

INTRODUCTION

It gives us great pleasure to introduce this special issue of *Physiological Research* as the representative publication of recent results of the research projects realized at the Institute for Heart Research, Slovak Academy of Sciences in Bratislava. The authors would like to thank for fundamental support of Slovak Research and Development Agency, which enabled to stimulate more intensively young investigators resulting in a fact that nine of thirteen papers of this issue are their contributions. It should also be emphasized fruitful cooperation with others institutes of Slovak Academy of Sciences and faculties of Comenius University as well as with Academy of Sciences of Czech Republic.

It is known that failing heart is the main problem of cardiovascular medicine today. Heart failure due to cardiovascular disease is associated with contractile dysfunction and high risk of life-threatening arrhythmias, with up to 50% of mortality attributable to sudden cardiac death. Sudden cardiac death is the most common and often the first manifestation of coronary heart disease and occurrence of fatal ventricular fibrillation is associated with ischemic heart, hypertension and hypertrophy as well as diabetic cardiomyopathy. Although during the past 20 years, morbidity and mortality rates for nearly all types of cardiovascular disease declined, there has been little decline in incidence or improvement in outcome after sudden cardiac arrest. The management of cardiac

fibrillation and heart failure in clinic is a very dynamic process and there is still a task for a more efficient and safe therapy. Thus, it is challenging to find new therapeutic strategies and to develop more safe and efficient cardioprotective compounds to prevent sudden cardiac death and contractile dysfunction.

Rapidly developing experimental work including studies presented in this issue provide new insight into cardiac disease pathophysiology that will lead to novel mechanism-based therapy. This include endogenous mechanisms and exogenous compounds targeting specific mechanisms. It appears that targeting oxidative state, structural and extracellular matrix remodeling and particularly intracellular signalling and intercellular communication have advantages as novel therapeutic strategies. Omega-3 unsaturated fatty acids due to their wide spectrum of cardiovascular protective effects and antiarrhythmic potential seem to be crucial compounds. It is expected that stimulation of endogenous cardioprotective and antiarrhythmic mechanisms linked to activation of nuclear transcription factors such as peroxisome proliferator-activated receptor α , by omega-3 fatty acids may be a promising way to prevent pathophysiological or to restore physiological processes in the heart for the maintenance of its unique function.

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