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In this Issue

My Life with Developmental Cardiology

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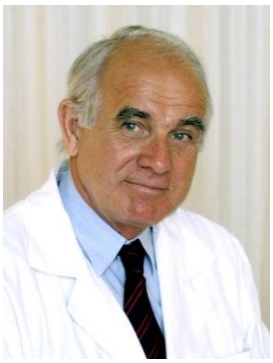

Dr. Bohuslav Ostadal

Introduction

My close relationship to the developmental medicine started more than 60 years ago, with my University education at the Faculty of Pediatric Medicine of the Charles University in Prague. Already during my University studies, head of the Department of Pathological Physiology, Professor Otakar Poupa, offered me the position of volunteer in his team. Lifetime desire of my first teacher and scientific advisor was to clearly define the scientific basis of cardiology. He focused his attention in this area because he early recognized that heart disease is a major killer in the Western world and its trend is on the rise in developing countries. In his laboratories at the University as well as in the Institute of Physiology of the Czech Academy of Sciences he started studies on the onto- and phylogenesis of the cardiac muscle for understanding the basis of fetal and neonatal cardiology. This area of cardiovascular research attracted many young students and became a specialty of the "Prague School" of developmental and comparative cardiology. My first experimental studies were devoted to the development of myocardial blood supply during phylogeny and ontogeny. This type of research would be unthinkable without the advice and help of my second important teacher, advisor and finally very close friend, Dr. Zdenek Rychter. Leading Czech embryologist, founder of the Czech experimental embryology of the cardiac muscle, entered the top league of the world cardiac science by his original studies on experimental morphology of the aortic arches during the heart loop in chick embryos.

Essential for the developmental cardiology is a close cooperation of experimental and clinical cardiologists. I was very happy that my third important mentor was the outstanding pediatric cardiologist, founder of the Center of the Pediatric Cardiology in Prague, Professor Milan Samanek. He focused my interest on the clinical developmental cardiology, particularly on the comparison of pathophysiology and metabolism of hypoxemic and normoxemic congenital heart defects. There are another two exceptional personalities outside of the Czech Republic they supported significantly my scientific career. Professor T.H. Schiebler from the University of Würzburg, Germany, offered me to spend very fruitful year in his Institute and made me familiar with the possibilities of ultramicroscopic techniques. Professor Naranjan Dhalla from the Institute of Cardiovascular Sciences, Winnipeg Canada, outstanding experimental cardiologist and altruistic scientific manager helped me to join the international cardiological scientific community and invited me to work with him in Winnipeg I was not alone, several my collaborators had the opportunity to work with him as well; I am very grateful for his long-lasting support and friendship. I am convinced that good mentors play a decisive role in the scientific career of each young enthusiast. I am, therefore, very lucky that this condition was in my life completed thanks to the above mentioned outstanding scientific personalities. Another important factor in the scientific life is a good team of highly educated collaborators, students and technical assistants. It is impossible to present a long list of my colleagues and friends who helped me during the last sixty years and who created very good and friendly teamwork. Nevertheless, there are two persons they had very special position in my career and whom I would like to express my sincere thanks. My former pupil, colleague and now my boss and friend, Professor Frank Kolar, exceptional scientist and very close friend and last but not least my wife Ivana. We are living together for more than 55 years and she was close to me during all happy and sad days. Moreover, she was working with me on the developing heart; many common publications are the best evidence for that.

As it has been mentioned above, since the very beginning of the scientific career, my main area of research has been focused on the development of the heart structure and function under normal and pathological conditions. In this situation question arises what are the roots, main principles, philosophy and advantages of developmental approach in medicine and cardiology in particular.

Origin of developmental biology and medicine

The origin of developmental biology and medicine as a scientific discipline dates back to the discoveries of Darwin and Mendel in the second half of the nineteenth century. When Darwin brought forward the theory of the

origin of species by natural selection, there were no other evolutionary theories to compete with it. Its rapid acceptance was due to the fact that evolution was "in the air" at the time. Darwin realized that an understanding of heredity was essential for evolutionary studies, but the apparently never came across Mendel´s paper, and he stated in the last edition of the *Origin of Species* that the fundamental principles of heredity were still unknown. Only six years after the publication of Darwin´s famous book, Mendel described the laws of heredity. His words were unfortunately long forgotten and were only rediscovered 16 years after his death; today the tenets of Mendel´s principles are the basis of most studies in evolution. It is only through an irony of fate that at the beginning of its existence Mendelism was often interpreted as the opposite of Darwinism.

It took, however, a long time before both of these basic theories became an integral part of modern physiology and medicine. In the second half of the nineteenth century these disciplines profited from the work of another scientific genius - Claude Bernard. This French physiologist formulated for the first time the concept of stability of the internal environment (homeostasis), which for a long time formed the basis of most physiological investigations. Bernard himself during his work on the theory of homeostasis had no clear view of evolution, and his originally vitalistic ideas changed only before the end of his life. So it happened that the two most important theories of life sciences, the idea of the internal milieu and the idea of evolution, were for a long time studied separately. In this connection it is interesting to mention that the lack of logic of this situation was first recognized by scientists studying evolution; it took a substantially longer time before physiologists started with an investigation of the previous history of their experimental models. This is also the reason that classical physiology, as is obvious from many textbooks, is predominantly the physiology of adults - the developing approach is lacking.

Developmental approach to cardiology

The importance of the developmental approach for experimental and clinical cardiology is indisputable. Clinical-epidemiological studies have shown that the risk factors of serious cardiovascular diseases, such as atherosclerosis and ischemic heart disease, are present already during the early phases of ontogenetic development. Some of them, such as excessive food intake and an increased level of cholesterol, operate just after birth. They are followed by smoking, where the connection with ischemic heart disease is beyond any doubt, stress, and decreased physical activity. Last but not least, genetic factors are present even before birth. Atherosclerosis and ischemic heart disease are thus no longer diseases of the fifth and higher decades of life, rather, their origins and consequences may be influenced by risk factors acting during development. It follows that experimental studies on the pathogenetic mechanisms of these disturbances must shift to the early ontogenetic period. Furthermore, congenital cardiovascular malformations remain the single largest cause of infant mortality from congenital defects in industrialized countries. In spite of dramatic advances in surgical therapy, many patients´ heart defects are not cured. There is lingering morbidity and mortality that increases with age after surgery. It is, therefore, unsurprising that the interest of theoretical and clinical cardiologists in the developmental approach keeps increasing. Recent advances in molecular and cellular biology and the developing possibilities of prenatal cardiology over the last decades amount to a very major revolution in our knowledge of the development of living systems.

There are, however, many controversies concerning the mechanisms of developmental variations in cardiovascular responsiveness; the obvious discrepancies may be partly due to different experimental procedures used for studying different animal species. Nevertheless, it is worth noting that ontogenetic conclusions are often based on observations from two or three developmental stages, such as fetal, newborn and adult. It is, therefore, necessary to point out that possible developmental changes between selected (and not exactly defined) points remain undetermined. The precise knowledge of individual ontogenetic periods critical for cardiac ontogeny (prenatal, neonatal, suckling, weaning, adolescence, adulthood) is thus crucial for the prediction and explanation of cardiac reactions to various pathogenetic stimuli. Furthermore, experimental data on ontogenetic differences in cardiac responsiveness were obtained almost exclusively from healthy individuals. However, such an approach is far from clinical situations, where interventions applied in the critical developmental periods may have serious consequences for further maturation.

While it has long been established that the fundamental mechanisms of cardiovascular function apply to all animals, it is also becoming clear that most animals, i.e. both invertebrates and vertebrates, share the same genetic programming for the development of the heart and major vessels. It is also well established that many of the cardiac features of adult fish, amphibians and reptiles resemble stages in the ontogenetic development of the mammalian heart as well as some common cardiac malformations in humans. As an example, the ventricular septum defects that occur during congenital heart disease in mammals resemble incomplete ventricular septum in some amphibians and reptiles. Moreover, many laboratories primarily interested in the molecular mechanisms underlying cardiac malformations in humans, are now conducting much of their research on cold-

blooded vertebrates such as Xenopus and zebra fish, because these animals are much easier to maintain and manipulate than mammals. In parallel to more clinically oriented research on cardiac development, comparative physiologists have studied cardiac function in all vertebrate groups for more than a century and the interest in the ontogenetic development of the cardiovascular function in non-mammalian vertebrates has been a major topic over the past decades. Comparative phylogenetic studies are thus integral part of the developmental cardiology.

Some our contributions to the developmental cardiology

Developmental cardiology is an integral part of so-called adult cardiology but it has some of its own specificities. Research in this field can generally be divided into four closely related areas:

i. study of normal structural, functional and biochemical development of the cardiovascular system;
ii. study of the sensitivity of the developing cardiovascular system to different pathogenetic factors;
iii. possibilities of protective influences; and
iv. late effects of early disturbances of the cardiovascular system.

In a short survey I would like to summarize some of our results achieved in these four different areas.

i. Study of normal development of cardiovascular system

In late sixties and early seventieth of the last century we have studied the phylogenetic development of cardiac muscle. Performance of the heart as a pump must be precisely adapted to the oxygen consumption of the total active body mass. As a result, the heart size in different species of vertebrates expressed as the relative heart weight varies considerably, by as much as 20-fold. The relative heart weight is highest in birds, followed by mammals and by poikilotherms. The maximum acceleration of heart weight during phylogeny occurs when the metabolic activity of animal tissues has substantially increased, i.e. during transition from pokilotherms to homeotherms. Significant differences can be observed also in individual classes of vertebrates: relative heart weight in physically active animals is significantly higher in comparison with less active species. Changes in the heart weight are accompanied during phylogeny by transformation of the myocardial structure and blood supply. The myocardium of cold-blooded vertebrates (fish, amphibians, reptiles) is either entirely spongious, supplied by diffusion from ventricular cavity or its inner spongy-like layer is covered by the compact myocardium with vascular supply. The thickness of the compact layer depends upon the weight of animals (law of Laplace). Moreover, the activities of enzymes of energy metabolism were surprisingly significantly increased in the inner avascular spongious layer as compared with outer compact layer, supplied from coronaries. The heart of adulthomeotherms is entirely compact and supplied from coronary arteries; spongious myocardium supplied by diffusion from ventricular cavity, can be observed only during prenatal development (1-5).

ii. Study of the sensitivity of the developing cardiovascular system to different pathogenetic factors

Cardiotoxic effect of beta-mimetic catecholamines during development

After the discovery of Rona in 1956, the high doses of isoproterenol were used for induction of experimental cardiac necrosis. One of the still unresolved questions was the possible participation of coronary arteries in the pathogenesis of these changes. We have used our experience with the myocardium of cold-blooded animals and applied the high dose of beta-mimetic agent to the turtle. To our surprise, necrotic changes were localized predominantly in the inner vascularless layer of the myocardium suggesting, that necrotic changes induced by isoproterenol, are not ischemic (6).

Similarly, we wanted to ascertain the response of the chick embryonic heart to isoproterenol. Catecholamines are involved in the regulation of a wide variety of vital functions. The β-adrenergic receptor (β–AR) - adenylyl cyclase (AC) system has been identified early in embryogenesis before the heart has received adrenergic innervation. The structure of β-receptors in the immature myocardium is similar to that in adults; there are, however, significant quantitative developmental changes in the inotropic and chronotropic responsiveness. Information on the toxic effect of the β-AR agonists in the immature heart is surprisingly scarce, even though these agents are used in clinical practice both during pregnancy and in early postnatal development. Large doses of β-AR agonists induce malformations of the cardiovascular system; the type of change depends upon the time at which the β-AR agonist was administered during embryogenesis. During postnatal ontogeny the cardiotoxicity of β-AR agonists increased from birth to adulthood. It seems likely that despite interspecies differences, developmental changes in the cardiac sensitivity to β-AR agonists may exist in all mammals depending on the degree of maturation of the system involved in β-adrenergic signaling. All the existing data draw attention to the possible harmful consequences of the clinical use of β-AR agonists as tocolytics (to prevent premature labor) during early phases of cardiac

development. Late effects of the early disturbances of the cardiac muscle cannot be excluded. (7-11)

Developmental and sex differences in cardiac tolerance to oxygen deprivation

Age and sex play essential role in the cardiac tolerance to ischemia/reperfusion (I/R) injury: cardiac resistance significantly decreases during postnatal maturation and female heart is more tolerant as compared with the male myocardium. It is widely accepted that mitochondrial dysfunction and particularly mitochondrial permeability transition pore (MPTP) opening plays a major role in determining the extent of cardiac I/R injury. The aim of our studies was to analyze (i) whether calcium-induced swelling of cardiac mitochondria is age- and sex-dependent and related to the degree of cardiac tolerance to I/R injury and (ii) whether changes in MPTP components – cyclophilin D (CypD) and ATP synthase – can be involved in this process. We have observed that in mitochondria isolated from neonatal and adult myocardium as well as from adult male and female hearts the MPTP has different sensitivity to the calcium load. Neonatal and female mitochondria are more resistant both in the extent and in the rate of mitochondrial swelling at higher calcium concentration. Our data further suggest that age- and sex-dependent specificity of the MPTP is not the result of different amounts of ATP synthase and CypD: neonatal and adult hearts, similarly as the male and female hearts contain comparable amount of MPTP and its regulatory protein CypD; parallel immunodetection revealed also the same contents of adenine nucleotide translocator or voltage dependent anion channel. Increased resistance of the neonatal and female heart thus cannot be explained by changes in putative components of MPTP and rather reflects regulation of MPTP function. Our results suggests that mitochondria are deeply involved in the mechanism of the high ischemic tolerance of the immature and female myocardium. (12-23)

Metabolic adaptation to chronic hypoxia in children with congenital heart disease

Timing of corrective surgery for hypoxemic congenital heart disease is critically important, with early surgery desirable to promote more normal development. Many children undergoing cardiac surgery in the first year of life exhibit varying degrees of cyanotic heart disease where the myocardium is chronically perfused with hypoxic blood. We have observed metabolic adaptation to CH in the myocardium of children with cyanotic congenital cardiac malformations. The capacity of the aerobic energy metabolism was significantly reduced in hypoxic hearts as compared with normoxic patients. Understanding the mechanisms by which cyanotic congenital heart disease modifies the myocardium and the modifications impact on the cardiac tolerance to ischemia may provide insight into the treatments for limiting myocardial damage during cardiac surgery. (24-26)

iii. Protective strategies for the immature myocardium

Ischemic preconditioning

As mentioned above, cardiac tolerance of the immature heart to oxygen deficiency is significantly higher as compared with the adult myocardium. Thus the question arises whether we can further increase the already high resistance of the immature heart. I would like to mention our results with two protective phenomena, ischemic preconditioning (IP) and adaptation to chronic hypoxia (CH). Whereas extensive data are available on IP in the adult myocardium, information on whether this protective phenomenon also occurs in immature heart is inadequate. We have shown, that classical IP, at least in rats, is not present at birth and that the enhanced postischemic recovery of contractile function can be observed only at the end of the first postnatal week. The decreasing tolerance of the neonatal heart to ischemia is thus counteracted by the development of the inducible endogenous protective mechanism. (12, 27)

Adaptation to chronic hypoxia

Overwhelming majority of studies, analyzing the protective effect of adaptation to CH, deals exclusively with the adult myocardium. It follows from our results that the protective effect of CH is absent in newborn rats and it develops – similarly as that of IP – only during the first postnatal week. These results suggest that we might be dealing with the more general biological phenomenon: the already high resistance of the cardiac muscle cannot be further increased by different protective mechanisms. By analyzing the possible protective mechanisms of CH in the immature heart we have observed that - unlike in IP – both mitochondrial K_{ATP} channels and NO may play an important role. Furthermore, we have shown that also angiotensin II is involved in the mechanism of adaptation of the immature heart to CH; the chronic blockade of angiotensin II type I receptors by irbesartan completely abolished the cardiac protection by CH. (12, 16, 27)

iv. Late effects of early disturbances of cardiovascular system

Human epidemiological studies have shown a clear association between adverse intrauterine environment and increased risk of ischemic heart disease in later adult life. One of the most common insults during perinatal development is hypoxemia due to congenital cyanotic heart defects or pulmonary disease secondary to prematurity. We have found that prenatal CH significantly changed the sensitivity of adult myocardium to I/R injury in sex-dependent manner: whereas the sensitivity in the adult male myocardium was significantly increased,

perinatal exposure to CH in females markedly increased cardiac tolerance to acute ischemic injury. These studies suggest that CH exposure during early development may cause in-utero neonatal programming of several genes that may play an important role in the increased or decreased susceptibility of the adult heart to I/R injury. These results would have important clinical implications since cardiac sensitivity in adult patients may be significantly influenced by perinatal hypoxia in sex-dependent manner. (16, 28, 29)

Conclusions and perspectives

Developmental approach in medical sciences and particularly in cardiology offers new possibilities in the experimental studies of pathogeny, prevention and therapy of cardiovascular diseases. The structure and function of the developing heart are intrinsically linked, so studying both morphology and physiology provides added value and helps with data interpretation. The differences between individual stages of ontogenetic development are often more profound than differences between species, so translation of data obtained in animal studies to humans needs to be primarily considered in developmental terms (for example, newborn rodents are more similar to third trimester human fetuses than to neonates). Recent advances in our understanding of reactions of the immature heart could help in devising optimal protection strategies for the immature heart. Recent advances of new methodology, particularly molecular biology and genetics, may substantially help in the laborious search for a better understanding of the underlying mechanisms. Nevertheless, molecular analysis in developmental cardiology is unthinkable without comprehensive and well integrated view of the field.

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2018 Election of IACS Officers and Members of the Council

The International Academy of Cardiovascular Sciences, is pleased to announce that the following Candidates have been elected to the Executive Council for a 3 year term (2018-2021):

1. **Dr. Grant Pierce (Winnipeg, Canada): President-Elect**
2. **Dr. Gary Lopaschuk (Edmonton, Canada): Council Member**
3. **Dr. Lorrie Kirshenbaum (Winnipeg, Canada): Council Member**
4. **Dr. Dobromir Dobrev (Essen, Germany): Council Member**
5. **Dr. Dragan Djuric (Belgrade, Serbia): Council Member**
6. **Dr. Tatiana Ravingerova (Bratislava, Slovakia): Council Member**

Grant Pierce

Dr. Grant Pierce

Dr. Grant N. Pierce completed postdoctoral training at UCLA before returning to Canada where he is Executive Director of Research at St Boniface Hospital and a Professor of Physiology and Pathophysiology at the University of Manitoba in Winnipeg. He has published over 225 peer reviewed research manuscripts and 8 textbooks on metabolism, nutrition and cardiovascular health. His work on diabetic cardiomyopathy and ischemic heart disease has been pioneering and highly cited. Overall, his work has been cited over 8,000 times with a Google Scholar H index of 53. His most recent work is examining dietary flaxseed as an anti-hypertensive strategy, as well as the development of a new platform of antibiotics. He has served as Chair of the Executive Review Committee for the Heart and Stroke Foundation of Canada where he oversaw all peer review for three years. Dr. Pierce was Editor-in-Chief of the Canadian Journal of Physiology and Pharmacology from 2003-2016. He also served as the President of the North American Section of the International Academy of Cardiovascular Sciences (2015-2018). He recently received the Queen Elizabeth II Diamond Jubilee Medal for service to Canada, the 2016 Research Canada Leadership Award and is an elected Fellow of the Royal Society of Canada, the highest distinction for a scientist in Canada as well as elected Fellow of the American College of Cardiology and the International Academy of Cardiovascular Sciences. In 2018, Dr. Pierce was invested with the Order of Manitoba. The Order of Manitoba is the Province of Manitoba's highest honour and recognizes Manitobans who have demonstrated excellence and achievement, thereby enriching the social, cultural or economic well-being of the province and its residents.

Gary Lopaschuk

Dr. Gary Lopaschuk

Dr. Gary D. Lopaschuk is a Distinguished University Professor of Pediatrics at the University of Alberta, Edmonton. He is a Cardiovascular Researcher whose research focuses on the regulation of fatty acid oxidation in the heart, and the mechanism by which high rates of fatty acid oxidation contribute to heart disease and heart failure. He is also examining how alterations in fatty acid metabolism contribute to cardiovascular disease in the diabetic. At a molecular level he has characterized a number of key enzymes important in the regulation of cardiac fatty acid oxidation. He is also developing a number of therapeutic strategies that involve optimizing energy metabolism in the heart that can be used to prevent the development of heart disease, and that can also be used to treat heart failure. His research has resulted in the publication of over 400 original research articles, and he has been recognized by awards such as the Canadian Cardiovascular Research Achievement Award and the

International Academy of Cardiovascular Sciences Research Achievement Award.

Dr. Lopaschuk is an Alberta Innovates Health Solution Scientist, and is a Fellow of the Royal Society of Canada. He has served as Scientific Director of the Mazankowski Alberta Heart Institute, and has previously served in a number of capacities with the Heart Stroke Foundation of Canada, including as Chair of the Scientific Review Committee and the Vice-Chair of the Research Planning and Priorities Committee. He serves on a number of journal editorial boards, including Circulation Research, Journal of Clinical Investigation, American Journal of Physiology, Cardiovascular Research, Journal of Molecular and Cellular Cardiology, Canadian Journal of Physiology and Pharmacology, Heart and Metabolism, and Cardiovascular Drugs and Therapy. He is also the President and CEO of a biotechnology company (Metabolic Modulators Research Ltd.), that is developing novel drugs to treat heart disease that optimize energy metabolism in the heart.

Lorrie Kirshenbaum

Dr. Lorrie Kirshenbaum

Dr. Lorrie Kirshenbaum is Canada Research Chair in Molecular Cardiology, Director, Institute of Cardiovascular Sciences, St. Boniface Hospital Albrechtsen Research Centre, Head, Division of Cardiovascular Science and Disease, Professor, Departments of Physiology & Pathophysiology and Pharmacology and Therapeutics, Max Rady College of Medicine, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, Canada.

Dr. Kirshenbaum received his MSc in 1988 from the University of Manitoba, PhD degree in Cardiac Physiology from the Faculty of Medicine University of Manitoba in 1992 and he completed a research fellowship in Molecular Cardiology at Baylor College of Medicine from 1992-1995. In 1995, Dr. Kirshenbaum was recruited to the Institute of Cardiovascular Sciences at St. Boniface Hospital Albrechtsen Research Centre and the University of Manitoba, where he has been an independent research scientist with continual national grant funding support for the past 23 years.

Dr. Kirshenbaum has served as Professor at the University of Manitoba with his focus on studying cardiac myocyte death where he has been working for the past 15 years. Dr. Kirshenbaum been the holder of a Canada Research Chair Tier 2 in Molecular Cardiology for the past 10 years and was recently awarded a CRC, Tier 1 for his outstanding scientific achievements and leadership. He has served as Director of the Institute of Cardiovascular Sciences since 2017.

Over the past 23 years Dr. Kirshenbaum has published 122 original research articles, 10 book chapters, edited 2 books and 160 abstracts on his studies. With an H index is 46 with over 9,000 citations describing the high quality of this research world-wide. Dr. Kirshenbaum has been invited to speak at >190 conferences worldwide including prestigious Gordon and Keystone conferences. He has been receiving continuous CIHR grant funding ($8 million). Most notably, he was awarded a $3 million (7 year) CIHR Foundation Grant.

Dr. Kirshenbaum has been the recipient of over 40 prestigious local, national and international awards from agencies including the ISHR, Canadian Cardiovascular Society, Canadian Society for Clinical Investigation, CIHR and HSF of Canada. He has served as a council member of the Canadian Cardiovascular Society, and world sections of the ISHR, he also serves as vice-chair of the membership committee and leadership committee for the AHA. He currently serves as an editorial board member of several prestigious scientific journals including Circulation Research, CJC, Journal of Molecular and Cellular Cardiology, Associate Editor for Circulation Heart Failure and Journal of Cardiovascular Translational Research.

Dr. Kirshenbaum has been the recipient of multiple prestigious honours awards including the Upjohn Award of the International Society for Heart Research, Joe Doupe Young Investigators Award of the Canadian Society for Clinical Investigation, Robert E. Beamish Award for Excellence in Cardiovascular Research of the Canadian Cardiovascular Society. Most recently, he received the Distinguished Alumni, Professional Achievement Award from the University of Manitoba, Norman Alpert Award for Established Investigators in Cardiovascular Sciences and Howard Morgan Award for Distinguished Achievements in Cardiovascular Research from the International Academy of Cardiovascular Sciences.

Dobromir Dobrev

Dr. Dobromir Dobrev

Dr. Dobromir Dobrev is Full Professor and Director of Institute of Pharmacology, University Duisburg-Essen, Essen, Germany. He also serves as Adjunct Full Professor of Medicine at Montreal Heart Institute and University of Montreal (Montreal, Canada) and at Department of Molecular Physiology Biophysics, Baylor College of Medicine (Houston, USA). He studied medicine in Budapest/Pécs (Hungary) and Dresden (Germany) and obtained his Doctorate of Medicine (M.D. degree) in 1994 at the Dresden University of Technology (Germany). He became board certified ("Facharzt") in Pharmacology and Toxicology in 1998. Dr. Dobrev obtained his Facultas docendi and Venia legendi in Pharmacology and Toxicology in 2002 and rose to the rank of Professor of Medicine in 2008. In 2010 he was appointed as a Full Professor of Experimental Cardiology and Chair of Division of Experimental Cardiology at the Medical Faculty Mannheim of the University of Heidelberg. Dr. Dobrev moved to Essen in October 2012, to take the position of Full Professor of Pharmacology and Toxicology and Director of Institute of Pharmacology, West German Heart and Vascular Center, University Duisburg-Essen, Essen, Germany.

His main research interest is the molecular basis of disease-related cardiac remodeling and arrhythmias with a main focus on atrial fibrillation and the identification and validation of novel targets for atrial fibrillation therapy. Dr. Dobrev was Grantee Coordinator of "European-North American Atrial Fibrillation Research Alliance" (Transatlantic Network of Excellence in Cardiovascular Diseases Program, Fondation Leducq, Paris, France; 2007-2013) and Work Package Leader in EU FP7 Large-scale Integrating Project "The European Network for Translational Research in Atrial Fibrillation" (2010-2015). He was also Co-coordinator (2011-2013) of Arrhythmia Research Program of the German (National) Centre for Cardiovascular Research ("Deutsches Zentrum für Herz-Kreislauf-Forschung"). Total amount of peer-reviewed grants in which Dr. Dobrev is/was Principal Investigator is approx. 9 Mil. €.

Dr. Dobrev is recognized nationally and internationally as an expert in cardiovascular research. He has authored over 217 peer-reviewed articles in medical journals including Circulation, Circulation Research, Journal of Clinical Investigation, Journal of American College of Cardiology, European Heart Journal, The Lancet, Nature Reviews Drug Discovery, and Nature Reviews in Cardiology and has received over 160 invitations to speak at congresses/seminars worldwide. He serves on Editorial Boards of major cardiovascular journals and is currently Editor-in-Chief of International Journal of Cardiology: Heart Vasculature. Dr. Dobrev has received numerous awards including a Research Award of the German Heart Foundation (2001), the Albert-Fraenkel-Award of the German Society of Cardiology (2005) and the Outstanding Achievement Award of the European Cardiac Arrhythmia Society (2012). From 2004-2007 he was vice chair and from 2007-2010 chair of Working Group on Cellular Electrophysiology of the German Cardiac Society. From 2014-2016, Dr. Dobrev was vice chair and from 2016 he is chair of the Working Group on Cardiac Cellular Electrophysiology of the European Society of Cardiology. He was Reviewer of the 2016 ESC Guidelines on atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS). From 2017 he is a Board Member of the European Heart Rhythm Association.

Dragan Djuric

Dr. Dragan M. Djuric received his M.D. degree in 1987, M.S. degree in 1991 and Ph.D. degree in 1993 from the Faculty of Medicine University of Belgrade. He is full Professor of Medical Physiology at the Faculty of Medicine University of Belgrade. From 1997-2000 he was Head of the Centre for Atherosclerosis and Vascular Biology in the Dedinje Cardiovascular Institute, Belgrade. From 2006-2009 he was a Director, and then in 2009 until 2012 he was a Chair of the Board of Medical Physiology "Richard Burian" at the Faculty of Medicine University of Belgrade. He initiated and co-founded Ph.D. program in physiological sciences (2009), and from that time he is a Chairman of that program at the Belgrade University Faculty of Medicine. He initiated and co-founded the

Dr. Dragan Djuric

establishment of the Yugoslav Atherosclerosis Society in 1998, then he was a first Secretary General (1998-2002). He was a President of the Executive Committee and Assembly of the Serbian Physiological Society (2006-2013), President of the Program and Nominating committee of the Serbian Physiological Society (2013-2017), and again he was elected as a President of the Assembly of the Serbian Physiological Society (2018-2021). Dr. Djuric also had a lot of international responsibilities: 2000-present, Council Member, International Atherosclerosis Society; 2003-2013 Council Member, Federation of European Physiological Societies (FEPS); 2005-2009 Council Member, International Union of Physiological Sciences (IUPS); 2006-2014 Council Member, International Society for Pathophysiology; 2011-present, Member, Steering Committee, Global Network for Global Fight Against Cardiovascular Diseases, International Academy of Cardiovascular Sciences); 2015-Council Member, European Section, International Academy of Cardiovascular Sciences-IACS.

He serves as a member of the International Lipid Expert Panel (ILEP, 2015-present) and Lipid and Blood Pressure Meta-Analysis Collaboration (LBPMC) Group (2017-present). He also served as a member of Homocysteine Expert Panel (Germany), and was a member of the scientific/organizing committee at the global international conference entitled "Advances and Controversies in B-Vitamins and Choline" (Leipzig, Germany, 2012).

Dr. Djuric published more than 716 different publication units in English, German, Russian and Serbian languages, with 117 full-length papers in peer-reviewed journals indexed in ISI/JCR list plus 15 papers indexed only in PubMed as well as 30 chapters in books/monographs; he wrote or edited 4 monographs about endothelium, atherosclerosis and nutrition (in Serbian language), and edited/co-edited 12 books of abstracts from scientific meetings (all in English language). He was cited more than 1000 times, and was invited for presenting the lectures 70 times in Serbia as well as 38 times abroad at different foreign institutions and international meetings.

His research interests include studies on the effects and mechanisms of different principles in cardiovascular system, ie. homocysteine and its thiolactone metabolites, other sulphur-containing acids (methionine, cysteine, N-acetyl-L-cysteine), gasotransmitters (NO, H2S, CO), oxidative stress, folic acid, vitamin B6, L-arginine, vitamin C, histamine, cardiovascular biomarkers, cardiac and neural NMDA receptors, cardiac and neural hyperexcitability, vibroacoustic microvibrations, coronary heart disease, cardiac failure, hypertension, diabetes mellitus, peripheral vascular disease, cardiovascular prevention, nutraceuticals and exercise.

Dr. Djuric was elected as a fellow of the International Academy of Cardiovascular Sciences (2011). He has been awarded with Andras Varro Award for Excellence in Cardiovascular Sciences (2018), Serbian Physiological Society Award for Lifetime Achievement in Physiological Sciences (2016), Lifetime Achievement Award in Cardiovascular Science, Medicine and Surgery by the International Academy of Cardiovascular Sciences (2015), Samuel Racz Medal and Honorary Member for the Contribution in Physiology from the Hungarian Physiological Society (2010), Honorary Member of the Bulgarian Society for Cell Biology (2009), Honorary Member of the Romanian Society for Laboratory Medicine (2008), Medal of the Yugoslav Society of Cardiology (2002), and Belgrade City October Award (1987).

Tatiana Ravingerova

Dr. Tatiana Ravingerova

Dr. Tatiana Ravingerová, received her Doctor of Medicine from the Russian Medical University, Moscow, Russia and completed her Ph.D. at Comenius University, Bratislava, Slovakia and D.Sc. degree at the Slovak Academy of Sciences, Bratislava, Slovakia. Since 1978, she has been at the Institute for Heart Research, Slovak Academy of Sciences, Bratislava, Slovakia, where her current position is as Head of the Department of Cardiovascular Physiology and Pathophysiology. Her field of interest includes ischemic injury of the heart, anti-iischemic protection, lifestyle-related diseases as well as molecular mechanisms of innate cardioprotection. To date, Dr. Ravingerová has published more than 170 papers in peer reviewed journals and as book chapters with a total citation of greater than 900 with H-index of 27.

Her work has yielded that lifestyle-related risk factors have a negative impact on the myocardial response to ischemia per se and reduce the effectiveness of innate cardioprotective interventions. However, impaired adaptive potential of the myocardium can be restored by the modulation of the type and/or intensity of the adaptive (conditioning) stimulus. Also, it has been found that the activation of the transcription factor PPAR-alpha simulates the effect of preconditioning and protects the heart by means of up-regulation of PPAR "downstream" metabolic genes and via non-metabolic effects. Results suggest a positive role of genes of fatty acids metabolism during acute myocardial I/R and overall important role of metabolic genes in the adaptive processes in the myocardium. Dr. Ravingerová has also established that age and gender determine cardiac response to ischemia as well as the efficiency of ischemic preconditioning that has been observed already during the period of maturation and that remote preconditioning induces preservation of myocardial function and of biophysical properties of cardiac mitochondria after acute ischemia/reperfusion. This intervention is a relatively simple and effective tool to attenuate irreversible consequences of lethal injury. Dr. Ravingerová has several international projects: European network COST projects on Cardioprotection – including current EU Cardioprotection COST project CA 16225, bilateral COST (SR- Austria, SR-CR, SR-GR). She has also conductd her work at the Cardiovascular Research Laboratories, King´s College, London, UK, with Dr. M. Curtis, Department of Physiology and Pharmacology, University of Strathclyde, Glasgow, Scotland (in the frames of European COST network) with Prof. J. Parratt and at the Institute of Medical Physics and Biophysics, University of Graz, Graz, Austria with Prof. B. Koidl. She has been a visiting scientist at the Department of Med. Physiology, Institute of Med. Biology, University of Tromsoe, Norway and at the Institute of Cardiovascular Sciences, St. Boniface Hospital Research Centre, Winnipeg, Canada. She is an lecturer in cardiovascular pathophysiology and supervised several Ph.D., M.Sc. and BSc. Students.

Her professional activities include Vice-President of the European Section of the IACS, Council member – ISHR-European Section (1999-2005), Council member and Fellow of the IACS- European Section, Slovak Physiological Society; Czech-Slovak Working Group on Experimental Cardiology, Member of the Evaluation Commissions for Ph.D. defence, habilitation and inauguration procedures at home and abroad, Member of the Grant Evaluation Commission of Slovakia (VEGA SR). Dr. Ravingerová has received many awards and honors including Medals of the Slovak Cardiological Society (2001), Slovak Physiological Society & Slovak Medical Association (2011, 2017), Jan Jessenius Medal of the Slovak Academy of Sciences (2012), Medal of SAS for the Support of Science (2016), Distinguished Service Award of the IACS (2013), IACS Award for Excellence in Cardiovascular Sciences (2015), Elected Member of the European Academy of Sciences and Arts (2015) and the Learned Society of the SAS (2016). IACS Distinguished Leadership Award in Cardiovascular Sciences (2018). Elected Member of the Executive Council of IACS (2018). Dr. Ravingerová has served as a Faculty Member at the international scientific meetings in Europe (CR, France, Hungary, Serbia, Norway, Romania, Turkey, UK) and worldwide (Australia, India, Canada, Taiwan, Japan) and had more than 75 invited talks.

2018 Medal of Merit – Call for Nominations

The International Academy of Cardiovascular Sciences requests Nominations/Applications for the Award of 2018 Medal of Merit. This highest honour of the Academy will be bestowed upon an individual who has made original research discoveries that clearly stand on their own or for contributing important educational services that have influenced how cardiovascular science is learned and practiced. A two page summary of achievements along with a complete bibliography and two references should be sent by August 30, 2018 to Dr. N.S. Dhalla, Executive Director, IACS, St Boniface Hospital Albrechtsen Research Center, Winnipeg, Canada (email:nsdhalla@sbrc.ca).The previous 34 Medal of Merit Recipients are listed in past issues of CV Network (www.heartacademy.org). Eight recent recipients are: Laurentiu M. Popescu, Romania; Makoto Nagano, Japan; Roberto Bolli, USA; Ferid Murad, USA; Francois Abboud, USA; Valentin Fuster, USA; Otoni M. Gomes, Brazil; Arnold Schwartz, USA.

Report on the 5th Meeting of the IACS - European Section: Advances ın Cardıovascular Research: From basic mechanisms to therapeutic strategies, Smolenice, Slovakia, May 23 - 26, 2018

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The Congress Center of the Slovak Academy of Sciences in Smolenice, Slovakia, hosted the 5th meeting of the International Academy of Cardiovascular Sciences – European Section (IACS-AS) "Advances in Cardıovascular Research" organized by the Institute for Heart Research, Slovak Academy of Sciences in collaboration with the IACS-ES, Ministry of Education of the Slovak Republic, Slovak Physiological Society, Slovak Society of Cardiology, and the Institute of Cardiovascular Sciences St. Boniface Research Centre, University of Manitoba, Winnipeg, Canada. The meeting was held under the auspices of the International Academy of Cardiovascular Sciences and European Academy of Sciences and Arts.

Presentation of 2018 Naranjan S. Dhalla Honorary Lecture Award to Dr. Ger Stienen. L to R: Drs. Andras Varro, Ger Stienen, Naranjan S. Dhalla and Zoltan Papp

The venue of the meeting, Smolenice Castle, located on the slopes of the Small Carpathian Mountains provided a unique opportunity to facilitate more close interaction between basic scientists and leading cardiologists and created an exciting, enjoyable and friendly atmosphere for an exchange of new ideas and stimulating discussions.

The meeting was focused on the recent advances in research in the field of cardiovascular diseases, in particular, of ischemic heart disease and hypertension, from genes and molecules up to clinical applications, with special regards to the risk factors and genetic aspects of

Drs. Ger Stienen with Zoltan Papp

pathological states including sudden cardiac death, cardiomyopathies, heart failure, vascular dysfunction and metabolic disorders, as well the possibilities of their prevention and activation of natural mechanisms of cell

Presentation of the Andras Varro Award to Dr. Dragan Djuric; L to R: Drs. Andras Varro, Dragan Djuric and Jan Slezak

survival in cardiovascular system. Novel approaches were envisaged in the session dedicated to protective effects of molecular hydrogen in different types of pathological conditions. Last but not least, the attention was paid to the topics such as natural medicine, plant substances, healthy nutrition as additive pharmacological approaches to classic therapy.

Presentation of the Howard Morgan Award to Dr. Lorrie Kirshenbaum; L to R: Drs. Andras Varro, Lorrie Kirshenbaum and Bohuslav Ostadal.

The plenary session featured a prestigious Naranjan S. Dhalla Honorary lecture 2018 given by Prof. G.J.M. Stienen (Amsterdam, the Netherlands) focused on matching of ATP supply and demand in cardiac muscle, lectures presented by Prof. Naranjan Dhalla (Winnipeg, Canada) on store operated Ca^{2+}-channel blockers as a potential therapy for hypertension, followed by the lecture of Prof. Bohuslav Ošťádal (Prague, Czech Republic) on the role of developmental and sex differences in the

Presentation of the Distinguished Leadership Award to Dr. Tatiana Ravingerova. L to R: Drs. Naranjan S. Dhalla, Tatiana Ravingerova and Bohuslav Ostadal

sensitivity of cardiac mitochondrial permeability transition pore, as well as by the lecture of Prof. Andras

Presentation of the Distinguished Leadership Award to Dr. Jan Slezak; L to R: Drs. Naranjan S. Dhalla, Jan Slezak and Bohuslav Ostadal

Varró (Szeged, Hungary) on the inotropic effects of NCX inhibition in cardiac muscle.

During the Opening ceremony, the welcome greetings were presented by the President of the IACS, Prof. Bohuslav Ošťádal, Prof. Naranjan Dhalla representing the International Academy of Cardiovascular Sciences, by the President of the IACS-ES, Prof. Andras Varró, and by the Honorary President of the meeting, Prof. Ján Slezák.

More than 100 participants of the meeting had the opportunity to attend the lectures of renowned scientists from Canada, USA, Japan, Czech Republic, Germany, Hungary, India, Norway, Serbia, Slovakia, Romania, The Netherlands, Turkey and UK.

The scientific program covering different aspects of cardiovascular research consisted of 53 oral

Presentation of the Jan Slezak Award to Dr. Frantishek Kolar. L to R: Drs. Andras Varro, Frantishek Kolar and Grant Pierce

Early Career and Young Investigators pictured with Drs. Andras Varro, Tatiana Ravingerova and Jan Slezak

communications representing both, basic science and clinical research, presented in the frames of ten oral scientific sessions and 36 poster presentations.

During the IACS Awards giving ceremony, the Award of the International Academy of Cardiovascular Sciences, Howard Morgan Award for Distinguished Achievements in Cardiovascular Research, was granted to Lorrie Kirshenbaum (Winnipeg, Canada).

The Awards of the IACS-European Section for the important contributions to the Cardiovascular Research were bestowed on the following individuals: Prof. Frank Kolar (Prague, Czech Republic) was honored with the Ján Slezák IACS-ES Award, Dr. Dragan Djuric (Belgrade, Serbia) received the Andras Varró Award for Excellence in Cardiovascular Sciences and the Bohuslav Ošťádal IACS-ES Award was given to Dr. Narcis Tribulova (Bratislava, Slovakia).

Early Career and Young Investigators pictured with Drs. Andras Varro, Tatiana Ravingerova and Jan Slezak

The Awards of the International Academy of Cardiovascular Sciences "Distinguished Leadership Award in Cardiovascular Sciences" were given to Tatiana Ravingerova (Bratislava, Slovakia) and to Ján Slezák (Bratislava, Slovakia).

The highlights of the meeting were the Early Career Investigators (ECI) Oral Competition and Young Investigators Poster Competition. In ECI Competition, the awards were given to Branislav Kura (Bratislava, Slovakia), Adrian Sturza (Timisoara, Romania) and Martin Lewis (Bristol, UK), while in YI competition, the prices for the Best posters were awarded to: Jaroslav Hrdlicka (Prague, Czech Republic), Jovana Jeremic (Kragujevac, Serbia), Tibor Hornyik (Szeged, Hungary), Sagar P. Patel (Vadodara, India), Katie Hall (Bristol, UK) and Tomas Rajtik (Bratislava, Slovakia).

The major benefit of the meeting was a possibility of intensive interaction between the scientists from different fields of research, which was especially important for young participants who gained a unique opportunity to launch international contacts and collaboration in an informal atmosphere.

On the last evening, the social program of the symposium included the Farewell Dinner that was held at the Castle courtyard, where the participants could enjoy national songs and music.

The organizers thank all the participants for their active participation and valuable contributions to the high quality scientific program of the meeting.

Group picture of conference attendees

Academy Presents Distinguished Achievements, Leadership and Service Awards

The following six awards were presented during the European meeting of the IACS in Smolenice, Slovakia, May 23 - 26, 2018:

1. **Andras Varro Award for Excellence in Cardiovascular Sciences to Dr. Dragan M. Djuric, Belgrade, Serbia**
2. **Howard Morgan Award for Distinguished Achievements in Cardiovascular Research to Dr. Lorrie Kirshenbaum, Winnipeg, Canada**
3. **Jan Slezak Award for Excellence in Cardiovascular Sciences to Dr.Frantisek Kolar, Prague, Czech Republic**
4. **Bohuslav Ostadal Award for Excellence in Cardiovascular Sciences to Dr. Narcisa Tribulova, Bratislava, Slovak Republic**
5. **Distinguished Leadership Award in Cardiovascular Sciences to Dr. Tatiana Ravingerova, Brastislava, Slovak Republic**
6. **Distinguished Leadership Award in Cardiovascular Sciences to Dr. Jan Slezak, Bratislava, Slovak Republic**

Dragan M. Djuric Receives the Andras Varro Award for Excellence in Cardiovascular Sciences

Dr. Dragan M. Djuric

Dr. Dragan M. Djuric received his MD in 1987, MS in 1991 and PhD degree in 1993 from the School of Medicine University of Belgrade. He was research assistant (1989-1991), assistant (1991-1994), assistant professor (1994-1999) , associate professor (1999-2008) and is now a full professor of medical physiology at the School of Medicine University of Belgrade. He completed his postdoctoral training in Germany and USA (1998-202). He established PhD program in physiological sciences (2009) and is now a chairman of that program at the Belgrade University School of Medicine. From 1997-2000 he was chief at the Centre for Atherosclerosis and Vascular Biology in the Dedinje Cardiovascular Institute, Belgrade. In period 2006-2009 he was a director of the Institute of Medical Physiology "Richard Burian" at the School of Medicine University of Belgrade and is now a chair. He was co-founder of the Yugoslav Atherosclerosis Society (1998) and a president of the organizing committee of the first Yugoslav congress on atherosclerosis (2001). In 2006 he organized Belgrade satellite symposium of XIV International Symposium on Atherosclerosis. He also organized two congresses of physiological sciences with international participation in Serbia (2005 and 2009, respectively) and a few scientific meetings on nutrition and cardiovascular health. Recently, Dr. Djuric was awarded with Samuel Racz Medal and honorary member for the contribution in physiology from the Hungarian Physiological Society (2010); honorary member in the Bulgarian Society for Cell Biology (2009) and honorary member in the Romanian Society for Laboratory Medicine (2008). Dr. Djuric is serving on editorial boards in several journals. He was guest editor in a few special issues and also was invited for lectures many times at different institutions and meetings. Dr. Djuric has published more than 400 papers. His research interests include studies on the roles of homocysteine, gasotransmitters, oxidative stress and folic acid in blood flow, cardiac function and seizures.

Lorrie Kirshenbaum Receives the Howard Morgan Award for Distinguished Achievements in Cardiovascular Research

Dr. Lorrie Kirshenbaum

Dr. Lorrie Kirshenbaum's research is directed toward understanding the molecular mechanisms and signaling factors that influence cardiac cell death in the pathogenesis of ischemic heart disease and heart failure. His research includes studying the cellular factors that regulate cell metabolism and mitochondrial dynamics in genetically engineered mouse models of heart disease. Dr. Kirshenbaum's research has led to several important and seminal discoveries and was among the first labs to identify a role for apoptotic cell death in the heart during hypoxic injury. His lab also defined a role of certain Bcl-2 family members in the regulation of cardiac cell survival and cell death in the heart. Dr. Kirshenbaum's research resulted in the identification of the Bcl-2 protein Bnip3 (Bcl-2-Nineteen Interacting Protein 3) as a critical regulator of mitochondrial injury and cell death of cardiac myocytes during hypoxic injury. Dr. Kirshenbaum's lab demonstrated the Bnip3 is highly induced in cardiac myocytes during ischemic or hypoxic stress where it integrates and disrupts mitochondrial respiration. Indeed, the integration of Bnip3 into mitochondrial membranes disrupts complexes between UCP3 and cytochrome c oxidase on the mitochondrial inner membrane. Dr. Kirshenbaum further showed that defects on the inner mitochondrial membrane result in permeability transition pore opening and necrotic cell death of cardiac myocytes. These important findings provided the first evidence that defects on the inner result in necrotic cell death. Moreover, Dr. Kirshenbaum further identified an alternatively spliced form of Bnip3 that is highly expressed in cancer cells and in cardiac myocytes subjected to hypoxia. Notably, the spliced form of Bnip3 is activated during glycolysis by pyruvate dehydrogenase kinase (PDK). Interestingly, in contrast to Bnip3 which promotes cell death of cardiac myocytes, the spliced form of Bnip3 promotes cell survival. The work is highly original and demonstrates an important contribution to advancing the field by providing new insight into how Bcl-2 proteins regulate cell survival and cell death. Importantly, Dr. Kirshenbaum's lab has also demonstrated an important link between Bnip3 proteins and mitochondrial quality control processes involving autophagy/mitophagy. Interventions that modulate Bnip3 and related Bcl-2 proteins play a crucial role in cardiac cell autophagy and adverse cardiac remodeling following myocardial infarction. Dr. Kirshenbaum is also investigating the effects of the chemotherapy drug doxorubicin on mitochondrial injury and cell death. Collectively, Dr. Kirshenbaum's leadership and body innovative research has contributed significantly toward advancing the field and provide new avenues of future cardiovascular research.

Frantisek Kolar Receives the Jan Slezak Award for Excellence in Cardiovascular Sciences

Dr. Frantisek Kolar

Dr. Frantisek Kolar is a Professor of Physiology and Pathophysiology and Chair of the Department of Developmental Cardiology, Institute of Physiology of the Czech Academy of Sciences in Prague. He studied physiology at the Faculty of Science of the Charles University in Prague, where he graduated in 1977 and received PhD degree in 1985. Then he accepted a postdoctoral position at the Institute of Physiology, Czechoslovak Academy of Sciences in Prague, and underwent research training in cardiovascular physiology and biochemistry at the St. Boniface Research Centre in Winnipeg, Canada, the Catholic University of Louvain in Brussels, Belgium, and the University of Strathclyde in Glasgow, Scotland. During the 1990s, he was also frequently a Visiting Professor at the Department of Physiology, University of Ottawa, Canada. He was appointed Full Professor of Physiology and

Pathophysiology at the 2nd Faculty of Medicine, Charles University in Prague in 2005.

Dr. Kolar is a member of several societies including the International Society for Heart Research (serving as a Secretary of the European Section in 1998-2003), the International Society for Chronic Hypoxia, the Society for Experimental Biology and Medicine, and the International Academy of Cardiovascular Sciences (Council Member of the European Section). He is a member of the Council of the Institute of Physiology and a member of the Assembly of the Czech Academy of Sciences. He has also been involved in committees of the Czech Science Foundation and co-organized several national and international cardiological conferences. He currently serves as a Field Editor of Acta Physiologica since 2006 and editorial board member of Experimental Biology and Medicine and Physiological Research.

Dr. Kolar's early research concerned the role of skeletal muscle in catecholamine-induced thermogenesis. After joining the Institute of Physiology, his main research direction focused on early postnatal development of the heart with particular interest in cardiac contractile function, calcium handling and its humoral control. More recently, he became interested in cardiovascular effects of chronic hypoxia and its influence on myocardial tolerance to acute ischemia/reperfusion injury of normal and diseased hearts. He has characterized important roles of a number of molecules and signaling pathways involved in mechanisms of sustainable cardioprotection induced by adaptation to various modes of chronic hypoxia.

Dr. Kolar has published over 180 peer-reviewed papers, reviews and book chapters and is a co-author of one monograph. He received awards from the Czechoslovak Cardiological Society, the Czech Physiological Society, the Ministry of Health of the Czech Republic, the Slovak Academy of Sciences and the International Academy of Cardiovascular Sciences.

Narcisa Tribulova Receives the Bohuslav Ostadal Award for Excellence in Cardiovascular Sciences

Dr. Narcisa Tribulova

Dr. Narcisa Tribulova graduated from the Faculty of Life Sciences, Comenius University, Bratislava, Slovak Republic with Ph.D. and D.Sc. degrees. Since 1969, she has been a staff member of the Institute for Heart Research, Slovak Academy of Sciences, Bratislava. Her current position is as Head of the Research Team. Over the years she has been a visiting scientist and had collaborations with several international institutions including at the Institute of Cardiovascular Research, Berlin, Germany, Fukuoka University, Medical School, Fukuoka, Japan, Tel Aviv University, Medical School, Tel Aviv, Israel, Jikei University, Division of Cardiology, Tokyo, Japan, Max-Planck-Institute, Bad Nauheim, Germany and Bar-Ilan University, Faculty of Life Sciences, Ramat Gan, Israel.

Her current research interests include the cellular and molecular mechanisms involved in development of life-threatening cardiac arrhythmias, gap junction connexin-43 channels as a promising therapeutic target in prevention of sudden cardiac death, as well as role of cardio-protective drugs, natural products and endogenous compounds in modulation of myocardial Cx43-mediated cell-to-cell communication in diseased heart. Dr Tribulova and her team have published the findings indicating that impairment of intercellular coupling at gap junctions mediated by connexin-43 channels is involved in the pathogenesis of heart diseases and sudden cardiac death. Down-regulation and/or abnormal cellular distribution of Cx43 due to hypertension, hyperthyroidism, obesity or ageing, as well as acute dysfunction of Cx43 channels renders the heart prone to life-threatening arrhythmias. On the other hand, the up-regulation of myocardial Cx43 have been found in response to acute heart injury, e.g., due to irradiation or infarction and it was associated with protection of heart function. Original findings demonstrated antiarrhythmic effects of atorvastatin, omega-3 fatty acids, red palm oil and melatonin that can be attributed to up-regulation of myocardial Cx43 and attenuation of its abnormal distribution. Dr. Tribulova has published over 150 original research papers and review articles with a total citation of around 1500. She has supervised 17 pre- and post-graduated students. Dr. Tribulova is a member of several international organizations including International Society for Heart Research, European Society of Cardiology, European Heart Rhythm Society and the International Federation of Societies for Histochemistry and Cytochemistry.

Tatiana Ravingerova Receives the Distinguished Leadership Award in Cardiovascular Sciences

Dr. Tatiana Ravingerová

Dr. Tatiana Ravingerová is a distinguished scientist from the Slovak Republic with high recognition in the field of Cardiovascular Physiology and Experimental Cardiology graduated with distinction as a Doctor of Medicine from the Russian Medical University in Moscow and obtained her PhD degree in the subject of Normal and Pathological Physiology from the Comenius University, Bratislava, Slovakia in 1993. In 1978 she joined the Institute for Heart Research, Slovak Academy of Sciences in Bratislava, where she stays until present, being appointed Chair of the Department of Cardiovascular Physiology and Pathophysiology in 1998. Tatiana Ravingerová, Senior Scientist and Head of the Scientific board of the Institute for Heart Research SAS obtained her degree of Doctor of Medical Sciences (D.Sc.) from the Slovak Academy of Sciences in Bratislava in 2009.

During her scientific career she has established fruitful collaboration with many important institutions worldwide: Cardiovascular Research Laboratories, Pharmacology Group, King´s College, London, UK (Dr. M.J. Curtis), Department of Physiology and Pharmacology, University of Strathclyde, Glasgow, Scotland (Prof. J.R. Parratt), Institute of Medical Physics and Biophysics, University of Graz, Austria – Cooperation in Research and Education between Austria and Slovakia (Prof. B. Koidl), Bilateral Czech-Slovak Cooperation in Science and Technology, Institute of Physiology, AS of the CR, Prague, Czech Republic (Prof. F. Kolář), Slovak-Greek Cooperation in Science and Technology, Aristotle University of Thessaloniki, Thessaloniki, Greece (Prof. A. Lazou), Department of Medical Physiology, Institute of Medical Biology, University of Tromsoe, Tromsoe, Norway (Prof. K. Ytrehus) and Institute of Cardiovascular Sciences, St. Boniface General Hospital Research Centre, University of Manitoba, Winnipeg, Canada (Prof. N.S. Dhalla).

Research interests of Dr. Ravingerová have been focused mainly on the studies of ischemia-reperfusion injury, with particular regards to the mechanisms of malignant arrhythmias, endogenous mechanisms of cardioprotection and molecular mechanisms of cardiac adaptation. In her earlier experimental studies, Dr. Ravingerová has demonstrated a central role of free radicals and duration of ischemia in the genesis of reperfusion-induced arrhythmias that were considered as an index of the myocardial viability upon sustained ischemia. Further on, she has characterized different forms of short-term endogenous cardioprotection from the level of isolated patch-clamped cardiomyocytes, papillary muscles, isolated heart preparations up to the level of the in vivo animals. She has shown the efficiency of ischemia-, hypoxia- and pharmacologically induced preconditioning and its delayed second phase conferred by pretreatment of animals in vivo and in vitro preparations with catecholamines, prostacyclin, mitoK(ATP) opening and by hypolipidemic drugs, statins, associated with enhanced PPAR gene expression. She has also demonstrated the role of alpha1-adrenergic stimulation, NO and ROS signalling in the early phase of preconditioning, as well signalling via "survival" cascades: ERK1/2 cascade of MAPK and PI3K/Akt with differential effects of the latter on antiinfarct and antiarrhythmic protection.

Main contributions of Dr. Ravingerová in the field of long-term cardioprotection are related to the studies of the infarct size-limiting effect of adaptation by chronic hypobaric hypoxia and the role of pro-survival mechanisms. Recently, most important contributions are related to the phenomenon of an increased resistance to ischemia in the experimental models of the diabetic heart that may be considered as an alternative metabolic form of preconditioning, similar to preconditioning in the non-diabetic myocardium. Mechanisms of this paradoxically enhanced resistance to I/R injury in the diabetic heart that is blunted by concurrent hypercholesterolemia involve activation of the similar intracellular pathways.

She has published 135 full text scientific papers in recognized international journals and book chapters and her papers obtained more than 450 scientific citations. She often serves as a member of the Organizing and Programme Committies and a Faculty member at the important international meetings in the field of cardiovascular sciences including those organized under the auspicies of the IACS or the ISHR worldwide, meetings of the Czech-French-Slovak cardiologists and New EU members, annual bilateral scientific meetings of the Czech and Slovak experimental cardiologicts and physiologists. Dr. Ravingerova also serves as a member of boards or stirring committees in several scientific societies and associations. In the years 1999-2005 she served as a Council member of the European Section of the ISHR, a representative of the Slovak Academy of

Sciences in the European Science Foundation (2001-2004) and is a Member of the Experts panel of the ESF (2001- till present) and a Member of the Commission for Medical and Pharmaceutical Sciences of the Grant Agency of the Slovak Republic.

Dr. Ravingerova has also been continuously teaching cardiovascular physiology at the Comenius University in Bratislava and Slovak Medical University and actively participates in the training programs for pregraduate and, in particular, PhD students at the Faculty of Medicine, Faculty of Pharmacy, Faculty of Natural Sciences, Comenius University in Bratislava and Faculty of Science, Pavol Jozef Safarik University in Kosice, as well as in supervision and mentorship of foreign students (India, Ethiopia, Greece) and organizing international networking of young scientists. She also serves as an international reviewer in the Evaluation Committees for PhD defense procedures abroad.

She also serves as a journal referee for British Journal of Pharmacology; Basic Research in Cardiology; Experimental and Clinical Cardiology; Molecular & Cellular Biochemistry; Canadian Journal of Physiology & Pharmacology; Physiological Research; General Physiology & Biophysics, European Journal of Pharmacology, and is a member of the Editorial boards of several scientific journals. For her achievements and services in science Dr. Ravingerova has been bestowed with several awards from the international and national scientific institutions, e.g., Award of Merit of the ISHR-European Section, Prize of The Physiological Society (UK), Medal and Prizes from the Slovak Society of Cardiology and Slovak Society of Cardiology.

Jan Slezak Receives the Distinguished Leadership Award in Cardiovascular Sciences

Dr. Jan Slezak

Dr. Jan Slezak recieved his M.D. Degree in 1963 from the Medicine Comenius Univiversity, Bratislava, Czechoslovakia and completed his Ph.D. in 1968 at the same institute. He received D.Sc. degree in 1984 in Functional Morphology from the University of Safarik, Kosice, Czechoslovakia. Dr. Slezak became Associate Professor in 1990 and Full Professor of Physiology at Comenius Univiversity since 1996. He became a Fellow of the IACS in 2002. He is currently head of the Department of Histochemistry and Electron Microscopy, Institute for Heart Research, Slovak Academy of Sciences and Vice-rector of the Slovak Medical University in Bratislava since 2010.

Dr. Slezak was the Vice-rector of Slovak Medical University from 2010-2014 and First Vice-President of Slovak Academy of Sciences Bratislava from 1998 to 2009. He was also the Director and Chairman of the Institute for Heart Research, Slovak Academy of Sciences, Bratislava, Slovak Republic from 1988 to 1998. From 1978 to 1988, Dr. Slezak was Deputy Director of the Institute of Experimental Surgery, Slovak Academy of Science, Bratislava, Czechoslovakia.

Dr. Slezak has been a visiting Professor for several times at many different institutes including, Institute of Cardiovascular Sciences, St. Boniface Hospital Research Centre during 1990 to 1998, at the Department of Cardiothoracic Surgery and Department of Pathology, Mount Sinai School of Medicine, New York, USA (1979-1986) and at the Department of Anatomy, University of California, Los Angeles, USA (1970-1972). From 1991 to 2011, Dr. Slezak was the President of the Slovak League for Prevention and Treatment of Cardiovascular Diseases as well as President of the Slovak Histochemical and Cytochemical Society (President 1990-2000). Since 1971, his research interests have been primarily involved in a national cardiovascular research projects, and has been carrying out research into experimental and/or molecular cardiology.

He has been involved in basic academic research problems, such as artificial circulation and heart transplantation with special emphasis on the study of histochemical, cytochemical, immunocytochemical and ultrastructural changes in the myocardium under various experimental conditions e.g. ischemia and reperfusion injury, calcium paradox, adaptation of the myocardium to ischemia, efect of radiation on cardivascular system and prevention of its adverse effect, molecular hydrogen effect and treatment. His teaching specialaities are in the fields of morphology, histochemistry, electron microscopy, physiology, pathophysiology, experimental and/or molecular cardiology and has trained/supervised 22 Ph.D. students.

Dr. Slezak has received almost 60 Domestic and international honours and awards; including the Gold Medal of Slovak Academy of Sciences (2005), 1st price of Academy of Education for popularization of science (2005), Gold Medal of University of Constantine Philoshopher for Scientific Achievements in Medical Sciences (2006), President of Slovakia – Presidental State Award of Slovak Republic – 1st Class Ľudovít Štúr Order (2006), Doctor Honoris Causa (Dr.h.c.) from the Žilina University (2008), Great Medal of Mikovíni for lifetime achievement in science and technology from the Minister of Education, Slovak Republic, Medal of Merit, Institute of Cardiovascular Sciences, ISHR (2001), Honorary Citizen of the City of Winnipeg, Canada (2001), IACS Norman Alpert Award for Established Investigators in Cardiovascular Sciences (2002), Institute of Cardiovascular Sciences Vincenzo Panagia Distiguished Lecturer Award (2011), IACS Distinquished Leadership Award in Cardiovascular Sciences (2014), IACS Naranjan Dhalla Award for Innovative Investigators in Cardiovascular Sciences (2015) and Medal for Outstanding Contributions to the IACS (2015). Dr. Slezak has over over 550 publications as full length papers in journals, book chapters and proceedings with more than 3,000 citations. He has been an invited symposia speaker for national and international meetings over 50 times. Dr. Slezak is/has been council member/fellow of several organizations including IACS, ISHR, Slovak Cardiological Society, Slovak Physiological Society and serves on the editorial board of several international journals including Canadian Journal of Cardiology, Canadian Journal of Physiology and Pharmacology, General Physiology and Biophysics (Field Editor) and The Histochemical Journal.

Officers of Different Sections of the Academy

IACS – North America	**President**:	Gary Lopaschuk, Edmonton, Canada
	Vice President:	Michael Czubryt, Winnipeg, Canada
	Past President:	Grant Pierce, Winnipeg, Canada
	Secretary General:	Dinender K. Singla, Orlando, USA
IACS – Europe	**President**:	Andras Varro, Szeged, Hungary
	Vice President:	Tatiana Ravingerova, Bratislava, Slovak Republic
	Vice President:	Danina Muntean, Timisoara, Romania
	Past President:	Karl Werdan, Halle, Germany
	Secretary General:	Istvan Baczko, Szeged, Hungary
IACS – India	**President:**	Chandrasekharan Kartha, Trivandrum, India
	Vice President:	Ramesh K. Goyal, New Delhi, India
	Vice President:	Ajit S. Mullasari, Chennai, India
	Past President:	Suresh K. Gupta, New Delhi, India
	Secretary General:	Surya Ramachandran, Trivandrum, Kerala
IACS – South America	**President:**	Otoni Gomes, Belo Horizonte, Brazil
	Vice President:	David Brasil, Belo Horizonte, Brazil
	Past President:	Ricardo Gelpi, Buenos Aires, Argentina
	Secretary General:	Elaine Maria Gomes Freitas, Belo Horizonte, Brazil
IACS – Japan	**President:**	Naoki Makino, Beppu, Japan
	Hon. Life President:	Makoto Nagano, Tokyo, Japan
	Secretary General:	Atushi Takeda, Tokyo, Japan

IACS European Section Honoured Ger Stienen with 2018 Naranjan S. Dhalla Honorary Lecture Award

Dr. Ger Stienen

The European Section of the IACS presented a medal to Dr. Ger Stienen for the 2018 Naranjan S. Dhalla Honorary Lecture Award in Smolenice, Slovakia, during their annual meeting held in May 23 - 26, 2018.

Dr. Ger Stienen received his M.S. degree in Experimental Physics at the Radboud University in Nijmegen in 1975. In 1981 he received his Ph.D. degree in Physiology and worked from 1975 until 1985 as Research fellow/postdoc at the Department of Physiology of the University of Amsterdam (UvA). In 1985 he became staff member at the Laboratory for Physiology at VU University Medical Center in Amsterdam. Since 2006 he is Professor in Medical Physiology at VUmc/VU. He is Visiting Professor at the Institute of Biomedical Research, Manchester Metropolitan University in Manchester (U.K.) and at the Department of Human Anatomy and Physiology of the University of Padua (Italy). From 2009 until 2013 he has been Program Director of the Cardiovascular Research Master of VUmc. His current research interests are on the origins of the alterations in contractile properties and energy utilisation by the mitochondria of cardiac muscle cells during heart failure; origin of skeletal muscle weakness resulting from alteration in cytoskeletal muscle proteins. From 1996 to 2004, Dr. Stienen was Chairman European Society for Muscle Research; he has been Treasurer of the European Society for Muscle Research since 2004 and was Editor-in-Chief of the Journal of Physiology.

He is a member of the Nederlandse Fysiologen Vereniging; Physiological Society, UK; Nederlandse Vereniging voor Biofysica; Biophysical Society, USA; European Society for Muscle Research; American Heart Association and of the European Society for Cardiovascular Research. Dr. Stienen has received several honors and awards including member of the external evaluation committee, Department of Human Anatomy and Physiology, University of Padua, Italy (2005); Secretary of the external evaluation committee, Institute for Fundamental and Clinical Movement Studies (2007) and in 2013 received an Honorary Doctorate from the University of Debrecen, Hungary. Dr. Stienen has been organizer and chairman of Sessions of various International Conferences.

Photo of the 2018 Prof. Naranjan S. Dhalla Honorary Lecture Medal presented to Dr. Ger Stienen

Report on the 6th Annual Meeting of the International Academy of Cardiovascular Sciences: North American Section Havana, Cuba, June 5-8, 2018

By: Dr. Paramjit S. Tappia
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Following up on the last 5 annual meetings of the North American Section of the International Academy of Cardiovascular Sciences (Louisville, Winnipeg, Omaha, Sherbrooke and Orlando), the 6th Annual Meeting of the International Academy of Cardiovascular Sciences (IACS) North American Section was held June 5th – 8th, 2018 jointly with the Central American and Caribbean Society of Cardiology and the Cuban Society of Cardiology. The meeting site was the Havana International Convention Centre, Havana, Cuba. The meeting brought together, both young and established cardiologists and scientists to learn of advances in the field. Invited speakers and delegates were from across North America, Central America, South America, Europe and the Caribbean. The conference began with the inaugural ceremony followed by 2 keynote addresses by Dr. Valentin Fuster (New York, USA) and Dr. David Wood (London, U.K.). Dr. Fuster spoke about the new frontiers in health and the connection between the heart and the brain, while Dr. Wood spoke about the global challenges for prevention of cardiovascular disease. The evening concluded with a welcome reception and dinner in the restaurante "El Bucán" in the Convention Centre. The scientific program of the IACS conference consisted of 12 named symposia and 2 young investigator award competitions in honor of Drs. Roberto Bolli and Gary Lopaschuk, and began on Wednesday, June 6th with the following sessions.

Delegates at the opening plenary lecture

Dennis B. McNamara Symposium on the Metabolic Basis of Heart Disease

Drs. Carlos Fernandez-Patron (Edmonton, Canada) and Jeff Wigle (Winnipeg, Canada) co-chaired this scientific session which began with a presentation by Dr. Naranjan S. Dhalla (Winnipeg, Canada) on the role of lysophosphatidic acid in the pathogenesis of hypertension. The second presenter of the session was Dr. Srinivas Tipparaju (Orlando, USA). He presented on the topic of myocardial redox regulation during diabetes and its contribution to the development of cardiomyopathy. The session concluded with a talk by Dr. Harpal Buttar (Ottawa, Canada). He provided an overview on healthy dietary habits, as well as the impact of weight, exercise and smoking on the risk of cardiovascular disease.

James Willerson Presidential Symposium on the Molecular Basis of Cardiac Electrical Activity

Drs. Martin Morad (Charleston, USA) and Andras Varro (Szeged, Hungary) served as co-chairs for this session. The session began with a talk entitled "Creation of human cardiomyocytes expressing catecholaminergic polymorphic ventricular tachycardia (CPVT1) associated RyR2 mutations using CRISPR/Cas9 gene editing". This was followed by a very interesting presentation by Dr. James Weiss (Los Angeles, USA) on a novel gene therapy approach involving "stabilizer cells" for the treatment of cardiac arrhythmias. Dr. Ghassan Bkaily from Sherbrooke, Canada finished this session speaking on ionic homeostasis and the NaH exchanger in cardiac pathologies.

Norman Alpert Symposium on Impacting Cardiovascular Disease

This session was chaired by Drs. Suresh Tyagi (Louisville, USA) and Zam Kassiri (Edmonton, Canada) and began with an interesting talk on the development of a cardiac intraoperative medical imaging system by Dr. Bram Ramjiawan (Winnipeg, Canada). This was followed by a presentation by Dr. Delfin Rodriguez Leyva (Holguin, Cuba), who reviewed the use of new oral

anticoagulants for stroke prevention in patients with atrial fibrillation. The next speaker of the session was Dr. Suresh Tyagi. He spoke about 1-carbon metabolism and epigenetics in the microbiome as a mechanism of cardiovascular remodeling and for a personalized medicine approach for diseases. The session closed with a talk by Dr. Belma Turan (Ankara, Turkey) on the role of cellular zinc in cardiac function under hyperglycemic conditions and particularly providing a new insight for prevention/therapy of heart failure in diabetes.

Canadian Journal of Physiology and Pharmacology Symposium on Heart and Vascular Failure

Drs. Ghassan Bkaily and Pedro D'Orleans-Juste, both from Sherbrooke, Canada co-chaired this session, which began with a talk by Dr. Bkaily on intracellular sodium homeostasis as a novel target for the prevention of Duchenne muscular dystrophy and subsequent heart and vascular failures. Next was Dr. Grant N. Pierce (Winnipeg, Canada) who spoke about the results from clinical trials that demonstrated dietary flaxseed is able to modulate oxylipins in conditions of cardiovascular disease as well as the relationship between specific oxylipins with aging, inflammation and hypertension. This was followed by a presentation by Dr. Paramjit S. Tappia (Winnipeg, Canada) on the fetal origins of adult heart disease; specifically he spoke about the role of prenatal low protein diet and programming of cardiac dysfunction in postnatal life. The session concluded by a presentation by Dr. D'Orleans-Juste entitled "Chymase dependent cardiovascular response to central or systemic administered ET-1". He spoke about the pivotal role of ET-1 and serine proteases on cardiovascular pathologies.

Young Investigator Competitions

In addition to the series of conference symposia, 2 young investigator competitions were conducted to highlight and encourage the exceptional work conducted among graduate students, fellows and residents working within the field of cardiovascular sciences. The 2 competitions were as follows:

Gary Lopaschuk Young Investigator Competition

The chairpersons for this competition were Dr. Peter Backx (Toronto, Canada) and Dr. James Weiss (Los Angeles, USA). The first contestant was Anthony Cannavicci (Toronto, Canada) and he spoke about the characterization of microRNAs in early endothelial progenitor cells and peripheral blood mononuclear cells from hereditary hemorrhagic telangiectasis patients. This was followed by a presentation by Mihir Parikh (Winnipeg, Canada) on the effects of dietary flaxseed and its various components on heart function and MI induced arrhythmias in rat model of myocardial infarction. The third competitor, Pedro Manuel Collazo Rodriguez (Havana, Cuba) spoke about the design and validation of a prognostic/predictive index for determining the risk of recurrence of paroxysmal atrial fibrillation. This session closed with a talk by Glen Sequiera (Winnipeg, Canada) on the feasibility of employing induced pluripotent stem cells to provide stable *in vitro* models that directly mimic multisystemic mitochondrial disorders in humans.

Roberto Bolli Young Investigator Competition

Drs. Martin Morad (Charleston, USA) and Gary Lopaschuk (Edmonton, Canada) served as co-chairs for this young investigator competition. The first speaker was Ayelen Rodriguez-Portelles (Holguin, Cuba) who gave a talk on endothelial and diastolic dysfunction in young smokers, which was followed by Aleksandra Stamenkovic (Winnipeg, Canada) who spoke about the mechanisms of oxidized phosphatidylcholine induced cardiomyocyte cell death during ischemia-reperfusion and its potential as a novel approach for the treatment of ischemia-reperfusion injury. The next contestant in this competition was Daniel Szulc (Toronto, Canada) who presented on a novel method for local delivery of protein and gene-based drugs. This session finished with a presentation by Raghu S. Nagalingam (Winnipeg, Canada) on the attenuation of cardiac fibrosis and restoration of function through genetic deletion of scleraxis in a mouse model of pressure overload induced by transverse aortic constriction.

The scientific program for the day ended upon completion of the young investigator competitions. The second day of the conference began Thursday, June 7th with the following sessions.

Grant N. Pierce Symposium on Electrical Activity of the Heart

The chairpersons for this session were Drs. Bram Ramjiawan and Belma Turan. The symposium began with a talk by Dr. Antoinette Blackman (Belo Horizonte, Brazil). She spoke about the impact of grade 1 left ventricular diastolic dysfunction on dynamic parameters of ventricular repolarization. This was followed by a presentation by Dr. Robert G. Tsushima (Toronto, Canada) on the role of the phosphatidylinositol-3-kinase-Akt-glycogen synthase kinase 3 pathway in eliciting ischemic preconditioning in the myocardium, which was followed by a talk by Dr. Peter Nánási ((Debrecen, Hungary). He spoke about the calcium-activated chloride current in both canine and human ventricular myocytes. The session concluded with a presentation by Dr. Andras Varro on the restitution of the action potential as an important contributor to the antiarrhythmic properties of antiarrhythmic drugs.

Howard Morgan Symposium on Critical Balance Between Wound Healing and Fibrosis

This session was opened by chairpersons, Dr. Michael Czubryt (Winnipeg, Canada) and Dr. Merry Lindsey

(Jackson, Canada). The first speaker introduced was Dr. Michael Czubryt. He presented on the role of scleraxis in regulating wound repair in the heart as well as other tissues and that excessive scleraxis expression tips the balance toward fibrosis. This was followed by a presentation by Dr. Zam Kassiri. She spoke about novel functions of Tissue Inhibitor of Metalloproteinases (TIMPs) in fibrosis as well as cardiac remodeling. Dr. Merry Lindsey then spoke about the role of fibroblasts in post-MI left ventricular remodeling and future directions to further advance fibroblast biology. The final talk in this session was by Dr. Carlos Fernandez-Patron on the emerging role of matrix metalloproteinases (MMPs) as major modulators of inflammation and systemic metabolism.

Naranjan S. Dhalla Symposium on Newer Understanding of the Pathogenesis and management of Heart Failure

Drs. Dinender Singla (Orlando, USA) and Pawan Singal (Winnipeg, Canada) were co-chairs for this session, which began with a talk by Dr. Singal. He spoke about the role of IL-10 stimulation through TLR4 signaling which initiates IRAK-4 dissociation into IRAK-1, a potentially important therapeutic approach in restoring protection against ischemia-reperfusion injury. This was followed by a presentation by Dr. Singla on inflammation-induced cell death (pyroptosis) in doxorubicin-induced heart failure. Dr. Marek Michalak (Edmonton, Canada) then spoke about the identification of ER/SR associated proteins that could serve as novel pharmacological targets for control of cardiac muscle stress response to improve cardiac function and prevent cardiac pathology. The final talk of the session was by Dr. Ren-Ke Li (Toronto, Canada). He spoke about a novel technique for enriching aged bone marrow with young stem cells to increase regenerative capacity and restoration of tissue function and repair.

Makoto Nagano Symposium on Basic Biology and Clinical Application of Circulating Angiogenic Cells

Drs. Michael J.B. Kutryk (Toronto, Canada) and Marek Michalak co-chaired this session, which began with a talk by Dr. Kutryk. He described the design as well as the potential of the investigator initiated trial of enhanced cell therapy (ENACT) for acute myocardial infarction. Next in line was a talk by Dr. Sanjiv Dhingra (Winnipeg, Canada) on allogenic stem cell therapy for cardiac regeneration. This was followed by a presentation by Dr. Qiuwang Zhang (Toronto, Canada) on the role of endoglin in miRNA dysregulation in endothelial cells and abnormal cell function. Dr. Jeff Wigle then gave the final presentation in this session. He spoke about the cardiovascular effects of a polyphenol (cyanidin 3-0-glucoside) derived from blueberries and blackberries in different models of cardiovascular disease.

With the closing of this session, the scientific program for the day ended. The third day of the conference began Friday, June 8th with the following sessions.

Bohuslav Ostadal Symposium on Life and Death in the Heart

The chairpersons for this session were Drs. Lorrie Kirshenbaum (Winnipeg, Canada) and Maha Abdellatif (Newark, USA). This session began with a talk by Dr. John McDermott (Toronto, Canada) on gene transcription networks involved in heart failure that have the potential for disease diagnosis and targets for therapeutic interventions for heart failure. This was followed with a talk by Dr. Abdellatif on the interdependence of transcription and metabolism in cardiac hypertrophy. Dr. Kirshenbaum then spoke about how abrogation of Bnip3 (a death protein) activity by ellagic acid suppresses mitochondrial injury and necrotic cell death and thus may provide a therapeutic approach during anthracycline treatment.

Andras Varro Symposium on Metabolism in Cardiovascular Disease

This final session of the conference was chaired by Drs. Gary Lopaschuk (Edmonton, Canada) and Dr. Delfin Rodriguez Leyva, which opened with a talk by Dr. Lopaschuk. He spoke about how increased ketone oxidation provides additional energy for the failing heart without improving cardiac efficiency. This was followed with a talk by Dr. Peter H. Backx (Toronto, Canada) on how inhibition of phosphodiesterase 3 attenuates pressure overload-induced cardiac dysfunction and remodeling in mice. The final speaker was Dr. John Seubert (Edmonton, Canada) who spoke about novel epoxy lipids and how they can protect mitochondria from ischemic injury.

IACS Award Presentations

The President of the North American Section of the IACS, Dr. Grant Pierce, presided over the Young Investigator awards. Each of the finalists of the Gary

Finalists of the Roberto Bolli Young Investigator Competition

Finalists of the Gary Lopaschuk Young Investigator Competition

Presentation of the Grant Pierce Award to Dr. Suresh Tyagi. L to R: Drs. Andras Varro, Suresh Tyagi and Grant Pierce

Lopaschuk Young Investigator competition and Roberto Bolli Young Investigator Competition were presented with a certificate as well as honorarium from Dr. Lopaschuk. Each of the 8 finalists had already won $500 to partially cover travel expenses. Dr. Dhalla then presented the Dr. Grant Pierce Award for Excellence in Cardiovascular Sciences to Dr. Suresh Tyagi. Dr. Dhalla

Presentation of the James Willerson Award to Dr. James Weiss; L to R: Drs. Grant Pierce, James Wiess and Andras Varro and Naranjan S. Dhalla

Presentation of the Lifetime Achievements Award to Dr. Grant Pierce; L to R: Drs. Andras Varro, Grant Pierce, and Naranjan S. Dhalla

continued with the IACS award presentations with Dr. James Weiss receiving the James Willerson Award for Excellence in Cardiovascular Sciences, Dr. Lorrie Kirshenbaum receiving the Established Investigator in Cardiovascular Sciences and Dr. Grant Pierce receiving the Lifetime Achievement Award in Cardiovascular Science, Medicine and Surgery. This part of the awards presentations culminated with the induction of the Incoming President of the IACS North America Section, Dr. Gary Lopaschuk as well as announcement of his Vice-President, Dr. Michael Czubryt.

Presentation of the Norman Alpert Award to Dr. Lorrie Kirshenbaum. L to R: Drs. Grant Pierce, Lorrie Kirshenbaum, Andras Varro and Naranjan S. Dhalla

Closing Ceremony and Farewell Lunch

The conference ended with an elegant closing ceremony. Closing remarks were given by Dr. Eduardo Rivas Estany, President of the Cuban Society of Cardiology; Dr. Grant Pierce, President IACS North American Section and by Dr. Naranjan S. Dhalla, Honorary Life President of the IACS. Dr Rivas announced there were over 750 attendees at the meeting including over 280 foreign delegates in attendance. In addition, the IACS

Presentation of the Distinguished Leadership Award to Dr. Eduardo Rivas-Estany. L to R: Drs. Grant Pierce, Eduardo Rivas-Estany and Naranjan S. Dhalla

Distinguished Service Awards were presented by Dr. Pierce to Dr. Estany and Dr. Rodriguez Leya. Dr. Pierce followed this with the announcement of the young competition award winners. The recipient of the Gary Lopaschuk Young Investigator Award was Anthony Cannavicci from Toronto, Canada and the winner of the Roberto Bolli Young Investigator Award was Ayelen

Presentation of the Distinguished Service Award to Dr. Delfin Rodriguez-Leyva; L to R: Drs. Grant Pierce, Delfin Rodriguez-Leyva, and Naranjan S. Dhalla

Rodriguez-Portelles from Holguin, Cuba. During this ceremony, Dr. Estany also presented Lifetime Achievement Awards, on behalf of the Cuban Society of Cardiology to Dr. Naranjan Dhalla, Dr. Grant Pierce, Dr. Lorrie Kirshenbaum, Dr. Pawan Singal and Dr. Bram Ramjiawan. At the end, all delegates were invited to the farewell lunch in the restaurante "El Bucán" in the Convention Centre with music and dancing to one of Cuba's most famous bands. These celebrations brought to a conclusion what was a highly successful, well organized and attended meeting in one of the Caribbean's most exciting and unique countries.

Presentation of the Gary Lopaschuk Young Investigator Award to Anthony Cannavicci (middle); flanked by Drs. Grant Pierce (left) and Gary Lopaschuk (right)

Presentation of the Roberto Bolli Young Investigator Award to Ayelen Rodriguez-Portelles (middle); flanked by Drs. Grant Pierce (left) and Gary Lopaschuk (right)

Academy Presents Distinguished Achievements, Leadership and Service Awards

The following seven awards were presented during the North American Section meeting of the IACS in Havana, Cuba, June 5-8, 2018:

1. **Norman Alpert Award for Established Investigators in Cardiovascular Sciences to Dr. Lorrie Kirshenbaum**
2. **Naranjan Dhalla Award for Innovative Investigators in Cardiovascular Sciences to Dr. Andrew Marks**
3. **Lifetime Achievement Award in Cardiovascular Science, Medicine and Surgery to Dr. Grant Pierce**
4. **Distinguished Leadership Award in Cardiovascular Sciences to Dr. Eduardo Rivas-Estany**
5. **Distinguished Service Award in Cardiovascular Science, Medicine and Surgery to Dr. Delfin Rodriguez-Leyva**
6. **Grant Pierce Award for Excellence in Cardiovascular Sciences to Dr. Suresh C. Tyagi**
7. **James Willerson Award for Excellence in Cardiovascular Sciences to Dr. James Weiss**

Lorrie Kirshenbaum Receives the Norman Alpert Award for Established Investigators in Cardiovascular Sciences

Dr. Lorrie Kirshenbaum

Dr. Lorrie Kirshenbaum is the Director of the Institute of Cardiovascular Sciences, Albrechtsen Research Centre, St. Boniface Hospital. He is principal investigator of Cardiac Gene Biology, Institute of Cardiovascular Sciences, Albrechtsen Research Centre, St. Boniface Hospital, and Professor, Department of Physiology and Pathophysiology, University of Manitoba. He holds a Canada Research Chair in Molecular Cardiology. Dr. Kirshenbaum is also currently the Director of Research Development College of Medicine, University of Manitoba. His research is setting the stage for the use of gene therapy in the treatment of cardiovascular diseases and is supported by a Foundation grant from the Canadian Institutes of Health Research, the Heart and Stroke Foundation of Canada, and the St. Boniface Hospital Foundation. Dr. Kirshenbaum is a Fellow of the International Academy of Cardiovascular Sciences, International Society for Heart Research, American Heart Association and Canadian Academy of Health Sciences. For most of the last 20 years, Dr. Kirshenbaum has been engaged in determining ways to keep heart cells alive and to prevent heart failure by preventing Bnip3 from turning on in the first place. He has published well over 120 papers and received several national and international honors and awards including the University of Manitoba 2018 Distinguished Alumni Award Recipient for Professional Achievement as a cardiovascular pioneer.

Andrew Marks Receives the Naranjan Dhalla Award for Innovative Investigators in Cardiovascular Sciences

Dr. Andrew R. Marks received his undergraduate degree from Amherst College where he was the first student in the history of the college to graduate with honors in two subjects (Biology and English), and his M.D. from Harvard Medical School. Following an internship and residency in internal medicine at the Massachusetts General Hospital (MGH), he was a post-doctoral fellow in molecular genetics at Harvard Medical School, and then a clinical cardiology fellow at the MGH. He is board certified in internal medicine and in cardiology. Dr. Marks is Chair and Professor of the Physiology and Cellular Biophysics Department at Columbia University.

Dr. Andrew Marks

From 2002-2007 Dr. Marks was Editor-in-Chief of the Journal of Clinical Investigation. His honors include: ASCI, AAP, the National Academy of Medicine (2004), American Academy of Arts and Sciences (2005) and the National Academy of Sciences (2005). Doctor of Science Honoris Causa from Amherst College (2009), Docteur Honoris causa, del'Université de Montpellier (2016), the ASCI Stanley J. Korsmeyer Award (2010), the Pasarow Foundation Award for Cardiovascular Research (2011) and the Ellison Medical Foundation Senior Scholar in Aging Award (2011), Glorney-Raisbeck Award from NY Academy of Medicine (2016). In 2015 Dr. Marks was chosen to present the Ulf von Euler lecture at the Karolinska Institute. Dr. Marks' identification of the mechanism of action of rapamycin's inhibition of vascular smooth muscle proliferation and migration lead to the development of the first drug-eluting stent (coated with rapamycin) for treatment of coronary artery disease. This substantially reduced the incidence of instent restenosis. In 2014 Dr. Marks reported the high resolution structure of the mammalian type 1 ryanodine receptor/calcium release channel (required for excitation-contraction coupling in skeletal muscle) which he had cloned and worked on since 1989. His research has contributed new understandings of fundamental mechanisms that control muscle contraction, heart function, lymphocyte activation, and cognitive function. He discovered that "leaky" intracellular calcium release channels (ryanodine receptors) contribute to heart failure, fatal cardiac arrhythmias, impaired exercise capacity in muscular dystrophy, post-traumatic stress disorder (PTSD) and Alzheimer's Disease. Dr. Marks discovered a new class of small molecules (Rycals), developed in his laboratory, that target leaky ryanodine receptor channels and effectively treat cardiac arrhythmias, heart failure, muscular dystrophy and prevent stress induced cognitive dysfunction and symptoms of Alzheimer's Disease in pre-clinical studies. Rycals are now in clinical trials for the treatment of heart failure and cardiac arrhythmias, and entering clinical trials for the treatment of Duchenne Muscular Dystrophy.

Grant Pierce Receives the Lifetime Achievement Award in Cardiovascular Science, Medicine and Surgery

Dr. Grant Pierce

Dr. Grant N. Pierce completed postdoctoral training at UCLA before returning to Canada where he is Executive Director of Research at St Boniface Hospital and a Professor of Physiology and Pathophysiology at the University of Manitoba in Winnipeg. He has published over 200 peer reviewed research manuscripts and 7 textbooks on metabolism, nutrition and cardiovascular health. He has been cited over 8000 times with a Google Scholar H index of 53. He just completed a 13 year term as the Editor of the Canadian Journal of Physiology and Pharmacology. He recently received the Queen Elizabeth II Diamond Jubilee Medal for service to Canada and is an elected Fellow of the Royal Society of Canada, the highest distinction for a scientist in Canada.

Eduardo Rivas-Estany Receives the Distinguished Leadership Award in Cardiovascular Sciences

Dr. Eduardo Rivas Estany received his M.D. degree from the Faculty of Medicine, University of Havana, Cuba, 1969 and his Doctorate degree in Medical Science in 1989 from the same institute. He is a Senior Researcher, Institute of Cardiology, Ministry of Public Health, Cuba and Cardiologist at the Institute of Cardiology and Cardiovascular Surgery, Havana. Dr. Estany is Professor of Cardiology, at the Superior Institute of Medical Sciences, Fajardo Faculty, University of Havana, Cuba. He has been the Director of the Cardiac Rehabilitation

Dr. Eduardo Rivas Estany

Center, Institute of Cardiology & Cardiovascular Surgery of Havana as well as President of the Cuban Society of Cardiac Rehabilitation. He is currently the President of the Cuban Society of Cardiology. His research interests include cardiac rehabilitation, heart failure, left ventricular dysfunction, pulmonary vascular hypertension and exercise training. In 2010, Dr. Estany was elected President of the "Friends of the Heart around the World" Society, in recognition of his dedication in this field and extensive to Cuban cardiology. Dr. Estany is a member of several national and international societies/organizations including the Scientific Council of the National Institute of Cardiology and Cardiovascular Surgery, the Panamerican Society of Cardiology, the European Society of Cardiology, the Working Group of Cardiac Rehabilitation of the European Society of Cardiology, the Working Group of Epidemiology and Prevention of the European Society of Cardiology, the Scientific Council of the Section of Rehabilitation of Cardiac Patients, World Heart Federation, the National Working Group of Cardiology, Ministry of Public Health, Cuba, the American Association of Cardiovascular and Pulmonary Rehabilitation as well as honorary member of the Venezuelan Society of Cardiology, the Argentine College of Cardiology, the Mexican Association of Cardiovascular and Pulmonary Rehabilitation. Dr. Estany has presented at over 100 international cardiology scientific meetings and more than 150 scientific presentations at national conferences. He has published over 100 scientific articles in national or international medical journals, 4 publications in books as editor or author of chapters. Dr. Estany is also on the Editorial Board of the Intercontinental Journal of Cardiology, Panama and the Cuban Journal of Cardiology and Cardiovascular Surgery.

Delfin Rodriguez-Leyva Receives the Distinguished Service Award in Cardiovascular Science, Medicine and Surgery

Dr. Delfin Rodriguez-Leyva

Dr. Delfin Rodriguez-Leyva was born in Holguin, Cuba, obtained a Bachelor in Sciences Degree at Pre-University on Exact Sciences Institute “Jose Marti” in Holguin, Cuba, and graduated from the Faculty of Medical Sciences “Mariana Grajales Coello” and Higher Institute of Medical Sciences of Santiago de Cuba with a MD in 1996. He completed a residency in Cardiology at the University of Medical Sciences of Holguin from 1996-2000. Subsequently, he completed his Ph.D (cardiovascular medicine) at the Higher Institute of Medical Sciences of Havana, Cuba. In 2004 he received a Second Degree Specialization in Critical Medicine. Dr. Rodriguez joined the Section of Cardiology, Department of Internal Medicine, Faculty of Medicine at the University of Medical Sciences of Holguin in 2000. From 2000 to 2015 he was faculty member as assistant and associate professor of Internal Medicine. In 2015, Dr. Rodriguez was appointed as Professor of Internal Medicine and Critical Care Medicine. Also in 2015, Dr. Rodriguez was appointed as Associated Professor of the Department of Physiology and Pathophysiology and the Department of Internal Medicine, Section of Cardiology, Faculty of Medicine, University of Manitoba. He is also Principal Investigator of the Cardiology Translational Program as a member of the Institute of Cardiovascular Sciences. Dr. Rodriguez is a Cardiologist and Fellow of the Royal College of Physicians and Surgeons of Canada and Fellow of the American Heart Association. Dr. Rodriguez main objective is to facilitate the translation of basic cardiovascular research into the clinical environment. He is convinced of the necessity of providing more effective diagnosis, treatment and intervention to cardiac patients by moving experimental discoveries faster into the real world of cardiovascular care.

Suresh C. Tyagi Receives the Grant Pierce Award for Excellence in Cardiovascular Sciences

Dr. Suresh C. Tyagi

Dr. Suresh C. Tyagi is Professor of Physiology & Biophysics, University of Louisville, Louisville, Kentucky; Stodghill Endowed Chair in Biomedical Sciences, University of Louisville, Louisville, Kentucky; and Vice Chair for Research, Physiology & Biophysics, University of Louisville, Louisville, Kentucky.

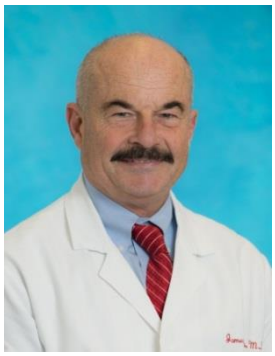
Dr. Tyagi's research career began as a biophysical scientist during his graduate and post-graduate training in India and Ireland. His career explored the dynamics of molecular biology of metalloproteinase homeostasis in cardiovascular remodeling in several post-doctoral fellowships (1984-1991). He was an assistant professor of medicine and biochemistry at University of Missouri-Columbia (1992-1996); and associate professor (1998-2003) University of Mississippi Medical Center. Currently he is professor at University of Louisville. His research has demonstrated the role of metal in gene transcription by RNA polymerase. Subsequently, he explored the role of metalloproteinase in heart and vessels. The work from Dr. Tyagi's laboratory was the first to discover that normally metalloproteinases are latent in heart and vessels. These metalloproteinase can be activated by oxidative stress in pathological conditions such as the heart failure. This novel finding has standed the numerous tests of time again and again. He has published in excellent journals such as American J Physiology, Circulation, J Biol Chem; Biochemistry, J Mol Cell Cardiology and various excellent biomedical science journals. Dr. Tyagi is member of honored societies such as the APS, ISHR, and AHA where he has served in various capacities. He has served on NIH study section committees. Currently he is regular member of NIH-MIM study section. He is on editorial board of AJP, JMCC, Clin & Exper Hypertension, and Mol Cell Biochemistry. He has numerous awards and honors from AHA and APS. He has been supported by national funding through out his research career. Currently he is supported by four (4) NIH-RO1 grants to study the homocysteine homeostasis and matrix remodeling in cardiovascular and cerebral vascular diseases. He is co-investigator on several NIH funded grants. He has published more than 190 research articles in peer-reviewed journals, such as AJP, Circulation, JMCC, JBC and others. He has chapters in more than 50 books. These books are valuable to many basic science and medical students. He has been an invited speaker at more than 60 institutes and presented more than 200 research papers.

Dr. Tyagi has consistently pursued a research program aimed at elucidating the role of metalloproteinase in cardiovascular disease and stroke. His work has impacted our view of metalloproteinase in cardiovascular remodeling and dysfunction. His research has great significance for many diseases, especially heart failure, Alzheimer's disease, renal disease, Type 1 and 2 diabetes, hypertension. Based on his findings he has received many gold level awards.

Quality of the human resources: Dr. Tyagi and his research team have worked deliberately and enthusiastically over 2 decades to create a research environment with substantial international recognition. As a result of his sound reputation as a scientific supervisor, he has trained many students, post-doctoral fellows and faculty to the levels of excellence in science. These are not only excellent scientists; they are also excellent role models for a younger generation of scientists. Many of Dr. Tyagi's trained fellows are now independent scientists pursing their research endeavors in cardiovascular sciences. Dr. Tyagi is a role model to our scientific community.

Additional aspects: It is clear that Dr. Tyagi is not only an excellent scientist in cardiovascular remodeling area. He is also a wonderful friend and colleagues, and has developed a great relationship with medical science arena around the nation and the world. His research group grew exponentially in human resources and funding support. He is also a role model for the leadership qualities. His research extends beyond the field of remodeling and has implications in cancer, vascular dementias, and brain micro vascular diseases.

James Weiss Receives the James Willerson Award for Excellence in Cardiovascular Sciences



Dr. James Weiss

Dr. James N. Weiss received his undergraduate degree in physics from Hamilton College, and his medical degree and internal medicine training at the University of Pennsylvania School of Medicine. He completed his cardiology fellowship at the University of California, Los Angeles in 1981, including clinical electrophysiology training at the University of Maastricht, the Netherlands. He then joined the faculty at the UCLA School of Medicine, where he was director of Clinical Cardiac Electrophysiology from 1981-1985. He became the first holder of the Chizuko Kawata Endowed Chair in Cardiology in 1993, the Director of the Cardiovascular Research Laboratory in 1997, the Chief of Cardiology in 2001, and is currently Distinguished Professor of Medicine and Physiology. From a background in ion channel biophysics and basic and clinical cardiac electrophysiology, he currently leads an interdisciplinary group which combines mathematical and experimental biology to develop innovative techniques to treat cardiac arrhythmias, to prevent injury from heart attacks and to understand the genetic basis of heart disease using systems biology approaches. He has directed a National Institutes of Health Specialized Center of Research in Sudden Cardiac Death (1995-2005) and a National Institutes of Health Program Project Grant (2005-2017), and several other grants. He has published over 300 articles and holds memberships in numerous professional organizations, including the American Society of Clinical Investigation, Association of University Cardiologists, American Heart Association, American College of Cardiology, the Heart Rhythm Society and the International Society for Heart Research.

Current Cardiology Practices and Clinical Research in Hungary

By: Dr. Judit Barta
Institute of Cardiology and Cardiac Surgery, Medical Centre, University of Debrecen, Debrecen, Hungary
Email: bartajud@gmail.com

Pharmacological treatment, interventional cardiology and device therapy have improved enormously in the last decades in Europe as well as in Hungary, cardiovascular mortality still remains the leading cause of death worldwide. According to ESC data, cardiovascular death accounted for all-cause mortality in 45% (ischemic heart disease 20%) in the year of 2017 in Europe. Ischemic heart disease is responsible for the lost patient years in 14%.

Ischemic heart disease and catheter interventions

In Hungary lots of effort has been made to improve acute myocardial infarction treatment. We deal with 20,000 new infarction/year for 10 million inhabitants. There are 20 well-organized catheter centers, which fully cover Hungary. 6,700 primary PCIs have been performed annually (primary PCI + elective PCI = 23,900). From every city or township one of the cath labs can be reached within 60-70 min with direct transport which is in the timeframe suggested in the ACS guideline. As a result, thrombolysis has been replaced by percutaneous coronary intervention (PCI) in almost 100%. The interventions are performed from radial access over 90%; however the drug eluting stent (DES) penetrance is only around 55%. The running Hungarian Infarction Registry has confirmed that interventional cardiology has revolutionized early infarction mortality results, in-hospital mortality dropped from 30% to 9-10%. These results are comparable with the Swedish data. Registered events are distributed as follows: 41.8% STEMI and 58.2% NSTEMI. 94.4% of STEMI patients are treated in PCI centers, unfortunately, only 83.9% of STEMI patients are treated with primary PCI, the rest have late diagnosis, there is a long delay between symptom onset and first medical contact (hesitation time). PCI frequency in NSTEMI is lower, 57.7%. Despite the big achievements in early treatment,

the long term cardiovascular mortality data is worse although show slight improvement; in 2017 the 30-day mortality was 12.9%, 1-year mortality was 15.2%. Many factors can explain the worse mortality in the long term, such as only 20% of infarcted patients participate in early rehabilitation, some go for ambulatory rehabilitation but the majority goes for none because of noncompliance or fear to lose their job. There is a need to improve patient education, prevention programs, lifestyle modification, e-health programs, tight patient follow-up and drug persistence.

Non-coronary interventions

Besides coronary interventions, in certain centers great investment goes into the interventional treatment of structural heart diseases, such as transcatheter aortic valve implantation (TAVI), transcatheter mitral valve repair, left atrial appendage closure and atrial septal defect closure. TAVI and transcatheter mitral valve repair are expensive procedures and the financial sources are limited, therefore, the number of procedures is also limited. Arrhythmia ablations are routine procedures. The treatment of 200,000 heart failure patients also put a big burden on the health care system. 33% of them are NYHA III-IV or rehospitalized, needing close follow-up on heart failure outpatient units for a personalized treatment. Device therapy with ICD and resynchronization therapy (CRT), mechanical circulatory support and transplant surgery are also of great value. These latter ones are draining money. More than 500 heart transplantations have been performed in 2 Hungarian centers so far. Hungary has joined the Eurotransplant 5 years ago. This gives a higher probability to find matching donor hearts. It seems, longer ischemia time of the donor hearts due to longer transportation has no unfavorable effect on the organ viability and perioperative graft failure or in-hospital mortality. Recently an improvement has started in the treatment of pulmonary hypertension including balloon angioplasty in CTEPH. Introducing a new drug in the Hungarian Health Care system is not easy due to limited financial sources and usually the new drugs are expensive. We have access to some of the new thrombocyte aggregation inhibitory drugs, all of the NOACS, SGLT2 inhibitors but the prescriptions are strictly regulated. However, ARNI and PCSK9 inhibitors are not available yet. Fortunately many clinical trials run in Hungary that provides opportunity to have early experience with the new drugs.

Open heart surgery

The development of interventional cardiology has reshaped open heart surgery profile as well. Now that interventionalists solve the majority of the significant coronary lesions by PCI, even complex procedures like bifurcation stenting, left main stenting, and rotablation as well as opening of chronic total occlusions are done on an everyday basis, heart surgeons have to deal with the most complicated coronary artery disease status that are not suitable or too high risk for intervention, as well as valvular diseases and congenital cases. Some valvular operations are also replaced by catheter interventions like TAVI and transcatheter mitral valve repair. As a result, nowadays in the 5 Hungarian heart surgery centers more than 6,000 adult operations are performed altogether, valvular surgery 43%, CABG 43%, combined 10%, other 4%. Children are operated mostly in 1 center in Budapest, 500 open heart surgeries + 250 catheter interventions/year, the indications are mostly congenital causes and heart transplantation.

Risk factors

High cardiovascular mortality rate is party explained by aging of the population and changes in risk factors, however, in a paradox manner the broader use of new and effective technologies in the health care system also contribute. The most important modifiable risk factors are hypertension, hyperlipidemia, diabetes and smoking. There is a linear correlation between the severity of hypertension vs. stroke and acute myocardial infarction. The INTERHEART study found 22% of acute myocardial infarction related to hypertension. In Hungary the prevalence of hypertension in adults is 24% in women and 35% in men, with this prevalence Hungary is among the worst countries in Europe. In patients with high cardiovascular risk antihypertensive treatment has to be started as early as high-normal blood pressure values and 120mmHg being the systolic blood pressure target. In other cases the target blood pressure is < 140/90 mmHg. LDL cholesterol levels also correlate with mortality due to coronary artery disease. 10% reduction of LDL in 5 years results in 50% decrease in the prevalence of cardiovascular diseases. The prevalence of diabetes mellitus in the adult population is 9.1% (66 millions) in Europe and 9.61% in Hungary, and is expected to increase. This accounts for 700,000 patient deaths in Europe. Impaired glucose tolerance is also frequent with the prevalence of 5.6%. Obesity, inactive lifestyle and eating habits are crucial in the development of the disease. The lowest mortality is found when the body mass index (BMI) = 20-25 kg/m^2, however in Europe and also in Hungary every 5^{th} patient is overweight or obese. In Hungary the average BMI is 25.5 kg/m^2 for women and 27.8 kg/m^2 for men. These numbers put Hungary to the 8^{th} place on the European list. Smokers represent 28% of the European population causing 700,000 deaths. The proportion of women is higher in the developed countries. Smoking often is accompanied by inactive lifestyle, in 18% in men and 22.5% in women, which is better than the European average (22.7% 30.1% respectively).

Research

For the successful clinical work several research groups provide scientific background. The 4 medical universities and some other centers are the basis of research however collaborations with other research groups in Hungary and abroad are also essential for research development. The financial sources for research come from Hungary, European and US grants. A broad spectrum of research topics are covered in basic research, translational research as well as clinical research, such as ischemic heart disease, ischemia reperfusion, oxidative stress, Ca^{2+} homeostasis, systolic and diastolic heart failure, cardiomyopathies, remodeling, ACE inhibition, hypertension, metabolic disorders, electrophysiology, antiarrhythmic drug research, sport cardiology, stem cell research, etc.

Conclusion

Despite all efforts, cardiovascular morbidity remains high, cardiovascular diseases are the major cause of death and in long term cardiovascular mortality Hungary is among the file-closers in Europe. Using world class technologies for treatment is not enough. For a better patient health and well being, there is a lot to improve in prevention, patient education and compliance. On the other hand we have to emphasize, that Hungarian medical care system is public health insurance based with limited financial source which also restrain liberal development.

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Balram Bhargava Appointed to the Highest Health Research Administrative Position in India

Editor's Note: Dr. Bhargava is a Fellow of the IACS and received the Academy Distinguished Service Award in 2012.

Dr. Balram Bhargava

Dr. Balram Bhargava, Secretary, Department of Health Research, (Ministry of Health & Family Welfare), Government of India became Director General, Indian Council of Medical Research (ICMR) on 16th April, 2018. Dr. Bhargava is Professor of Cardiology at All India Institute of Medical Sciences (AIIMS), New Delhi and also serves as the Executive Director for Stanford India Biodesign Centre, School of International Biodesign (SiB). Dr. Bhargava is an outstanding cardiologist, one of the foremost leaders in biomedical innovation, public health, medical education and medical research.

Dr. Bhargava has excellent leadership qualities; and has established the India-Stanford Biodesign programme, a unique interdisciplinary fellowship programme to foster innovation, design in low cost implants/devices. This programme has led to the establishment of the School of International Biodesign (SIB) at AIIMS and development of 30 low cost medical devices leading to 10 startups. Four of the low cost devices are in the Indian market and one device has been approved by the USFDA. He developed the indigenous Platinum Iridium coil coronary stent and has been instrumental in clinically evaluating and establishing the use of two other laser cut medicated Indian stents. These low cost indigenous stents have benefitted several thousand patients. The philosophy of the programme has been "More for less for more" with a mandate to promote Global Affordable Need Driven Healthcare Innovation (GANDHI).

He set up the c-GMP Centre for Excellence for Stem Cell Studies, at AIIMS which has initiated treatment of patients with dilated cardiomyopathy; this has benefitted number of no-option heart failure patients waiting on the cardiac transplant list. He is currently developing the Chest Compression Device for Sudden Cardiac Death patients; funded by the Wellcome Trust, London and is providing leadership for creative disease prevention, early detection and transport system for sick cardiac patients. This programme mission DELHI (Delhi Emergency Life Heart-attack Initiative) is in the process of early diagnosis and treatment of heart attack patients by trained motorcycle first respondent paramedics. (ICMR)

Dr. Bhargava is an innovator par excellence with innovations touching everyday lives with very huge social impact for which he has started the Society for Less Investigative Medicine (SLIM). He has published several papers on the harmful cardiovascular effects of chewing tobacco and is evaluating the continuous blood pressure of DTC bus drivers in Delhi. He has led two major trials in India funded by the NIH, Bethesda, USA which has changed clinical practice. He has pioneered several techniques in interventional cardiology.

He has been awarded the SN Bose Centenary award by the Indian National Science Congress and National Academy of Sciences Platinum Jubilee Award, Tata Innovation Fellowship and Vasvik Award for Biomedical Technology Innovation, Ranbaxy Award and the OP Bhasin Award in the field of Health and Medical Sciences. He is the Founding, Editor in Chief of the British Medical Journal Innovations (BMJi). He has been awarded the 'Padma Shri' high civilian award by the Honourable President of India and the UNESCO Equatorial Guinea International Prize for research in Life Sciences at Paris.

Amarjit Arneja Honoured with the Distinguished Service Award from Doctors Manitoba

Editor's Note: Dr. Amarjit S. Arneja is an elected Fellow of the IACS.

Dr. Amarjit Arneja

Dr. Amarjit Arneja came to Winnipeg in 1973 as an intern and completed residency and fellowship in Rehabilitation Medicine in 1979 and has worked as an active staff member of the Rehab Hospital, Health Sciences Centre and St. Boniface Hospital since 1980 and is Associate Professor, Department of Medicine, University of Manitoba. Dr. Arneja is known within the Manitoba health services community as one of the most caring, compassionate and innovative physician, who has done an outstanding job in the practice of Rehabilitation Medicine in the Province of Manitoba over a period of more than 37 years.

His work in the health care field should be recognized for the following reasons:

As an active staff member of the Rehabilitation Medicine in both Health Sciences Centre and St. Boniface Hospital since 1980, he has improved the quality of life for over 15,000 patients with chronic musculoskeletal pain through his innovative treatment techniques. Particularly, his collaborative approach for the induction of a new injection treatment for the myofascial pain is being adopted at the national level.

In his capacity as Founding Director of the Amputee Rehabilitation Program during 1980-2008, he built at the Health Science Center one of the most comprehensive Amputee Rehabilitation Program in Canada. His excellent services and high quality care were recognized by the War Amps of Canada and he has been honored with Humanitarian and other Awards.

Since 2008, Dr. Arneja has been serving as Founding Director of Day Hospital Amputee Program at the Rehabilitation, Health Sciences Center and has been treating about 300 patients per year. His coordinated and efficient rehabilitation efforts have resulted in reducing the length of stay in hospital and promoting attendance in outpatient clinics. The barrier to health care access for Aboriginal population with diabetic foot ulcers and amputation has been addressed by providing care at Day Hospital.

During 1983-1985, Dr. Arneja was Founding Co-Director of the Stroke Rehabilitation at the St Boniface Hospital. He was successful in organizing the rehabilitation of

about 100 patients per year and his dedicated services were recognized by several awards from different organizations.

Throughout his professional career, Dr. Arneja has been deeply involved in improving the quality of life of elderly people with arthritis and chronic obstructive pulmonary diseases as well as aboriginals with lifestyle diseases such as diabetes, foot ulcers, peripheral arterial disease, hypertension and atherosclerosis. His distinguished services for taking care of these people were commended by the Lions Club International and other institutions.

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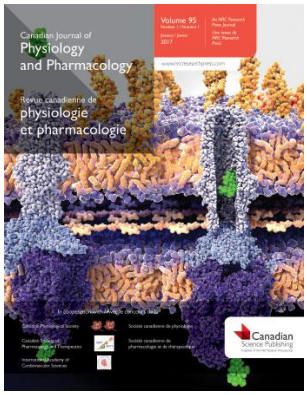

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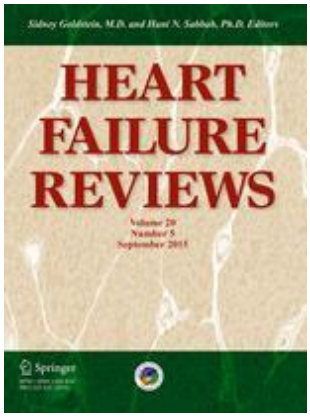

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