are involved in NO-signalling pathway which contributes to some of their numerous beneficial biological effects.
- Role of the calcium signalling is crucial for the cell. Specific calcium concentrations in the time and space enable the cell to regulate variety of individual processes. Calcium transport systems are deeply involved in the regulation of calcium concentration. Inositol 1,4,5-trisphosphate (IP₃) receptor is intracellular calcium transport system, which can release calcium from its intracellular stores. Up to now, three types of IP₃ receptors, type 1, 2 and 3 were cloned and described. These types differ in the sensitivity to IP₃ and a calcium and based on their different localization it could be proposed that they have different function. We have shown that expression of the IP₃ receptors of type 1 significantly increased during hypoxia in cerebellar granular cells (Jurkovicova et al., Pflugers Arch. 2007), but also in the stable cardiac H9c2 cell line (Krizanova et al., Ann NY Acad Sci, 2008). In these cells during hypoxia, not only type 1 IP₃ receptors was increased, but also (although with certain delay), also type 2 IP₃ receptor increased. Similar increase was observed also in the individual parts (atria and ventricles) of the heart during ageing (Kaplan et al., Mol Cell Biochem., 2007) and also during repeated cold stress (Krizanova et al., Ann NY Acad Sci, 2008). We have observed increase in type 1 and 2 IP₃ receptors also after the haloperidol treatment, but only in cardiac atria (Novakova et al., Gen Physiol Biophys, 2010). Uranyl acetate markedly increased gene expression of the IP₃ receptors of type 2 and not type 1 in the mice kidney (Ondrias et al., Gen Physiol Biophys., 2008). All these results point to the altered calcium regulation through the IP₃ receptors. It is already known that IP₃ receptors are involved in

the development of apoptosis - controlled cell death. We succeeded to prove that after the uranyl acetate treatment increased expression of type 2 IP3 receptors at least partially contributes to the development of apoptosis (Kopacek et al., Toxicology, 2009). Detailed studies of IP3 receptors of type 1 during development of apoptosis clearly revealed that apoptosis not only increased the amount of these receptors, but also causes their translocation to the nucleus and cluster formation (Ondrias et al., J Cell Physiol., 2011). This translocation has possible effect on enforcement of calcium signaling in the nucleus, which might have an impact on e.g. DNA fragmentation.

Team of Laboratory of biochemistry of transport systems represents standard European scientific team that was recognized by independent scientific ranking agency ARRA as **above standard** in the world scientific ranking (http://arra.sk/sites/arra.sk/files/sav-nadpriemer_tabulka2011_5.pdf). This may be documented by publication activity and by the fact that members of this team are often invited to submit papers to the recognized international scientific media.

The part of the department research activity is focused on the study of the human genome of population of Slovakia at the DNA level with special emphasis on those regions, which are involved in inherited pathologies frequent in the population of Slovakia. The knowledge of complete mutation scale in genes responsible for inherited disorders is inevitable for precise and effective DNA-based diagnostics. In frames of several research projects monogenic disorders as cystic fibrosis, phenylketonuria, alkaptonuria, myotonic dystrophy, Wilson's disease, Charcot–Marie-Tooth syndroms, deafness, etc. has been analysed. The results of the analysis enabled to develop diagnostic tests for medical applications, based on direct mutation detection for purposes of more effective diagnostics, prevention, and treatment.

The details of the analysis:

- Genes responsible for *cystic fibrosis* (CF) and *phenylketonuria* (PKU) have been subjected to complex molecular analysis. We identified new mutations, which significantly expand the mutations scale in relevant genes in Slovak patients, and so contribute to their more effective diagnostics.

- *Alkaptonuria* (AKU) is a severe inherited metabolic disorder caused by the deficiency of homogentisate 1,2 dioxygenase (HGD) activity, the prevalence of which in Slovakia is 10 times higher than in other populations of the world. We performed a complete mutation analysis and cataloguing of mutations in the *HGD* gene, not only in Slovak patients but also in patients from several countries from other parts of the world. For effective molecular diagnostics workflow we established and maintain a freely accessible web based database of *HGD* mutations which encompasses all AKU causing mutations, polymorphisms and haplotype data published up to present (<http://hgddatabase.cvtisr.sk>).

- *Myotonic dystrophies type 1 (DM1), and type 2 (DM2)* represent a serious neuro-muscular disorders, affecting not only muscles but also endocrine system, eyes and gonads. The clinical symptoms vary considerably and overlap with symptoms of other neuro-muscular disorders, which make clinical diagnosis very unreliable, and it must be confirmed by analysis on the DNA level. We found that both disorders are caused by expansions of short repeats in the responsible genes. Our research was focused on the development of methods for reliable identification of causative mutations for diagnostic purposes.

Department of Muscle Cell Research consists of Laboratory of Cell Morphology, Laboratory of Electrophysiology and Laboratory of Molecular Biophysics.

Long-term activities in the Department of Muscle Cell Research (DMCR) are focused on subcellular mechanisms of cardiac excitation-contraction coupling, the grand topic of cardiac function in health and disease. Our common aim was to contribute to the field by original ideas, to promote internationally competitive research, and to publish in leading journals of the field. To succeed under the declining institutional support of science in the country, we took an advantage of the European 6th Framework Programme that luckily represented the

primary resource for our research and that was a basis for additional financing through domestic grant schemes.

Conceptually, we focused on molecular mechanisms of calcium signalling and on ultrastructural aspects of cellular compartments that serve calcium signalling and energetics in myocytes. We used cutting-edge experimental and theoretical methodologies. These include recording, analysis and mathematical modelling of activity of membrane ion channels, of intracellular calcium concentration changes, and of membrane structures. We used our original experimental techniques of isolation of functional cardiac myocytes, combination of the patch-clamp and confocal microscopy techniques, reconstruction of RYR2 calcium channels in bilayer lipid membranes, quantitative electron microscopy and image analysis. Most of them were supported by our original software for data acquisition and analysis. We developed unique *in silico* models of RYR2 gating, of calcium release unit and calcium signals, of quantitative 3D ultrastructure of striated muscle cells, all based on our results and on the recent understanding of the topic, which served as effective tools to formulate and verify working hypotheses and to support and to disseminate the results.

DMCR is considered a serious international partner in Europe as well as in the USA. As a result, in the reported period DMCR pursued research funded by two projects of the 6th Framework Programme (the Integrated Project EUGeneHeart; the Specific Targeted Research Project CONTICA). International recognition of DMCR was enhanced by participation in the ESF collaboration project FuncDyn, to which we contributed by organisation of the International Conference on Functional Dynamics (Smolenice 2010), as well as by informal collaboration with the Davis Heart and Lung Research Institute, Ohio State University, Columbus, OH.

During the assessed period, the members of the laboratory published 20 articles in impacted international journals. Their work was cited 337 times in the period 2006 - 2010.

The molecular mechanisms that governs local calcium signalling between DHPR calcium channels of the sarcolemma and the RyR2 channels of the sarcoplasmic reticulum were characterized. It was shown that efficacy of DHPR-RyR2 coupling is unexpectedly low, while the probability of calcium release is reasonably high. The physiological control of the intensity of myocyte contractions is achieved by increasing the recruitment of DHPR channels. We have shown how this mechanism can avoid the danger of inadvertent triggering of calcium release under diastolic conditions (Polakova et al., J. Physiol., 2008 - this publication received two editorial articles: Bridge et al., J. Physiol. 2008; Fowler, J. Physiol. 2009 and was reported as "Recommended (score 6)" by post-publication review in Faculty of 1000).

In collaboration with Ohio State University, the changes of intracellular calcium handling evoked by heart failure or by CPVT-causing mutations of calsequestrin were found to cause abnormalities in activation and deactivation of RYR2s, which critically contributed to reduced calcium content and increased formation of calcium waves in cardiac myocytes of mice (Belevych et al., Biophys. J. 2007; Terentyev et al., Biophys. J. 2008).

We have revealed and explained a novel molecular mechanism, by which Mg²⁺ ions participate in the control of contraction in cardiac myocytes. RyR2 channels are activated by a small local increase of calcium concentration at >10000x higher background of the cytosolic magnesium concentration. To understand this chemical paradox, we developed a theory that explains the opposing role of calcium and magnesium ions in RyR2 activation. We defined the competitive mechanism of divalent ion binding to the RyR2 and its allosteric relationship to RyR2 activity. The theory was tested against unexplained results published previously by other investigators and our own results of older provenience. Mathematical modelling reproduced the experimental findings with high reliability. The new role of Mg²⁺ in cardiac calcium signalling was proposed to help with identification of RyR2 malfunction in related inborn or acquired arrhythmias, sudden cardiac death and heart failure (Zahradnikova et al., J. Gen. Physiol. 2010a; this paper become the most read article of the Journal of General Physiology in July 2010; Zahradnikova et al., J. Gen. Physiol. 2010; this paper become the most read article of the Journal of General Physiology in November 2010).

Pharmacological modulation of DHPR calcium channels by calcium antagonists is used to control specific cardiovascular dysfunctions including arrhythmias, increased blood pressure and failing heart. Unfortunately, inhibition of DHPR channels may also represent a serious cardiotoxic side-effect of many drugs, including antidepressants. We characterized the competitive interaction of various calcium antagonists with their binding sites at DHPR channels and with binding of a range of antidepressants. The results led to extension of the guarded modulated receptor model and explained the existence of both, positive and negative allosteric interactions between drugs, and the cardiotoxic effect of antidepressants at the level of the DHPR calcium channels (Zahradníková et al., J. Pharmacol. Exp. Ther. 2007; Zahradník et al., J. Pharmacol. Exp. Ther. 2008).

Our previous studies revealed that invalidation of a single protein may lead to adaptation of cell ultrastructure to compensate for the loss of function. This led to a series of studies with colleagues at INSERM, France, devoted to understanding of the role of cellular architecture in energy channelling in cardiac myocytes. We showed that the depression of myocardial function including contractile force in failing heart results from intricate alterations in calcium handling and energetic starvation but also from cytoarchitectural disorganization. This was confirmed in studies of formation of intracellular energetic pathways during the hypertrophic phase of postnatal development of mouse heart. We demonstrated that the period between days 3 and 7 after birth represents an important step in the development of mitochondria-SR and mitochondria-myofibril contacts, together with final organization of SR and T-tubules to maximize the efficiency of excitation-contraction coupling and of intracellular energy flow. These findings highlighted the very early optimization of energy distribution via formation of the intracellular energetic units and the complex relationship between cell architecture, energetics and function (Athéa et al., Diabetes 2007; Joubert et al., J. Physiol. 2008).

An electron microscopic study aimed at changes in cellular organization during the development of compensated hypertrophy characterised subcellular remodeling in injured myocardium. Besides adaptive changes of sarcolemma, fully differentiated cardiomyocytes displayed small regions with morphological features of postnatal cardiomyocytes, pointing to a possible mechanism of cellular adaptation (Mikušová et al., Can. J. Physiol. Pharmacol. 2009).

Striated muscle cells display complex architecture that varies across muscle types in ontogeny as well as in phylogeny, and is vulnerable to adaptations under physiological and pathological stimuli. This variation is difficult to study, understand and communicate. To overcome these problems, we have developed complex software aimed to create and display a computer model of muscle cells based either on detailed quantitative data collected by stereological methods, or created ad hoc, which is quantitatively correct in 3D. The model allows for hypothetical electron microscopy experiments, including sectioning, viewing, and quantitative evaluation by a tested method of analysis.

Department of Transport Proteins consists from three laboratories: i. Laboratory of Biochemistry and Cytochemistry; ii. Laboratory of Biophysics; iii. Laboratory of Ion Channels Function. The RD activities of these laboratories during time period 2007-2011 are described below.

Laboratory of Biochemistry and Cytochemistry studied expression and function of P-glycoprotein (P-gp) in leukemia cells. P-gp in neoplastic tissue is often responsible for multidrug resistance (MDR) and represents real obstacle in effective chemotherapy of cancer. P-gp is ABCB1 member of ABC transporter family and when expressed in cancer cells, is responsible for effective elimination of lipophilic substances including several anticancer drugs from intracellular space. We induced overexpression of P-glycoprotein in L1210 cells by selection with vincristine and by transfection with gene encoding human P-gp. While transcription of P-gp is known to be predominately regulated by pregnan-X nuclear receptor, we found that also nuclear receptors for all-*trans* retinoic acid could be involved in P-gp expression in L1210 cells (Sulova et al., Toxicol in Vitro, 2008). Cell resistance

mediated by P-gp is a complex phenotype in which overexpression of P-gp represents most remarkable difference as compared from sensitive cells. However, several other alterations in cell metabolic and regulatory pathway are associated with P-gp overexpression and are involved in reduced cell sensitivity to anticancer drugs. We described alteration in expression of anti-apoptotic proto-oncogene Bcl-2 and activation of Caspase-3 in P-gp positive L1210 cells that were lead to reduced sensitivity of cells also to cisplatin, i.e., to drug that is not transportable by P-gp (Gibalova et al., *Gen Physiol and Biophys*, 2009). Down-regulation of endoplasmic reticulum calcium pump and calnexin (calcium dependent lectin active in protein synthesis quality control in endoplasmic reticulum) we found in P-gp positive cells (Šereš et al., *Gen Physiol and Biophys*, 2010). The latter features are also responsible for altered intracellular homeostasis of calcium that we observed in P-gp positive cells (Sulova et al., *Gen Physiol and Biophys*, 2009). Overexpression of P-gp in L1210 cells is associated with massive remodeling of cell surface sugars that could be monitored by several lectin. Jack bean lectin concanavalin A interacts with cell surface of P-gp negative cells more effectively as with cell surface of P-gp positive L1210 cells. In contrast tomato lectin binds more effectively P-gp positive cells. However both these lectins did not interact with sugar residues located directly on P-gp molecule (Sulova et al., *J Proteome Res*, 2008). Thus overexpression of P-gp in L1210 cells is associated with alteration in glycosylation of several proteins distinct from P-gp. P-gp positive L1210 cells are less sensitive to tunicamycin (inhibitor of protein N-glycosylation) as P-gp negative cells. Complete suppression of P-gp glycosylation was observed in P-gp-positive L1210 cells following tunicamycin treatment. However, non-glycosylated P-gp was localized in the plasma membrane, and its transport activity was unrelated (Šereš et al., *Intl J Mol Sci*, 2011).

Team of Laboratory of biochemistry and cytochemistry represents standard European scientific team that was recognized by independent scientific ranking agency ARRA as **above standard** in the world scientific ranking (http://arra.sk/sites/arra.sk/files/sav-nadpriemer_tabulka2011_5.pdf). This may be documented by publication activity and by the fact that members of this team are often invited to submit papers to the recognized international scientific media.

Laboratory of Biophysics investigated role of voltage-dependent calcium channels in neuronal excitability. We concentrated on two major subgroups: L-type and T-type calcium channels. Role of L-type calcium channels was investigated in two neuronal cell lines, primary culture of hippocampal neurons from newborn rat and PC12 line from rat pheochromocytoma, which differentiates into neuron-like cell upon exposure to neuronal growth factor. These models do express both Ca_v1.2 and Ca_v1.3 isoform of L-type calcium channel. Ca_v1.2 and Ca_v1.3 channels have virtually identical pharmacology and very similar electrophysiological properties, yet it seems that their role in various tissues including neurons is highly specific. Role of Ca_v1.2 in pathologies like Alzheimer disease and autism was suggested, while the Ca_v1.3 is involved in hearing and in neuronal and cardiac pacemaking. Initial results suggest that downregulation of the Ca_v1.2 channel in rat hippocampal neurons by siRNA does not affect an action potential generation. This contrasts our previous finding that an inactivation of the corresponding gene in mouse hippocampus moderately suppressed excitability. Species difference could be attributed to different distribution of both channel isoforms. Mouse hippocampal neurons express predominantly Ca_v1.2 channel, only negligible expression of the Ca_v1.3 channel was detected. Therefore in rat hippocampal neurons Ca_v1.3 may have a compensatory role (Lacinova et al., *Life Sciences*, 2008).

Due to their negative threshold for voltage-dependent activation T-type or Ca_v3.n or low-voltage-activated calcium channels contribute to initiation of action potential firing in many neuronal tissues and in sinoatrial nodus. Structural determinants of their activation were the main subject of our investigation. Principal α_1 -subunit of voltage-activated calcium channel is built from four homological domains I - IV, each consisting from six transmembrane segments. Segments S1 – S4 in each domain form a putative voltage sensor. Positively charged S4 segment is responsible for voltage-sensing. Segments S5 – S6 and intracellular

loop between them create conducting pore. The process of voltage-dependent activation consists of two distinctive steps: activation of voltage sensor and opening of conductive pore. Our results point to specific role of domain I in both steps (Kurejova et al., Pflug. Arch. 2007). S4 segment in the domain I is connected to the segment S5 by a long extracellular loop containing 6 cysteins. This loop is specific for T-type calcium channels as it is much shorter in high-voltage-activated calcium channels and contains 4 cysteins only. We have shown that all six cysteins are essential for proper pore opening and may obscure conductive pathway when the loop is improperly folded (Karmazinova et al., Pflug. Arch. 2010). Gating current reflecting activation of voltage sensor is activated at more negative voltages than inward current reflecting the opening of conducting pore. However, voltage dependencies of gating and inward current cross each other so that pore opening reaches its' maximum before all voltage sensors are fully activated. Further, when we remove putative "gating brake" in the intracellular loop connecting domain I and domain II in the $Ca_v3.3$ channel both gating current and inward current activated at voltages more negative by almost 30 mV (gating current) or 20 mV (inward current) (Karmazinova et al., Pflug. Arch. 2011). All these results allow to hypothesize that conducting pore of low-voltage-activated channels does not need activation of voltage sensors in all four domains and that activation of the domain I is of particular importance.

Research on L-type calcium channels was done as a part of international cooperation between ten European institutions within Marie Curie Research training network CavNet. Research on gating of T-type was done under bilateral cooperations with groups at University in Freiburg (Kurejova et al., Pflug. Arch. 2007), Universities in Freiburg and Vienna (Karmazinova et al., Pflug. Arch. 2010), University of Virginia (Karmazinova et al., Pflug. Arch. 2011) and Grenoble Institute of Neuroscience (Weiss et al., J. Biol. Chem. 2011). Our work during the period 2007-2011 resulted in 18 articles in impacted international journals and 517 citations.

Laboratory of Ion Channel Function is smallest yet it has youngest principle investigators in our institute. Our research during 2007-2011 was mainly focused on the specific regulation of cardiac ryanodine receptor (RYR2) that could have a significant impact on our understanding the molecular basis of cardiac contractility. During the 2007-2011 period, we published 6 articles in impacted international journals. Our work was cited 372 times in the period 2006 - 2010.

The intracellular trigger for the contraction is a transient rise in cytosolic Ca^{2+} that is caused by the massive release of Ca^{2+} from intracellular stores through activated RYR2 channels. Although, the activity of RYR2 channels is primary controlled by cytosolic Ca^{2+} , there is growing evidence that Ca^{2+} in the lumen of Ca^{2+} stores and the inter-channel communication can also be effectively involved in the regulation process. Local Ca^{2+} release is intrinsically self-regenerative because open RYR2 channel can reactivate neighboring RYR2 channels via released Ca^{2+} ; and thus, a mechanism leading to robust termination of Ca^{2+} flux is required to ensure periodic cardiac contraction and relaxation. Although identifying such a termination mechanism is an outstanding unsolved problem, several mechanisms have been suggested and one of them is "coupled gating". This phenomenon observed in a planar lipid membrane is primarily manifested by simultaneous openings and closings of multiple RYR2 channels; and thus, the simultaneous closure of all channels in the release unit would break the positive feedback loop and terminate Ca^{2+} release. Importantly, this finding has provided new provocative evidence that clusters of RYR2 channels can gate in a coordinated fashion. In our work, we focused our effort on a systematic characterization of specific functional properties of coupled RYR2 channels in order to identify some attributes that could help us to answer the question: What is the nature of functional interaction among RYR2 channels? Using a method of reconstitution of an ion channel into a planar lipid membrane, we systematically examined the sensitivity to cytosolic Ca^{2+} and permeation properties of coupled RYR2 channels isolated from the rat heart because these properties appear to be feasible *in vivo*. By comparing our results to that of the single independent RYR2 channel, we suggested that the main purpose of a functional coupling among RYR2 channels is a

synchronization of the channel gates because the sensitivity to cytosolic Ca^{2+} and the permeation properties of the individual RYR2 channels recruited into a functional complex remained unchanged (Gaburjakova & Gaburjakova, J. Membr. Biol. 2010).

Currently, we attempt to understand how information about the position of one channel gate could be transferred to the gate of an adjacent channel. Evidently, some form of crosstalk between gates must take place.

The typical feature of most coupled RYR2 channels is a “noisy” current level corresponding to the main open state that is caused by brief transitions between open and closed states of individual RYR2 channels. In other words, the channels try to escape from the tightly synchronized regime of their functioning. Thus, we suggested that the intensity of such flickering likely reflects the thermodynamic stability of the channel complex. We introduced a new parameter, the coupling stability, and we revealed that it was significantly reduced when RYR2 channels entered the open state; and furthermore, we showed that the magnitude of reduction significantly depended on the concentration of luminal Ca^{2+} . Taken together, we proposed that a decrease in the concentration of luminal Ca^{2+} during excitation-contraction coupling in cardiac muscle could reduce the coupling stability of activated RYR2 channels required, according to the mathematical models, for the fast termination of Ca^{2+} release that would be in the agreement with experimental outcomes. In contrast, an elevation of luminal Ca^{2+} above the physiological level would stabilize the functional interaction among RYR2 channels in the open state that would result, according to the theoretical predictions, in a pathological prolongation of Ca^{2+} release (Gaburjakova & Gaburjakova, Acta Physiol., 2008). Recently, we started an international collaboration with the group of prof. Blas Echebarria from the Department of Applied Physics at Universitat Politecnica de Catalunya in Barcelona who found our experimental work on the coupled RYR2 channels interesting.

3. Concept of R&D activity of the Organisation for the next four years (recommended 3 pages, max. 5 pages)

i. Present state of knowledge and status of ongoing research related to the subject of the Concept, from both international and national perspective

Basic research in all medical fields moves towards molecular-biological aspects of cell/tissue function. Understanding physiological processes at molecular and subcellular levels provides guidance to this effort. Uncovering pathways and functional differences during pathophysiological states could provide effective tool for development potent therapeutics and/or therapeutic approaches. Although the research in our Institute belongs mainly to basic one, it has a long-term ambition to result into such application outcome. Multidisciplinary teams are indispensability to fulfil such ambitions.

Department of Cell Physiology and Genetics (DCPG)

Calcium signaling is a crucial regulatory mechanism in all types of cells. Dysregulation of this mechanism can lead to detrimental effects on cells. Although calcium signaling is well explored in variety of cells, little is known about involvement of calcium in tumour development and progression. Our first results shows the marked differences in calcium transport systems and also in calcium signaling in tumor cell lines.

Another transmitter, H_2S , modulates the NO signaling pathway, influences neuromodulation, heart regulation, vasorelaxation and has cardioprotective, neuroprotective and cytoprotective properties. Current results are focused on the explanation of biological effects of H_2S and its molecular mechanism.

Department of Muscle Cell Research (DMCR)

Complex data generated by this research necessitate their integration and validation through the use of computer models. In cardiac excitation – contraction coupling, the general progress lead to integration of human and animal models due to common molecular pathways in mammals. This topic developed due to an interdisciplinary approach that requires prolonged training of specialists coming from different disciplines of natural sciences. The team of DMCR consists of physiologists, biophysicists, chemists, engineers and information scientists who develop their curriculum through international experience.

Department of Transport Proteins (DTP)

Part of the research in this Department is dedicated to structure-functional studies of neuronal voltage-activated calcium channels. Due to their negative threshold for voltage-dependent activation T-type calcium channels can contribute to initial phase of cell depolarization, initiate so-called low-voltage calcium spikes, support neuronal firing and neurotransmitter release or initiate epileptic seizure activity.

The potential physiological role of coupled gating among ryanodine channels of type 2 has been hypothesized only by mathematical models of the cardiac excitation-contraction coupling. Till now, the experimental evidence is still missing. Therefore, the aim of our future work is to identify determinants of the coupled gating phenomenon on the experimental level. This could help us to suggest some concepts of inter-channel communication that might be tested on the cellular level in order to reveal the physiological role of coupled gating in Ca^{2+} signaling and cardiac excitation-contraction coupling.

P-glycoprotein (P-gp), is ABCB1 member of the ABC transporter family of proteins, and is an integral protein of the plasma membrane of animal cells. When expressed in neoplastic tissue, P-gp represents a real obstacle for effective chemotherapy of neoplastic diseases, and tissues with increased P-gp are most often observed with the multidrug resistance (MDR) phenotype.

ii. Organisation's role or significance in the overall research effort within the field of the Concept on both the national and international scales

Institute of Molecular Physiology and Genetics (IMPG), SAS belongs to the recognized institutions in the field of calcium transport systems globally. Thus, majority of teams are oriented towards studies of plasma and/or intracellular calcium systems. Publication in foreign and domestic journals with impact factor 3.0 – 5.0 is a warranty of quality research.

Scientific cooperation is not negligible part of a research work. Since Institute have researcher from the field of biochemistry, physiology, biophysics, molecular biology, genetics, etc., cooperation among individual teams and researcher provide effective tool for improvement the quality of their research. Also, scientists from the Institute have wide and fruitful cooperation with research teams from other scientific institutions in Slovakia (e.g. Institute of Virology, SAS, Institute for Heart Research, SAS, Institute of Experimental Endocrinology, SAS, Institute of Cancer Research, SAS, Faculty of Natural Sciences, Comenius University, Bratislava, Jessenius Medical Faculty, Comenius University in Martin, etc.), Czech Republic (e.g. Medical Faculty of Masaryk University, Brno, Medical Faculty, Charles University, Prague, etc.) and other recognized teams from Europe and USA. Two members of the Institute are members of COST action – Action TD0901 Hypoxia sensing, signalling and adaptation and COST Action BM1005: Gasotransmitters: from basic science to therapeutic applications.

As mentioned elsewhere in this questionnaire, IMPG has training Ph.D programs in the field of biochemistry, biophysics and animal physiology. Institute is selecting the best students from these programs and offering them scientific positions at the Institute. This can not only boost the scientific potential of the Institute, but secures continuity of the research.

iii. Objectives of the Concept

Department of Cell Physiology and Genetics (DCPG)

The main goal of part of the research in DCPG will be to understand changes in intracellular calcium systems during tumor development, growth and progression. Since one of the intracellular calcium transport systems – inositol 1,4,5-trisphosphate (IP₃) receptor is deeply involved in induction of apoptosis, we presume that modulation of this receptor towards its upregulation can enhance the chance of the tumor cell to induce apoptosis. We will also check, how some pathophysiological exogenous or endogenous factors will affect intracellular calcium transporters.

Our project will test the hypothesis whether there is H₂S signalization and whether it is connected to NO signalization. We will study how physical and chemical factors and biologically active compounds influence H₂S-induced NO release from NO-donors. We will study products of H₂S-NO interaction and biological effects of the products on aortic ring tonus, blood pressure and mitochondrial function.

Department of Muscle Cell Research (DMCR)

Objective of the research in DMCR is to understand the dynamics of calcium signalling in cardiac excitation – contraction coupling from the structural and functional aspects. The idea behind is that the phenomena accompanying excitation – contraction coupling are complex by a large part due to the microscopic machinery that varies in form (spatial variability) and rate (temporal variability). The spatial and temporal aspects are convolved via reaction-diffusion processes leading to local variation of ligands and receptors. Structural adaptation of the myocytes to the changing demands of the organism adds to the range of effects. The observed variability may reflect the limits of functional states of the studied processes. We will focus on morphological and functional aspects of calcium signalling challenged by physiological stimuli provided by voluntary exercise, and by pathological stimuli provided by myocardial injury induced by experimental diabetes and by catecholaminergic overload.

Department of Transport Proteins (DTP)

Currently, the precise gating machinery of a voltage-dependent channel turns change of transmembrane voltage into conformational changes of channel's voltage sensor and conducting pore is not known. We will address function of voltage sensors in individual domains of Ca_v3 voltage-dependent calcium channel and the interaction of these sensors with channel's conducting pore with the aim to identify determinants of their negative activation threshold voltage.

At present, it is of primary importance to understand the mechanism of inter-channel communication among coupled type 2 ryanodine receptor channels in order to elucidate the physiological role of coupled gating. The systematical identification of the determinants of coupled gating phenomenon is the way how to resolve this issue.

Systematic study of P-glycoprotein (P-gp) mediated multidrug resistance (MDR) of leukemia cells is necessary to overcome the chemoresistance. This topic will include measurements of: i) P-gp expression and function in leukemia cells treated and untreated with several cytotoxic agents; ii) apoptotic progression of leukemia cells under treatment with drugs known as P-gp transportable and non-transportable substances; iii) expression and activity of several key players of cell regulatory pathways such as different protein kinases, matrix metalloproteinases, nuclear receptors – transcription factors and others in relation to development of P-gp mediated MDR; iv) influence of P-gp overexpression on protein glycosylation pathway. The *in vitro* studies using several known leukemia cell cultures will be combined with analysis of samples obtained from leukemia patients. This activity will be based on recent results obtained from implementation of application project supported by Celgene CR and from research activities covered by cooperation contract between Institute of Molecular Physiology and Genetics SAS and National Institute of Oncology Bratislava.

iv. Proposed strategies and methods to be applied, and time schedule

Strategies and time schedule is highly dependent on the funding granted to the Institution and individual projects.

Department of Cell Physiology and Genetics (DCPG)

Studies of altered metabolic pathways as well as their modulation will be performed on two types of tumor cell lines – pheochromocytoma and leukemia. Modulations will be aimed towards inducing endoplasmic stress and induction of the apoptosis. The main interest will be given to intracellular calcium transport systems, predominantly to the IP₃ receptors. We will try to upregulate responsive elements in the promoter region of individual types of IP₃ receptors in order to increase their expression. We will correlate the effect of individual types of IP₃ receptors on the possible induction of apoptosis. For these issues we will use advanced techniques are RNA silencing, real-time PCR, Western blot, fluorescent calcium measurement, immunofluorescence, flow cytometry, etc.

Since H₂S is relatively new transmitter, results obtained might contribute to understanding of the basic mechanisms of the broad range of H₂S effects and bring basic information for the future studies for H₂S application in medicine.

Department of Muscle Cell Research (DMCR)

The state-of-the art methods including confocal microscopy, patch-clamp, planar lipid bilayers, electron microscopy, quantitative image analysis, and mathematical modelling will be used for characterization of myocyte ultrastructure, calcium signals and membrane excitability to understand compensatory mechanisms by which myocytes adapt to specific loads. We are in informal contacts with partners abroad to coordinate our efforts and take advantage of EU funding when available.

Department of Transport Proteins (DTP)

For construction of channel mutants PCR-based method for point mutations will be used. Whole-cell patch clamp will be used for measurement of inward and gating currents. Channel constructs with eGFP protein fused to carboxy terminus will enable localization of channel protein within the cell by confocal microscope.

Firstly, the isolation procedure of cardiac microsomes (ionic strength of the isolation buffers) and the experimental conditions (lipid composition, temperature and membrane voltage) will be optimized to increase the number of reconstituted coupled RYR2 channels in a planar lipid membrane. Afterwards, the main focus will be on the regulation role of luminal Ca²⁺. Our plan is to separate between the effect of Ca²⁺ flux via the channel in the lumen-to-cytosol direction and the true effect of luminal Ca²⁺ on the luminal face of coupled RYR2 channels. In addition, we believe that we will succeed to record, for the first time, the coupled RYR2 channels under physiological conditions, in respect to luminal Ca²⁺ (1 mM). It is essential to see how coupled RYR2 channels behave under these conditions, if we want to advance our understanding of the coupled gating phenomenon significance in physiological as well as pathophysiological processes. Furthermore, we will investigate the role of associated proteins located on the luminal face of the RYR2 channels such as calsequestrin in the luminal regulation. This issue is becoming of significant interest in the field of RYR2 channel regulation. As the main experimental approach we will use the method of reconstitution of an ion channel into the planar lipid membrane. This method allows us to investigate detail functional properties of individual ion channels.

Expression of P-gp in leukaemia cell models will induce by selection with drugs known as Pgp substrates and by transfection with gene encoding P-gp. Detection of protein expression and activity will be studied with the aid of modern methods of molecular and cellular biology like PCR reaction, western blot, flow cytometry, electron and confocal microscopy etc.

III. Partial indicators of the main activities:

1. Research output

i. Principal forms of research outputs of the Organisation

Peer reviewed papers in the impacted journals, monographs, chapters in monographs.

ii. List of the selected publications documenting the most important results of basic research. Total number of publications in the whole assessed period should not exceed the average number of the research employees. The principal science outputs (max. 5) underline

- [1] JURKOVIČOVÁ, Dana - KOPÁČEK, Juraj - ŠTEFÁNIK, Peter - KUBOVČÁKOVÁ, Lucia - ZAHRADNÍKOVÁ, Alexandra, ml. - ZAHRADNÍKOVÁ, Alexandra - PASTOREKOVÁ, Silvia - KRIŽANOVÁ, Oľga. Hypoxia modulates gene expression of IP3 receptors in rodent cerebellum. In Pflugers Archiv-European Journal of Physiology, 2007, vol. 454, no. 3, p. 415-425. ISSN 0031-6768. (4.807 - IF2006).
- [2] **ZAHRADNÍKOVÁ, Alexandra Jr. – POLÁKOVÁ, Eva – ZAHRADNÍK, Ivan – ZAHRADNÍKOVÁ, Alexandra.** Kinetics of calcium spikes in rat cardiac myocytes. In Journal of Physiology Vol. 578 (2007), p. 677-691 (4.407 – IF2006)
- [3] **KUREJOVÁ, Martina – UHRÍK, Branislav – SULOVÁ, Zdena – SEDLÁKOVÁ, Barbora – KRIŽANOVÁ, Oľga – LACINOVÁ, Ľubica.** Changes in ultrastructure and endogenous ionic channels activity during culture of HEK 293 cell line. In European Journal of Pharmacology. Vol. 567, no. 1-2 (2007), p. 10-18. (2.522 – IF2006)
- [4] **MÁLEKOVÁ, Ľubica – KOMÍNKOVÁ, Viera – FERKO, Miroslav – ŠTEFÁNIK, Peter – KRIŽANOVÁ, Oľga – ZIEGELHOFFER, Attila – SZEWCZYK, A. – ONDRIAŠ, Karol.** Bongkrekic acid and atractyloside inhibits chloride channels from mitochondrial membranes of rat heart. In Biochimica et Biophysica Acta – Bienergetic Vol. 1767 (2007), p. 31-44 (4.237 – IF2006)
- [5] **MÁLEKOVÁ, Ľubica – TOMÁŠKOVÁ, Jana – NOVÁKOVÁ, Maria – ŠTEFÁNIK, Peter - KOPÁČEK, Juraj – LAKATOS, Boris – PASTOREKOVÁ, Silvia. – KRIŽANOVÁ, Oľga – BREIER, Albert – ONDRIAŠ, Karol.** Inhibitory effect of DIDS, NPPB and phloretin on cardiomyocyte apoptosis and intracellular chloride channels. In Pflugers Archives – European Journal of Physiology Vol. 455 (2007), p. 349-357 (4.807 – IF2006)
- [6] **TOMÁŠKOVÁ, Zuzana - GABURJÁKOVÁ, Jana - BREZOVÁ, Anna - GABURJÁKOVÁ, Marta.** Inhibition of anion channels derived from mitochondrial membranes of the rat heart by stilbene disulfonate-DIDS. In *Journal of Bioenergetics and Biomembranes*, 2007, vol. 39, iss. 4, p. 301-311. ISSN 0145-479X. (3.16-IF2006)
- [7] **VALENT, Ivan – ZAHRADNÍKOVÁ, Alexandra – PAVELKOVÁ, Jana – ZAHRADNÍK, Ivan.** Spatial and temporal Ca²⁺, Mg²⁺, and ATP²⁻ dynamics in cardiac dyads during calcium release. In *Biochemical et Biophysical Acta* Vol 1768 no.1 (2007), p. 155-66 (3.587 – IF2006)

- [8] **KUREJOVÁ, Martina – LACINOVÁ, Ľubica – PAVLOVIČOVÁ, Michaela. – ESCHBACH, M. – KLUGBAUER, N.** The effect of positively charged residues in individual S4 segments of the Ca_v3.1 T-type calcium channel on gating. In Pflügers Archives Vol. 455, no. 3 (2007), p. 527-539. (4.807 – IF2006)
- [9] **ZAHRADNÍKOVÁ, Alexandra – MINAROVÍČ, Igor – ZAHRADNÍK, Ivan.** Competitive and cooperative effects of Bay K8644 on the L-type calcium channel current inhibition by calcium channel antagonists. In Journal of Pharmacology and Experimental Therapeutics Vol. 322 (2007), p. 638-645 (3.956 – IF2006)
- [10] **ONDRIAŠ, Karol - STAŠKO, Andrej - ČAČÁNYIOVÁ, Soňa - SULOVÁ, Zdena - KRIŽANOVÁ, Oľga - KRISTEK, František - MÁLEKOVÁ, Ľubica - KNEZL, Vladimír - BREIER, Albert.** H₂S and HS⁻ donor NaHS releases nitric oxide from nitrosothiols, metal nitrosyl complex, brain homogenate and murine L1210 leukaemia cells. In Pflugers Archiv-European Journal of Physiology, 2008, vol. 457, no. 2, p. 271-279. ISSN 0031-6768. (3.842 - IF2007).
- [11] **POLÁKOVÁ, Eva - ZAHRADNÍKOVÁ, Alexandra, ml. - PAVELKOVÁ, Jana - ZAHRADNÍK, Ivan - ZAHRADNÍKOVÁ, Alexandra.** Local calcium release activation by DHPR calcium channel openings in rat cardiac myocytes. In Journal of Physiology, 2008, vol. 586, iss. 16, p. 3839-3854. ISSN 0022-3751. (4.580 - IF2007).
- [12] **TOMÁŠKOVÁ, Zuzana - GABURJÁKOVÁ, Marta.** The cardiac ryanodine receptor: Looking for anomalies in permeation properties. In Biochimica et Biophysica Acta-Biomembranes, 2008, vol. 1778, issue 11, p.2564-2572. (3.640 - IF2007)
- [13] **ZAHRADNÍK, Ivan – MINAROVÍČ, Igor – ZAHRADNÍKOVÁ, Alexandra.** Inhibition of the cardiac L-type calcium channel current by antidepressant drugs. In: Journal of Pharmacology and Experimental Therapeutics. Vol. 324, (2008), p. 977-984 (4.003 - IF2007)
- [14] **KOPÁČEK, Juraj - ONDRIAŠ, Karol - SEDLÁKOVÁ, Barbora – TOMÁŠKOVÁ, Jana - ZAHRADNÍKOVÁ, Lucia - SEDLÁK, Jan - SULOVÁ, Zdena - ZAHRADNÍKOVÁ, Alexandra - PASTOREK, Jaromír - KRIŽANOVÁ, Oľga.** Type 2 IP(3) receptors are involved in uranyl acetate induced apoptosis in HEK 293 cells. In Toxicology. ISSN 0300-483X, 2009, vol. 262, iss. 1, p. 73-79. (2.836 -IF2008)
- [15] **SULOVÁ, Zdena - GIBALOVÁ, Lenka - VAJCNEROVÁ, Z - POLÁKOVÁ, Eva - UHRÍK, Branislav - TYLKOVA, Lucia - KOVÁROVÁ, Annamaria - SEDLÁK, Ján - BREIER, Albert.** Vincristine-Induced Overexpression of P-Glycoprotein in L1210 Cells Is Associated with Remodeling of Cell Surface Saccharides. In Journal of Proteome Research. ISSN 1535-3893, 2009, vol. 8, no. 2, p. 513-520. (5.684 - IF2008)
- [16] **TOMÁŠKOVÁ, Zuzana - ČAČÁNYIOVÁ, Soňa - BENČO, Andrej - KRISTEK, František - DUGOVIČOVÁ, Lea - HRBÁČ, Jan - ONDRIAŠ, Karol.** Lipids modulate H₂S/HS⁻ induced NO release from S-nitrosoglutathione. In Biochemical and Biophysical Research Communications, 2009, vol. 390, no. 4, p. 1241-1244. ISSN 0006-291X. (2.648 - IF2008)
- [17] **HUDECOVÁ, Soňa - SEDLÁKOVÁ, Barbora - KVETŇANSKÝ, Richard - ONDRIAŠ, Karol - KRIŽANOVÁ, Oľga.** Modulation of the sodium-calcium exchanger in the rat kidney by different sequential stressors. In Stress, 2010, vol. 13, iss. 1, p.15-21. ISSN 1025-3890. (3.205 - IF2009)
- [18] **KOMÍNKOVÁ, Viera - MÁLEKOVÁ, Ľubica - TOMÁŠKOVÁ, Zuzana - SLEZÁK, Peter - SZEWCZYK, A. - ONDRIAŠ, Karol.** Modulation of intracellular chloride channels by ATP and Mg²⁺. In Biochimica et Biophysica Acta :

bioenergetics, 2010, vol. 1797, no. 6-7, p. 1300-1312. ISSN 0005-2728. (3.688 - IF2009)

- [19] **LENČEŠOVÁ, Ľubomíra - ŠÍROVÁ, Marta - CSÁDEROVÁ, Lucia - LAUKOVÁ, Marcela - SULOVA, Zdena - KVETŇANSKÝ, Richard - KRIŽANOVÁ, Oľga.** Changes and role of adrenoceptors in PC12 cell after phenylephrine administration and apoptosis induction. In *Neurochemistry International*, 2010, vol. 57, p. 884-892. ISSN 0197-0186. (3.541 - IF2009).
- [20] **RADVÁNSKÝ, Ján - RESKO, Peter - SUROVÝ, Milan - MINARIK, Gabriel - FICEK, Andrej - KÁDAŠI, Ľudevít.** High-resolution melting analysis for genotyping of the myotonic dystrophy type 1 associated Alu insertion/deletion polymorphism. In *Analytical Biochemistry*, 2010, vol. 398, no.1, p.126-128. ISSN 0003-2697. (3.287 - IF2009).
- [21] **TOMÁŠKOVÁ, Zuzana - ONDRIAŠ, Karol.** Mitochondrial chloride channels - What are they for?. In *FEBS Letters*, 2010, vol. 584, no. 10, p. 2085-2092. ISSN 0014-5793. (3.541 - IF2009).
- [22] **ZAHRADNÍKOVÁ, Alexandra - VALENT, Ivan - ZAHRADNÍK, Ivan.** Frequency and release flux of calcium sparks in rat cardiac myocytes: a relation to RYR gating. In *Journal of General Physiology*, 2010, vol. 136, iss. 1, p. 101-116. ISSN 0022-1295. (4.260 - IF2009).
- [23] **KARMAŽÍNOVÁ, Mária - BAUMGART, J.P. - PEREZ-REYES, Edward - LACINOVÁ, Ľubica.** The voltage dependence of gating currents of the neuronal Cav3.3 channel is determined by the gating brake 6 in the I-II loop. In *Pflugers Archiv-European Journal of Physiology*, 2011, vol. 461, no. 4, p.461-468. ISSN 0031-6768. (3.354 - IF2010).
- [24] **ONDRIAŠ, Karol - LENČEŠOVÁ, Ľubomíra - ŠÍROVÁ, Marta - LABUDOVA, Martina - PASTOREKOVÁ, Silvia - KOPÁČEK, Juraj - KRIŽANOVÁ, Oľga.** Apoptosis induced clustering of IP (3) R1 in nuclei of nondifferentiated PC12 cells. In *Journal of Cellular Physiology*, 2011, vol. 226, no. 12, p. 3147-3155. ISSN 0021-9541. (3.986 - IF2010).
- [25] **TOMÁŠKOVÁ, Zuzana - BERTO VÁ, Anna - ONDRIAŠ, Karol.** On the Involvement of H₂S in Nitroso Signaling and Other Mechanisms of H₂S Action. In *Current Pharmaceutical Biotechnology*, 2011, vol. 12, p. 1394-1405. ISSN 1389-2010. (3.455 - IF2010).
- [26] **ZAŤKOVÁ, Andrea - SEDLÁČKOVÁ, T. - RADVÁNSKÝ, Ján - POLÁKOVÁ, Helena - NÉMETHOVÁ, Martina - AGUARON, Robert - DURSUN, Ismail - USHER, Jeannette L. - KÁDAŠI, Ľudevít.** Identification of 11 Novel Homogentisate 1,2 Dioxygenase Variants in Alkaptonuri Patients and Establishment of a Novel LOVD-Based HGD Mutation Database. In *Journal of Inherited Metabolic Disease*, 2011, vol., no., p. as DOI: 10.1007/8904-2011-68. ISSN 0141-8955. (3.808 - IF2010).
- [27] **ZAŤKOVÁ, Andrea.** An update on molecular genetics of alkaptonuria (AKU). In *Journal of Inherited Metabolic Disease*, 2011, vol. 34, no. 6, p. 1127-1136. ISSN 0141-8955. (3.808 - IF2010).

iii. List of monographs/books published abroad

- [1] VOGT, Gábor - **KÁDAŠI, Lúdevít** - CZEIZEL, Endre. A szem fejlődési rendellenességei : magyarországi gyakoriságuk, genetikai és külső korokai, megelőzési lehetőségeik. Budapest : Medicina Kiadó, 2009. 256 s. ISBN 978-963-226-198-0.

iv. List of monographs/books published in Slovakia

- [1] BARANČÍK, Miroslav - **BREIER, Albert** - KOPÁČEK, Juraj – **KRIŽANOVÁ, Oľga** - **LACINOVÁ, Ľubica** - LEHOTSKÝ, Ján - **NOVÁK, Pavel** - **ONDRIAŠ, Karol** - **PAVLOVIČOVÁ, Michaela** - VALENT, Ivan - **SULOVÁ, Zdena** - ŠTOLC, Svorad - **ZAHRADNÍKOVÁ, Alexandra**. Biomembranes. Editor L. Lacinová. Bratislava : Petrus, 2010. 286 s. APVV projekt VVCE-0064-07 Biomembranes: Structure and dynamics of biological membranes related to cell functions. ISBN 978-80-89233-46-5.

v. List of other scientific outputs specifically important for the Organisation

- [1] **PARULEK, Július** - ŠRÁMEK, Miloš - ČERVENANSKÝ, Michal - **NOVOTOVÁ, Marta** - **ZAHRADNÍK, Ivan**. A Cell Architecture Modeling System Based on Quantitative Ultrastructural Characteristics. In Systems Biology. - Pittsburgh : Humana Press, 2009. ISBN 978-1-934115-64-0, p.289-312.

vi. List of patents registered abroad, incl. revenues

None

vii. List of patents registered in Slovakia, incl. revenues

None

viii. Table of research outputs

Table **Research outputs** shows research outputs in number of specified entries; these entries are then divided by FTE employees with a university degree (from Tab. Research staff) for all Organisation at the respective year; finally these entries are divided by the total salary budget (from Tab. Salary budget).

Research outputs	2007			2008			2009			2010			2011			total			
	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	averaged number per year	av. No. / FTE	av. No. / salary budget
chapters in monographs, books published abroad	0	0,000	0,00	0	0,000	0,00	3	0,103	6,52	0	0,000	0,00	1	0,041	2,26	4	0,8	0,029	1,82
chapters in monographs, books published in Slovakia	0	0,000	0,00	1	0,033	2,32	0	0,000	0,00	0	0,000	0,00	1	0,041	2,26	2	0,4	0,014	0,91
WOS publications	27	0,975	67,52	25	0,831	58,11	22	0,756	47,82	30	1,103	64,28	22	0,898	49,70	126	25,2	0,909	57,28
scientific publications indexed by other databases (specify)	0	0,000	0,00	0	0,000	0,00	0	0,000	0,00	0	0,000	0,00	0	0,000	0,00	0	0,0	0,000	0,00
scientific publications in other journals	0	0,000	0,00	1	0,033	2,32	3	0,103	6,52	0	0,000	0,00	0	0,000	0,00	4	0,8	0,029	1,82
publications in proc. of international scientific conferences	28	1,011	70,02	26	0,864	60,44	35	1,203	76,07	36	1,324	77,14	22	0,898	49,70	147	29,4	1,061	66,83
publications in proc. of nat. scientific conferences	23	0,830	57,51	22	0,731	51,14	26	0,893	56,51	46	1,691	98,56	55	2,245	124,24	172	34,4	1,241	78,20
active participations at international conferences	24	0,866	60,02	21	0,698	48,81	28	0,962	60,86	30	1,103	64,28	21	0,857	47,44	124	24,8	0,895	56,37
active participations at national conferences	30	1,083	75,02	19	0,631	44,17	37	1,271	80,42	47	1,728	100,71	49	2,000	110,68	182	36,4	1,313	82,74
patents registered in Slovakia	0	0,000	0,00	0	0,000	0,00	0	0,000	0,00	0	0,000	0,00	0	0,000	0,00	0	0,0	0,000	0,00
patents registered in abroad	0	0,000	0,00	0	0,000	0,00	0	0,000	0,00	0	0,000	0,00	0	0,000	0,00	0	0,0	0,000	0,00

ix. List of patents and patent applications

None

x. Supplementary information and/or comments on the scientific output of the Organisation

During the period of years 2007-2011 researches of IMPG SAS published 126 papers in journals indexed in CC and/or in WOS. From these, 41 papers were published in journals with the IF higher than 3,0. 30 papers were published in General Physiology and Biophysics (2007-2011) and these papers were up to now (until 4/2012) cited together 27 - times. This journal represents an international scientific platform for publication manuscripts from the field of molecular and cellular physiology and biophysics.

Paper of researches from IMPG were cited 2960 - times in the period of 2006-2010 WOS, SCOPUS). This scientometric parameter documens the high quality research performed in the IMPG SAS.

Quality of scientific work is warranted by high number of D.Sc. – 6 – all in the age 60 or lower. During evaluated period, the 6th scientist – Dr. Alexandra Zahradnikova, Ph.D. defended her D.Sc. thesis. This year, another D.Sc. work is under the consideration. We propose that Dr. Sulova. Ph.D.. could obtain her D.Sc. this year.

Notice: List of all research outputs of monitored assessment period of structure of the Organisation's annual report is included in the separate annex

2. Responses to the scientific output

Table **Citations** shows specified responses to the scientific outputs; these entries are then divided by the FTE employees with a university degree (from Tab. Research staff) for all Organisation at the respective year; finally these entries are divided by the total salary budget (from Tab. Salary budget).

Citations	2006			2007			2008			2009			2010			total			
	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	averaged number per year	av. No. / FTE	av. No. / salary budget
Web of Science	599	21,6	1497,9	665	22,1	1545,8	626	21,5	1360,6	440	16,2	942,8	429	17,5	969,1	2759	551,8	19,9	6271,6
SCOPUS (if not listed above)	15	0,5	37,5	35	1,2	81,4	19	0,7	41,3	36	1,3	77,1	96	3,9	216,9	201	40,2	1,5	456,9
specify Database if relevant (if not listed above)	0	0,0	0,0	0	0,0	0,0	0	0,0	0,0	0	0,0	0,0	0	0,0	0,0	0	0,0	0,0	0,0
in monographs, conf. proceedings and other publications abroad (if not listed above)	4	0,1	10,0	0	0,0	0,0	1	0,0	2,2	0	0,0	0,0	2	0,1	4,5	7	1,4	0,1	15,9
in monographs, conf. proceedings and other publications in Slovakia (if not listed above)	0	0,0	0,0	0	0,0	0,0	0	0,0	0,0	1	0,0	2,1	3	0,1	6,8	4	0,8	0,0	9,1

i. List of 10 top-cited publications and number of their citations in the assessment period (2006 – 2010)

- [1] MARX, S. O. - **GABURJÁKOVÁ, Jana** - **GABURJÁKOVÁ, Marta** - HENRIKSON, C. - **ONDRIAS, Karol** - MARKS, A. R. Coupled gating between cardiac calcium release channels (ryanodine receptors). In Circulation research, 2001, vol. 88, iss. 11, p. 1151-1158. (9.193 - IF2000). ISSN 0009-7330, **81 - times cited**
- [2] KLUGBAUER, N. - **LACINOVÁ, Ľubica** - FLOCKERZI, V. - HOFMANN, F. Structure and functional expression of a new member of the tetrodotoxin-sensitive sodium channel family from human neuroendocrine cells. In EMBO journal : European Molecular Biology Organization, 1995, vol. 14, iss. 6, p. 1084-1090. ISSN 0261-4189, **62 - times cited**
- [3] REIKEN, S. - **GABURJÁKOVÁ, Marta** - GUATIMOSIM, S. - GOMEZ, A. M. - D'ARMIENTO, J. - BURKHOFF, D. - WANG, J. - VASSORT, G. - LEDERER, W. J. -

- MARKS, A. R. Protein kinase A phosphorylation of the cardiac calcium release channel (ryanodine receptor) in normal and failing hearts - Role of phosphatases and response to isoproterenol. In *Journal of Biological Chemistry*, 2003, vol. 278, iss. 1, p. 444-453. ISSN 0021-9258, **57 - times cited**
- [4] KLUGBAUER, N. - **LACINOVÁ, Ľubica** - MARAIS, E. - HOBOM, M. - HOFMANN, F. Molecular diversity of the calcium channel alpha(2)delta subunit. In *Journal of neuroscience*, 1999, vol. 19, iss. 2, p. 684-691. (8.403 - IF1998). ISSN 0270-6474, **55 - times cited**
- [5] KAASIK, A. - VEKSLER, V. - BOEHM, E. - **NOVOTOVÁ, Marta** - MINAJEVA, A. - VENTURA-CLAPIER, R. Energetic crosstalk between organelles - Architectural integration of energy production and utilization. In *Circulation research*, 2001, vol. 89, iss. 2, p. 153-159. (9.193 - IF2000). ISSN 0009-7330, **55 - times cited**
- [6] HAMOSH, A. - COREY, M. - **KÁDAŠI, Ľudevít**. Cystic Fibrosis Genotype-Phenotype Consortium : Correlation between genotype and phenotype in cystic fibrosis patients. In *New England Journal of Medicine*, 1993, vol. 329, iss. 18, p. 1308-1313. ISSN 0028-4793, **53 - times cited**
- [7] MARX, S. O. - **ONDRIŠ, Karol** - MARKS, A. R. Coupled gating between individual skeletal muscle Ca²⁺ release channels (ryanodine receptors). In *Science*, 1998, vol. 281, issue 5378, p. 818-821. (24.676 - IF1997). ISSN 0036-8075, **52 - times cited**
- [8] **LACINOVÁ, Ľubica**. Voltage gated calcium channels. In *General physiology and biophysics*, 2005, vol. 24, suppl., p. 1-82. (0.694 - IF2004). ISSN 0231-5882, **43 - times cited**
- [9] GROMAN, J.D. - HEFFERON, T. W. - CASALS, T. - BASSAS, L. S. - ESTIVILL, X. - DES GEORGES, M. - GUITTARD, C. - KOUDOVA, M. - FALLIN, M. D. - NEMETH, K. - FEKETE, G. - **KÁDAŠI, Ľudevít** - FRIEDMAN, K. - SCHWARZ, M. - BOMBIERI, C. - PIGNATTI, P. F. - KANAVAKIS, E. - TZENIS, M. - SCHWARTZ, M. - NOVELLI, G. - D'APICE, M. R. - SOBCZYNSKA-TOMASZEWSKA, A. - BAL, J. - STUHRMANN, M. - MACEK, M. - CLAUSTRES, M. - CUTTING, G. R. Variation in a repeat sequence determines whether a common variant of the cystic fibrosis transmembrane conductance regulator gene is pathogenic or benign. In *American Journal of Human Genetics*, 2004, vol. 74, iss. 1, p. 176-179. ISSN 0002-9297, **40 - times cited**
- [10] MORRAL, N. - BERTRANPETIT, J. - ESTIVILL, X. - NUNES, V. - CASALS, T. - GIMENEZ, J. - REIS, A. - VARONMATEEVA, R. - MACEK, M. - KÁLAYDJIEVA, L. - ANGELICHEVA, D. - DANCHEVA, R. - ROMEO, G. - RUSSO, M.P. - GARNERONE, S. - RESTAGNO, G. - FERRARI, M. - MAGNANI, C. - CLAUSTRES, M. - GESGEORGES, M. - SCHWARTZ, M. - SCHWARZ, M. - DALLAPICCOLA, B. - NOVELLI, G. - FEREC, C. - DEARCE, M. - NEMETI, M. - KERE, T. - ANVRET, M. - DAHL, N. - **KÁDAŠI, Ľudevít**. The origin of the major cystic-fibrosis mutation (delta-F508) in european populations. In *Nature Genetics*, 1994, vol. 7, no. 2, p. 169-175. ISSN 1061-4036. **40 - times cited**

ii. List of top-cited authors from the Organisation (at most 10 % of the research employees) and their number of citations in the assessment period (2006 – 2010)

- [1] doc. RNDr. Ľubica Lacinová, DrSc. (503 citations)
- [2] RNDr. Karol Ondriaš, DrSc. (474 citations)
- [3] Mgr. Marta Gaburjaková, PhD. (372 citations)
- [4] doc. Ing. Oľga Križanová, DrSc. (304 citations)

iii. Supplementary information and/or comments on responses to the scientific output of the Organisation

We are proud that besides foreign international journals, also papers published in General Physiology and Biophysics are well cited. The best three cited papers during the period of 2006-2010 published in GPB are:

1. **LACINOVÁ, Ľubica**. Voltage gated calcium channels. In General physiology and biophysics, 2005, vol. 24, suppl., p. 1-82. (0.694 - IF2004). (2005 - Current Contents). ISSN 0231-5882, **43 - times cited**
2. MINARIK, Gabriel - FERÁK, Vladimír - FERÁKOVÁ, E. - **FICEK, Andrej - POLÁKOVÁ, Helena - KÁDAŠI, Ľudevít**. High frequency of GJB2 mutation W24X among Slovak Romany (Gypsy) patients with non-syndromic hearing loss (NSHL). In General physiology and biophysics, 2003, vol. 22, iss. 4, p. 549-556. (0.719 - IF2002). (2003 - Current Contents). ISSN 0231-5882, **18 – times cited**
3. PINTEROVÁ, L. - **KRIŽANOVÁ, Oľga** - ZÓRAD, Štefan. Rat epididymal fat tissue express all components of the renin-angiotensin system. In General physiology and biophysics, 2000, vol. 19, iss. 3, p. 329-334. (0.400 - IF1999). (2000 - Current Contents). ISSN 0231-5882. **8 – times cited**

3. Research status of the Organisation in the international and national context

- **International/European position of the Organisation**

- i. **List of the most important research activities documenting international importance of the research performed by the Organisation, incl. major projects (details of projects should be supplied under Indicator 4). Collective membership in the international research organisations, in particular within the European Research Area**

Projects :

- [1] **Marie Curie Research Training Network (6FP): L-type calcium channels in health and disease**, CavNet, MRTN-CT-2006-035367, Responsible in IMPG SAS: doc. RNDr. Ľubica Lacinová, DrSc., 12/2006 – 12/2010.

- [2] **Integrated Project 6FP LifeSciHealth: Genomics of Cardiomyocyte Signalling to Treat and Prevent Heart Failure (EUGeneHeart), n.018833**, Coordinator Prof. Gerd HASENFUß (Georg-August-University, Göttingen), Researchers: Ing. Alexandra Zahradníková, CSc., RNDr. Ivan Zahradník, CSc., RNDr. Marta Novotová, CSc. IMPG SAS, 01/2006-12/2010
- [3] **STREP projekt 6FP LifeSciHealth: Control of intracellular Calcium and Arrhythmias (CONTICA)**, Coordinator Prof. Dr. med. Burkert Pieske (Universität Göttingen, Göttingen), Researchers: Ing. Alexandra Zahradníková, CSc., RNDr. Ivan Zahradník, CSc., IMPG SAS, 02/2006-01/2009
- [4] **P-glycoprotein Mediated Multidrug Resistance in Radiation-Associated Hematological Malignancies Following the Chernobyl Accident**. Coordinator: Ing. Albert Breier, DrSc. NATO Grant PDD(CP)-(CBP.NUKR.CLG 982646), 01/2007-12/2008.
- [5] **Reorganization of calcium signaling in heart failure**. Prof. S. Györke, Department of Physiology, TTU HSC, Lubbock, TX, USA Ing. Alexandra Zahradníková, CSc., RNDr. Ivan Zahradník, CSc., IMPG SAS, Fogarty International Research Collaboration Award (FIRCA), 2R03TW005543-05, NIH, USA, 05/2005-04/2008
- [6] **Hypoxia and oxygen sensing, signalling and adaptation. (COST), TD0901**, Coordinator: Prof. Roland H. Wenger, Zurich Center for Integrative Human Physiology ZIHP, Institute of Physiology, University of Zurich, Responsible in IMPG SAS : doc. Ing. Ol'ga Križanová, DrSc., 07/2009-05/2013.
- [7] **Gasotransmitters: from basic science to science to therapeutic applications (ENOG: European Network on Gasotransmitters) BMBS COST Action BM1005**, Coordinator: Prof. Andreas Papapetropoulos, University of Patras, Lab for Molecular Pharmacology, 26504 Patras, Grécko, Responsible in IMPG SAS: RNDr. Karol Ondriaš, DrSc. 05/2011-05/2015.

ii. List of international conferences (co-) organised by the Organisation

- [1] Ninth Symposium on Catecholamines and Neurotransmitters in Stress, Smolenice, June 16 -21, 2007 (co-organised)
- [2] Joint Meeting of the Slovak Physiological Society and the Physiological and the Federation of European Physiological Societies, Bratislava, September 11 – 14, 2007:
- Cardiac Excitation-contraction Coupling in Health and Diseases. Symposium at the Joint Meeting of the Slovak Physiological Society and the Physiological and the Federation of European Physiological Societies, Bratislava, September 11 – 14, 2007
 - Role of T-type Calcium Channels in Cellular Excitability. Symposium at the Joint Meeting of the Slovak Physiological Society and the Physiological and the Federation of European Physiological Societies, Bratislava, September 11 – 14, 2007
- [3] Drug Resistance in Cancer, Smolenice, June 7 – 11, 2008 (co-organised)
- [4] The Second ECS Workshop, Smolenice, June 3 – 6, 2009
- [5] ESF Science Meeting Cardiac Dynamics, Smolenice, August 24 – 27, 2009
- [6] Oxygen in health and disease. The meeting of the COST Action TD0901 Hypoxianet, Smolenice, June 15 – 18, 2010 (co-organised)
- [7] 2nd Drug Resistance in Cancer, Smolenice, May 29 – June 1, 2011 (co-organised)

- [8] 10th Symposium on Catecholamines and Neurotransmitters in Stress, Smolenice, June 25 -30, 2011 (co-organised)

iii. List of journals edited/published by the Organisation:

1. **WOS (IF of journals in each year of the monitoring period)**
2. **SCOPUS**
3. **other database**
4. **not included in the databases**

[1] General Physiology and Biophysics

IF2006 = 0.771

IF2007 = 1.286

IF2008 = 0.697

IF2009 = 0.741

IF2010 = 1.146

iv. List of edited proceedings from international scientific conferences and other proceedings

- [1] Drug resistance in Cancer, Smolenice, June 7-11, 2008, Program and Abstracts, Edited by: Albert BREIER, Dagmar ZBYŇOVSKÁ
- [2] UHRÍK, Branislav - ZBYŇOVSKÁ, Dagmar. ECS WORKSHOP 2009, PROGRAM AND ABSTRACTS, Smolenice, June 3 - 6, 2009. Bratislava: Institute of Molecular Physiology and Genetics Slovak Academy of Sciences. ISBN 978-80970164-0-1.
- [3] ZAHRADNÍKOVÁ, Alexandra – ECHEBARRIA, BLAS – LUTHER, Stefan – BÄR, Markus – ZAHRADNÍK, Ivan. ESF Science Meeting. Cardiac Dynamics. Smolenice, August 24-27, 2009: Institute of Molecular Physiology and Genetics Slovak Academy of Sciences. ISBN 978-80-970164-2-5.
- [4] Oxygen in health and disease: Proceedings from the meeting of the COST Action TD0901 Hypoxianet . Bratislava, Edited by: PASTOREKOVÁ Silvia, KRIŽANOVÁ Oľga, Institute of Virology SAS: Institute of Molecular Physiology and Genetics SAS, 2010. 74 p.
- [5] 2nd Drug resistance in cancer: Program and abstracts Albert BREIER, Jan SEDLÁK, . Cancer Research Institute SAS : Institute of Molecular Physiology and Genetics SAS, 2011. ISBN 978-80-970128-4-7.

- **National position of the Organisation**

- List of selected most important national projects (the EU Structural Funds, Slovak Research and Development Agency (APVV), State Research Programmes, Scientific Grant Agency of the Slovak Academy of Sciences and the Ministry of Education (VEGA), Centres of Excellence, National Reference Laboratories and others)**

Projects:

- [1] **Signaling and transport function of biological membranes under normal and pathological conditions**, RNDr. Karol Ondriaš, DrSc., 10/2005-12/2007, APVT-51-027404
- [2] **Mechanism of excitation-contraction coupling in normal and failing mammalian myocardium**, RNDr. Ivan Zahradník, CSc., 01/2005-12/2007, Projekt APVT-51-31104
- [3] **Abnormal cytosolic and luminal calcium signalling in heart research**. Ing. Alexandra Zahradníková, DrSc., LPP-0099-06, 01/2007-11/2008.
- [4] **Building of Biotechnological Center – BITCET**. Contract 337/2003. Coordinator: prof. RNDr. Jaroslav Pastorek, DrSc., Institute of Virology SAS, Responsible in IMPG SAS : doc. Ing. Albert Breier, DrSc. 2003 - 2010
- [5] **Center of excellence for cardiovascular research (CEKVY)** Coordinator: doc. Ing. Oľga Križanová, DrSc. 01/2007-12/2010
- [6] **„BIOMEMBRANES: cross-sectional educational program for graduate students and young scientists in life sciences. European Social Fond Project. JPD 3 2005 1-010 (Code 13120200072)** Coordinator: Institute of Animal Biochemistry and Genetics SAS, RNDr. Ivan Hapala, CSc., Responsible in IMPG SAS : doc. Ing. Albert Breier, DrSc., doc. RNDr. Ľubica Lacinová, DrSc.
- [7] **Biomembranes: Structure and dynamics of biological membranes related to cell functions**. VVCE-0064-07, Coordinator: IABG SAS, RNDr. Ivan Hapala, CSc., Responsible in IMPG SAS : doc. RNDr. Ľubica Lacinová, DrSc., 07/2008-06/2011
- [8] **Mutation analysis, early DNA diagnostics and prevention of frequent and severe inherited disorders of children** : 2. children clinic DFNSP LF UK, Project Application Research of Ministry of Health SR, Coordinator: Prof. MUDr. László Kovács, DrSc., Responsible in IMPG SAS: doc. RNDr. Ľudevít Kádáši, DrSc., 2006 – 2008
- [9] **IP3 receptors, their modulation and fuction in normal and pathological conditions**. APVV-51-0397-07, doc. Ing. Oľga Križanová, DrSc., 06/2008-12/2010
- [10] **Overexpression of P-glycoprotein and associated changes in spectrum and levels oligo- and polysaccharides**. APVV-0084-07, Ing. Zdena Sulová, CSc., 06/2008-12/2010
- [11] **Mechanisms of ryanodine receptor dysregulation**. LPP-0441-09, Ing. Alexandra Zahradníková, DrSc., 09/2009-08/2012...
- [12] **Center of excellence for the translational research in molecular medicine (TRANSMED)**. EU Structural Funds n.26240120008, Coordinator: doc. RNDr. Silvia Pastoreková, DrSc., Institute of Virology SAS, Responsible in IMPG SAS : doc. Ing. Oľga Križanová, DrSc., 05/2009-04/2011

- [13] **Center of excellence for the translational research in molecular medicine (TRANSMED 2).** EU Structural Funds n.26240120030, Coordinator: MVDr. Juraj Kopáček, DrSc., Institute of Virology SAS, Responsible in IMPG SAS: doc. Ing. Oľga Križanová, DrSc., 06/2010-05/2012.
- [14] **Diagnostics of socially important disorders in Slovakia, based on modern biotechnologies (DNA – DG).** EU Structural Funds ITMS 26240120031, Coordinator: doc. RNDr. Ľudevít Kádaši, DrSc., 11/2010-10/2013.
- [15] **Center of excellence for the glycomics (GLYCOMICS).** EU Structural Funds ITMS 26240220058, Coordinator: RNDr. Ján Mucha, CSc., Institute of Chemistry SAS, Responsible in IMPG SAS :Ing. Zdena Sulová, CSc., 11/2010-10/2013.
- [16] **Calcium channels in neuronal excitability.** APVV-0212-10, doc. RNDr. Ľubica Lacinová, DrSc., 05/2011-10/2014.
- [17] **Alternation in cell metabolism associated with drug transporter P-glycoprotein overexpression in leukemia cells.** APVV-0290-10, Ing. Zdena Sulová, CSc., 05/2011-10/2014.
- [18] **Myocardial remodelling – the role of calcium signalling.** APVV-0721-10, Ing. Alexandra Zahradníková, DrSc., 05/2011-10/2014.
- [19] **Center of excellence for the treatment of metabolic aspects of development, diagnostics and treatment of cancer diseases.** Coordinator: doc. Ing. Oľga Križanová, DrSc., 07/2011-12/2014.
- [20] **Building of Competent Center for Research and Development in Molecular Medicine.** EU Structural Funds IMTS 26240220071, Coordinator: prof. RNDr. Ján Turňa, CSc., Comenius University in Bratislava, Responsible in IMPG SAS: doc. Ing. Albert Breier, DrSc., doc. Ing. Oľga Križanová, DrSc., 10/2011-09/2014

ii. List of national scientific conferences (co)-organised by the Organisation

- [1] XXIV. Xenobiochemical symposium, Liptovský Ján, May 22 – 24, 2007
- [2] Drobnica memorial, 4. ročník, Kočovce, September 19-21, 2007
- [3] Drobnica memorial, 5. ročník, Rajecká Lesná, September 2-4, 2009
- [4] IV. Slovak Biophysical symposium, Modra, April 24 – 26, 2010
- [5] XXVI. Xenobiochemical symposium, Trenčianske Teplice, September 7 – 9, 2011
- [6] Drobnica memorial, 6. ročník, Piešťany, September 21 – 23, 2011

iii. List of edited proceedings of national scientific conferences/events

XXIV. Xenobiochemical Symposium: Program & abstracts. Edited by Viera Boháčová, Albert Breier, Dagmar Zbyňovská. Bratislava: Institute of Molecular Physiology and Genetics SAS, Faculty of Chemical and Food Technology, Slovak University of Technology in Bratislava, 2007. 95 s. ISBN 978-80-969688-5-5

4th Drobica memorial: Program & abstracts. September 19 – 21, 2007, Kočovce. Edited by Albert Breier, Zdena Sulová, Dagmar Zbyňovská. [Bratislava] : Institute of Molecular Physiology and Genetics SAS, Slovak Society for Biochemistry and Molecular Biology, 2007. 125 s. ISBN 978-80-969755-3-2. [in slovak]

5th Drobica memorial, Program & abstracts. September 2 – 4, 2009, Rajecká Lesná. Editors: Albert Breier, Zdena Sulová, Dagmar Zbyňovská Bratislava: Institute of Molecular Physiology and Genetics SAS, Slovak Society for Biochemistry and Molecular Biology, Faculty of Chemical and Food Technology, Slovak University of Technology in Bratislava, 2009. 87 s. ISBN 978-80-970164-1-8. [in slovak]

IV. Slovak Biophysical Symposium : Modra-Harmonia, Slovakia, April 24 - 26, 2010 : program and abstracts. Edited by Jana Gaburjaková, Marta Gaburjaková. Bratislava : Institute of Molecular Physiology and Genetics SAS, 2010. 97 s.

XXVI. Xenobiochemical symposium : Trenčianske Teplice, September 7- 9, 2011. Program & abstracts. Edited by Viera Boháčová, Albert Breier. Bratislava : Institute of Molecular Physiology and Genetics SAS, 2011. 64 p. ISBN 978-80-89233-48-9.

6th Drobica memorial, Program & abstracts. September 21 – 23, 2011. Piešťany, hotel Lux. Edited by Michaela Pavlovičová, Albert Breier, Zdena Sulová. Bratislava : Petrus, 2011. 73 s. ISBN 978-80-970164-3-2. [in slovak]

- **International/European position of the individual researchers**

- i. **List of invited/keynote presentations at international conferences, documented by an invitation letter or programme**

doc. Ing. Albert Breier, DrSc. - Cell changes directly related to P-glycoprotein over-expression in leukemia cells. In 2nd Drug resistance in cancer: Program and abstracts. - Cancer Research Institute SAS : Institute of Molecular Physiology and Genetics SAS, May 29 – June 1, 2011, p. L1. ISBN 978-80-970128-4-7

doc. RNDr. Ľudevít Kádaši, DrSc. - Monogenic disorders in the population of Slovak Roms. Vth International Symposium on Genetics, Health and Disease. Amritsar, India, February 17-19, 2008
- A Szlovák Roma populációban előforduló retinitis pigmentosa egyik formájáért felelős gén feltérképezése és alapító mutációjának identifikálása. In Magyar Humángenetikai társaság VIII. kongresszusa : 2010. szeptember 2-4., Debrecen, s. 49.

doc. Ing. Oľga Križanová, DrSc. - Apoptosis induced clustering of IP3R1 in nuclei of nondifferentiated PC12 cells. In Joint Conference of the Czech and Slovak Neuroscience Societies: programme and abstracts book, May 18-21, 2011, Smolenice, p. 31. ISBN 978-80-969931-6-1.

doc. RNDr. Ľubica Lacinová, DrSc. - Role of S4 segments in voltage-dependent gating of the Cav3.1 channel. Abstract Book of "T-type Calcium

Channels: from Discovery to Channelopathies, 25 Years of Research", Advanced Workshop, Kyiv, Ukraine, 5-7 June 2008, p. 15

RNDr. Karol Ondriaš, DrSc. - Single channel properties and modulation of intracellular chloride channels. 16th European Bioenergetics Conference, Jul 17-22, 2010, Warsaw, Poland. In *Biochimica et Biophysica Acta: Bioenergetics*, 2010, vol. 1797, p. 6-7. (3.688 - IF2009). ISSN 0005-2728.
- Single channel properties and modulation of intracellular membrane channels. In *Regional Biophysics Conference: Book of abstracts*, 15.-18. september, 2010, Primošten, Croatia, s. 20.

Ing. Alexandra Zahradníková, DrSc. - Spontaneous action potentials in ventricular myocytes. Third European Science Foundation Conference on Functional Dynamics, March 2 – 5, 2009, Portugal

Mgr. Andrea Zat'ková, PhD. - Update on Alkaptonuria in Slovakia: HGD Mutation Database re-activated. In 4th International Workshop on AKU. Finding a cure for Alkaptonuria. Sidney Sussex College, Cambridge, January 10 -11, 2011, United Kingdom

ii. List of employees who served as members of the organising and/or programme committees for international conferences

doc. Ing. Albert Breier, DrSc.

- Chair of Organising Committee Drug Resistance in Cancer, Smolenice, 2008
- Member of Programme Committee The Second ECS Workshop, Smolenice, 2009
- Member of Programme Committee Drug Resistance in Cancer, Smolenice, 2011

RNDr. Viera Boháčová, CSc.

- Member of Organising Committee Drug Resistance in Cancer, Smolenice, 2008

Mgr Martin Cagala

- Member of Organising Committee Oxygen in Health and Disease, Smolenice, 2010
- Member of Organising Committee Tenth Symposium on Catecholamines and Other Neurotransmitters in Stress, Smolenice, 2011

Mgr. Marta Gaburjaková, PhD.

- Member of Organising Committee ESF Science Meeting Cardiac Dynamics, Smolenice, 2009

Mgr. Radoslav Janíček

- Member of Organising Committee ESF Science Meeting Cardiac Dynamics, Smolenice, 2009

PhDr. Zuzana Klimešová

- Member of Organising Committee Drug Resistance in Cancer, Smolenice, 2008
- Member of Organising Committee The Second ECS Workshop, Smolenice, 2009
- Member of Organising Committee Oxygen in Health and Disease, Smolenice, 2010

doc. Ing. Oľga Križanová, DrSc.

- Chair of Organising Committee 9th Symposium on Catecholamines and Other Neurotransmitters in Stress, Smolenice, 2007
- Member of Local Organising Committee Joint Meeting of the Slovak Physiological Society and the Physiological and the Federation of European Physiological Societies, Bratislava, 2007
- Chair of Organising Committee and Member of Programm Committee Oxygen in Health and Disease, Smolenice, 2010
- Chair of Organising Committee and Member of Programme Committee Tenth Symposium on Catecholamines and Other Neurotransmitters in Stress, Smolenice, 2011

doc. RNDr. Ľubica Lacinová, DrSc.

- Chair of Organising Committee Symposium: Role of T-type Calcium Channels in Cellular Excitability at the Joint Meeting of the Slovak Physiological Society and the Physiological and the Federation of European Physiological Societies, Bratislava 2007.

Silvia Marková

- Member of Organising Committee Drug Resistance in Cancer, Smolenice, 2008
- Member of Organising Committee The Second ECS Workshop, Smolenice, 2009

RNDr. Marta Novotová, CSc.

- Member of Organising Committee Cardiac Dynamics, Smolenice, 2009

Ing. Andrej Opálek

- Member of Organising Committee Drug Resistance in Cancer, Smolenice, 2008

Ing. Zdena Sulová, CSc.

- Member of Organising Committee Drug Resistance in Cancer, Smolenice, 2008
- Member of Organising Committee The Second ECS Workshop, Smolenice, 2009
- Member of Programme Committee Drug Resistance in Cancer, Smolenice, 2011

MUDr. Branislav. Uhrík, CSc.

- Member of Programme Committee The Second ECS Workshop, Smolenice, 2009

RNDr. Ivan Zahradník, CSc.

- Member of Programme Committee ESF Science Meeting Cardiac Dynamics, Smolenice, 2009

Ing. Alexandra Zahradníková, DrSc.

- Member of Local Organising Committee Joint Meeting of the Slovak Physiological Society and the Physiological and the Federation of European Physiological Societies, Bratislava, 2007
- Chairperson of Organising Committee Symposium: Cardiac Excitation-contraction Coupling in Health and Diseases at the Joint Meeting of the Slovak Physiological Society and the Physiological and the Federation of European Physiological Societies, Bratislava, 2007.
- Member of Organising Committee ESF Science Meeting Cardiac Dynamics, Smolenice, 2009

RNDr. Alexandra Zahradníková jr., PhD.

- Member of Organising Committee ESF Science Meeting Cardiac Dynamics, Smolenice, 2009

Ing. Dagmar Zbyňovská, CSc.

- Member of Organising Committee Drug Resistance in Cancer, Smolenice, 2008

- Member of Organising Committee The Second ECS Workshop, Smolenice, 2009

iii. List of employees who served as members of important international scientific bodies (e.g. boards, committees, editorial boards of scientific journals)

doc. Ing. Albert Breier, DrSc.

- Member of Editorial Board of Journals Recent Patent on Anticancer Drug Discovery, Bentham Science Publishers, Ltd. <http://www.bentham.org/prs/EBM.htm> 2007
 - Member of Scientific Advisory Committee of European Centre for Validation of Alternative Methods Ispra, Italy

doc. RNDr. Ľubica Lacinová, DrSc.

- Member of Editorial Board of Journal Sedmá generace, Hnutí Duha in Brno

RNDr. Ivan Zahradník, CSc.

- Member of Board for Neurosciences, Czech republic

Ing. Alexandra Zahradníková, DrSc.

- Reviewing Editor of Journal Frontiers in Physiology
 - Editor of Journal Central European Journal of Biology, VERSITA in partnership SPRINGER
http://www.versita.com/science/lifesciences/cejb/editors/alexandra_zahradnikova/

iv. List of international scientific awards and distinctions

- [1] **RNDr. Peter Proks, PhD.** – OXION 2007 Ion Channel Day Poster Prize
 [2] **doc. Ing. Albert Breier, DrSc.** - Award for Exceptional Contribution to the Quality of Toxicology in Vitro (Elsevier)

v. List of employees with the highest H – index indicating field of science by WOS

- [1] RNDr. Karol Ondriaš, DrSc. – 21 (Biophysics)
 [2] doc. RNDr. Ľubica Lacinová, DrSc. – 18 (Biophysics)
 [3] doc. Ing. Oľga Križanová, DrSc. – 16 (Animal Physiology)
 [4] doc. Ing. Albert Breier, DrSc. – 16 (Biochemistry)
 [5] Ing Alexandra Zahradníková, DrSc. – 15 (Biophysics)

- **National position of the individual researchers**

- i. **List of invited/keynote presentations at national conferences documented by an invitation letter or programme**

[1] **doc. Ing. Oľga Križanová, DrSc.** - Hypoxia modulates gene expression and protein levels of the sodium-calcium Exchange in HEK 293 cell line. Molecular mechanisms of neurological and psychiatric disorders. 26. –29. 11. 2009, Martin

[2] **RNDr. Karol Ondriaš, DrSc.** - On the interaction of H₂S with biological system. In Book of Contributions 6th International Conference Structure and Stability of Biomacromolecules SSB 2009, 9. – 11. 9. 2009, Košice

[3] **RNDr. Ivan Zahradník, CSc.** - A microsystem approach to electrical and calcium signaling in cardiac muscle cells. Trends in biomedical engineering, 16. – 18. 9. 2009, Bratislava

- ii. **List of employees who served as members of organising and programme committees of national conferences**

doc. Ing. Albert Breier, DrSc.

- Member of Programme Committee XXIV. Xenobiochemical Symposium, Liptovský Ján, 2007
- Member of Organising Committee, Drobnica memorial, Kočovce, 2007
- Member of Programme Committee XXV. Xenobiochemical Symposium, Mikulov, 2009
- Member of Organising Committee, Drobnica memorial, Rajecká Lesná, 2009
- Member of Programme Committee XXII. Biochemical Symposium, Martin, 2010
- Member of Organising Committee, Drobnica memorial, Piešťany, 2011
- Member of Programme Committee XXVI. Xenobiochemical Symposium, Trenčianske Teplice, 2011

RNDr. Viera Boháčová, CSc.

- Member of Programme Committee XXIV. Xenobiochemical Symposium, Liptovský Ján, 2007
- Member of Organising Committee, Drobnica memorial, Rajecká Lesná, 2009
- Member of Programme Committee XXVI. Xenobiochemical Symposium, Trenčianske Teplice, 2011

Mgr. Andrea Faltínová

- Member of Organising Committee IV. Biophysical Symposium, Modra, 2010

Mgr. Marta Gaburjaková, PhD.

- Member of Organising Committee IV. Biophysical Symposium, Modra, 2010

Mgr. Jana Gaburjaková, PhD.

- Member of Organising Committee IV. Biophysical Symposium, Modra, 2010

Mgr. Lenka Gibalová, PhD.

- Member of Organising Committee XXVI. Xenobiochemical Symposium, Trenčianske Teplice, 2011

doc. RNDr. Ľudevít Kádaši, DrSc.

- Chairperson of Programme Committee, XVIII. Izakovič memorial, Košice, 2007
 Chairperson of Programme Committee, XIX. Izakovič memorial, Podbanské, 2008
 Chairperson of Programme Committee, XX. Izakovič memorial, Terchová, 2009
 Chairperson of Programme Committee, XXI. Izakovič memorial, Bratislava, 2010
 Chairperson of Programme Committee, XXII. Izakovič memorial, Spišská Nová Ves, 2011

doc. Ing. Oľga Križanová, DrSc.

- Member of Programme Committee XXII. Biochemical Symposium, Martin, 2010
 - Member of Programme Committee XXVI. Xenobiochemical Symposium, Trenčianske Teplice, 2011

PhDr. Zuzana Klimešová

- Member of Organising Committee XXIV. Xenobiochemical Symposium, Liptovský Ján, 2007
 - Member of Organising Committee, Drobnica memorial, Kočovce, 2007
 - Member of Organising Committee, Drobnica memorial, Rajecká Lesná, 2009
 - Member of Organising Committee, Drobnica memorial, Piešťany, 2011
 - Member of Organising Committee XXVI. Xenobiochemical Symposium, Trenčianske Teplice, 2011

doc. RNDr. Ľubica Lacinová, DrSc.

- Member of Programme Committee XXII. Biochemical Symposium, Martin, 2010

Silvia Marková

- Member of Organising Committee XXIV. Xenobiochemical Symposium, Liptovský Ján, 2007

RNDr. Karol Ondriaš, DrSc.

- Chairperson of Programme Committee IV. Biophysical Symposium, Modra, 2010

Ing. Andrej Opálek

- Member of Organising Committee XXIV. Xenobiochemical Symposium, Liptovský Ján, 2007
 - Member of Organising Committee, Drobnica memorial, Rajecká Lesná, 2009
 - Member of Organising Committee IV. Biophysical Symposium, Modra, 2010
 - Member of Organising Committee XXVI. Xenobiochemical Symposium, Trenčianske Teplice, 2011

RNDr. Michaela Pavlovičová, PhD.

- Member of Organising Committee, Drobnica memorial, Piešťany, 2011

Ing. Andrej Rusnák, PhD.

- Member of Organising Committee IV. Biophysical Symposium, Modra, 2010
 - Member of Organising Committee, Drobnica memorial, Piešťany, 2011
 - Member of Organising Committee XXVI. Xenobiochemical Symposium, Trenčianske Teplice, 2011

Ing. Zdena Sulová, CSc.

- Member of Programme Committee XXIV. Xenobiochemical Symposium, Liptovský Ján, 2007
- Member of Organising Committee, Drobница memorial, Kočovce, 2007
- Member of Organising Committee, Drobница memorial, Rajecká Lesná, 2009
- Member of Programme Committee XXII. Biochemical Symposium, Martin, 2010
- Member of Organising Committee, Drobница memorial, Piešťany, 2011
- Member of Programme Committee XXVI. Xenobiochemical Symposium, Trenčianske Teplice, 2011

Mgr. Mário Šereš, PhD.

- Member of Organising Committee XXVI. Xenobiochemical Symposium, Trenčianske Teplice, 2011

RNDr. Barbora Tencerová

- Member of Organising Committee IV. Biophysical Symposium, Modra, 2010

Mgr. Zuzana Tomášková, PhD.

- Member of Organising Committee IV. Biophysical Symposium, Modra, 2010

Ing. Dagmar Zbyňovská, CSc.

- Member of Programme Committee XXIV. Xenobiochemical Symposium, Liptovský Ján, 2007
- Member of Organising Committee, Drobница memorial, Kočovce, 2007
- Member of Organising Committee, Drobница memorial, Rajecká Lesná, 2009

iii. List of employees serving in important national scientific bodies (e.g. boards, committees, editorial boards of scientific journals)

RNDr. Miroslav Barančík, DrSc.

- Member of Committee VEGA (Scientific Grant Agency Ministry of Education of the Slovak Republic and SAS) for Medical and Pharmaceutical Sciences SAS (until 2010)

doc. Ing. Albert Breier, DrSc.

- Member of Editorial Boards of Journal General Physiology and Biophysics (GPB)
- Member of Scientific Board of Faculty of Natural Sciences, Comenius University in Bratislava
- Member of Scientific Board of Faculty of Sciences, P.J. Šafárik University in Košice
- Member of Scientific Board of Faculty of Natural Sciences University, St. Cyril and Methodius in Trnava
- Member of Scientific Board of Faculty of Chemical and Food Technology, Slovak University of Technology in Bratislava
- Slovak Society for Biochemistry and Molecular Biology, member of IUBMB and FEBS, Scientific Secretary
- Member of Committee for defense of PhD thesis in the field Biochemistry
- Member of Committee for defense of doctor' thesis (DrSc.) Ministry of Education SR in the fields: Biochemistry (until 2010), Chemical Engineering and Biotechnology
- Member of Committee for Cooperation with „European X-ray Free Electron Laser Facility“ – Ministry of Education SR
- Member of Committee VEGA (Scientific Grant Agency Ministry of Education of the Slovak Republic and SAS) for Medical and Pharmaceutical sciences SAS (until 2008)
- Chairman of Committee for Chemical Sciences of Board for Natural Sciences, Slovak Research and Development Agency, Vicepresident
- Vicepresident of Board for Programme VVCE, Slovak Research and Development Agency

Mgr. Marta Gaburjaková, PhD.

- Slovak Biophysical Society, Secretary General

doc. RNDr. Ľudevít Kádaši, DrSc.

- President of Slovak Medical Society - Slovak Society of Medical Genetics
- Chairman of Committee for defense of doctor' thesis (DrSc.) Ministry of Education SR in the field Genetics
- Member of Committee for defense of PhD thesis in the fields: Molecular Biology, Pediatrics and Genetics
- Member of Ethics Committee, Ministry of Health of the Slovak Republic
- Member of Categorization Classification Committee, Ministry of Health of the Slovak Republic
- Member of Scientific board of Criminalist and Advisory Institute of Police Force Slovak Republic
- Forensic Expert in the field Genetics: DNA analysis, Ministry of Justice of the Slovak Republic

doc. Ing. O. Križanová, DrSc.

- Member of Editorial Boards of Journal General Physiology and Biophysics, corresponding editor
- Member of Scientific Board of Faculty of Medical Sciences, Comenius University in Bratislava
- Member of Committee VEGA (Scientific Grant Agency Ministry of Education of the Slovak Republic and of SAS) for Medical and Pharmaceutical Sciences SAS (until 2008)
- Member of Committee for defense of PhD thesis in the field Animal Physiology
- Member of Committee for defense of doctor' thesis (DrSc.) Ministry of Education SR in the fields: Molecular Biology and Animal Physiology

doc. RNDr. Ľubica Lacinová, DrSc.

- Member of Editorial Boards of Journal Mosty
- Editor in chief of Journal General Physiology and Biophysics
- Member of Committee VEGA (Scientific Grant Agency Ministry of Education of the Slovak Republic and SAS) for Molecular Biology SAS (until 2008)
- Member of Committee for defense of PhD thesis in the fields: Animal Physiology and Biophysics
- Member of Committee for Biosafety at Ministry of Environment of the Slovak Republic
- Member of Committee National Expert Scientific Group for GMO newfoods derived from Biotechnology of Ministry of Agriculture SR

RNDr. Karol Ondriaš, DrSc.

- Member of Editorial Boards of journal GPB
- Member of Committee for defense of PhD thesis in the field Biophysics

RNDr. Helena Poláková

- Forensic expert in the field Genetics: DNA analysis, Ministry of Justice of the Slovak Republic

MUDr. Branislav Uhrík, CSc.

- Coordinated Editor of journal GPB

RNDr. Ivan Zahradník, CSc.

- President of Slovak Committee for Biophysics
- Member of Board of Slovak Biophysical Society,
- Member of Committee for defense of PhD thesis in the fields: Biophysics and Biotechnology

Ing. Alexandra Zahradníková, DrSc.

- Member of Committee for defense of PhD thesis in the field Biophysics
- Member of Scientific Colegium for Chemical Sciences

iv. List of national awards and distinctions**doc. Ing. Albert Breier, DrSc.**

- Honorable plaque of Dionýz Ilkovič for the results in Physico - Biochemical Sciences, 2007

Mgr. Marta Gaburjaková, PhD.

- The prize of the Slovak Biophysical Society in category of Young Scientists for the excellent results in Biophysics, 2008

doc. RNDr. Ľudevít Kádaši, DrSc.

- The silver medal of the Slovak Medical Society for the development of Pediatrics, 2007
- The prize of the Slovak Academy of Sciences for the popularization of Science, 2008
- The Jedlík' prize for the results in Natural Sciences, 2010

doc. Ing. Oľga Križanová, DrSc.

- Member of Team, which acquire recognition - „Zlatá Incheba“ on exhibition INPHARMED 2007
- The bronze medal of the Faculty of Natural Sciences Comenius University, 2010
- Honorable plaque of SAS for the results in Biological Sciences, 2010

doc. RNDr. Ľubica Lacinová, DrSc.

- Honorable plaque of SAS for the results in Biological Sciences, 2009

RNDr. Ján Radvánský, PhD.

- The prize of the Slovak Society of Medical Genetics for the best publication of Young Scientists in 2009 in the field of Medical Genetics, 2010

Ing. Zdena Sulová, CSc.

- The Prize of Presidium SAS for Infrastructure, 2010

Mgr. Zuzana Tomášková, PhD.

- 2. place in the Competition of Young Scientists up to 35 years, 2009
- Schwarz' foundation, 2009
- The prize of the President of the Slovak Republic Ivan Gašparovič, 2010

RNDr. Ivan Zahradník, CSc.

- Honorable plaque of Dionýz Ilkovič for the results in Physico – Biochemical Sciences, 2010

RNDr. Alexandra Zahradníková

- Academic Individuality of Year 2008/2009 in SR for remarkable results in study / science research (Valuation from Junior Chamber International Slovakia), 2009

RNDr. Andrea Zat'ková, PhD.

- The prize of the Slovak Society of Medical Genetics for the best publication in 2009 in the field of Medical Genetics, 2010

Team of authors (doc. Ing. A. Breier, DrSc., doc. Ing. O. Križanová, DrSc., Ing. P. Novák, PhD., RNDr. K. Ondriaš, DrSc., Mgr. M. Pavlovičová, PhD., Ing. Z. Sulová, CSc., Ing. A. Zahradníková, DrSc.) under guidance **doc. RNDr. Ľ. Lacinová, DrSc.**
 Bonus for Scientific and Expert Literature in 2010, (Valuation from Fond of Literature)

v. Supplementary information and/or comments documenting international and national status of the Organisation

During period 2007 – 2011 position of the IMPG SAS on both national and international level was strengthened. Two cooperation agreements with Comenius University are signed: one with Department of Molecular Biology Faculty of Natural Sciences; the other with Department of Physical Chemistry of Drugs Faculty of Pharmacy. Further, individual research groups collaborate with research teams from Faculty of Natural Sciences, Jessenius School of Medicine, Faculty of Chemical and Food Technology Slovak Technical University, Institute of Normal and Pathological Physiology SAS, Institute of Experimental Endocrinology SAS, Institute for Heart Research SAS, Institute of Virology SAS. This cooperation strengthened the position of IMPG in multiple directions. First, a number of high-quality articles under joint authorship were published in renowned journals and two collectives attained status of “above-the-average” group in recent ARA evaluation. Second, institute organizes successful regular (mostly bi-annual) national conferences. Third, IMPG increases its impact on high-quality university education at each level. Systematic involvement in teaching on bachelor and master level resulted in publishing several textbooks, three habilitations and one inauguration. Bi-annual Drobnica Memorial, conference dedicated to presentation of work of diploma and PhD students as well as young post-doctoral fellows, is attracting an increasing number of young promising researchers. Institute is involved in similar activities on international level as well. IMPG was organizer and/or co-organizer of several international conferences which attracted top personalities in field like stress or drug resistance in cancer. Institute was invited by European calcium society to organize its second workshop. Individual researchers were invited to lecture at international conferences abroad (India, Ukraine), to write a review article for a top scientific journal (FEBS Letters), to give a lecture at renowned foreign institutions (France, Germany, Spain, USA) or to serve as a visiting professor for a full semester (University of Vienna). Contacts within European research area resulted in participation of several groups in projects funded by EU within 6th framework program or COST. Several groups currently have joint research projects with laboratories in France, Germany, Poland or Czech Republic. Bilateral cooperation is funded also by domestic grant agency APVV. Individual researchers served as reviewers for international institutions like EU framework program, NATO, DAAD or for foreign national granting agencies (Austria).

4. Project structure, research grants and other funding resources

- **International projects and funding**

- i. **List of major projects within the European Research Area – 6th and 7th Framework Programme of the EU, European Science Foundation, NATO, COST, INTAS, CERN, etc. (here and in items below please specify: type of project, title, grant number, duration, total funding and funding for the Organisation, responsible person in the Organisation and his/her status in the project, e.g. coordinator, work package leader, investigator)**

- [1] **Marie Curie Research Training Network (6FP): L-type calcium channels in health and disease**, CavNet, MRTN-CT-2006-035367, , Responsible in IMPG SAS: doc. RNDr. Ľubica Lacinová, DrSc., 12/2006 – 12/2010. Number of Coinvestigators organizations - 9: Karls-University Tuebingen [**UTUB**], Germany; Central Institute of Mental Health [**CIMH**], Germany; Lectus Therapeutics Ltd [**LECTUS**], the United Kingdom; University of Torino [**UNITO**], Italy; University of Kaiserslautern [**UKL**], Germany; Centre National de Recherche Scientifique [**CNRS**], France; Lund University [**LU**], Sweden; University of Innsbruck [**UI**], Austria; University of Manchester [**UMAN**], the United Kingdom. 12/2006-12/2010, funding for IMPG SAS: 182 503 €
- [2] **Integrated Project 6FP LifeSciHealth: Genomics of Cardiomyocyte Signalling to Treat and Prevent Heart Failure (EUGeneHeart), n.018833**, Coordinator Prof. Gerd HASENFUß (Georg-August-University, Göttingen), Researchers: Ing. Alexandra Zahradníková, CSc., RNDr. Ivan Zahradník, CSc., RNDr. Marta Novotová, CSc., IMPG SAS, 01/2006-12/2010, total funding: 11 400 000 €, funding for IMPG SAS: 267 658 €
- [3] **STREP projekt 6FP LifeSciHealth: Control of intracellular Calcium and Arrhythmias (CONTICA)**, Coordinator Prof. Dr. med. Burkert Pieske (Universität Göttingen, Göttingen), Researchers: Ing. Alexandra Zahradníková, CSc., RNDr. Ivan Zahradník, CSc., IMPG SAS, 02/2006-01/2009, total funding: 2 755 000 €, funding for IMPG SAS: 209 060 €
- [4] **P-glycoprotein Mediated Multidrug Resistance in Radiation-Associated Hematological Malignancies Following the Chernobil Accident**. Coordinator: Ing. Albert Breier, DrSc. NATO Grant PDD(CP)-(CBP.NUKR.CLG 982646), 01/2007-12/2008, total funding for IMPG SAS: 15 000 €
- [5] **Reorganization of calcium signaling in heart failure**. Prof. S. Györke, Department of Physiology, TTU HSC, Lubbock, TX, USA Ing. Alexandra Zahradníková, CSc., RNDr. Ivan Zahradník, CSc., IMPG SAS, Fogarty International Research Collaboration Award (FIRCA), 2R03TW005543-05, NIH, USA, 05/2005-04/2008, total funding: 96 000 €
- [6] **Hypoxia and oxygen sensing, signalling and adaptation. (COST)**, TD0901, Coordinator: Prof. Roland H. Wenger, Zurich Center for Integrative Human Physiology ZIHP, Institute of Physiology, University of Zurich, Responsible in IMPG SAS : doc. Ing. Oľga Križanová, DrSc., 07/2009-05/2013. funding for IMPG SAS: 9660 €.
- [7] **Gasotransmitters: from basic science to science to therapeutic applications (ENOG: European Network on Gasotransmitters)** BMBS COST Action BM1005, Coordinator: Prof. Andreas Papapetropoulos, University of Patras, Lab for Molecular Pharmacology, 26504 Patras, Grécko, Responsible in IMPG SAS:

RNDr. Karol Ondriaš, DrSc. 05/2011-05/2015, total funding: 400 000 €, funding for IMPG SAS: 0 € in 2011.

ii. List of other international projects incl. total funding and funding for the Organisation

- [1] **Possible correlations between expression/activity of various proteins/enzymes markers and incidence of myelodysplastic syndrome (MDS) and its development to acute myeloid leukemia (AML) in samples from patients treated and untreated with Lenalidomide, as well as Lenalidomide's effects on expression/activity of some markers using the leukemic cell lines (CELGENE).** Coordinator: doc. Ing. Albert Breier, DrSc., Contract with company Celgene. 10/2009-12/2012, total funding: 94 000 Euro, funding for IMPG SAS: 56 647 €

iii. List of other important projects and collaborations without direct funding

- [1] **Localization of S100A1 in human heart muscle cells.** MUDr. Branislav Uhrík, CSc., in cooperation with Division of Clinical Chemistry and Biochemistry, Department of Pediatrics, University of Zurich, Zurich, Switzerland
- [2] **RNDr. Karol Ondriaš, DrSc.** in cooperation with Prof. Adam Szewczyk, Nencki Institute of Experimental Biology, 02-093 Warsaw, Poland

• **National projects and funding²**

i. List of State Research Programmes, and their funding

Projects supported by:

- [1] the EU Structural Funds (ERDF/ESF)
- [2] the Slovak Research and Development Agency (APVV)
- [3] the Scientific Grant Agency of the Slovak Academy of Sciences and the Ministry of Education (VEGA)

ii. List of project supported by APVV

² Excluding projects for the popularisation of science

Start	Project title	Project number	Duration in months	Funding for the Organisation (EUR)	Role of the Organisation
2007	Signaling and transport of biological membranes under normal and pathological conditions	APVT-51-027404	12,000	136095	coordinator
	Mechanisms of excitation-contraction coupling in normal and failing mammalian myocardium	APVT-51-31104	12,000	44778,000	coordinator
	Abnormal cytosolic and luminal calcium signalling in heart research	LPP-0099-06	12,000	13277,000	coordinator
	Structure-function relationships of the ryanodine receptor domains involved in CPVT arrhythmias	APVV-0139-06	11,000	19684,000	co-investigator
2008	Abnormal cytosolic and luminal calcium signalling in heart research	LPP-0099-06	11,000	6638,000	coinvestigator
	Structure-function relationships of the ryanodine receptor domains involved in CPVT arrhythmias	APVV-0139-06	12,000	26820,000	co-investigator
	Biomembranes: Structure and dynamics of biological membranes related to cell functions.	VVCE-0064-07	6,000	12381,000	co-investigator
	IP3 receptors, their modulation and function in normal and pathological conditions	APVV-0397-07	7,000	37642,000	coordinator
	Overexpression of P-gp and associated changes in spectrum and levels of oligo- and polysaccharides	APVV-0084-07	7,000	24795,000	coordinator
	Energetic cross-talks and cytoarchitecture of cardiac myocytes. Developmental changes and the role of cytoskeleton	SK-FR0021/07	12,000	2589,000	coordinator
2009	Structure-function relationships of the ryanodine receptor domains involved in CPVT arrhythmias	APVV-0139-06	12,000	25592,000	co-investigator
	Biomembranes: Structure and dynamics of biological membranes related to cell functions.	VVCE-0064-07	12,000	26256,000	co-investigator

Start	Project title	Project number	Duration in months	Funding for the Organisation (EUR)	Role of the Organisation
2009	IP3 receptors, their modulation and function in normal and pathological conditions	APVV-0397-07	12,000	58554,000	coordinator
	Overexpression of P-gp and associated changes in spectrum and levels oligo- and polysaccharides	APVV-0084-07	12,000	47035,000	coordinator
	Mechanisms of ryanodine receptor dysregulation	LPP-0441-09	4,000	7189,000	coordinator
	Energetic cross-talks and cytoarchitecture of cardiac myocytes. Developmental changes and the role of cytoskeleton	SK-FR-0021/07	12,000	2589,000	coordinator
2010	Biomembranes: Structure and dynamics of biological membranes related to cell functions.	VVCE-0064-07	12,000	27086,000	co-investigator
	IP3 receptors, their modulation and function in normal and pathological conditions	APVV-0397-07	12,000	49093,810	coordinator
	Overexpression of P-gp and associated changes in spectrum and levels oligo- and polysaccharides	APVV-0084-07	12,000	47035,000	coordinator
	Mechanisms of ryanodine receptor dysregulation	LPP-0441-09	12,000	27767,000	coordinator
	Cell and molecular physiology of cardiomyocytes	SK-CZ-0172-09	12,000	1700,000	coordinator
2011	Biomembranes: Structure and dynamics of biological membranes related to cell functions.	VVCE-0064-07	6,000	17327,000	co-investigator
	Mechanisms of ryanodine receptor dysregulation	LPP-0441-09	12,000	30967,000	coordinator
	Cell and molecular physiology of cardiomyocytes	SK-CZ-0172-09	12,000	1700,000	coordinator
	Calcium channels in neuronal excitability	APVV-0212-10	8,000	32929,000	coordinator
	Alteration in cell metabolism associated with drug transporter P-gp overexpression in leukemia cells	APVV-0290-10	8,000	35367,000	coordinator
	Myocardial remodelling - the role of calcium signalling	APVV-0721-10	8,000	44987,000	coordinator

iii. Number of projects supported by the Scientific Grant Agency of the Slovak Academy of Sciences and the Ministry of Education (VEGA) for each year, and their funding

VEGA	2007	2008	2009	2010	2011
number	11	12	10	15	16
funding in the year (EUR)	47400	51351	44376	116480	97182

- Summary of funding from external resources

External resources	2007	2008	2009	2010	2011	total	average
external resources (milions of EUR)	0,480	0,406	0,447	0,400	0,309	2,042	0,408
external resources transfered to cooperating research organisations (milions of EUR)	0,008	0,013	0,015	0,015	0,032	0,083	0,017
ratio between external resources and total salary budget	1,201	0,943	0,972	0,856	0,698	-	0,934
overall expenditures (milions of EUR)	1,132	1,138	1,162	1,177	1,252	5,861	1,172

iv. List of projects the EU Structural Funds

• Summary of external resources of the EU Structural Funds (ERDF/ESF)

Year	Project title	Project number	Duration in months	Funding for the Organisation (EUR)	Role of the Organisation
2007					
2008					
2009	TRANSMED	26240120008	8,000	1755,310	co-investigator
2010	TRANSMED	26240120008	12,000	858,520	co-investigator
	TRANSMED 2	26240120030	7,000	0,000	co-investigator
	DNA - DG	26240120031	2,000	0,000	coordinator
	GLYCOMICS	26240220058	2,000	0,000	co-investigator
2011	TRANSMED	26240120008	4,000	8411,870	co-investigator
	TRANSMED 2	26240120030	12,000	0,000	co-investigator
	DNA - DG	26240120031	12,000	149262,320	coordinator
	GLYCOMICS	26240220058	12,000	0,000	co-investigator
	COMPETENT CENTER	26240220071	3,000	0,000	co-investigator

v. Supplementary info and/or comments on research projects and funding resources

Biophysical principles of voltage dependent ion channels regulation in health and disease. Project KEGA n. 3/7389/09, Coordinator: Faculty of Pharmacy, Comenius University, Bratislava. Responsible in IMPG SAS: **doc. RNDr. Ľubica Lacinová, DrSc.**, 01/2009 – 12/2011

5. Organisation of PhD studies, other pedagogical activities

- i. List of accredited programmes of doctoral studies (as stipulated in the previously effective legislation as well as in the recently amended Act on the Universities). Period of validity of accredited scientific disciplines, characterization of perspectives of PhD study on the Organisation

IMPG SAS is accredited in following programs:

[1] 4.2.10 animal physiology

[2] 4.1.22 biochemistry

[3] 4.1.12 biophysics

- ii. Summary table on doctoral studies (number of internal/external PhD students; number of students who completed their study by a successful thesis defence; number of PhD students who quitted the programme)

PhD study	31.12.2007			31.12.2008			31.12.2009			31.12.2010			31.12.2011		
number of potential PhD supervisors	16			16			16			16			15		
PhD students	number	defended thesis	students quitted	number	defended thesis	students quitted	number	defended thesis	students quitted	number	defended thesis	students quitted	number	defended thesis	students quitted
internal	6	2	2	10	1	0	6	6	1	11	1	0	12	0	0
external	1	0	0	2	0	0	2	0	0	2	0	0	2	0	0
supervised at external institution by the research employees of the assessed organisation	6	0	0	7	0	0	8	0	0	11	4	0	7	3	0

- iii. Postdoctoral positions supported by

a) external funding (specify the source)

Marianna Zana, PhD. (Marie Curie Research Training Network, 6FP)

Mgr. Zuzana Kubalová, PhD. (APVV-LPP-0099-06)

RNDr. Július Parulek, PhD. (Integrated Project 6FP LifeSciHealth-EUGeneHeart)

RNDr. Alexandra Zahradníková, jr., PhD. (Integrated Project 6FP LifeSciHealth-EUGeneHeart)

Ing. Lucia Zahradníková, PhD. (Integrated Project 6FP LifeSciHealth-EUGeneHeart)

b) internal funding - the Slovak Academy of Sciences Supporting Fund of Stefan Schwarz

In 2007 - 2011 we gained three postdoctoral positions supported from the Schwarz' fond

Mgr. Zuzana Tomášková, PhD.

Mgr. Mária Karmažínová, PhD.

Mgr. Mgr. Mário Šereš, PhD.

iv. Summary table on pedagogical activities

Teaching	2007	2008	2009	2010	2011
lectures (hours/year) ³	152	131	176	163	190
practicum courses (hours/year) ³	74	42	183	88	105
supervised bachelor thesis (in total)	3	3	6	7	7
supervised diploma thesis (in total)	9	18	24	24	21
supervised rigorous thesis (in total)	1	1	1	2	4
members in PhD committees (in total)	18	15	14	16	11
members in DrSc. committees (in total)	3	3	3	4	4
members in university/faculty councils (in total)	2	2	3	3	6
members in habilitation/inauguration committees (in total)	2	5	1	6	2

3

³ Do not include time spent with bachelor, diploma or PhD students during their supervising

v. List of published university textbooks

- [1] BILČÍK, B. – HERICHOVÁ, I. – KISS, A. – KOŠŤÁL, Ľ. – **KRIŽANOVÁ, Olga-KRŠKOVÁ, L.** - KUBÍKOVÁ, L. – OKULIAROVÁ, M. – TALAROVIČOVÁ, A. – VÝBOH, P.– ZEMAN, M. Current trends in the physiological and behavioral research. – 1th edition - Nitra : ASAP-translation.com, s.r.o., 2007. 107 s. - (eBook.sk); ISBN 978-80-96970-0-1
- [2] **LACINOVÁ, Ľubica** - UHRÍKOVÁ, Daniela. Biophysics of voltage-dependent ion channels. 1th edition Bratislava : Comenius University, 2010. p.59, ISBN 978-80-223-2889-0.
- [3] **LACINOVÁ, Ľubica** - UHRÍKOVÁ, Daniela. Voltage dependent ion channels channels in excitable membranes.: Textbook for pharmacy students. Bratislava : Comenius University, 2011, P. 99. ISBN 978-80-223-3081-7.

vi. Number of published academic course books

- [1] **GABURJÁKOVÁ, Jana** – **KOMÍNKOVÁ, Viera** – **LACINOVÁ, Ľubica** – **TOMÁŠKOVÁ, Zuzana** – **ZAHRADNÍKOVÁ, Alexandra** – **ZAHRADNÍKOVÁ, Lucia**: Electrophysiological methods of monitoring of ion channels. Published: Institute of Molecular Physiology and Genetics SAS, ISBN 978 80 970028-5-5
- [2] **KÁDAŠI, Ľudevít**. Human Genetics, p. 1010-1032. In: Šašinka M., Šagát T., Kovács L. et al. *Pediatrics*, Bratislava: HERBA s.r.o. 2007, ISBN 978-80-89171-49-1, 1450
- [3] **KÁDAŠI, Ľudevít**. Human Genetics [electronical source]. 1th edition Bratislava : Publisher Comenius University, 2010. 1 CD-ROM. ISBN 978-80-223-2849-4

vii. List of joint research laboratories/facilities with the universities

- [1] Joint research laboratories: Laboratory of Genetics IMPG SAS and Department of Molecular Biology Faculty of Natural Sciences, Comenius University in Bratislava
- [2] Joint research laboratories: Laboratory of Biophysics IMPG SAS and Faculty of Pharmacy, Comenius University in Bratislava..

viii. Supplementary information and/or comments on doctoral studies and pedagogical activities

doc. RNDr. Ľubica Lacinová, DrSc. was twice (2008, 2011) member of committee for defense of PhD thesis at University of Vienna in Austria.

6. Applied research

(Applications of results)

i. List of the most important results of applied research projects

On the basis of molecular analysis of responsible genes DNA-based diagnostics methods were developed or optimized for the following monogenic disorders:

Cystic fibrosis (CF) and phenylketonuria (PKU). The knowledge of complete mutation scale in genes responsible for inherited disorders is inevitable for precise and effective DNA-based diagnostics. Genes responsible for CF and PKU have been subjected to complex molecular analysis. After designing and optimizing reaction conditions DNA samples from Slovak CF and PKU patients were subjected to analysis. In CF patients 65 different mutations have been identified, not yet found in Slovakia, 4 of them not yet described in the word at all. In PKU patients 45 mutations, not yet found in Slovakia, have been identified, 4 of them not yet described in the word at all. Identified mutations significantly expand the mutations scale in relevant genes in Slovak patients, and so contribute to their more effective diagnostics.

Alkaptonuria. We performed a complete mutation analysis and cataloguing of mutations in the *HGD* gene, not only in Slovak patients but also in patients from several countries from other parts of the world. For effective molecular diagnostics workflow we established and maintain a freely accessible web based database of *HGD* mutations which encompasses all AKU causing mutations,

Myotonic dystrophies type 1 (DM1), and type 2 (DM2). The clinical symptoms of these disorders vary considerably and overlap with symptoms of other neuro-muscular disorders, which make clinical diagnosis very unreliable, and it must be confirmed by analysis on the DNA level. The need of DNA-based diagnosis is strengthened by the fact that in about 50 % cases the diagnosis is erroneously set. Both disorders are caused by expansions of short repeats in the responsible genes. Our research was focused on the development of methods for reliable identification of causative mutations for diagnostic purposes.

Wilson's disease (WD). WD is a serious monogenic disorder affecting gastrointestinal tract and central nervous system requiring life-long treatment. Fatal end can be prevented only by early diagnosis. Clinical diagnosis, however, is very un-precise due to variable clinical symptoms. Only DNA-based diagnosis is reliable. We have developed an ARMS-PCR based method for rapid and reliable identification of the most frequent mutation in the responsible gene for diagnostic purposes.

Non-syndromic hearing loss (NSHL). NSHL is a genetically extremely heterogeneous monogenic disorder caused by mutations in more than 40 known genes. We have identified in Slovak Romany a gene (*TRIC*) and a founder mutation, which is responsible for a significant proportion of NSHL in this population.

All above described knowledge and developed methods are being currently used in every-day health service in Slovakia.

ii. List of the most important studies commissioned for the decision-making authorities, the government and NGOs, international and foreign organisations

doc. RNDr. Ľ. Kádaši, DrSc. - Forensic Expert in Genetics Specialization: DNA analysis

doc. RNDr. Ľ. Lacinová, DrSc. - Expert for Commission for Biosafety, an Advisory Group of Ministry of Environment of Czech republic

RNDr. H. Poláková - Forensic Expert in Genetics Specialization: DNA analysis

iii. List of licences sold abroad, incl. revenues

None

iv. List of licences sold in Slovakia, incl. revenues

None

v. List of contracts with industrial partners, incl. revenues⁴

None

vi. List of research projects with industrial partners, incl. revenues⁴

Possible correlations between expression/activity of various proteins/enzymes markers and incidence of myelodysplastic syndrome (MDS) and its development to acute myeloid leukemia (AML) in samples from patients treated and untreated with Lenalidomide, as well as Lenalidomide's effects on expression/activity of some markers using the leukemic cell lines (CELGENE). Coordinator: doc. Ing. Albert Breier, DrSc., Contract with company Celgene. 10/2009-12/2012.

vii. Supplementary information and/or comments on applied activities

	2007	2008	2009	2010	2011	total
studies for the decision sphere, government and NGOs, international and foreign organisations	50	49	35	46	38	218

7. Popularisation of Science (outreach activities)**i. List of the most important popularisation activities****[1] doc. Ing. Albert Breier, DrSc.**

Radio: - Rádio Devín, program Solarium, Talk about Molecular Physiology and Genetics, 30.11.2010

[2] doc. RNDr. Ľ. Kádaši, DrSc.

Radio: - Radio Regina, 2 hours with Science, discussion about Human Genetics, 4.11.2009
 - Slovak Radio Patria 6:30, World of Science (discussion about Genetics), 10.10. 2010
 - Radio Devín, Personalities of Science, 17.8.2011

⁴ If not included in documentation of projects in chapter 4 (Projects structure, research grants and other funding resources).

TV: - TV Markíza, program "Reflex" about twins, 17:30, 9.12.2010

Printed Media: - Health, Oktober 2010, str. 95 – 102, "What would happen, if it would be hereditary?", 2010

[3] doc. RNDr. Ľ. Lacinová, DrSc.

Lecture: - Gallery Ján Koniarek – Koppel Castle, Trnava. Lecture within the frame Festival Multiplace 6: Transgen Art "From Biology to Gallery", 14.7.2007

Radio: - Slovak Radio 1 Nočná pyramída, 22:30 - 24:00, Genetics and Genetic Biotechnology, 2008
- Slovak Radio Devín, 19:05, Discussion: "Poesy and Science", 28.10.2011

TV: - STV2, program "You are not alone", documentary profile, 21:55, 22.6.2007

Printed Media: - Quark 9/2010 , "Channels, conducting electrical current".

[4] RNDr. Marta Novotová, CSc.

Radio: - radio DEVIN, Talk about "Heart Cell", 5.7.2011

[5] doc. Ing. Albert Breier, DrSc., Ing. Zdena Sulová, CSc.

TV: - STV 2, program Spectrum of Science, "Focused on Cancer Cell", 1.12.2010

[6] Ing. Alexandra Zahradníková, DrSc.

TV: - Prof. Burkert Pieske, Guest in Telestudio , TA 3; 19.02.2008 , 2008

Lecture: - Science in Center - "Cell, that power Live", Center of scientific-technical informations, 29.1.2009

Printed Media: - "Meaningful science could be done even in Slovakia", Discussion in the frame of theme "Secret of Success", <https://www.vedatechnika.sk/SK/enovinyRozhovory/Reportaze/Stranky/AZahradnikovaAjNaSlovenskuSaDaRobitZmysluplnaVeda.aspx>, 3.7.2009
- SME Woman č. 37. p. 6 – 8, "Long way to new drugs", 24.9.2010
- Pravda Weekend, p. 18-21, "Way to the deepest secrets of the heart", 32.7.2010
- SME - Science, "Extracted heart still live", 30.10.2011

[7] RNDr. Ivan Zahradník, CSc., Ing. Alexandra Zahradníková, DrSc., RNDr. Alexandra Zahradníková, jr.

Scientific Discussion: - SOVVA Café Scientifique, 26.9.2008 Night of Researcher, Panta Rhei, Aupark Bratislava, 2008

ii. Summary of outreach activities

Outreach activities	2007	2008	2009	2010	2011	total
articles in press media/internet popularising results of science, in particular those achieved by the Organization	18	14	17	11	7	67
appearances in telecommunication media popularising results of science, in particular those achieved by the Organization	3	11	4	9	6	33
public popularisation lectures	2	3	3	3	3	14

iii. Supplementary information and/or comments on popularisation activities

Healthcare should be considered as main acceptor of IMPG SAS research activities for applications. Several methods and methodologies were offered to the clinical institutions for diagnosis predominantly in monogenic hereditary diseases. Solution of state program concerning genomic of cardiovascular diseases revealed data that are applicable in early diagnosis of cardiovascular diseases and in this time are tested on National institute of cardiovascular diseases. Several researchers from IMPG SAS were active in cooperation with media like TV, radio, etc. Documentation of major activities are summarized above.

8. Background and management. Staffing policy and implementation of recommendations from previous assessments

i. Summary table of personnel

Personnel	2007	2008	2009	2010	2011
all personnel	80	78	67	66	66
research employees from Tab. Research staff	45	48	39	34	32
FTE from Tab. Research staff	27,7	30,1	29,1	27,2	24,5
average age of research employees with university degree	41	41	41	42	42

ii. Professional qualification structure (as of 31.12. 2011)

FEMALE	AGE								
	< 30	31 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	> 65
Number of									
DrSc. / prof. ⁵	0	0	0	0	0	2	1	0	0
II.a / Assoc. prof. ⁶	0	0	4	1	1	1	1	1	0
other researchers PhD./CSc.	3	2	2	0	1	1	0	0	0
doc./Assoc. prof.	0	0	0	0	0	0	0	0	0

⁵ ⁶
,

iii. Professional qualification structure (as of 31.12. 2011)

MALE	AGE								
	< 30	31 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	> 65
Number of									
DrSc. / prof. ⁵	0	0	0	0	0	1	2	0	0
II.a / Assoc. prof. ⁶	0	0	0	0	0	0	0	1	0
other researchers PhD./CSc.	2	2	1	0	0	0	0	0	0
doc./Assoc. prof.	0	0	0	0	0	0	0	0	0

⁵ Responsibility to organize PhD study

⁶ Responsibility to be a supervisor of PhD study

iv. Status and development of research infrastructure incl. experimental, computing and technical base (description of the present infrastructure, premises, and material and technical resources. Infrastructure, instrumentation and major technical equipment necessary for the achievement of the objectives specified in the research Concept)

IMPG is equipped with modern technologies that enables to deal with complicated scientific tasks. For imaging techniques, Institute has an electron microscope, confocal microscope, fluorescence microscope and three inverted microscopes for cell culturing. Institute has three cell culture laboratories, equipped for cultivation primary and stable cell lines. For biophysical studies, patch clamp apparatus, voltage clamp apparatus a methodology for planar lipid bilayers. For bio-imaging, Typhoon 9210 and Kodak camera are available. Institute owns two ultracentrifuges, flow cytometer, two ELISA readers, etc. Besides these major instruments, Institute is equipped for basal studies in molecular biology, genetics, proteomics. To institutional facilities belongs cold room, centrifugation room and animal facility.

v. Describe how the results and suggestions of the previous assessment were taken into account

Major suggestion from the previous evaluation in 2007 was to the organizational structure. Since 1990 IMPG has Laboratories as a organizing units, leaded by head of the laboratory. Since January 1, 2011 ten laboratories were grouped into three departments and one laboratory was closed down. Nowadays, IMPG has three departments - Department of Cell Physiology and Genetics, Department of Muscle Cell Research and Department of Transport Proteins were established.

vi. Supplementary information and/or comments on management, research infrastructure, and trends in personnel development

Other information relevant to the assessment

ANNEX

List of Research Outputs

WOS Publications 2007:

1. ATHEA, Yoni - VIOLLET, Benoit - MATEO, Philippe - ROUSSEAU, Delphine - **NOVOTOVÁ, Marta** - GARNIER, Anne - VAULONT, Sophie - WILDING, James R. - GRYNBERG, Alain - VEKSLER, Vladimir - HOERTER, Jacqueline - VENTURA-CLAPIER, Renee. AMP-activated protein kinase alpha 2 deficiency affects cardiac cardiolipin homeostasis and mitochondrial function. In DIABETES, 2007, vol. 56, iss. 3, p. 786-794. ISSN 0012- (7.955 – IF2006)
2. BELEVYCH, Andriy E. - **KUBALOVÁ, Zuzana** - TERYTYEV, D. - HAMLIN, Robert L. - CARNES, Cynthia A. - GYORKE, S. Enhanced ryanodine receptor-mediated calcium leak determines reduced sarcoplasmic reticulum calcium content in chronic canine heart failure. In Biophysical Journal, 2007, vol. 93, no., p. 4083-4092. ISSN 0006-3495 (4.757 – IF2006)
3. **BREZOVÁ, Anna** - HEIZMANN, C W - **UHRÍK, Branislav**. Immunocytochemical localization of S100A1 in mitochondria on cryosections of the rat heart. In General physiology and biophysics, 2007, vol. 26, issue 2, p.143-149. (0.771 – IF2006)
4. BRTKO, Július - ROCK, E. - NEZBEDOVÁ, P. - **KRIŽANOVÁ, Oľga** - DVORČÁKOVÁ, M. - MINET - QUINARD, R - FARGES, M. C. - RIBALTA, J. - WINKLOHOFER - ROOB, B.M. - VASSON, M.P. - MACEJOVÁ, Dana. Age-related change in the retinoid X receptor beta gene expression in peripheral blood mononuclear cells of healthy volunteers: Effect of 13-cis retinoic acid supplementation. In Mechanisms of Ageing and Development, 2007, vol. 128, issue 11 - 12, p.594-600. ISSN 0047-6374. (3.846 – IF2006)
5. HERICHOVÁ, Iveta - MRAVEC, Boris - STEBELOVÁ, Katarína - **KRIŽANOVÁ, Oľga** - **JURKOVIČOVÁ, Dana** - KVETŇANSKÝ, Richard - ZEMAN, Michal. Rhythmic clock gene expression in heart, kidney and some brain nuclei involved in blood pressure control in hypertensive TGR(mREN-2)27 rats. In Molecular and Cellular Biochemistry, 2007, vol. 296, iss. 1 - 2, p. 25-34. ISSN 0300-8177. (1.862 – IF2006)
6. **HUDECOVÁ, Soňa** - KUBOVČÁKOVÁ, Lucia - KVETŇANSKÝ, Richard - KOPÁČEK, Juraj - PASTOREKOVÁ, Silvia - NOVÁKOVÁ, Martina - KNEZL, Vladimír - **TARBOVÁ, Bohumila** - **LACINOVÁ, Ľubica** - **SULOVA, Zdena** - **BREIER, Albert** - **JURKOVIČOVÁ, Dana** - **KRIŽANOVÁ, Oľga**. Modulation of expression of Na⁺/Ca²⁺ exchanger in heart of rat and mouse under stress. In Acta Physiologica, 2007, vol. 190, no. 2, p. 127-136. ISSN 1748-1708. (2.230 – IF2006)
7. JAVORSKÝ, Martin - TKÁČ, Ivan - GAŠPERÍKOVÁ, Daniela - UKROPEC, Jozef - **SEDLÁKOVÁ, Barbora** - RIEČANSKÝ, Igor - ŠEBŮKOVÁ, Elena - **KRIŽANOVÁ, Oľga** - DOBRIKOVÁ, Martina - KLIMEŠ, Iwar. Lipoprotein lipase HindIII polymorphism influences HDL-cholesterol levels in statin-treated patients with coronary artery disease. In Wiener klinische Wochenschrift : the middle european journal of medicine, 2007, vol. 119, iss. 15-16, p. 476-482. ISSN 0043-5325 (0.804 – IF2006)

8. **JURKOVIČOVÁ, Dana** - KOPÁČEK, Juraj - ŠTEFÁNIK, Peter - KUBOVČÁKOVÁ, Lucia - **ZAHRADNÍKOVÁ, Alexandra, ml.** - **ZAHRADNÍKOVÁ, Alexandra** - PASTOREKOVÁ, Silvia - **KRIŽANOVÁ, Oľga**. Hypoxia modulates gene expression of IP3 receptors in rodent cerebellum. In Pflugers Archiv-European Journal of Physiology, 2007, vol. 454, no. 3, p. 415-425. ISSN 0031-6768. (4.807 - IF2006).
9. **JURKOVIČOVÁ, Dana** - **SEDLÁKOVÁ, Barbora** - RIEČANSKÝ, I. - GONCALVESOVA, E. - PENESOVÁ, Adela - KVETŇANSKÝ, Richard - **KRIŽANOVÁ, Oľga**. Cardiovascular diseases and molecular variants of the renin-angiotensin system components in Slovak population. In General physiology and biophysics, 2007, vol. 26, iss. 1, p. 27-32. ISSN 0231-5882 (0.771 – IF2006)
10. KAPLÁN, Peter - **JURKOVIČOVÁ, Dana** - BABUŠÍKOVÁ, Eva - **HUDECOVÁ, Soňa** - RACAY, P. - **SIROVA, Marta** - LEHOTSKÝ, Ján - DRGOVA, A. - **KRIŽANOVÁ, Oľga**. Effect of aging on the expression of intracellular Ca²⁺ transport proteins in a rat heart. In Molecular and Cellular Biochemistry, 2007, vol. 301, issue 1 - 2, p. 219-226. ISSN 0300-8177 (1.862 – IF2006)
11. KOSZELA - PIOTROWSKA, Izabela - CHROMA, Katarzyna - BEDNARCZYK, Piotr - DOLOWY, Krzysztof - SZEWCZYK, Adam - KUNZ, Wolfram S - **MÁLEKOVÁ, Ľubica** - **KOMÍNKOVÁ, Viera** - **ONDRIAS, Karol**. Stilbene derivatives inhibit the activity of the inner mitochondrial membrane chloride channels. In Cellular and Molecular Biology Letters, 2007, vol. 12, issue 4, p. 493-508 (1.238 - IF2006)
12. **KRIŽANOVÁ, Oľga** - MYSLIVEČEK, Jaromír - TILLINGER, A. - **JURKOVIČOVÁ, Dana** - **KUBOVČÁKOVÁ, Lucia**. Adrenergic and calcium modulation of the heart in stress: From molecular biology to function. In Stress : the international journal on the biologie of stress, 2007, vol. 10, iss. 2, p. 173-184. ISSN 1025-3890 (3.200 – IF2006)
13. **KUREJOVA, Martina** - **PAVLOVIČOVÁ, Michaela** - **LACINOVÁ, Ľubica**. Monovalent currents through the T-type Ca(v)3.1 channels and their block by Mg²⁺. In General physiology and biophysics, 2007, vol. 26, issue 3, p. 234-239. ISSN 0231-5882. (0.771 - IF2006)
14. **KUREJOVÁ, Martina** - **LACINOVÁ, Ľubica** - **PAVLOVIČOVÁ, Michaela** - ESCHBACH, M. - KLUGBAUER, Norbert. The effect of the outermost basic residues in the S4 segments of the Ca(V)3.1 T-type calcium channel on channel gating. In Pflugers Archiv-European Journal of Physiology, 2007, vol. 455, issue 3, p. 527-539. ISSN 0031-6768 (4.807 – IF2006)
15. **KUREJOVA, Martina** - **UHRÍK, Branislav** - **SULOVÁ, Zdena** - **SEDLÁKOVÁ, Barbora** - **KRIŽANOVÁ, Oľga** - **LACINOVÁ, Ľubica**. Changes in ultrastructure and endogenous ionic channels activity during culture of HEK 293 cell line. In European Journal of Pharmacology, 2007, vol. 567, iss. 1-2, p. 10-18. ISSN 0014-2999 (2.522 – IF2006)
16. **MÁLEKOVÁ, Ľubica** - **KOMÍNKOVÁ, Viera** - FERKO, Miroslav - ŠTEFÁNIK, Peter - **KRIŽANOVÁ, Oľga** - ZIEGELHÖFFER, Attila - SZEWCZYK, Adam - **ONDRIAS, Karol**. Bongkreikic acid and atractyloside inhibits chloride channels from mitochondrial membranes of rat heart. In Biochemica et Biophysica Acta, 2007, vol. 1767, s. 31- 44, (4.237 – IF2006)
17. **MÁLEKOVÁ, Ľubica** - TOMÁŠKOVÁ, Jana - NOVÁKOVÁ, Martina - **ŠTEFÁNIK, Peter** - KOPÁČEK, Juraj - LAKATOŠ, B. - PASTOREKOVÁ, Silvia - **KRIŽANOVÁ, Oľga** - **BREIER, Albert** - **ONDRIAS, Karol**. Inhibitory effect of DIDS, NPPB, and phloretin on intracellular chloride channels. In Pflugers Archiv-European Journal of Physiology, 2007, vol. 455, no. 2, p. 349-357. ISSN 0031-6768. (4.807 - IF2006).

18. **NOVAK, Pavel – GABURJAKOVA, Marta – ZAHRADNIK, Ivan.** BLM Analyzer: a software tool for experiments on planar lipid bilayers. In *BioTechniques* Vol. 42, 2007, no. 3, p. 335-341, ISSN 0736-6205 (2.460 - IF2006)
19. NOVÁKOVÁ, M. - BRUDEROVÁ, V. - **SULOVÁ, Zdena** - KOPÁČEK, Juraj - **LACINOVÁ, Ľubica** - KVETŇANSKÝ, Richard - VASKU, A. - KAPLÁN, Peter - **KRIŽANOVÁ, Oľga - JURKOVIČOVÁ, Dana.** Modulation of expression of the sigma receptors in the heart of rat and mouse in normal and pathological conditions. In *General physiology and biophysics : international journal*, 2007, vol. 26, no.2, p. 110-117. ISSN 0231-5882. (0.771 - IF2006)
20. **POLÁKOVÁ, Helena** - KATRINCSAKOVA, B. - MINÁRIK, G. - FERÁKOVÁ, E. - **FICEK, Andrej** - BALDOVIC, M. - **KÁDAŠI, Ľudevít.** Detection of His1069Gln mutation in Wilson disease by bidirectional PCR amplification of specific alleles (BI-PASA) test. In *General physiology and biophysics : an international journal*, 2007, vol. 26, no. 2, p. 91-96. ISSN 0231-5882. (0.771 - IF2006)
21. **TARABOVÁ, Bohumila - LACINOVÁ, Ľubica** - ENGEL, Jutta. Effects of phenylalkylamines and benzothiazepines on Ca(v)1.3-mediated Ca²⁺ currents in neonatal mouse inner hair cells. In *European Journal of Pharmacology*, 2007, vol. 573, iss. 1-3, p. 39-48. ISSN 0014-2999. (2.522 – IF2006)
22. **TOMÁŠKOVÁ, Zuzana - GABURJÁKOVÁ, Jana - BREZOVÁ, Anna - GABURJÁKOVÁ, Marta.** Inhibition of anion channels derived from mitochondrial membranes of the rat heart by stilbene disulfonate-DIDS. In *Journal of Bioenergetics and Biomembranes*, 2007, vol. 39, iss. 4, p. 301-311. ISSN 0145-479X. (3.16- IF2006)
23. **VALENT, Ivan - ZAHRADNÍKOVÁ, Alexandra - PAVELKOVÁ, Jana - ZAHRADNÍK, Ivan.** Spatial and temporal Ca²⁺, Mg²⁺, and ATP(2-) dynamics in cardiac dyads during calcium release. In *Biochimica et Biophysica Acta : biomembranes*, 2007, vol. 1768, p. 155-166. ISSN 0005-2736 (3.587 – IF2006)
24. **ZAHRADNÍKOVÁ, Alexandra, ml. - POLÁKOVÁ, Eva - ZAHRADNÍK, Ivan - ZAHRADNÍKOVÁ, Alexandra.** Kinetics of calcium spikes in rat cardiac myocytes. In *Journal of Physiology*, 2007, vol. 578, iss. 3, p. 677-691. ISSN 0022-3751, (4.407 – IF2006)
25. **ZAHRADNÍKOVÁ, Alexandra - MINAROVICH, Igor - ZAHRADNÍK, Ivan.** Competitive and cooperative effects of bay k8644 on the L-type calcium channel current inhibition by calcium channel antagonists. In *Journal of Pharmacology and Experimental Therapeutics*, 2007, vol. 322, iss. 2, p. 638-645. ISSN 0022-3565 (3.956 – IF2006)
26. ZMETAKOVA, I. - FERÁK, Vladimír - MINÁRIK, G. - **FICEK, Andrej - POLÁKOVÁ, Helena** - FERÁKOVÁ, E. - **KÁDAŠI, Ľudevít.** Identification of the deletions in the UGT1A1 gene of the patients with Crigler-Najjar syndrome type I from Slovakia. In *General physiology and biophysics : an international journal*, 2007, vol. 26, no. 4, p. 306-310. ISSN 0231-5882. (0.771 - IF2006)
27. ZURMANOVA, Jitka - DIFATO, Francesco - MALACOVA, Daniela - MEJSNAR, Jiri - STEFL, Bohumir - **ZAHRADNÍK, Ivan.** Creatine kinase binds more firmly to the M-band of rabbit skeletal muscle myofibrils in the presence of its substrates. In *Molecular and Cellular Biochemistry*, 2007, vol. 305, iss. 1-2, p. 55-61. ISSN 0300-8177 (1.862 - IF2006)

Chapters in monographs published in Slovakia 2008:

1. **ONDRIAS, Karol**. Trends in pharmacological research – contribution from studies of the membrane transport and cell signaling. In “Trends in pharmacological research”, Ed.: V. Bauer, Publ.: Institute of Experimental Pharmacology, SASc. Bratislava 2008, pp. 96-101

WOS Publications 2008:

1. FISHER, V. - GABAUER, I. - TILLINGER, A. - NOVÁKOVÁ, M. - PECHÁŇ, Ivan - **KRIŽANOVÁ, Oľga** - KVETŇANSKÝ, Richard - MYSLIVEČEK, Jaromír. Heart adrenoceptors gene expression and binding sites in human failing heart. In ANNALS NEW YORK ACADEMY OF SCIENCES, 2008, vol. 1148, p. 400-408. (1.731 - IF2007)
2. JOUBERT, Frederic - WILDING, James R - FORTIN, Dominique - DOMERGUE-DUPONT, Valerie - **NOVOTOVÁ, Marta** - VENTURA-CLAPIER, Renee - VEKSLER, Vladimír. Local energetic regulation of sarcoplasmic and myosin ATPase is differently impaired in rats with heart failure. In Journal of Physiology, 2008, vol. 586, iss. 21, p. 5181-5192. ISSN 0022-3751, (4.580 - IF2007).
3. **GABURJÁKOVÁ, Marta** - **GABURJÁKOVÁ, Jana**. Effect of luminal Ca(2+) on the stability of coupled gating between ryanodine receptors from the rat heart. In Acta Physiologica, 2008, vol. 193, issue 3, p.219-227. ISSN 1748-1708, (1.602 - IF2007)
4. **JURKOVIČOVÁ, Dana** - **SEDLÁKOVÁ, Barbora** - **LACINOVÁ, Ľubica** - KOPÁČEK, Juraj - **SULOVA, Zdena** - SEDLÁK, Ján - **KRIŽANOVÁ, Oľga**. Hypoxia differently modulates gene expression of inositol 1, 4, 5 - trisphosphate receptors in mouse kidney and HEK 293 cell line. In Stress, Neurotransmitters and hormones: Neuroendocrine and genetic mechanisms Book of Series: Annals of the New York Academy of Sciences, 2008, vol. 1148, p. 421- 427. ISSN 0077-8923. (1.731 - IF2007).
5. KOLESÁR, P. - MINÁRIK, G. - BALDOVIC, M. - **FICEK, Andrej** - KOVACS, L. - **KÁDAŠI, Ľudevít**. Mutation analysis of the CFTR gene in Slovak cystic fibrosis patients by DHPLC and subsequent sequencing: identification of four novel mutations. In General physiology and biophysics : an international journal, 2008, vol. 27, no. 4, p. 299-305. ISSN 0231-5882. (1.286 - IF2007)
6. **KRIŽANOVÁ, Oľga** - HOLOTŇÁKOVÁ, Terézia - **JURKOVIČOVÁ, Dana** - **POLÁKOVÁ, Eva** - **ZAHRADNÍKOVÁ, Alexandra** - **LACINOVÁ, Ľubica** - KVETŇANSKÝ, Richard - MYSLIVEČEK, Jaromír - PASTOREKOVÁ, Silvia. Type 1 and 2 IP3 receptors respond differently to catecholamines and stress. In Annals of the New York Academy of Sciences, 2008, vol. 1148, p. 331-337. ISSN 0077-8923. (1.731 - IF2007)
7. KRSKOVA-TYBITANCLOVA, Katarína - MACEJOVÁ, Dana - BRTKO, Július - BACULÍKOVÁ, Martina - **KRIŽANOVÁ, Oľga** - ZÓRAD, Štefan. Short term 13-cis-retinoic acid treatment at therapeutic doses elevates, expression of leptin, glut 4, ppar gamma and AP2 in rat adipose tissue. In Journal of Physiology and Pharmacology, 2008, vol. 59, iss 4., p. 731-743. ISSN 0867-5910. (4.466 - IF2007).
8. **LACINOVÁ, Ľubica** - MOOSMANG, Sven - LANGWIESER, Nikole - HOFMANN, Franz - KLEPPISCH, Thomas. Ca(v)1.2 calcium channels modulate the spiking pattern of hippocampal pyramidal cells. In Life Sciences, 2008, vol. 82, issue 1 - 2, p. 41-49. ISSN 0024-3205. (2.257 - IF2007).
9. LEHOCKÝ, I. - BALDOVIČ, M. - **KÁDAŠI, Ľudevít** - MESTSPALU, E. A database of mitochondrial DNA hypervariable regions I and II sequences of individuals from

- Slovakia. In Forensic science international. Genetics, 2008, vol. 2, p. 413-421. ISSN 1872-4973. (2.015 – IF2007)
10. LUKACOVA, N. – DAVIDOVA, A. – KOLESAR, D. – KOLESAROVA, M. – SCHREIBEROVA, A. – LACKOVA, M. – **KRIŽANOVÁ, Oľga** – MARSALA, M. – MARSALA, J.: The effect of N-nitro-L-arginine and aminoguanidine treatment on changes in constitutive and inducible nitric oxide synthases in the spinal cord after sciatic nerve transection. In: Int J Molec Med, Vol., 2008, vol 21, p. 413-421 (1.847 – IF2007)
 11. KVETŇANSKÝ, Richard - **KRIŽANOVÁ, Oľga** - TILLINGER, A. - SABBAN, E. L. - THOMAS, Steven A. - KUBOVČÁKOVÁ, Lucia. Regulation of Gene Expression of Catecholamine Biosynthetic Enzymes in Dopamine-beta-Hydroxylase- and CRH-Knockout Mice Exposed to Stress. In Annals of the New York Academy of Sciences, 2008, vol. 1148, p. 257-268. ISSN 0077-8923. (1.731 - IF2007).
 12. **ONDRIAŠ, Karol** - STAŠKO, Andrej - ČAČANYIOVÁ, Soňa - **SULOVÁ, Zdena** - **KRIŽANOVÁ, Oľga** - KRISTEK, František - **MÁLEKOVÁ, Lubica** - KNEZL, Vladimír - **BREIER, Albert**. H₂S and HS⁻ donor NaHS releases nitric oxide from nitrosothiols, metal nitrosyl complex, brain homogenate and murine L1210 leukaemia cells. In Pflugers Archiv-European Journal of Physiology, 2008, vol. 457, no. 2, p. 271-279. ISSN 0031-6768. (3.842 - IF2007)
 13. **ONDRIAŠ, Karol** - **MÁLEKOVÁ, Ľubica** - **KRIŽANOVÁ, Oľga**. Potassium-chloride promiscuous channels in mitochondrial membranes. In General physiology and biophysics, 2008, vol.27, issue 1, p. 38-44. ISSN 0231-5882. (1.286 - IF2007).
 14. **ONDRIAŠ, Karol** - **ŠIROVÁ, Marta** - KUBOVČÁKOVÁ, Lucia - **KRIŽANOVÁ, Oľga**. Uranyl acetate modulates gene expression and protein levels of the type 2, but not type 1 inositol 1,4,5-trisphosphate receptors in mouse kidney. In General physiology and biophysics, 2008, vol. 27, issue 3, p. 187-193. ISSN 0231-5882. (1.286 - IF2007)
 15. PATTERSON-BUCKENDAHL, P. E. - POHORECKÝ, L. - KUBOVČÁKOVÁ, Lucia - **KRIŽANOVÁ, Oľga** - MARTIN, R.B. - MARTINEZ, A. - KVETŇANSKÝ, Richard. Ethanol and stress activate catecholamine synthesis in the adrenal: Effects on bone. In Annals of the New York Academy of Sciences, 2008, vol. 1148, p. 542-551. ISSN 0077-8923, (1.731 - IF2007).
 16. **POLÁKOVÁ, Eva** - **ZAHRADNÍKOVÁ, Alexandra, ml.** - **PAVELKOVÁ, Jana** - **ZAHRADNÍK, Ivan** - **ZAHRADNÍKOVÁ, Alexandra**. Local calcium release activation by DHPR calcium channel openings in rat cardiac myocytes. In Journal of Physiology, 2008, vol. 586, iss. 16, p. 3839-3854. ISSN 0022-3751. (4.580 - IF2007).
 17. **SULOVÁ, Zdena** - MACEJOVÁ, Dana - **ŠEREŠ, Mário** - SEDLÁK, Ján - BRTKO, Július - **BREIER, Albert**. Combined treatment of P-gp-positive L1210/VCR cells by verapamil and all-trans retinoic acid. induces down-regulation of P-glycoprotein expression and transport activity. In Toxicology in vitro, 2008, vol. 22, iss. 1, p. 96-105. ISSN 0887-2333. (2.193 - IF2007)
 18. **ŠEREŠ, Mário** - **POLÁKOVÁ, Eva** - **KRIŽANOVÁ, Oľga** - **HUDECOVÁ, Soňa** - KLYMENKO, S.V. - **BREIER, Albert** - **SULOVÁ, Zdena**. Overexpression of P-glycoprotein in L1210/VCR cells is associated with changes in several endoplasmic reticulum proteins that may be partially responsible for the lack of thapsigargin sensitivity. In General physiology and biophysics, 2008, vol. 27, issue 3, p. 211-221. ISSN 0231-5882. (1.286 - IF2007)
 19. **ŠPÁNIKOVÁ, Anna** - ŠIMONČÍKOVÁ, Petra - RAVINGEROVÁ, Táňa - PECHÁŇOVÁ, Oľga - BARANČÍK, Miroslav. The effect of chronic nitric oxide synthases inhibition on regulatory proteins in rat hearts. In Molecular and Cellular Biochemistry, 2008, vol. 312, iss. 1-2, p. 113-120. ISSN 0300-8177, (1.707 - IF2007).

20. TEREPTYEV, D. - **KUBALOVA, Zuzana** - VALLE, G. - NORI, A. - VEDAMOORTHYRAO, S. - TEREPTYEVA, R. - VIATCHENKO-KARPINSKI, S. - BERS, D. M. - WILLIAMS, S. C. - VOLPE, P. - GYORKE, S. Modulation of SR Ca release by luminal Ca and calsequestrin in cardiac myocytes: Effects of CASQ2 mutations linked to sudden cardiac death. In BIOPHYSICAL JOURNAL, 2008, vol. 95, issue 4, p. 2037-2048. ISSN 0006-3495. (4.627 – IF2007)
21. TILLINGER, A. - MYSLIVEČEK, Jaromír - NOVÁKOVÁ, Martina - **KRIŽANOVÁ, Oľga** - KVETŇANSKÝ, Richard. Gene Expression of Adrenoceptors in the Hearts of Cold-Acclimated Rats Exposed to a Novel Stressor. In Annals of the New York Academy of Sciences, 2008, vol. 1148, p. 393-399. ISSN 0077-8923, (1.731 - IF2007).
22. **TOMÁŠKOVÁ, Zuzana** - **GABURJÁKOVÁ, Marta**. The cardiac ryanodine receptor: Looking for anomalies in permeation properties. In BIOCHIMICA ET BIOPHYSICA ACTA-BIOMEMBRANES, 2008, vol. 1778, issue 11, p.2564-2572. (3.640 - IF2007)
23. **TYLKOVÁ, Lucia** - **NOVOTOVÁ, Marta** - **ZAHRADNÍK, Ivan** - KISS, Alexander.: Evaluation of changes atrial myocytes - A morphometric approach. In: Analytical and Quantitative Cytology and Histology, 2008, Vol. 30, p. 53-59 (2.940 – IF2007)
24. **ZAHRADNÍK, Ivan** - **MINAROVÍČ, Igor** - **ZAHRADNÍKOVÁ, Alexandra**. Inhibition of the cardiac L-type calcium channel current by antidepressant drugs. In Journal of Pharmacology and Experimental Therapeutics, 2008, vol. 324, iss. 3, p. 977-984. ISSN 0022-3565. (4.003 - IF2007)
25. ZEMAN, Michal - PETRÁK, Juraj - STEBELOVÁ, Katarína - NAGY, Gyoergy - **KRIŽANOVÁ, Oľga** - HERICHOVÁ, Iveta - KVETŇANSKÝ, Richard. Endocrine Rhythms and Expression of Selected Genes in the Brain, Stellate Ganglia, and Adrenals of Hypertensive TGR Rats. In Annals of the New York Academy of Sciences, 2008, vol. 1148, p. 308-316. ISSN 0077-8923. (1.731 - IF2007)

Scientific publications in other journals 2008:

1. POLÁK, E. - **FICEK, Andrej** - BALDOVIČ, M. - FERÁKOVÁ, E. - ŠOLTYSOVÁ, A. - STRNOVÁ, J. - URGE, O. - KOVÁCS, László - **KÁDAŠI, Ľudevít**. Komplexná mutačná analýza génu PAH u slovenských pacientov postihnutých fenylketonúriou. In Česko-slovenská pediatrie, 2008, roč. 61/10, č., s. 528-534. ISSN 0069-2328.

Chapters in monographs published abroad 2009:

1. LUKÁČOVÁ, Nadežda - SCHREIBEROVÁ, Andrea - LACKOVÁ, Monika - DÁVIDOVÁ, Alexandra - KOLESÁR, Dalibor - GÁLIK, Ján - **KRIŽANOVÁ, Oľga** - RADOŇAK, J. - MARŠALA, Jozef - MARŠALA, Martin. Nitric oxide as a neuromodulator of retrograde and/or anterograde. In LUKÁČOVÁ, Nadežda et al. NO-cGMP Signaling in the Spinal Cord and Brain Stem Circuitry 2009. - Trivandrum (Kerala, India) : Transworld Research Network, 2009. ISBN 978-81- 7895-416-5, p. 115-138.
2. **PARULEK, Július** - ŠRÁMEK, Miloš - **ZAHRADNÍK, Ivan**. GeomCell, Design of Cell Geometry. In: "Recent Advances in the 3D Physiological Human", Magnenat-Thalmann, Nadia; Zhang, Jian J.; Feng, David D. (Eds.) VIII, © Springer-Verlag London Limited, 2009 ISBN: 978-1-84882-564-2. p. 21 – 36
3. **PARULEK, Július** - ŠRÁMEK, Miloš - ČERVENANSKÝ, Michal - **NOVOTOVÁ, Marta** - **ZAHRADNÍK, Ivan**. A Cell Architecture Modeling System Based on Quantitative Ultrastructural Characteristics. In Systems Biology. - Pittsburgh : Humana Press, 2009. ISBN 978-1-934115-64-0, p.289-312.

WOS Publications 2009

1. DÁVIDOVÁ, Alexandra - SCHREIBEROVÁ, Andrea - KOLESÁR, Dalibor -CAPKOVÁ, Ľudmila - **KRIŽANOVÁ, Oľga** - LUKÁČOVÁ, Nadežda. Spinal Cord Transection Significantly Influences nNOS-IR in Neuronal Circuitry that Underlies the Tail-Flick Reflex Activity. In Cellular and Molecular Neurobiology. ISSN 0272-4340, 2009, vol. 29, no. 6-7, p. 879-886. (2.550 - IF2008).
2. **DRIGEL'OVÁ, Mária** - **TARABOVÁ, Bohumila** - DUBURS, G. - **LACINOVÁ, Ľubica**. Dihydropyridine analogue cerebrocrast blocks both T-type and L-type calcium currents. In Canadian Journal of Physiology and Pharmacology. ISSN 0008-4212, 2009, vol. 87, p. 915-922. (1.763 - IF2008).
3. FIALOVÁ, K. - **KRIŽANOVÁ, Oľga** - JARKOVSKY, E. - NOVÁKOVÁ, Mária. Apparent desensitization of the effects of sigma receptor ligand haloperidol in isolated rat and Guinea pig hearts after chronic treatment. In Canadian Journal of Physiology and Pharmacology, 2009, vol. 87, p. 1-9. ISSN 0008-4212. (1.763 - IF2008)
4. **GIBALOVÁ, Lenka** – SEDLÁK, Ján – LABUDOVOVÁ, Martina – **BARANČÍK, Miroslav** – REHÁKOVÁ, Alena - **BREIER, Albert** – **SULOVÁ, Zdena**. Multidrug resistant P-glycoprotein positive L1210/VCR cells are also cross-resistant to cisplatin via mechanism distinct with P-glycoprotein drug efflux activity. In General Physiology and Biophysics. ISSN 0231-5882, 2009, vol. 28, issue 1, p.391-403. (0.697 - IF2008)
5. KLYMENKO, Sergiy, V. - ILYENKO, Irina, N. - GOLARNIK, Natalya, A. - MAZNICHENKO, Oksana, L. - **BREIER, Albert** - BAZYKA, Dimitry, A. Membrane transport and apoptosis-related proteins in radiation-associated acute myeloid leukemia following the Chernobyl accident. In General Physiology and Biophysics. ISSN 0231-5882, 2009, vol. 28, issue 1, p.63-69. (0.697 - IF2008).
6. KOPÁČEK, Juraj - **ONDRIAŠ, Karol** - **SEDLÁKOVÁ, Barbora** - TOMÁŠKOVÁ, Jana - **ZAHRADNIKOVA, Lucia** - SEDLÁK, Jan - **SULOVÁ, Zdena** - **ZAHRADNÍKOVÁ, Alexandra** - PASTOREK, Jaromír - **KRIŽANOVÁ, Oľga**. Type 2 IP(3) receptors are involved in uranyl acetate induced apoptosis in HEK 293 cells. In Toxicology. ISSN 0300-483X, 2009, vol. 262, iss. 1, p. 73-79. (2.836 -IF2008)
7. MACEJOVÁ, Dana - **KRIŽANOVÁ, Oľga** - BRTKO, Július. Different mRNA expression profiling of nuclear retinoid, thyroid, estrogen and PPARgamma receptors, their coregulators and selected genes in rat liver and spleen in response to short-term in vivo

- administration of 13-cis retinoic acid. In *Toxicology Letters*. ISSN 0378-4274, 2009, vol. 184, iss. 2, p.114-120. (3.249 - IF2008).
8. **MALEKOVA, Lubica - KRIŽANOVÁ, Oľga - ONDRIAŠ, Karol.** H₂S and HS(-) donor NaHS inhibits intracellular chloride channels. In *General physiology and biophysics*. ISSN 0231-5882, 2009, vol. 28, issue 2, p. 190-194. (0.697 - IF2008).
 9. **MIKUŠOVÁ, Andrea - KRÁLOVÁ, Eva - TYLKOVÁ, Lucia - NOVOTOVÁ, Marta - STANKOVIČOVÁ, T.** Myocardial remodelling induced by repeated low doses of isoproterenol. In *Canadian Journal of Physiology and Pharmacology*. ISSN 0008-4212, 2009, vol. 87, issue 8, p. 641-651. (1.763 - IF2008).
 10. **NAHÁLKA, Jozef - MISLOVIČOVÁ, Danica - KAVCOVÁ, Helena.** Targeting lectin activity into inclusion bodies for the characterisation of glycoproteins. In *Molecular BioSystems*. ISSN 1742-206X, 2009, vol. 5, iss. 8, p. 819-821. (4.236 - IF2008).
 11. **NEGISHI, Mayumi - SHIMOMURA, Kenju - PROKS, Peter - MORI, Masatomo - SHIMOMURA, Yohnosuke.** Mechanism of disopyramide-induced hypoglycaemia in a patient with Type 2 diabetes. In *Diabetic Medicine*. Vol. 26 (2009), iss. 1, p. 76-78, ISSN 0742-3071, (3.172 – IF2008).
 12. **PALFFY, Roland - GARDLIK, Roman - BEHULIAK, Michal - KÁDAŠI, Ľudevít - TURNA, Ján - CELEC, Peter.** On the physiology and pathophysiology of antimicrobial peptides. In *Molecular Medicine*. ISSN 1076-1551, 2009, vol. 15, p. 51-59. (3.411 - IF2008)
 13. **PAVLIKOVA, Martina - TATARKOVA, Zuzana - SIVONOVA, Monika - KAPLAN, Peter - KRIŽANOVÁ, Oľga - LEHOTSKY, Ján.** Alterations Induced by Ischemic Preconditioning on Secretory Pathways Ca²⁺-ATPase (SPCA) Gene Expression and Oxidative Damage After Global Cerebral Ischemia/Reperfusion in Rats. In *Cellular and molecular neurobiology*. ISSN 0272-4340, 2009, vol. 29, iss. 6-7, p. 909-916. (2.550 - IF2008).
 14. **SEDLÁKOVÁ, Barbora - ČAČÁNYIOVÁ, Soňa - ONDRIAŠ, Karol - KRISTEK, František - KRIŽANOVÁ, Oľga.** Effect of 7-nitroindazole on the expression of intracellular calcium in the kidney of spontaneously hypertensive rats. In *General Physiology and Biophysics*. ISSN 0231-5882, 2009, vol. 28, p. 225-232. (0.697 - IF2008).
 15. **STAŠKO, Andrej - BREZOVÁ, Vlasta - ZALIBERA, Michal - BISKUPIČ, Stanislav - ONDRIAŠ, Karol.** Electron transfer: A primary step in the reactions of sodium hydrosulphide, an H₂S/HS- donor. In *Free Radical Research : official journal of the Society for Free Radical Research -European Region*. ISSN 1071-5762, 2009, vol. 46, iss. 6, p. 581-593. (2.826 - IF2008).
 16. **SULOVÁ, Zdena - GIBALOVÁ, Lenka - VAJCNEROVÁ, Z - POLÁKOVÁ, Eva - UHRÍK, Branislav - TYLKOVÁ, Lucia - KOVÁROVÁ, Annamaria - SEDLÁK, Ján - BREIER, Albert.** Vincristine-Induced Overexpression of P-Glycoprotein in L1210 Cells Is Associated with Remodeling of Cell Surface Saccharides. In *Journal of Proteome Research*. ISSN 1535-3893, 2009, vol. 8, no. 2, p. 513-520. (5.684 -IF2008).
 17. **SULOVÁ, Zdenka - ŠEREŠ, Mário – BARANČÍK, Miroslav – GIBALOVÁ, Lenka – UHRÍK, Branislav – POLEKOVÁ, Lenka – BREIER, Albert.** Does any relationship exist between P-glycoprotein-mediated multidrug resistance and intracellular calcium homeostasis. *General Physiology and Biophysics*. 2009 vol. 28, Focus Issue, p. 89-95. (0.697 - IF2008)
 18. **TAKAHASHI, Masaki - SHIMOMURA, Kenju - PROKS, Peter – CRAIG, Timothy J.- NEGISHI, Mayumi - AKUZAWA, Masako – HAYASHI, Rikuro - SHIMOMURA, Yohnosuke - KOBAYASHI, Isao.** A proposal of combined evaluation of waist

- circumference and BMI for the diagnosis of metabolic syndrome. In *Endocrine Journal*. Vol. 56 (2009), Iss. 9, p.1079-1082, ISSN 0918-8959, (1.600 – IF2008).
19. **TARABOVÁ, Bohumila** - NOVÁKOVÁ, Mária - **LACINOVÁ, Ľubica**. Haloperidol moderately inhibits cardiovascular L-type calcium current. In *General Physiology and Biophysics*. ISSN 0231-5882, 2009, vol. 28, p. 249-259. (0.697 - IF2008).
 20. **TOMÁŠKOVÁ, Zuzana** - ČAČÁNYIOVÁ, Soňa - **BENČO, Andrej** - KRISTEK, František - DUGOVIČOVÁ, Lea - HRBÁČ, Jan - **ONDRIAŠ, Karol**. Lipids modulate H(2)S/HS(-) induced NO release from S-nitrosoglutathione. In *Biochemical and Biophysical Research Communications*, 2009, vol. 390, no. 4, p. 1241-1244. ISSN 0006-291X. (2.648 - IF2008).
 21. **TYLKOVÁ, Lucia** Architectural and functional remodeling of cardiac and skeletal muscle cells in mice lacking specific isoenzymes of creatine kinase. In *General Physiology and Biophysics*. ISSN 0231-5882, 2009, vol. 28, p. 219-224. (0.697 - IF2008)
 22. **ZAŤKOVÁ, Andrea** - MERK, Sylvia - WENDEHACK, Melanie - BILBAN, Matrin - MUZIK, Eva Maria - MURADYAN, Artur - HAFERLACH, Claudia - HAFERLACH, Torsten - WIMMER, Katharina - FONATSCH, Christa - ULLMANN, Reinhard. AML/MDS with 11q/MLL Amplification Show Characteristic Gene Expression Signature and Interplay of DNA Copy Number Changes. In *Genes Chromosomes and Cancer*. ISSN 1045-2257, 2009, vol. 48, iss 6, p. 510-520. (3.925 - IF2008).

Scientific publications in other journals 2009

1. ZMETAKOVA, Iveta - CIERNA, Iveta - SZEKYOVA, Dagmar - MINARIK, Gabriel - **FICEK, Andrej** - **POLÁKOVÁ, Helena** - FERAČ, Vladimír -FERAKOVA, Elena - **KÁDAŠI, Ľudevít** - KOVACS, László. Genetická diagnostika dedičných nekonjugovaných hyperbilirubinemií na Slovensku. In *Československá pediatrie*. ISSN 0069-2328, 2009, vol. 64, issue 5, p. 223-229.
2. BALÁKOVÁ, Dana - MINÁRIK, Gabriel - KOLEDVÁ, Zuzana - **KÁDAŠI, Ľudevít**. Mutačná analýza génov zodpovedných za nesyndrómovú hluchotu u slovenských pacientov. In *Lekársky obzor*. ISSN 0457-4214, 2009, vol. 57, p. 192-197.
3. BARTEKOVÁ, Monika - **BREIER, Albert** - RAVINGEROVÁ, Táňa - STYK, Ján. Možnosti zvýšenia odolnosti myokardu voči ischemicko-reperfúznemu poškodeniu: Úloha kardioprotektívnych proteínov vyplavených po ischemii pečene potkana. In *Zdravotnícke štúdie*. ISSN 1337-723X, 2009, ročník II, č. 1, p. 3-7.

WOS Publications 2010:

1. BARTEKOVÁ, Monika - ČARNICKÁ, Slávka - PANCZA, Dezider - ONDREJČÁKOVÁ, Mária - **BREIER, Albert** - RAVINGEROVÁ, Táňa. Acute treatment with polyphenol quercetin improves postischemic recovery of isolated perfused rat hearts after global ischemia. In *Canadian Journal of Physiology and Pharmacology*, 2010, vol. 88, issue 4, s. 465-471. ISSN 0008-4212. (1.341 - IF2009).
2. BAUEROVÁ-HLINKOVÁ, Vladena - HOSTINOVÁ, Eva - GAŠPERÍK, Juraj - BECK, K - BORKO, L. - LAI, F.A. - **ZAHRADNÍKOVÁ, Alexandra** - ŠEVČÍK, Jozef. Bioinformatic mapping and production of recombinant N-terminal domains of human cardiac ryanodine receptor 2. In *Protein Expression and Purification*, 2010, vol. 71, no. 1, p. 33-41. ISSN 1046-5928. (1.563 - IF2009).
3. **BERTOVÁ, Anna** - ČAČÁNYIOVÁ, Soňa - KRISTEK, František - **KRIŽANOVÁ, Oľga - TOMÁŠKOVÁ, Zuzana** - **ONDRIAŠ, Karol**. The hypothesis of the main role of H₂S in coupled sulphide-nitroso signalling pathway. In *General Physiology and Biophysics*, 2010, vol. 29, iss. 4, p. 402-410. ISSN 0231-5882. (0.741 - IF2009).
4. **DOČOLOMANSKÝ, Peter** - **BOHÁČOVÁ, Viera** - **BARANČÍK, Miroslav** - **BREIER, Albert**. Why the xanthine derivatives are used to study of P-glycoprotein-mediated multidrug resistance in L1210/VCR line cells. In *General Physiology and Biophysics*, 2010, vol. 29, iss. 3, p. 215-221. ISSN 0231-5882. (0.741 - IF2009).
5. **GABURJÁKOVÁ, Jana** - **GABURJÁKOVÁ, Marta**. Identification of Changes in the Functional Profile of the Cardiac Ryanodine Receptor Caused by the Coupled Gating Phenomenon. In *Journal of Membrane Biology*, 2010, vol. 234, iss. 3, p. 159-169. ISSN 0022-2631. (2.189 - IF2009).
6. HOLOTŇÁKOVÁ, Terézia - **TYLKOVÁ, Lucia** - TAKÁČOVÁ, Martina - KOPÁČEK, Juraj - PETRÍK, Juraj - PASTOREKOVÁ, Silvia - PASTOREK, Jaromír. Role of the HBx oncoprotein in carbonic anhydrase 9 induction. In *Journal of Medical Virology*, 2010, vol. 82, no. 1, p. 32-40. ISSN 0146-6615. (2.470 - IF2009).
7. **HUDECOVÁ, Soňa** - **SEDLÁKOVÁ, Barbora** - KVETŇANSKÝ, Richard - **ONDRIAŠ, Karol** - **KRIŽANOVÁ, Oľga**. Modulation of the sodium-calcium exchanger in the rat kidney by different sequential stressors. In *Stress*, 2010, vol. 13, iss. 1, p.15-21. ISSN 1025-3890. (3.205 - IF2009).
8. IMAMURA, Makoto - SHIMOMURA, Kenju - WATANABE, Ayako - NEGISHI, Mayumi - AKUZAWA, Masako - TAKAHASHI, M. - **PROKS, Peter** - SHIMOMURA, Yohnosuke. Sepsis and gas-forming splenic abscess by *Clostridium septicum* in a patient with type 2 diabetes. In *Journal of diabetes and its complications*, 2010, vol. 24, no. 2, p. 142-144. ISSN 1056-8727. (2.110 - IF2009).
9. **JEDINÁK, Andrej** - VALACHOVÁ, M. - MALIAR, T. - ŠTURDÍK, Ernest. Antiprotease activity of selected Slovak medicinal plants. In *Pharmazie : an international journal of pharmaceutical sciences*, 2010, Vol. 64, p. 137-140. ISSN 0031-7144. (0.812 - IF2009).
10. **JURKOVIČOVÁ, Dana** - **LENČEŠOVÁ, Ľubomíra** - **KRIŽANOVÁ, Oľga**. Expressional changes of ryanodine 1 and 2 receptors in PC12 cells after induction of apoptosis. In *General Physiology and Biophysics*, 2010, vol. 29, iss. 4, p. 414-418. ISSN 0231-5882. (0.741 - IF2009).
11. **KARMAŽÍNOVÁ, Mária** - **LACINOVÁ, Ľubica**. Removal of the outermost arginine in IVS4 segment of the Cav3.1 channel affects amplitude but not voltage dependence of gating current. In *General Physiology and Biophysics*, 2010, vol. 29, iss. 4, p. 419-423. ISSN 0231-5882. (0.741 - IF2009).

12. **KARMAŽÍNOVÁ, Mária** - BEYL, Stanislav - STARY, A. - SUWATTANASOPHON, Ch. - KLUGBAUER, Norbert - HERING, S. - **LACINOVÁ, Ľubica**. Cysteines in the loop between IS5 and the pore helix of Cav3.1 are essential for channel gating. In *Pflugers Archiv-European Journal of Physiology*, 2010, vol. 460, no. 6, p. 1015-1028. ISSN 0031-6768. (3.695 - IF2009)
13. **KARMAŽÍNOVÁ, Mária** - **LACINOVÁ, Ľubica**. Measurement of cellular excitability by whole cell patch clamp technique. In *Physiological Research*, 2010, vol. 59, p. 1-7. ISSN 0862-8408. (1.430 - IF2009).
14. **KOMÍNKOVÁ, Viera** - **MÁLEKOVÁ, Ľubica** - **TOMÁŠKOVÁ, Zuzana** - SLEZÁK, Peter - SZEWCZYK, A. - **ONDRIAŠ, Karol**. Modulation of intracellular chloride channels by ATP and Mg²⁺. In *Biochimica et Biophysica Acta : bioenergetics*, 2010, vol. 1797, no. 6-7, p. 1300-1312. ISSN 0005-2728. (3.688 - IF2009).
15. LAUKOVÁ, Marcela - VARGOVIČ, Peter - **KRIŽANOVÁ, Oľga** - KVETŇANSKÝ, Richard. Repeated Stress Down-Regulates beta(2)- and alpha (2C)-Adrenergic Receptors and Up-Regulates Gene Expression of IL-6 in the Rat Spleen. In *Cellular and Molecular Neurobiology*, 2010, vol. 30, p. 1077-1087. ISSN 0272-4340. (2.107 - IF2009)
16. **LENČEŠOVÁ, Ľubomíra** - **ŠÍROVÁ, Marta** - CSÁDEROVÁ, Lucia - LAUKOVÁ, Marcela - **SULOVÁ, Zdena** - KVETŇANSKÝ, Richard - **KRIŽANOVÁ, Oľga**. Changes and role of adrenoceptors in PC12 cell after phenylephrine administration and apoptosis induction. In *Neurochemistry International*, 2010, vol. 57, p. 884-892. ISSN 0197-0186. (3.541 - IF2009).
17. MÉZEŠOVÁ, Lucia - BARTEKOVÁ, Monika - JAVORKOVÁ, Veronika - VLKOVIČOVÁ, Jana - **BREIER, Albert** - VRBJAR, Norbert. Effect of quercetin on kinetic properties of renal Na, K-ATPase in normotensive and hypertensive rats. In *Journal of Physiology and Pharmacology : formerly Acta Physiologica Polonica*, 2010, vol. 61, no. 5, p. 593-598. ISSN 0867-5910. (1.489 - IF2009)
18. NEGISHI, Mayumi - SHIMOMURA, Kenju - **PROKS, Peter** - AKUZAWA, Masako - TAKAHASHI, M. - MORI, Masatomo - SHIMOMURA, Yohnosuke - KOBAYASHI, Isao. An Obese Patient with Slowly Progressive Type 1 Diabetes Diagnosed by Ketoacidosis. In *Internal Medicine*, 2010, vol. 49, no. 5, p. 393-395. ISSN 0918-2918. (1.040 - IF2009)
19. NOVÁKOVÁ, Mária - **SEDLÁKOVÁ, Barbora** - **ŠÍROVÁ, Marta** - FIALOVÁ, K. - **KRIŽANOVÁ, Oľga**. Haloperidol increases expression of the inositol 1,4,5-trisphosphate receptors in rat cardiac atria, but not in ventricles. In *General Physiology and Biophysics*, 2010, vol. 29, p. 381-389. ISSN 0231-5882. (0.741 - IF2009).
20. PÁLFFY, Roland - BEHULIAK, Michal - GARDLIK, Roman - JANI, P. - **KÁDAŠI, Ľudevít** - TURŇA, Ján - CELEC, Peter. Oral in vivo Bactofection in Dextran Sulfate Sodium Treated Female Wistar Rats. In *Folia Biologica - Krakow*, 2010, vol. 58, no. 3-4, p. 171-176.. ISSN 0015-5497. (0.547 - IF2009)
21. PIQUEREAU, Jérôme - **NOVOTOVÁ, Marta** - FORTIN, Dominique - GARNIER, A. - VENTURA-CLAPIER, Renée - VEKSLER, A. - JOUBERT, F. Postnatal development of mouse heart: formation of energetic microdomains. In *Journal of Physiology : A publication of the Physiological Society*, 2010, vol. 588, iss. 13, p. 2443-2454. ISSN 0022-3751. (4.764 - IF2009).
22. **RADVÁNSKÝ, Ján** - **KÁDAŠI, Ľudevít**. The Expanding World of Myotonic Dystrophies: How Can They Be Detected?. In *Genetic Testing*, 2010, vol. 14, no. 6, p. 733-741. ISSN 1090-6576. (1.170 - IF2009).
23. **RADVÁNSKÝ, Ján** - RESKO, Peter - SUROVÝ, Milan - MINARIK, Gabriel - **FICEK, Andrej** - **KÁDAŠI, Ľudevít**. High-resolution melting analysis for genotyping of the

- myotonic dystrophy type 1 associated Alu insertion/deletion polymorphism. In *Analytical Biochemistry*, 2010, vol. 398, no.1, p.126-128. ISSN 0003-2697. (3.287 - IF2009)
24. **SULOVÁ, Zdena** - DITTE, Peter - **KURUCOVÁ, Tatiana** - **POLÁKOVÁ, Eva** - **ROGOZÁNOVÁ, Kristína** - **GIBALOVÁ, Lenka** - **ŠEREŠ, Mário** - **ŠKVARKOVÁ, Lucia** - SEDLÁK, Ján - PASTOREK, Jaromír - **BREIER, Albert**. The presence of P-glycoprotein in L1210 cells directly induces down-regulation of cell surface saccharide targets of Concanavalin A. In *Anticancer Research*, 2010, vol. 30, no. 9, p. 3661-3668. ISSN 0250-7005. (1.428 - IF2009)
 25. **ŠEREŠ, Mário** - DITTE, Peter - **BREIER, Albert** - **SULOVÁ, Zdena**. Effect of thapsigargin on P-glycoprotein-Negative and P-glycoprotein-Positive L1210 Mouse Leukaemia Cells. In *General Physiology and Biophysics*, 2010, vol. 29, iss. 4, p. 396-401. ISSN 0231-5882. (0.741 - IF2009).
 26. **ŠPÁNIKOVÁ, Anna** - IVANOVÁ, Monika - MATEJÍKOVÁ, Jana - RAVINGEROVÁ, Táňa - **BARANČÍK, Miroslav**. Influence of ischemia/reperfusion and modulation of PI3K/Akt kinase pathway on matrix metalloproteinase-2 in rat hearts. In *General Physiology and Biophysics : an international journal*, 2010, vol. 29, no. 1, p. 31-40. ISSN 0231-5882. (0.741 - IF2009).
 27. **TOMÁŠKOVÁ, Zuzana** - **ONDRIAŠ, Karol**. Mitochondrial chloride channels - What are they for?. In *FEBS Letters*, 2010, vol. 584, no. 10, p. 2085-2092. ISSN 0014-5793. (3.541 - IF2009).
 28. VANDAEL, David Henry - MARCANTONI, Andrea - MAHAPATRA, Satyajit - **CARO, Anton** - RUTH, Peter - ZUCCOTTI, Annalisa - KNIPPER, Marlies - CARBONE, Emilio. Ca(v)1.3 and BK channels for timing and regulating cell firing. In *Molecular Neurobiology*, 2010, vol. 42, no. 3, p. 185-198. ISSN 0893-7648. (4.735 - IF2009).
 29. **ZAHRADNÍKOVÁ, Alexandra** - **GABURJÁKOVÁ, Marta** - BRIDGE, J.H.B. - **ZAHRADNÍK, Ivan**. Challenging quantal calcium signaling in cardiac myocytes. In *Journal of General Physiology*, 2010, vol. 136, p. 581-583. ISSN 0022-1295. (4.260 - IF2009).
 30. **ZAHRADNÍKOVÁ, Alexandra** - **VALENT, Ivan** - **ZAHRADNÍK, Ivan**. Frequency and release flux of calcium sparks in rat cardiac myocytes: a relation to RYR gating. In *Journal of General Physiology*, 2010, vol. 136, iss. 1, p. 101-116. ISSN 0022-1295. (4.260 - IF2009).

Chapters in monographs published abroad 2011:

1. BAUEROVÁ-HLINKOVÁ, Vladena - BAUER, Jacob - HOSTINOVÁ, Eva - GAŠPERÍK, Juraj - BECK, K. - BORKO, Ľubomír - **FALTINOVÁ, Andrea** - **ZAHRADNÍKOVÁ, Alexandra** - ŠEVČÍK, Jozef. Bioinformatics Domain Structure Prediction and Homology Modeling of Human Ryanodine Receptor 2. Editor Mahmood A. Mahdavi. In Bioinformatics-Trends and Methodologies. - Rijeka : InTech, 2011, p. 325-352. ISBN 978-953-307-282-1.

Chapters in monographs published in Slovakia 2011:

1. **LACINOVÁ, Ľubica**. O diskusii biologické a/versus kultúrne. In Rodové štúdiá. Súčasné diskusie, problémy a perspektívy. - Bratislava : Univerzita Komenského, 2011, s. 81-97. ISBN 978-80-223-2934-7.

WOS Publications 2011:

1. BARANČÍK, Miroslav - **BREIER, Albert**. alpha(2) integrin as regulator of metastatic potential. In Acta Pharmacologica Sinica : official journal of the Chinese Pharmacological Society and Shanghai Institute of Materia Medica, Chinese Academy of Sciences, 2011, vol. 32, iss. 3, p. 279. ISSN 1671-4083(print), 1745-7254(online). (1.909 - IF2010)
2. **CARO, Anton** - **TARABOVÁ, Bohumila** - ROJO RUIZ, Jonathan - **LACINOVÁ, Ľubica**. Nimodipine inhibits action potential firing in cultured hippocampal neurons predominantly due to block of voltage-dependent potassium channels. In General Physiology and Biophysics, 2011, vol. 30, sp. iss. 1, s44-S53. ISSN 0231-5882. (1.146 - IF2010)
3. **GRMAN, Marián** - **MIŠÁK, Anton** - ČAČÁNYIOVÁ, Soňa - KRISTEK, František - **TOMÁŠKOVÁ, Zuzana** - **BERTO VÁ, Anna** - **ONDRIAŠ, Karol**. The aqueous garlic, onion and leek extracts release nitric oxide from S-nitrosoglutathione and prolong relaxation of aortic rings. In General Physiology and Biophysics, 2011, vol. 30, p. 396-402. ISSN 0231-5882. (1.146 - IF2010)
4. GUCEV, Zoran - SLAVESKA, N. - LABAN, N. - TASIC, V. - DANILOVSKI, D. - POP-JORDANOVA, N. - **ZATKOVÁ, Andrea**. Early-onset ocular ochronosis in a girl with alkaptonuria (AKU) and a novel mutation in homogentisate 1,2-dioxygenase (HGD). In Prilozi, 2011, vol. 32, no. 1, p. 305-311.
5. **HUDECOVÁ, Soňa** - **LENČEŠOVÁ, Ľubomíra** - CSÁDEROVÁ, Lucia - **ŠÍROVÁ, Marta** - CHOLUJOVÁ, Dana - **CAGALA, Martin** - KOPÁČEK, Juraj - DOBROTA, D. - PASTOREKOVÁ, Silvia - **KRIŽANOVÁ, Oľga**. Chemically mimicked hypoxia modulates gene expression and protein levels of the sodium calcium exchanger in HEK 293 cell line via HIF-1 alpha. In General Physiology and Biophysics, 2011, vol. 30, p. 196 - 206. ISSN 0231-5882. (1.146 - IF2010)
6. **KARMAŽÍNOVÁ, Mária** - BAUMGART, J.P. - PEREZ-REYES, Edward - **LACINOVÁ, Ľubica**. The voltage dependence of gating currents of the neuronal Cav3.3 channel is determined by the gating brake 6 in the I-II loop. In Pflugers Archiv-European Journal of Physiology, 2011, vol. 461, no. 4, p.461-468. ISSN 0031-6768. (3.354 - IF2010).
7. **LACINOVÁ, Ľubica**. T-type calcium channel blockers-new and notable. In General Physiology and Biophysics, 2011, vol. 30, p. 403-409. ISSN 0231-5882. (1.146 - IF2010)

8. NEGISHI, Mayumi - SHIMOMURA, Kenju - **PROKS, Peter** - NAKAHARA, Rieko - MURAKAMI, M. - SHIMOMURA, Yohnosuke - KOBAYASHI, Isao. Development of postpartum Graves' disease and type 1 diabetes after delivery in a patient with gestational diabetes. In *Journal of Diabetes Investigation*, 2011, vol. 2, iss. 4, p. 328-330. ISSN 2040-1116.
9. **ONDRIAŠ, Karol** - **LENČEŠOVÁ, Ľubomíra** - **ŠÍROVÁ, Marta** - LABUDO VÁ, Martina - PASTOREKOVÁ, Silvia - KOPÁČEK, Juraj - **KRIŽANOVÁ, Oľga**. Apoptosis induced clustering of IP (3) R1 in nuclei of nondifferentiated PC12 cells. In *Journal of Cellular Physiology*, 2011, vol. 226, no. 12, p. 3147-3155. ISSN 0021-9541. (3.986 - IF2010).
10. PALFFY, Roland - GARDLIK, Roman - BEHULIAK, Michal - JANI, P. - BALAKOVA, Denisa - **KÁDAŠI, Ľudevít** - TURŇA, Ján - CELEC, Peter. Salmonella-mediated gene therapy in experimental colitis in mice. In *Experimental Biology and Medicine*, 2011, vol. 236, iss. 2, p. 177-183. ISSN 1535-3702. (2.954 - IF2010).
11. **RADVÁNSKÝ, Ján** - **FICEK, Andrej** - **KÁDAŠI, Ľudevít**. Upgrading molecular diagnostics of myotonic dystrophies: Multiplexing for simultaneous characterization of the DMPK and ZNF9 repeat motifs. In *Molecular and Cellular Probes*, 2011, vol. 25, p. 182-185. ISSN 0890-8508. (1.869 - IF2010)
12. **RADVÁNSKÝ, Ján** - **FICEK, Andrej** - MINÁRIK, G. - PÁLFFY, Roland - **KÁDAŠI, Ľudevít**. Effect of Unexpected Sequence Interruptions to Conventional PCR and Repeat Primed PCR in Myotonic Dystrophy Type 1 Testing. In *Diagnostic Molecular Pathology*, 2011, vol. 20, iss. 1, p. 48-51. ISSN 1052-9551 (2.129 - IF2010).
13. **RADVÁNSKÝ, Ján** - **FICEK, Andrej** - **KÁDAŠI, Ľudevít**. Repeat-Primed Polymerase Chain reaction in Myotonic Dystrophy type 2 testing. In *Genetic Testing and Molecular Biomarkers*, 2011, vol. 15, iss. 3, p. 133-136. ISSN 1945-0265. (0.879 - IF2010).
14. **RADVÁNSKÝ, Ján** - BAZSALOVICSOVÁ, Eva - HROMADOVÁ, Ivica - MINÁRIK, G. - **KÁDAŠI, Ľudevít**. Development of high-resolution meltin (HRM) analysis for population studies of *Fascioloides magna* (Trematoda: Fasciolidae), the giant liver fluke of ruminants. In *Parasitology Research*, 2011, vol. 108, no. 1, p. 201-209. ISSN 0932-0113. (1.812 - IF2010).
15. RESKO, Peter - **RADVÁNSKÝ, Ján** - ODNOGO VÁ, Z. - BALDOVIČ, M. - MINÁRIK, G. - **POLÁKOVÁ, Helena** - PÁLFFY, Roland - **KÁDAŠI, Ľudevít**. Mutation analysis of the PMP22 gene in Slovak patients with Charcot-Marie-Tooth Disease and hereditary neuropathy with liability to pressure palsies. In *General Physiology and Biophysics*, 2011, vol. 30, p. 379-388. ISSN 0231-5882. (1.146 - IF2010)
16. **ŠEREŠ, Mário** - CHOLUJOVÁ, Dana - **BUBENČÍKOVÁ, Táňa** - **BREIER, Albert** - **SULOVÁ, Zdena**. Tunicamycine depresses P-glycoprotein glycosylation without effect on its membrane localization and drug efflux activity in L1210 cells. In *International Journal of Molecular Science*, 2011, vol. 12, p. 7772-7784. ISSN 1422-0067. (2.279 - IF2010).
17. ŠOLTYSOVÁ, A. - MINÁRIK, G. - DZURENKOVÁ, A. - SUFLIARSKA, S. - **KÁDAŠI, Ľudevít** - TURŇA, Ján - MLADOSIEVIČOVÁ, B. APEX microarray panel for genotyping polymorphisms in cancer chemotherapy and estimation frequencies in a Slovak population. In *Pharmacogenomics*, 2011, vol. 12., iss. 4, p. 577-592. ISSN 1462-2416. (3.876 - IF2010)
18. TÓTHOVÁ TAROVÁ, E. - **POLÁKOVÁ, Helena** - KAYSEROVÁ, H. - CELEC, Peter - ZUZULOVÁ, M. - **KÁDAŠI, Ľudevít**. Study of the effect of DNA polymorphisms in the mannose-binding lectin gene (MBL2) on disease severity in Slovak cystic fibrosis patients. In *General Physiology and Biophysics*, 2011, vol. 30, p. 373-378. ISSN 0231-5882. (1.146 - IF2010)

19. **TOMÁŠKOVÁ, Zuzana - BERTO VÁ, Anna - ONDRIAŠ, Karol.** On the Involvement of H₂S in Nitroso Signaling and Other Mechanisms of H₂S Action. In *Current Pharmaceutical Biotechnology*, 2011, vol. 12, p. 1394-1405. ISSN 1389-2010. (3.455 - IF2010).
20. WEISS, Norbert - HAMEED, Shahid - FERNÁNDEZ-FERNÁNDEZ, José M. - FABLET, Katell - **KARMAŽÍNOVÁ, Mária** - POILLOT, Cathy - PROFT, Juliane - CHEN, Lina - BIDAUD, Isabelle - MONTEIL, Arnaud - HUC-BRANDT, Sylvaine - **LACINOVÁ, Ľubica** - LORY, Philippe - ZAMPONI, Gerald W. - DE WAARD, Michel. A Cav3.2/syntaxin-1A signaling complex controls T-type channel activity and low-threshold exocytosis. In *Journal of Biological Chemistry*, 2011, vol., no., p., as doi: 10.1074/jbc.M111.290882. ISSN 0021-9258. (5.328 - IF2010).
21. **ZAŤKOVÁ, Andrea** - SEDLÁČKOVÁ, T. - RADVÁNSKÝ, Ján - POLÁKOVÁ, Helena - **NÉMETHOVÁ, Martina** - AGUARON, Robert - DURSUN, Ismail - USHER, Jeannette L. - **KÁDAŠI, Ľudevít.** Identification of 11 Novel Homogentisate 1,2 Dioxygenase Variants in Alkaptonuri Patients and Establishment of a Novel LOVD-Based HGD Mutation Database. In *Journal of Inherited Metabolic Disease*, 2011, vol., no., p. as DOI: 10.1007/8904-2011-68. ISSN 0141-8955. (3.808 - IF2010).
22. **ZAŤKOVÁ, Andrea.** An update on molecular genetics of alkaptonuria (AKU). In *Journal of Inherited Metabolic Disease*, 2011, vol. 34, no. 6, p. 1127-1136. ISSN 0141-8955. (3.808 - IF2010).