

Introduction

Cardiovascular diseases represent the most important health risk factors because they are responsible for more than 50 % of total mortality. Among them, ischemic heart disease is the leading cause of morbidity and mortality and according to the World Health Organization it will be the major global cause of death by the year 2020. Although cardiovascular health status substantially improved in recent years and the cardiovascular mortality began to decline, we are still behind the acceptable limit. Among numerous measures, that should be adopted to reach substantial progress, there is also the necessity to form a modern research centre where well-trained research staff could utilize the contemporary advanced technologies. In the country, where more than 50 % inhabitants die of cardiovascular diseases, the existence of such a research basis is quite necessary.

The Centre for Cardiovascular Research in the Czech Republic was founded in 2005 as a logical continuation of the Centre for Experimental Cardiovascular Research, established already in 2000. The project concentrates on molecular and cellular mechanisms involved in the origin and progression of ischemic heart disease, with particular attention to its most important risk factors, i.e. atherosclerosis and hypertension. As the causes and also the “roots” of these cardiovascular diseases could already be found in early stages of ontogeny, the developmental principles are applied systematically throughout the entire project. Moreover, gender aspects have a particular relevance to this research project as risk factors, biological mechanisms, clinical manifestations and consequences may differ in men and women. Thus, solution of particular questions includes the following, closely related, areas: (i) mechanisms of cardiac tolerance to oxygen deprivation and the role of risk factors;

(ii) stabilization of the vulnerable plaque and genetic determinants of atherogenesis as a risk factor; (iii) molecular mechanisms of the abnormal reactivity of peripheral vessels in systemic and pulmonary hypertension and, finally (iv) late effects of early hypoxic disturbances of the cardiovascular system. Since the development of application toward human health and the improvement of cardiac patient-oriented strategies are the main outcome of this project, clinical research in cardiology and cardiac surgery is its integral part. Better understanding of the underlying pathogenetic mechanisms of ischemic heart disease should contribute to the development of novel preventive, diagnostic and therapeutic approaches, such as protection against ischemia/reperfusion injury, stabilization of the atherosclerotic plaque, and prevention of late effects of early hypoxic/ischemic events.

The Centre of Cardiovascular Research represents a unique research basis: closely collaborating teams of experimental and clinical cardiologists from the Academy of Sciences of the Czech Republic, Charles University in Prague and the Prague Institute for Experimental and Clinical Medicine identified themselves with the goals of the Centre; this made it possible to present results that would never be possible without this project. This indicates that the idea of the Centre was reasonable and simultaneously demonstrates that the foundation of the Centre signifies a new quality of research on the important topics of medicine.

This supplement of the *Physiological Research* represents a small sample of the scientific activity of the Centre of Cardiovascular Research, achieved by collaborating teams in different, closely related, areas.

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