



# **Institute of Molecular Physiology and Genetics**

## **Slovak Academy of Sciences**

# **Institute of Molecular Physiology and Genetics acreditation period 2012-2015**

- **Research orientation**
- **Scientific output**
- **Social impact**
- **PhD study**

**I will predominantly focus on the future of our institute**

# Research orientation

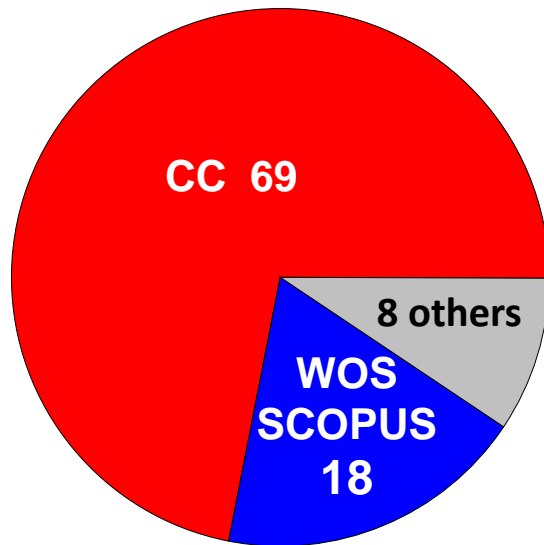
**The research activities of the Institute have been focussed on the molecular principles of basic cellular processes**

The main activities may be summarised as:

- **Molecular physiology of cardiac calcium signalling**
- **Molecular basis of neuronal excitability**
- **Multidrug resistance development in leukaemia cells**
- **Gasotransmitter signalling in regulatory pathways**
- **Study of the human genome**

**IMPG is the publisher of the journal *General Physiology and Biophysics*, indexed in CC, WOS and SCOPUS**

# Scientific output



**Orientation on publication in CC, WOS and SCOPUS indexed journals;**

- 1. Quartile 18 (Thomson JCR)**
- 2. Quartile 24 (Thomson JCR)**

**Papers published in the accreditation period were cited in WOS 349 times till the end of 2015**

All our papers were cited more than 2200 times during the accreditation period.

**Citations in WOS 1848**

**Citations in SOPUS 420**

## Scientific output

**Gibalová L, Sereš M, Rusnák A, Ditte P, Labudová M, Uhrík B, Pastorek J, Sedlák J, Breier A, Sulová Z.** P-glycoprotein depresses cisplatin sensitivity in L1210 cells by inhibiting cisplatin-induced caspase-3 activation. *Toxicol In Vitro*. 26: 435-44, 2012

**Janicek R, Zahradníková A Jr, Poláková E, Pavelková J, Zahradník I, Zahradníková A.**

Calcium spike variability in cardiac myocytes results from activation of small cohorts of ryanodine receptor 2 channels. *J Physiol*. 590: 5091-106, 2012

**Karmažínová M, Jašková K, Griac P, Perez-Reyes E, Lacinová Ľ.** Contrasting the roles of the I-II loop gating brake in CaV3.1 and CaV3.3 calcium channels. *Pflugers Arch*. 467:2519-27, 2015

# Social impact

**The main activity of the Institute towards the society:  
research oriented on applications to medicine.**

- **diagnosis and new molecular feature description in alkaptonuria and phenylketonuria**

*Project of EU structural funds: Diagnostics of socially significant diseases in Slovakia*

*Project of 7. FP EU Health: Clinical Development of nitisinone for alkaptonuria.*

- **effectiveness of lenalidomide therapy of the myelodysplastic syndrome**  
*project supported by the pharmaceutical company Celgene*
- **monitoring of multidrug resistance markers in blood of leukaemia patients**

*Contract with the National Cancer Institute*

## Educational activities

- **supervision of PhD, diploma and bachelor theses,**
- **teaching (Lectures and laboratory courses) at Slovak universities**

# PhD study

IMPG SAS is accredited in three PhD programs:

- Animal Physiology** - FNS CU Bratislava
- Biochemistry** - FCHFT STU Bratislava
- Biophysics** - FNS UPJS Kosice

The accreditations for all programs were awarded without temporal limitations.

- Defended theses:**
- 10 internal students
  - 1 external student
  - 3 students supervised by institute employees

**Three PhD students visited research institutions in US, UK and Estonia during their PhD study (5 stays).**

**Six students that finished PhD study in the assessed period obtained postdoctoral fellowships at research institutes abroad.**

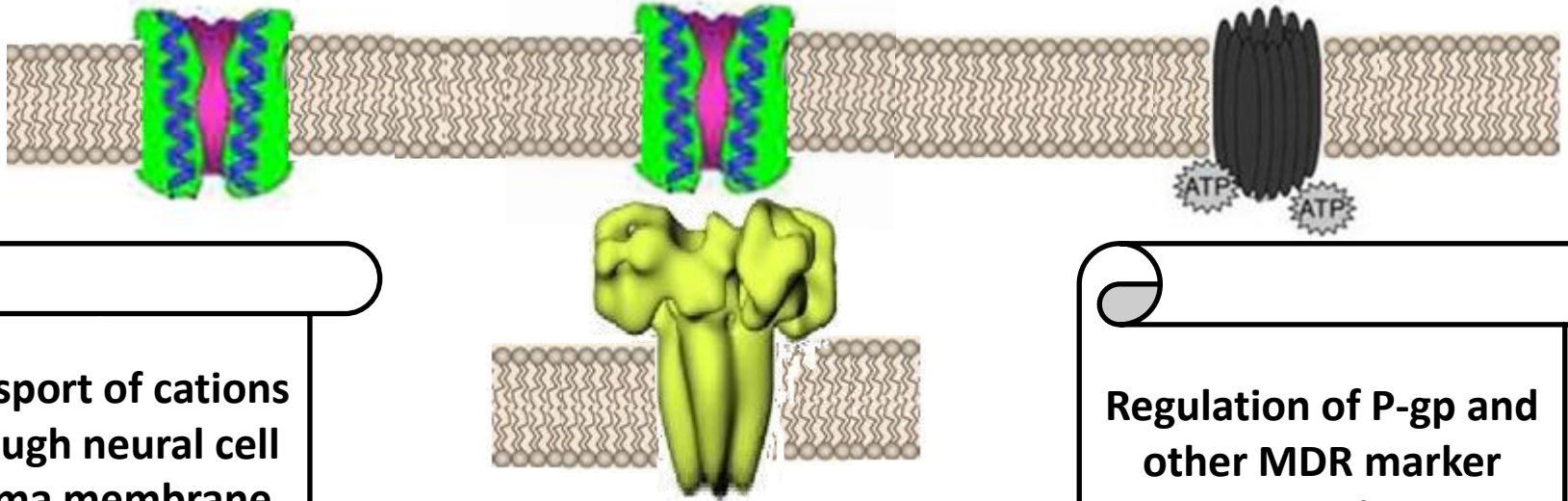
# **Future development of the institute**

- **Keep a clear scientific orientation**
- **Keep personal infrastructure oriented mainly on young scientists and middle-aged scientific leaders**
- **Increase cooperation with R&D organization in Slovakia and abroad**
- **Improve external funding from grant agencies and the commercial sphere**
- **Start integration with complementary organization of SAS**



# Future scientific orientation of IMPG

## Membrane transporting systems



**Transport of cations through neural cell plasma membrane.**

**Propagation of action potential in neurons associated with development of CNS diseases.**

**Excitation-contraction coupling in cardiac myocytes. Association with development of cardiovascular disease.**

**Regulation of P-gp and other MDR marker expression.**

**Association with development of resistance to chemotherapy in blood malignancies.**

**We are the only biomedical institute in the SAS with infrastructure for electron microscopy**

# New generation of leading scientists

<i>Name</i>	<i>Salary type</i>	<i>Experience</i>	<i>Pub/Cit</i>
<b>M. Gaburjakova:</b>	<b>IMPG salary budget</b>	<b>16 yr post-PhD.</b>	<b>26/1103</b>
<b>J. Gaburjakova:</b>	<b>IMPG salary budget</b>	<b>13 yr post-PhD.</b>	<b>18/800</b>
<i>Both attended 3-yr postdoc stay at Columbia university, New York</i>			
<b>J. Kralovicova:</b>	<b>IMPG salary budget</b>	<b>12 yr post-PhD.</b>	<b>30/500</b>
<i>Employed at IMPG from November 2016 after 10-yr stay in UK</i>			
<b>M. Šereš</b>	<b>IMPG salary budget</b>	<b>7 yr post-PhD.</b>	<b>14/121</b>
<b>Z. Tomašková</b>	<b>IMPG salary budget</b>	<b>7 yr post-PhD.</b>	<b>13/70</b>
<b>A. Zahradnikova</b>	<b>IMPG salary budget</b>	<b>6 yr post-PhD.</b>	<b>11/67</b>
<i>Talented young scientists with potential to become leaders in the future.</i>			
<b>E. Dremencov</b>	<b>SAS scholarship</b>	<b>12 yr post-PhD</b>	<b>47/574</b>
<i>Will be employed as staff member</i>			
<b>M. Cagalinec</b>	<b>SASPRO program</b>	<b>11 yr post-PhD</b>	<b>20/238</b>
<i>Preparing ERC grant</i>			

# Collaboration

- Further development of formal and informal collaborations with research institutes abroad and in Slovakia
- Preparing international partnerships to form a network for application of multilateral EU projects and other international projects

## Funding (grant agencies, commercial sphere)

**2016: 7 new projects from Slovak grant agencies  
(1 APVV, 3 VEGA).**

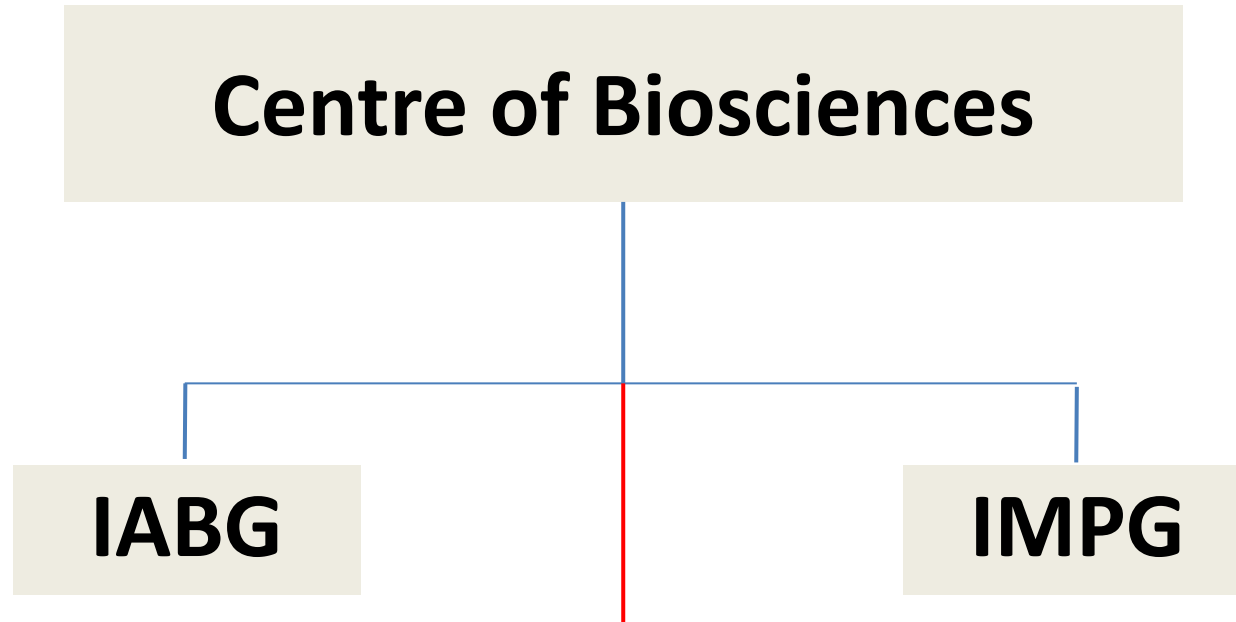
**Projects submitted/prepared for submission**

**International : 2x NATO, 1x COST, 1x ERC (consolidator)**

**National : 5x APVV, 3x VEGA**

# Integration

Integration with Institute of Animal Biochemistry and Genetics  
January 1, 2017



**Opened also for other SAS organizations**

At present we are solving administrative issues to achieve full functionality of the new Centre from January 2017

# Motivation for integration

Orientation of both institutions on molecular and cellular basis of physiological and pathological phenomena

Complementary methodology

## IABG

- Lipidomics
- Molecular determinants of animal behaviour
- Recombinant techniques in microorganisms
- Immunology
- Biosensors

## IMPG

- Ion channel electrophysiology
- Electron, confocal and light microscopy
- Techniques for neoplastic cell characterization
- Recombinant techniques in animal cell cultures

Same programs in PhD. study

Biochemistry

Biophysics

Animal  
physiology

**Aim: interdisciplinary approach, sharing infrastructure & methodologies will help us to accelerate and improve our research.**

# SWOT analysis

## STRENGTHS

- Clear scientific orientation
- Modern infrastructure
- Productive /stable PhD. program.
- Involvement in Bc. and Mgr./Eng. programs at Slovak universities
- Talented and motivated young scientists
- International acceptance of papers
- Cooperativeness of employees

## OPPORTUNITIES

- Integration with other SAS institutions
- Application for international projects
- Stimulation of young and talented scientists to work in CBs
- Finding non-governmental support of research
- Connection with the commercial sphere

## WEAKNESSES

- Relatively lower number of publications per year
- Relatively low number of applications for international projects
- Relatively low funds for stimulation of scientific quality
- Insufficient ability to attract young talented scientists

## THREATS

- Unstable situation of science support in SR
- Fluctuations in generation exchange
- Continuation of brain drain from Slovak scientific institutions.
- Problems in sustainability and maintenance of scientific infrastructure

# **Our vision**

**Centre of Biosciences, Slovak Academy of Sciences:**

**modern scientific centre with well-functioning facilities  
important for a successful European research institution**

- **Research topics relevant in the context of world-wide research**
- **Internationally accepted research output of reasonable quantity**
- **Workplace attractive for talented and dedicated students, postdocs, and early carrier researchers with international experience**
- **Reputable partner of international / domestic research institutions and universities**

**Thank you for your attention**