RBC 2014

REGIONAL BIOPHYSICS CONFERENCE

BOOK OF ABSTRACTS



15-20 MAY 2014
SMOLENICE CASTLE, SLOVAKIA

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in collaboration with
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The Regional Biophysics Conference is organised by Slovak Biophysical Society. This is traditional biannual scientific meeting etablished by biophysical societies of Austria, Croatia, Hungary, Italy, Serbia, Slovakia and Slovenia. However, the conference is open for all biophysicists. The first RBC meeting took place in March 2005 in Terme Zrece (Slovenia), the second one was held in August 2007 in Balatonfüred (Hungary), the third one in February 2009 in Linz (Austria), forth took place in September 2010 in Primošten (Croatia) and the fifth one in September 2012 in Kladovo (Serbia). The principal aims of the conference are: 1) to strengthen the collaboration between biophysics groups in the region, 2) to present the cutting-edge achievements from a broad range of biophysics disciplines to students and 3) to promote the field of biophysics. Following previous conferences, RBC 2014, features a combination of top level senior researchers and aspiring young scientists (postdoctoral fellows and graduate students). The conference is focused on the following topics:

1. Molecular biophysics
2. Membrane and cellular biophysics
3. Ionic transport
4. Modelling, bioimaging and instrumental techniques in biophysics
5. Bioinspired nanotechnologies and biosensors
6. Neurobiophysics
7. Medical biophysics

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Section S7: Medical biophysics

Chairs: Marko Dakovic, Ján Jakuš

15.00-15.45 **Plenary lecture: Catharina de Lange Davies** (Norway): Ultrasound-mediated delivery of nanoparticles to tumour cells

15.45-16.05 **Zuzana Garaiová** (Slovakia): Carbosilane dendrimers as potential delivery vehicles for HIV-derived peptides to dendritic cells

16.05-16.25 **Marcela Morvová jr.** (Slovakia): PMCA activity and membrane fluidity in patients with chronic kidney disease

16.25-16.45 **Karol Ondrias** (Slovakia): H_2S-NO interaction and consequent biological effects

16.45-17.15 Coffee break

17.15-17.35 **Katarína Kozlíková** (Slovakia): The time dependency of the extrema in the QRS isopotential maps of young adult controls

17.35-17.55 **Vito Šimonka** (Slovenia): Role of nitric oxide in pathogenesis of atherosclerosis: modelling approach

17.55-18.05 **Janez Urevc** (Slovenia): Numerical prediction of hemodynamic response of an atherosclerotic blood vessel

18.05-18.25 **Tadej Emeršič** (Slovenia): Dynamic model of eicosanoid production with special reference to aspirin-exacerbated respiratory disease (AERD)

18.25-18.45 **Andreas Ebner** (Austria): Single molecule force spectroscopy and recognition imaging investigation of blood clotting relevant receptors on living platelets

18.45-19.00 Closing ceremony

19.00-20.30 Dinner

May 20, 2014

07.30-09.00 Breakfast

09:00 Departure

S7-2

PMCA activity and membrane fluidity in patients with chronic kidney disease

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Chronic kidney disease (CKD) is accompanied by increased intracellular calcium concentration [1]. There are several mechanisms of regulation calcium concentration, involving calcium entry by way of various types of calcium channels in the plasma membrane, calcium influx from intracellular compartments and also active transport by Ca^{2+}-ATPase and the sodium-calcium exchanger witch transport calcium into the intracellular pools or pumped it out of the cells. In this study we concentrate our interest on activity of plasma membrane calcium ATPase (PMCA) of red blood cells (RBCs) and its relation to membrane fluidity. Twenty-five patients with stage 2-3 of CKD and the same number of healthy volunteers with normal hematological and biochemical values were included in the study. Isolation of erythrocyte membranes was carried out by using standard method Hanahan&Ekholm [2], protein content of isolated membranes were established by Lowry method [3]. PMCA activity was determined spectrophotometrically as amount of inorganic phosphate, which is generated by the decomposition of ATP into ADP at the transition of calcium ions across the plasma membrane. Membrane fluidity was appreciated using fluorescence anisotropy of 1,6-diphenyl-1,3,5-hexatriene (DPH). PMCA activity in human RBCs was significantly decreased in the group of patients with chronic kidney disease (stage 2-3) as compared to the control group of healthy volunteers (43.81 ± 20.41 nmol Pi/mg/h vs. 59.97 ± 18.16 nmol Pi/mg/h, $n = 25$, $P < 0.01$). In contrast, there was no significant difference of fluorescence anisotropy. The difference between groups was only 2.7 % (0.258 ± 0.022 vs. 0.265 ± 0.017, $n = 25$). Therefore, we conclude that the reduced PMCA activity is not caused by the surrounding environment of membrane lipids, which might affect its function via lipid – protein interactions.

Acknowledgements
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References

[1] Gafter, U. et al.: J Lab Clin Med, 114(3) (1989) 222-231.
[2] D. J. Hanahan, J. E. Ekholm, Methods Enzymol., 31 Pt A (1974) 168-72.
[3] Lowry O.H. et al., J. Biol. Chem., 193 (1951) 265–275.