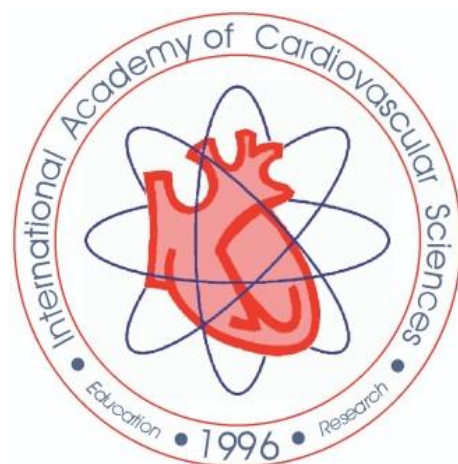


Promoting Cardiovascular Education, Research and Prevention

# CV Network

THE OFFICIAL BULLETIN OF THE INTERNATIONAL ACADEMY OF CARDIOVASCULAR SCIENCES

PUBLISHED WITH THE ASSISTANCE OF THE ST. BONIFACE  
HOSPITAL ALBRECHTSEN RESEARCH CENTRE



## In this Issue

	Page #
Academy Bestows 2018 Medals of Merit to Drs. J. Robbins and B. Ostadal	2
Election of 2018 IACS Fellows	4
Dr. Suresh Tyagi Receives Honorary Doctorate from Serbia	7
Dr. Surya Ramachandran Receives the ICMR Award	9
Partnering Journals of the IACS	9
20 <sup>th</sup> Institute of Cardiovascular Sciences Dr. Naranjan Dhalla Awards Day	10
Report of the 2018 Activities of the IACS by the Executive Director	11
2018 Election of Officers and Council Members of IACS – South America	12
Report of the 28th Scientific Forum – International Congress of Cardiovascular Sciences, Maceió, Alagoas, Brazil	13
Dr. Vladimir Jakovljevic Elected as Dean	16
Dr. Ramesh K. Goyal Conferred with Honorary Professorship	17
CV Network Editorial Board	18
Cardiovascular Diseases in the Middle East and Africa Region	19
Role of Exercise in Cardiovascular Disease	21
Officers of the Different Sections of the Academy	23
Advertisement of the IACS-India Section Meeting, Bangalore February 15-17, 2019	24

## Academy Bestows Medals of Merit Upon Two Outstanding Scientists, Drs. Robbins and Ostadal

Dr. Roberto Bolli is pleased to announce that two Medals of Merit be bestowed upon two highly respected scientists for the year 2018. Both Prof. Jeffery Robbins from Cincinnati and Prof. Bohuslav Ostadal from Prague will receive this highest honour.

### IACS Bestows Medal of Merit Upon Dr. Jeffrey Robbins



*Dr. Jeffrey Robbins*

Dr. Jeffrey Robbins received his Ph.D. in Genetics and Development in 1976 from the University of Connecticut and is currently Professor of Pediatrics, Division Chief of Molecular Cardiovascular Biology and Executive Co-Director of the Heart Institute at Cincinnati Children's Hospital and Distinguished University Professor at the

University of Cincinnati. He has continuously been funded by extramural grants since the beginning of his academic career, starting with an undergraduate award while at the University of Rochester from the Atomic Energy Commission.

After receiving his graduate degree, he took a fellowship with Dr. Jerry B. Lingrel at the University of Cincinnati, where he led the experimental team that first isolated and purified the goat globin genes. In 1978 he was recruited to the College of Medicine's Biochemistry department at the University of Missouri-Columbia as part of a group of 5 new faculty to start a molecular biochemistry initiative at the Medical School. After promotion to Associate Professor with tenure at Missouri, he was recruited back to Cincinnati in the Departments of Pharmacology and Cell Biophysics, Molecular Genetics and Biochemistry, and Molecular Physiology at the University of Cincinnati College of Medicine where he rose through the ranks to full professor. He has won a number of teaching awards, including the Golden Apple.

It was during this time that he initiated the research to define the elements necessary for cardiac specificity of the transcriptional apparatus. Success in this area led to the development of reagents that are currently used worldwide to affect the protein complement of the heart

through transgenic manipulation. Dr. Robbins, along with hundreds of other scientists, has used these tools to mechanistically explore the structure-function relationships of cardiac proteins. His work has focused on understanding the behavior of both the normal contractile proteins and the mutations that cause cardiovascular disease. Recognizing the limitations of the murine models, Robbins also developed the necessary reagents needed for controlled, cardiomyocyte- and developmental stage specific expression in rabbit hearts and pioneered a series of transgenic rabbits that tested the isoform functionality of selected sarcomeric proteins.

Dr. Robbins unambiguously showed the utility of the general approach and developed a set of robust reagents that could be used by relatively inexperienced investigators to create animal models of cardiovascular disease. Dr. Robbins' work has changed the way in which we explore the basic pathology of cardiovascular disease. With well over 1200 different models being developed and published using his reagents, the work that Dr. Robbins published allowed the entire field to move forward at a pace undreamed of only 15 years ago. A contributing factor to the rapid spread of the technology was Dr. Robbins' early decision to make the reagents freely available, allowing the rapid dissemination of the needed tools, free from the confines of university intellectual property concerns. Recognizing that temporal control of mutant gene expression is as important, or even more important than organ specific expression, Robbins devoted 4 years to establishing a robust system for both temporal and organ specific cardiac transgenesis, controlled by the administration of tetracycline.

Dr. Robbins went on to use gain-of-function approaches to further his own investigations into the underlying pathologies of hypertrophic cardiomyopathy, as well as defining the structure-function relationships in a number of the contractile proteins. His recent experiments have established the importance of mutations in the intermediate filament protein desmin and the chaperone

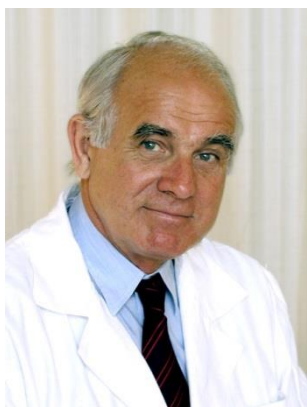
alpha B crystallin as causative for a class of cardiomyopathies, which has recently led to the startling observation that intracellular pre-amyloids appear to play an important, and possibly generalized role in cardiovascular diseases of various etiologies. He subsequently developed the concept of proteotoxicity playing an important role in cardiac disease and heart failure, opening up new therapeutic avenues in cardiovascular disease. Recognizing the potential parallels between the neurodegenerative and cardiovascular disorders, Robbins hypothesized that unfolded proteins might form in an under-recognized class of myopathies, the Desmin Related Myopathies. Robbins went on to show that protein conformation-based disease processes are important during the development of heart disease and failure and, on the basis of his early work, the study of proteasomal compromise, chaperone dysfunction and protein aggregation in the heart is now an established experimental field.

Dr. Robbins is a Fellow of the International Society of Heart Research and the American Heart Association and in 2011, he was elected a Fellow of the International Academy of Cardiovascular Sciences. He has served on and chaired numerous national research review committees for the National Institutes of Health and the American Heart Association. He currently serves on 10 Editorial Boards, is Associate Editor for a number of journals and served as Cardiovascular Section Editor for the Annual Review of Physiology for 10 years. He also serves as Senior Associate Editor for Circulation Research, which is the premier basic science journal for

cardiovascular science. He has won numerous research awards and, in 2005, was the recipient of the American Heart Association's Research Achievement Award. He was chosen to Chair the National Study Panel for the American Heart Association's program for establishing centers for Stem Cell Biology in the heart, the Jon DeHaan Competition and assumed the Chairmanship of that oversight committee. In 2009 he received two prestigious awards from the University of Cincinnati; the Rieveschel Award and the Drake Medal. The next year, he received the Distinguished Research Achievement Award from the International Society for Heart Research. In 2015, he received the prestigious Louis and Artur Lucian Award for Research in Circulatory Diseases and in 2017 he received the highest award given by Cincinnati Children's Hospital, the William Procter Medallion, which the Medical Center has given its faculty only 11 times in its history, the first recipient being Albert Sabin in 1960.

Dr. Robbins has been publishing in the field of cardiovascular biology for approximately 25 years. With over 260 publications, his contributions have changed the way that basic cardiovascular research is done. Robbins' work has consistently resulted in "scalable" data. That is, the data, or reagents resulting from the data, are generally applicable to the broad field, allowing numerous investigators to use Robbins' result and apply them to their own investigations. Thus, the implications of Robbins' data have been tremendously valuable and synergistic to the broad field of cardiovascular research.

## IACS Bestows Medal of Merit Upon Dr. Bohuslav Ostadal



*Dr. Bohuslav Ostadal*

Dr. Bohuslav Ostadal, MD, DSc, was born on January 28, 1940. His university education started in 1957 at the Faculty of Pediatric Medicine of the Charles University in Prague where he graduated in 1963. Since the very beginning, Ostadal's main area of research has been focused on the ontogenetic development of heart structure and function. Already his early experimental studies on

developing myocardial blood supply belong to landmark papers in the field that achieved well-deserved attention.

His laboratory was among the first to demonstrate the important ontogenetic differences in cardiac sensitivity to various pharmacological agents. In a series of papers he investigated developmental changes in myocardial responses to acute oxygen deprivation, mechanisms of increased ischemic tolerance of the immature heart, and protective effects of preconditioning and chronic hypoxia. He has also been deeply concerned with late cardiovascular consequences of risk factors acting during early phases of ontogenetic development, the phenomenon known as fetal programming. Recently, he became particularly interested in differences of ischemic tolerance between hearts of males and females, the topic which appears to gain increasing attention of both experimental and clinical cardiologists. His group described for the first time (already in 1984) that the female myocardium is more tolerant to oxygen deprivation as compared with males. He published more



than 280 scientific papers, 2 books and was editor of 6 monographs.

Ošťádal also became deeply involved in the organization of cardiovascular research and education on both national and international scale. He was among founding members of the Committee of Experimental Cardiology which has organized annual scientific meetings of Czech and Slovak researchers and clinicians continuously since 1972. In the early period of transformation after 1989, he served for five years as a director of the Institute of Physiology, Academy of Sciences of the Czech Republic. In 2000, he created Centre for Cardiovascular Research based on a project involving more than 100 researchers from several theoretical and clinical institutions in Prague. In addition, he was the President of the Executive Committee of the Postgraduate Education in Biomedicine at the Charles University in Prague and a member of several scientific boards; he is vice-president of the Czech Medical Academy. He served as the Council member of the International Society for Heart Research (1993-1998) and President of the International Academy of Cardiovascular Sciences (2015–2018). Ostadal was the main organizer of

many local and international scientific conferences, the biggest one and the most successful being the World Congress of the International Society for Heart Research in 1995, which is still remembered with joy by its participants. For many years he served as the Editor-in-Chief of Physiological Research and Editor-in-Chief of Experimental and Clinical Cardiology and a member of Editorial Boards of another five journals.

He is a Fellow of the Czech Medical Academy, Czech Learned Society, International Society for Heart Research and the International Academy of Cardiovascular Sciences. Ostadal has received numerous awards and distinctions from scientific societies, e.g. Medals of Honor J.E. Purkyne (2000) and G.J. Mendel (2015) of the Czech Academy of Sciences, Libensky Medal of the Czech Society of Cardiology (2010), Memorial Medal of the Charles University in Prague (1998), Award “Nummum Academiae Memorialem Tribut” of the Slovak Academy of Sciences (2000) and Medal of Merit of the International Academy of Cardiovascular Sciences (2018).



*Dr. Ostadal presented with the Medal of Merit from Drs. Pierce (L) and Dhalla (R) at the 13<sup>th</sup> Meeting of New Frontiers in Basic Cardiovascular Research (EU), Prague, November 11-14, 2018*



*Dr. Ostadal addresses the meeting delegates upon receipt of the Medal of Merit*

## Election of 2018 IACS Fellows

**Dr. Roberto Bolli, President of IACS, is pleased to announce the election of the following four Fellows for the year 2018. (The maximum member of active Fellows of the Academy does not exceed 250 at any given time):**

1. Dr. Walter J. Koch, Philadelphia, USA
2. Dr. Ross Feldman, Winnipeg, Canada
3. Dr. Antigone Lazou, Thessaloniki, Greece
4. Dr. Raj Kishore, Philadelphia, USA

## Dr. Walter J. Koch



Dr. Walter J. Koch

Dr. Walter J. Koch (Ph.D., Pharmacology and Cell Biophysics, University of Cincinnati College of Medicine, 1990) is the inaugural holder of the William Wikoff Chair in Cardiovascular Medicine at the Lewis Katz School of Medicine at Temple University. He is the Chairperson of the Department of Pharmacology and Director of the Center for Translational Medicine. Dr. Koch started his career at the University of Cincinnati College of Medicine where he received his PhD in Pharmacology and Cell Biophysics 1990 under the mentorship of Dr. Arnold Schwartz. He then went to Duke University Medical Center and the Howard Hughes Medical Institute as a postdoctoral fellow (1990-1995) in the lab of Dr. Robert Lefkowitz (Nobel Prize in Chemistry, 2012). He then was recruited to start a molecular cardiovascular biology laboratory in the Department of Surgery at Duke in 1995 and advanced to tenured Full Professor in 2001. In 2003 he was recruited to lead the newly established Center for Translational Medicine at Thomas Jefferson University and successfully built that Center before moving it to Temple in 2012. The Koch lab studies molecular mechanisms for

cardiac injury and repair focusing on G protein-coupled signaling in the heart and also development of novel molecular strategies to repair the heart including gene therapy. His research work has revealed the novel roles G protein-coupled receptor kinases (GRKs) play in cardiac injury and repair. Manipulating these GRKs, and targeting them with therapeutics, could lead to new treatments for heart failure patients. In fact, inhibition of one GRK, GRK2, in the heart has led to the reversal of heart failure in several animal models. This has been shown to occur by using a gene therapy approach in pre-clinical studies in both small and large animal models and this methodology is one step away from human clinical trials. More recently, small molecule, pharmacological inhibitors of GRK2 have been developed that show exciting translational potential. Dr. Koch heads a large laboratory group that is well funded and has trained over 50 fellows in the last 20 years. Numerous awards and honors have recognized Dr. Koch's research over recent years including the International Society for Heart Research 2011 Outstanding Investigator Award, the Jefferson Medical College Inaugural Career Achievement Award in Biomedical Sciences in 2010, the American Heart Association Thomas Smith Memorial Lecture and Award for Cardiovascular Signaling in 2009, and the 10-year MERIT award running through 2019. He recently received the 2017 Basic Research Prize from the American Heart Association and in 2018, a \$1 Million unrestricted Merit Award from the AHA. He also is an Associate Editor of *Circulation Research*.

## Dr. Ross Feldman



Dr. Ross Feldman

Dr. Ross Feldman is the Medical Director of the Cardiac Sciences Program, Winnipeg Regional Health Authority, and Professor of Medicine at the University of Manitoba. He is the author of more than 200 original manuscripts, reviews and book chapters. His clinical research focuses on the management of hypertension and specifically the development of innovative

strategies to improve blood pressure control. His major fundamental research program focuses on the elucidation of novel cell signalling mechanisms of vascular regulation/dysregulation linked to the development of hypertension and atherosclerosis- especially related to elucidation of the determinants of heart disease in women.

A major focus of his efforts has been in the prevention and control of hypertension in Canada and specifically in the knowledge translation of optimal treatment approaches for hypertension management. Among past leadership positions, Dr. Feldman served as President of the Canadian Hypertension Society. He was the first Chair of the Steering Committee of the Canadian Hypertension Education Program. He was also the

founding President of Hypertension Canada- leading the process of integrating the efforts of the Canadian Hypertension Society, Canadian Hypertension Education Program and Blood Pressure Canada into what is now the second largest cardiovascular disease not-for-profit agency in Canada.

He has received a number of awards and scholarships in recognition of his contributions in research, teaching and for his efforts in the prevention and control of hypertension in Canada. These include the George Morris Piersol Research and Teaching Scholarship from the

American College of Physicians, a Career Investigator Award from the Heart and Stroke Foundation of Ontario, the Burroughs-Wellcome Clinical Pharmacology Award and the Senior Investigator Award from the Canadian Society for Clinical Pharmacology as well as the Distinguished Service/Research Award of the Canadian Hypertension Society. In 2014 he was awarded the Ken Brown Research Award, Institute of Cardiovascular Sciences, Winnipeg, MB. He is also the recipient of the George Fodor Award from Hypertension Canada for outstanding contributions to the prevention and control of hypertension.

## Dr. Antigone Lazou



*Dr. Antigone Lazou*

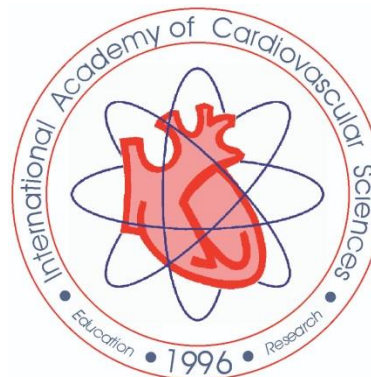
Dr. Antigone Lazou is a professor of Physiology and the Head of the Laboratory of Animal Physiology at the School of Biology, Aristotle University of Thessaloniki, Greece. Dr. Lazou obtained her diploma in Biology with Hons (1980) from Aristotle University of Thessaloniki and PhD in Physiology (1984) from the same University. Dr. Lazou

joined the School of Biology at Aristotle University as a lecturer, rose through the ranks and has been a full Professor since 2003. Between 1992 and 1994 she joined Prof. PH Sugden's group as a Research Associate at the Dept of Cardiac Medicine, National Heart and Lung Institute, London and she participated in the pioneering studies that provided evidence for important roles of signaling kinases (MAPKs) in cardiac pathophysiology. She is currently the director of the Graduate Program "Applications in Biology" of the School of Biology. She also holds a visiting professorship at the University of Reading, UK.

Dr Lazou's research focuses on the cellular and molecular mechanisms underlying cardiac hypertrophic response, ischemia/reperfusion injury and cell death, leading to cardiac failure. Her work has contributed to the elucidation of signaling pathways underlying cardiac hypertrophy and ischemia/reperfusion injury by unraveling the role of protein kinases such as MSK1. She has also established a role for the nuclear peroxisome proliferator-activated receptors (PPARs) in the regulation

of myocardial metabolic homeostasis and redox signaling. She has been the co-author of more than 90 articles in peer-reviewed journals and book chapters, which have received more than 2400 citations, with an H-index of 24. She has supervised and trained more than 80 students, post-docs and visiting scientists. Dr Lazou has participated in several European research networks, including the current COST actions EU-Cardioprotection, cardioRNA and NutRedOx, and bilateral co-operations with Slovakia, France, Romania and Hungary.

Dr Lazou is a member of various national and international professional organizations and she currently serves as the President of the Hellenic Society of Biological Sciences and the treasurer of the Hellenic Physiological Society. She also serves as an expert evaluator of research grant applications at the European Commission and other international organizations. She has organized more than 20 national and international conferences and meetings and she has numerous invited talks at various scientific events.



## Dr. Raj Kishore



*Dr. Raj Kishore*

Born and raised in Lucknow, India, Dr. Raj Kishore earned his Masters' degree in Biological Anthropology from Lucknow University and doctoral degree in Immuno-Genetics from Sanjay Gandhi Postgraduate Institute of Medical Sciences and University of Lucknow in India. He moved to United States in 1996 for his postdoctoral training and completed postdoctoral

fellowships at New York Medical College, Cleveland Clinic Foundation and Case Western Reserve University in Immunology. In 2001, Dr. Kishore changed the focus of his research to cardiovascular sciences when he was recruited as an Instructor at St. Elizabeth's Medical Center, Tufts University under the mentorship of Dr. Douglas Losordo. Dr. Kishore moved to Northwestern University as an Assistant Professor of Medicine-Cardiology where he grew his research program and was tenured as Associate Professor. In 2014, Dr. Kishore moved to his current position at Temple University as Professor of Medicine and Pharmacology and Director of Stem cell Research at Center for Translational Medicine.

A widely published researcher, Dr. Kishore's work focuses on cardiac regenerative medicine. For last 15 years or so, Dr. Kishore's research has been focused on studying the patho-physiology of myocardial infarct repair and regeneration and specifically on understanding the signaling, mechanism of survival and differentiation

of stem cells for ischemic tissue repair in mouse models of myocardial and lower extremity (hind limb) ischemia. Research in Dr. Kishore's laboratory has traditionally encompassed the role of stem cell-based ischemic myocardial repair and associated signal transduction pathways. Other areas of active research in his labs are studies on the role of inflammation in cardiac injury and repair, epigenetic and molecular mechanisms in stem cell-mediated cardiovascular differentiation and function as it relates to post-infarct myocardial repair and regeneration. More recently, Dr. Kishore's lab has also pioneered the characterization and therapeutic use of stem cell derived exosomes as cell free modality for post-infarct myocardial repair. During his successful career, Dr. Kishore developed several specific research areas within the overall theme of identifying novel insights into cardiovascular disease mechanisms and the translational integration of mechanistic studies in relevant physiological models.

Dr. Kishore is an active researcher with many concurrent NIH grants to his credit. He is on the editorial boards of a number of professional publications, including Circulation Research, and is a reviewer for more than two dozen journals. He is very involved with the American Heart Association (AHA) and on Leadership of Basic Cardiovascular Sciences council of AHA and serving as a member of the AHA's scientific session planning and other committees. He has also served on numerous NIH study-section rosters and is currently chartered member of NIH study section. Throughout his career, Dr. Kishore has received several accolades and awards and he is considered a thought leader. Dr. Kishore is a Fellow of American Heart Association and International Society of Heart Research.

## Dr. Suresh Tyagi Receives Honorary Doctorate from Serbia



*Dr. Suresh C. Tyagi*

Dr. Suresh Tyagi was recently (September 2018) honoured with Honorary Doctorate from the University of Kragujevac, Republic of Serbia. He is Professor of Physiology, Stodghill Endowed Chair in Biomedical Sciences, &

Vice Chair for Research University of Louisville School of Medicine, Louisville, Kentucky, USA.

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 stood 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. He has served as a 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 throughout 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 has published more than 350 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.

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.

The Tyagi lab focuses on exercise which can improve the metabolome by throwing out bad metabolites and making the new ones. It can lead to rejuvenation and healing. Exercise increases exosome that releases the product beneficial to physiological function. As such exosomes can package miRNA/herbs and other drugs for proper delivery system. Exercise can also improve the epigenome by turning on good genes.

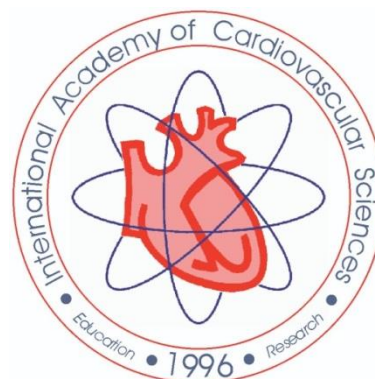
The good metabolome of the extracellular matrix helps in rejuvenation by pushing the stem cells to make new ones and discard the old dead ones. No stem cell can differentiate an organ unless it is homed by proper

extracellular matrix. The molecules like TIMP4 that comprise the metabolome in cardiac matrix can push the stem cells to make myocytes. The cardiac matrix is unique barrier in that cardiac cells don't metastasize.

Dr. Tyagi has been an invited speaker at more than 100 institutes and presented more than 200 research papers. Based on his findings he has received many gold level awards. 2017 A Ross McIntyre Award for Achievement in Medical Science, presented at the University of Nebraska College of Medicine, November 10, 2017. 2018 Grant Pierce Award Excellence in Cardiovascular Sciences, International Academy of Cardiovascular Science, Havana, Cuba, June 5-8, 2018. 2018 Albrecht Fleckenstein Memorial Award for distinguished contribution to basic research in cardiology. International Academy of Cardiology Memorial Award Recipient - 23rd World Congress on Heart Disease, July 27-29, 2018, Boston, MA. 2018 Lifetime achievement award in Physiological Science, Serbia Physiological Society, University of Nis, Serbia, September 19-23, 2018.

Dr. Tyagi and his research team have worked deliberately and enthusiastically over 3 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 pursuing their research endeavors in cardiovascular sciences. Dr. Tyagi is a role model to our scientific community.

Dr. Tyagi is not only an excellent scientist in cardiovascular remodeling area, but he is also very congenial 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.





## Dr. Surya Ramachandran Receives the ICMR Award



*Dr. Surya Ramachandran*

Dr Surya Ramachandran, Scientist in the Cardiovascular Diseases and Diabetes Biology program at Rajiv Gandhi Centre for Biotechnology, Trivandrum, India has been selected for the ICMR Chaturvedi Kalawati Jagmohan Das Memorial Award for her contributions to cardiovascular disease research. Her primary research interest is the study of pathogenesis of inflammatory macrovascular disease in type 2 diabetes. Her research efforts are aimed at developing circulatory monocyte proteins as efficient indicators of vascular wall injury in diabetes mellitus. Her studies on secretory monocyte

proteins have led to the identification of cyclophilin A as an important marker of detecting vascular complications in type 2 diabetes. She has been trained in LC-Tandem Mass Spectrometry & Proteomic technologies as part of a Visiting Scientist fellowship from Oklahoma Medical Research foundation, Oklahoma, USA. She is the recipient of Distinguished Service Award in Cardiovascular Science Medicine and Surgery from the International Academy of Cardiovascular Sciences, Canada and ISHR-Torrent Young Investigator Award 2017. She serves as an Editorial board member of Molecular and Cellular Biochemistry, an International Journal for Chemical Biology in Health and Disease, Springer Journals and as Reviewer of Scientific Reports, Plos One, Mutation Research and Proteomics journals. She is also the Secretary General of the India Section of IACS.

### Official Partnering Journals of the International Academy of Cardiovascular Sciences



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## 20<sup>th</sup> Institute of Cardiovascular Sciences Dr. Naranjan Dhalla Awards Day

**Dr. Lorrie Kirshenbaum, PhD, Director ICS**  
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The Institute of Cardiovascular Sciences at the St. Boniface Hospital Albrechtsen Research Centre in Winnipeg has been holding an annual awards day to celebrate excellence in cardiovascular research, education and training. Dr. Naranjan Dhalla, the founder of the Institute of Cardiovascular Sciences, established the cardiovascular awards day to recognize an individual's leadership and achievements in promoting cardiovascular research, education as well as their lifetime contributions to the cardiovascular community. These awards also honor individuals at various stages of their careers, from summer and graduate students to world leaders whose achievements significantly influenced cardiovascular education and medicine.

The awards include the Dr. Robert E. Beamish Leadership Award for outstanding leadership in cardiovascular sciences and education; Ken Bowman Research Achievement Award for outstanding achievements in cardiovascular research; Dr. John Foerster Distinguished Lecture Award for lifetime contributions to cardiovascular medicine; Dr. Vincenzo Panagia Distinguished Lecturer Award for cutting edge research in cardiovascular sciences; Mr. Jack Litvak Exemplary Service Award for exemplary service to the Institute of Cardiovascular Sciences; Dr. Arnold Naimark Post-doctoral Award for excellence in cardiovascular research by a post-doctoral scientist; Dr. Henry Friesen Young Scientist Award for excellence in cardiovascular research by pre-doctoral trainee; Sr. Jacqueline St-Yves Publication Award for best paper published in cardiovascular research; Mr. Kalwant Dhalla Research Technician Award for high quality of dedicated technical services; Dr. Ted Cuddy and Dr. James McGoey awards for exemplary performance of summer students. Moreover, a partnership with the Heart and Stroke Foundation of Manitoba was established for the Best MSc Thesis Award. The two day event is marked by a gala dinner, scientific program, poster competition, followed by awards ceremony and reception. Over the years this premier program has honored many distinguished scientists including several Nobel Prize Laureates. This year's awards day was particularly special because it marked the 20<sup>th</sup> anniversary of the event.

On October 26th 2018, the 20<sup>th</sup> Annual Institute of Cardiovascular Sciences, Dr. Naranjan Dhalla Awards Day was held and honored several world-class scientists including Dr. Joseph Hill, University of Texas South Western (Dr. John Forester Award); Dr. Evangelia (Litsa) Kranias, University of Cincinnati (Dr. Vincenzo Panagia Award); Dr. Michael Rudnicki, University of Ottawa, (Mr. Ken Bowman Award) and Dr. Martin Morad, University of South Carolina, (Dr. RE Beamish Award).



*Dr. Joseph Hill (L) presented with the Dr. John Forester Award by Dr. Forester*



*Dr. Evangelia Kranias (L) presented with the Dr. Vincenzo Panagia Award by Dr. Czubyrt*



*Dr. Michael Rudnicki (L) presented with the Ken Bowman Award by Dr. Kirshenbaum*

In the spirit of celebrating the 20<sup>th</sup> anniversary of the awards day, a special Life-Time Achievement Award was given to Dr. Dhalla in appreciation of his unwavering commitment, leadership and vision for establishing this awards day program. A specially designed plaque honoring Dr. Dhalla with inscription that reads “In recognition of this role in establishing an awards program that inspires excellence in research education and



*Dr. Martin Morad (L) presented with the Dr. Robert E. Beamish Award by Dr. Dhalla*

innovation for two decades” has been installed at Institute of Cardiovascular Sciences. We are very proud of Dr. Naranjan Dhalla for creating the awards day which has become a marquee event for the Institute of Cardiovascular Sciences, St. Boniface Hospital Albrechtsen Research Centre and the University of Manitoba.

## Report of the 2018 Activities of the International Academy of Cardiovascular Sciences by the Executive Director

The Academy has continued its efforts to promote cardiovascular education and prevention of heart disease in addition to encouraging young investigators and recognizing the achievements of high profile individuals during 2018. Specifically, the Academy was engaged in performing the following tasks and functions:

1. Four major conferences on diverse multidisciplinary cardiovascular topics in health and disease were held around the globe. The first meeting was organized in February, 2018 in Madurai, India, by the IACS-India Section whereas the second conference was organized by the IACS-European Section in Smolenice, Slovak Republic in May 2018. The third meeting was held in June, 2018 in Havana, Cuba by the IACS-North American Section, while the fourth conference was held in Maceio, Brazil in November, 2018 by the IACS-South American Section. All these conferences were attended by 250 to 400 people and were highly successful.
2. The Academy recognized the major contributions of 14 high profile individuals by bestowing 2 Lifetime

Achievement Awards (one in Havana and the other in Maceio), 5 Distinguished Leadership Awards (one in Madurai, one in Havana, two in Smolenice and one in Maceio) and 3 Distinguished Service Awards (one each in Madurai, Havana and Maceio).

3. Sixteen individuals with outstanding records of scientific achievements were recognized with Named Awards (5 in Madurai with Nagano, Gupta, Goyal, Buttar and Kukreja Awards; 5 in Smolenice with Morgan, Varro, Ostadal, Slezak Awards and Dhalla Distinguished Lecture Medal; 4 in Havana with Willerson, Alpert, Pierce and Dhalla Awards; and 2 in Maceio with Gomes and Gelpi Awards).
4. Five Young Investigator Competitions were held at different conferences (2 Agrawal and Tyagi Competitions in Madurai; one IACS-European Section Competition in Smolenice; 2 Bolli and Lopaschuk Competitions in Havana).
5. Twenty Young Investigators were encouraged with 4 Naranjan Dhalla Poster Awards and 10 CC Kartha Travel Awards in Madurai, as well as 6 IACS-European Section Poster Awards in Smolenice.



6. Four Exemplary Service Awards for promoting the activities of the Academy for 5 to 10 years were given to 3 individuals and 1 family in Winnipeg.
7. Academy also sponsored 4 public forums and workshops for promoting the prevention of heart disease. Two forums, one in Trivandrum and the other in Anand, were held in India; the Academy sponsored a Congress of Physiological Sciences in Nis, Serbia; and held a Forum in partnership with Caribbean Heart Health Group in Winnipeg.
8. Academy oversaw the election of President-Elect (Grant Pierce) and 4 Council Members namely Dobromir Dobrev, Lorrie Kirshenbaum, Gary Lopaschuk and Tanya Ravingerova. Council also approved the appointments of Melchior Lima as replacement for Otoni Gomes.
9. In the year 2018, the following individuals have assumed the positions as Officers of the IACS-North American Section: Gary Lopaschuk as President, Michael Czubryt as Vice President, Grant Pierce as Past President and Dinender Singla as Secretary General. Efforts are also being made to appoint 15 Council Members of this Section.
10. The IACS-South American Section had election of several Officers and Council Members in Maceio, which was approved by the IACS-Council. Otoni Gomes was elected as Honorary Life President,

Melchior Lima as President, Alexander Hueb as Vice President, Ricardo Gelpi as Past President, Elaine M.G. Freitas as Secretary General in addition of 2 Advisors and 3 Council Members. Dr. Lima was authorized to appoint 12 more Council members from all over South America.

11. Arrangements were made to establish Riya and Paul Ganguly Symposia at the IACS-India Section meetings. Arrangements were also made to establish Dr. Dennis B. McNamara Award at the IACS-North American Section effective 2019.
12. Both Jeffrey Robins and Bohuslav Ostadal were elected for the Award of 2018 Medal of Merit (the highest honour by the Academy). Four highly respected cardiovascular investigators namely Drs. Ross Feldman, Walter Koch, Raj Kishore and Antigone Lazou were elected as Fellows of the Academy.

From the foregoing information (details of which are published in 4 issues of CV Network, Vol 17, 2018), it can be seen that the Academy is in good health and for this I wish to thank Dr. Bohuslav Ostadal for his guidance. However, a great deal needs to be developed to achieve full potential of the Academy and this is a real challenge under the Presidency of Dr. Roberto Bolli.

Winnipeg  
December 18, 2018

Respectfully submitted  
Naranjan S. Dhalla  
IACS Executive Director

## 2018 Election of Officers and Council Members of IACS – South America

The Executive Committee of IACS has approved the following slate of individuals, who were elected during the 28<sup>th</sup> International Congress of Cardiovascular Sciences in Maceio, Brazil, November 22-24, 2018.

### Officers:

Honorary Life President: Dr. Otoni Gomes, Belo Horizonte  
President: Dr. Melchior L. Lima, Vitoria  
Vice President: Dr. Alexandre C. Hueb São Paulo, Brazil  
Past President: Dr. Ricardo Gelpi, Buenos Aires, Argentina  
Secretary General: Ms. Elaine M.G. Freitas, Belo Horizonte, Brazil  
Advisor: Dr. Elias Kallas Minas Gerais, Brazil  
Advisor: Dr. Enrique C. Saldana, Lima, Peru

### Council Members:

Dr. Antoinette O. Blackman, Distrito Federal, Brazil  
Dr. Ricardo A. Benfatti, Mato Grosso do Sul, Brazil  
Dr. Henrique B. Furtado, Tocantins, Brazil  
12 other Council Members to be named by Dr. Lima  
in consultation with other officers

# Report of the 28th Scientific Forum - International Congress of Cardiovascular Sciences, Maceió, Alagoas, Brazil

**Dr. Melchior Luiz Lima, MD, MSc, PhD**  
**Cardiovascular Institute Sao Francisco de Assis**  
**Enseada do Sua, Victoria, ES 29050-285, Brazil**  
**Email: [melchior.lima@me.com](mailto:melchior.lima@me.com)**



The São Francisco de Assis Cardiovascular Institute (ServCor), on behalf of the President Prof. Dr. Otoni Moreira Gomes, has the privilege of informing the accomplishment of the 28th Scientific Forum - International Congress of Cardiovascular Sciences, from November 22 to 24, 2018 at the Best Western Hotel in Maceió, Alagoas, Brazil. This important event was sponsored by the Heart Hospital of Alagoas, represented by the worthy Prof. Dr. José Wanderley Neto (President of the Congress).

The Opening of the Congress took place in the Sala Euryclides de Jesus Zerbini, at the end of November 22, 2018, with the welcome of the Director of Development Profa. Dr. Elaine Maria Gomes de Freitas and the President of the Congress Prof. Dr. José Wanderley Neto to all national and international congressmen present. In



addition, the Scientific Coordinators of the Forum were present: Prof. Dr. Alexandre Ciapina Hueb, Profa. Dr. Antoinette Oliveira Blackman, Prof. Dr. Elias Kallás, Prof. Dr. Ricardo Adala Benfatti and Prof. Dr. Melchior Luiz Lima.

Additionally, we received an important speech from the Hon. Mr. Marco Antônio de Araújo Fireman - Secretary of Science, Technology and Strategic Inputs (SCTIE), Ministry of Health, Government of Brazil. This Secretariat aims to develop the national scientific, technological and productive capacity to strengthen the Unified Health System (SUS) as a universal health system. SCTIE is responsible for formulating and implementing national policies on science, technology and innovation in health, pharmaceutical assistance and the promotion of research, development and innovation in





health. Additionally, it develops methods and mechanisms for the analysis of the economic-sanitary viability of public enterprises in the Health Industrial Complex, promotes the implementation of public-private partnerships in the technological development and production of strategic products for the country. The secretariat is also responsible for coordinating the process of incorporation and disincorporation of health technologies within SUS.

Then, Prof. Dr. Naranjan S. Dhalla promoted the delivery of International Academy of Cardiovascular Sciences (IACS) Gomes and Gelpi Awards for Excellence in Cardiovascular Sciences and Distinguished Service Award in Cardiovascular Science, Medicine and Surgery for Professors José Wanderley Neto (Brazil), András Varró (Hungary), Gary Lopaschuk (USA), Péter P. Nánási (Hungary) and Melchior Luiz Lima (Brazil).



Next, the harmony of the Brazilian National Anthem was played and sung publicly that marked this solemn moment.

Also, there was the important participation of the distinguished Prof. Dr. Naranjan S. Dhalla, Distinguished Professor of Physiology, University of Manitoba, and Director of Cardiovascular Developments, St-Boniface Hospital Research. Additionally, he is Executive Director of the International Academy of Cardiovascular Sciences who honored us with a brilliant lecture on World Landmarks of the IACS.

On November 23, 2018, there was the solemn Business Meeting International Academy of Cardiovascular Sciences - South American Section, under the coordination of the distinguished Prof. Dr Naranjan S. Dhalla, together with Professors José Wanderley Neto (Brazil), András Varró (Hungary), Gary Lopaschuk (USA), Péter P. Nánási (Hungary), Ricardo Jorge Gelpi (Argentina), Enrique Castañeda Saldaña (United States), Dinender Singla (USA), Devendra K. Agrawal (USA), Domingo Ramos de Souza (Sweden), Istvan Baczko (Hungary), Mikael Arbeus (Sweden), Melchior Luiz Lima Antoinette Oliveira Blackman (Brazil), Elias Kallás,







Ricardo Adala Benfatti (Brazil), Elmiro Santos Resende (Brazil), José Teles de Mendonça (Brazil), Mario Coli Junqueira de Moraes (Brazil), Tânia Maria de Andrade Rodrigues (Brazil), among others. At this meeting, Prof. Dr. Melchior Luiz Lima (Brazil) was adopted by acclamation as President of the South American Section of the International Academy of Cardiovascular Sciences to continue the work brilliantly performed by Prof. Dr. Otoni Moreira Gomes.

The Scientific Program sought to contemplate the current issues in the interest of dissipating human knowledge in the health area, with exquisite debates and exchanges of experiences focused on cardiovascular diseases. Several researchers participated in cardiology and Brazilian and international cardiovascular surgery. In addition, other health professionals such as Nurses, Perfusionists, Physiotherapists and Medical Graduates participated. During the three days of the event were presented 340 scientific articles in the form of banners and 69 free themes in oral presentation. The graduate students in medicine assisted as secretaries' tables in clinical

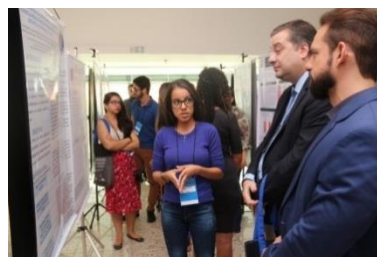
discussions.

On the last day of the International Scientific Forum the President of the Congress Prof. Dr. José Wanderley Neto affectionately offered a playful moment with dinner at his residence.

Of course, this important event would not be possible without the exceptional and arduous work of the organizers.

With the feeling of having fulfilled with responsibility the works of this important event, we glimpsed to have honored the hard work of our Professor Doctor Otoni Moreira Gomes who has always motivated us to contribute to the philosophy of medical work.

In continuity, we began our work for the next International Scientific Forum that will take place from 7 to 9 November 2019 in the city of Vitória, ES, Brazil. We are sure and look forward to welcoming you again.





## Dr. Vladimir Jakovljevic Elected as Dean of Medicine



*Dr. Vladimir Jakovljevic*

Dr. Vladimir Jakovljevic is Professor and Head of Cardiovascular Research Laboratory, Faculty of Medical Sciences University of Kragujevac, Serbia. With more than 20 years of research experience, Dr. Jakovljevic is a leading scientist in the field of cardiovascular science with more than 80 papers in journals indexed in Science Citation Index list.

Dr. Jakovljevic completed his PhD in 2004 and specialization in Clinical Physiology in 2005 in University of Belgrade. His main research interests represent examination of the changes in the cardiovascular system in various pathophysiological conditions and role of oxidative stress and reactive species in cardiovascular diseases. Dr. Vladimir Jakovljevic is highly dedicated to education of students of medicine, pharmacy, dentistry and postdoctoral students, to whom unselfishly transfer knowledge from the areas of his expertise, using interdisciplinary approach, thus providing strong intellectual basis for future medical doctors, pharmacists, dentists and young investigators.

Since 2014, he has been the President of the Serbian Physiological Society. Dr. Jakovljevic was directly involved in the organization of several eminent scientific

meetings, such as 2<sup>nd</sup> European Section Meeting of the International Academy of Cardiovascular Sciences held in Belgrade in 2015, under the auspices of the International Academy of Cardiovascular Sciences. All the efforts that Dr. Jakovljevic invests in the organization of scientific meetings and dissemination of scientific thought, which are strongly supported by the Dr. Naranjan Dhalla, with his outstanding energy and passion dedicated to research in cardiovascular sciences. Dr. Jakovljevic was awarded with the Distinguished Leadership Award in Cardiovascular Sciences in 2015 by International Academy of Cardiovascular Sciences. He is Editor in Chief of the Serbian Journal of Experimental and Clinical Research published by the Faculty of Medical Sciences University of Kragujevac.

Recently, Dr. Vladimir Jakovljevic was elected as the new Dean of the Faculty of Medical Science for a term of 3 years. The Council of the Faculty of Medical Sciences unanimously elected Dr. Jakovljevic in view of his exceptional successes as previous Vice-dean for Pharmacy Department. As a new Dean Dr. Jakovljevic established collaborations with several universities from all over the world, such as Karolinska Institute (Stockholm, Sweden), The First Moscow State Medical University I.M. Sechenov (Moscow, Russian Federation), Medical Faculty University of Montenegro (Podgorica, Montenegro), and Medical Faculty University of Banja Luka (Banja Luka, Bosnia and Herzegovina). The Faculty of Medical Sciences under the leadership of Dr. Jakovljevic and his team will continue to flourish with new scientific and educational heights.



## Dr. Ramesh K. Goyal Conferred with Honorary Professorship

Dr. Ramesh K. Goyal, Vice-Chancellor, Delhi Pharmaceutical Sciences and Research University (DPSRU), New Delhi has been conferred with Honorary Professorship by Stavropol State Medical University (StSMU), Russia. He is only the second foreigner to receive this honour in the last 80 years. This was given during its 80<sup>th</sup> Annual event of the University. DPSRU University and Stavropol State Medical University (StSMU) are currently working jointly on an INDO-RUSSIAN PROJECT-2018 for the treatment of “Diabetic Foot Ulcer”. Recently, he has also been given Fellowship of Indian Society of Veterinary Pharmacology and Toxicology.



*Dr. Ramesh Goyal Receiving the Honourable Professorship by Stavropol State Medical University (StSMU), Russia*

Dr. Ramesh Goyal joined as the Vice Chancellor of Delhi Pharmaceutical Sciences and Research University (DPSRU) in 2016. Dr. Goyal was Executive Director at V ClinBio Labs at Sri Ramachandra University, Chennai. He is among the few Vice Chancellors from pharmacy or medical sciences who attained this position for a second time in a Government University. He was formerly the Vice Chancellor of M. S. University of Baroda from 2008 to 2011. Before joining MSU, he was faculty at L M College of Pharmacy, Ahmedabad and served as



Associate Professor for 12 years and Professor for 16 years. He established separate Faculty of Pharmacy MSU (2010 becoming functional from 2015), revived Faculty of Pharmacy at Gujarat University (2002) and was appointed as in-charge to set up the academic program for pharmacy faculty at Gujarat Technological University.

He has 38 years of teaching and research in cardiovascular pharmacology and diabetes extended now to cancer and inflammatory disorders including psoriasis and multiple sclerosis. He has 3 patents, 18 books, 303 full papers, over 400 abstracts and guided 43 Ph.D. and 173 M. Pharm. students. He is the recipient of 61 awards including Best Pharmacy Teacher, Best Pharmaceutical Research Scientist, Life Time Achievement Award from the International Academy of Cardiovascular Sciences, Canada and Indo-Global Foundation, Inc. USA. He has travelled across the globe in different capacities including as a Post Doctoral Fellow, Visiting Scientist, Visiting Professor and invited speaker and Chairman in various countries including Canada, USA, U.K. and Australia. He has been the President of Indian Pharmacological Society, Society of Pharmacovigilance (India) and Indian Society of Hypertension. He has served in several committees like Institutional Ethics Committee for Clinical Trials and Animal Experiments. He was the Chairman of ‘Endosulfan Committee’ of Govt. of Gujarat, Central Regional Committee of AICTE, Bhopal and Member, Executive Committee of AICTE, New Delhi.

Dr. Goyal has associated with developing new drug molecules with 505(2)(b) pathway as well as 4 new drug entities moving towards IND filing stage at V ClinBio Labs. Dr. Goyal looks forward to develop Delhi Pharmaceutical Sciences and Research University as one of the model Universities in the world. According to him DPSRU University is probably the 3<sup>rd</sup> largest University in the world after China Pharmaceutical University, Nanjing, China and Gifu University, Gifu Prefecture, Japan.





Dr. Goyal wishes to encapsulate within the pharmacy profession, opportunities in bio-markers, bio-pharmaceuticals, bio-similars and medical devices as well as other health related emerging areas. Simultaneously, he wishes to have reorientation of community based pharmacy programs like pharmacovigilance,

pharmacoeconomics, and consultant-pharmacist for some diseases such as diabetes, cancer pharmacist neurological and cardiovascular diseases. He calls for the cooperation and suggestions from pharmaceutical fraternity of the country to meet his vision and mission of the University.

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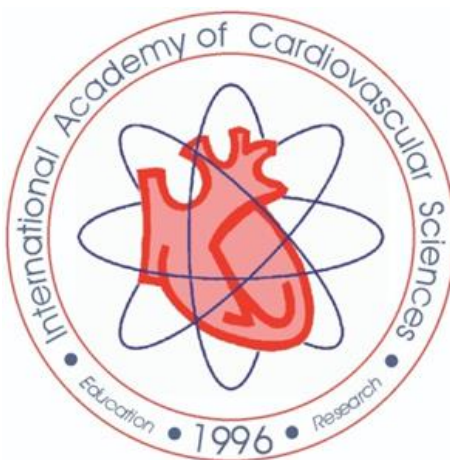
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# Cardiovascular Diseases in the Middle East and Africa Region: Are Diabetes Mellitus and Obesity the culprits?

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## Introduction

Cardiovascular diseases (CVD) are associated with high morbidity and mortality and are the number most common of death worldwide. In 2015, 422.7 million cases of CVD were reported (Roth et al., 2017). More than 17.9 million people died of CVD in 2016, accounting for almost 31% of all cases of death worldwide (World Health Organization, 2018). This is more than one-third of all deaths recorded for that year. The number of deaths from CVDs is projected to continue to grow and will likely reach an alarming rate of more than 23 million by the year 2030 (Myers and Mendis, 2014). The increasing number of deaths resulting from CVD has unfortunately been steady because in the year 2010 when the mortality from CVD was just 16 million. It is worth noting, however, that ischemic heart disease (IHD) and stroke accounted for more than 80% of all CVD deaths recorded for 2008 (Mendis et al., 2011).

IHD accounts for 14.3 % of deaths in the Arab world in 2010. It is also the number one cause of death in this part of the world. Moreover, 199 deaths/100,000 of population was recorded in the Middle East and North Africa region in 2010 (Mokdad et al., 2014). The number of deaths/100,000 of population has increased to 286/100,000 in 2015 (Roth et al., 2017). These numbers differ from country to country because of wide variation in income and availability of optimal healthcare. While the rate of CVD deaths is decreasing in high-income countries, it is increasing at alarming proportions in low-income countries, where people have restricted access to full-fledged healthcare services.

The age-standardized rate of CVD deaths in the Middle East and North Africa region is higher than those observed globally, but lower than those observed in Eastern Europe (Table 1).

**Table 1: CVD deaths/per 100,000 of population in Middle East and North Africa Region compared to other Regions (Roth et al., 2017)**

	Male	Female	Total
<b>Worldwide</b>	335	242	286
<b>Middle East and North Africa</b>	398	326	361
<b>Europe</b>	419	278	338
<b>Western Europe</b>	187	132	157
<b>Eastern Europe</b>	701	432	532
<b>East Asia</b>	359	237	295
<b>South Asia</b>	424	314	369
<b>South East Asia</b>	377	274	321

## What belongs to CVD?

CVD includes a large variety of conditions such as congenital and ischemic heart diseases, cerebrovascular disease, rheumatic heart and peripheral arterial diseases, deep venous thrombosis, cardiomyopathies and many others (Table 2).

**Table 2: Examples of Cardiovascular diseases**

Ischemic heart disease
Non ischemic strokes
Cardiomyopathies
Rheumatic heart disease
Peripheral arterial disease
Deep venous thrombosis
Inflammatory disease of the heart

## What are the risk factors for CVD?

Conditions that facilitate the development of CVD are numerous and multifactorial and are similar to those observed for diabetes mellitus. These factors include but not limited to diabetes mellitus (DM), obesity, hypertension, atherosclerosis and smoking (Beaglehole et al. 2011).

## Diabetes Mellitus

DM, a multifactorial disease like CVD, is a major risk factor in the development of cardiovascular diseases. People with DM are at increased risk of developing atherosclerosis, and IHD, hypertension and stroke. People with DM are 2-3 times more likely to develop CVD

compared to non-diabetic controls. In addition, about 60% of diabetic patients die of CVD (Pop-Busui et al., 2017). Since DM is a strong risk factor for CVD, the high prevalence of DM (6-18%) in the Middle East and North Africa region (IDF, 2017) will continue to be a challenge for healthcare policy makers.

### Obesity

Obesity has become a worldwide epidemic. World Health Organization reports showed that almost 2 billion adults worldwide were overweight in 2016 and 650 million of these people were obese. This indicates that a significant part of the world population is obese. Moreover, the prevalence of obese was reported to be more than 20% in the Middle East and North Africa region (NCD Risk Factor Collaboration, 2017). Obesity predisposes people to developing DM, CVD and some cancers.

### Hypertension

According to the World Health Organization (WHO), more than one billion people suffer from hypertension in 2008 (WHO, 2017). It has been shown that 7.5 million people died of hypertension in 2008. Hypertension increases the risk of CVDs especially cerebrovascular accidents. Globally, hypertension affects 4 out of every 10 adults and the North Africa region is no exception. It continues to rise in the Middle East and North Africa with high prevalence of hypertension in the Middle East (Roth et al., 2017)

### Conclusion

Obesity and DM are major health issues worldwide and more so in the Middle East and North Africa region. These conditions are also major risk factors for the development of CVD. Physical inactivity and inappropriate diet fuels the development of obesity and by extension DM. Since obesity and DM are high in the Middle East and North Africa region and shares some of the risk factors with CVD, the incidence and prevalence of CVD will continue to rise unless obesity as well as the prevalence of DM is checked (Table 3).

**Table 3: Correlation between Cardiovascular Diseases (CVD) and Diabetes Mellitus (DM)**

Obesity
Physical inactivity
Calorie-rich diet
Inflammation
Hypertension

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*L to R: Drs. Abdullah Shehab, Naranjan Dhalla, Ernest Adeghate and Salim Bastaki.*

Dr. Dhalla had a meeting to discuss the prevention of heart disease and promotion of the activities of the International Academy of Cardiovascular Sciences in Dubai, UAE. Dr. Abdullah Shehab is president of the Emirates Cardiac Society whereas Drs. Adeghate and Bastaki are Departmental Heads in College of Medicine, Al Ain.



# Role of Exercise in Cardiovascular Disease

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According to the World Health Organization, cardiovascular disease (CVD) is the number one cause of death worldwide, with an estimated 17.9 million deaths in 2016 (1). It is the second leading cause of death in Canadians as per the Public Health Agency in Canada (2). An umbrella term, CVD includes a number of disorders of the heart and blood vessels including coronary heart disease or ischemic heart disease, congenital heart disease, cerebrovascular disease, rheumatic heart disease, peripheral artery disease, deep vein thrombosis and pulmonary embolism. The diseases are characterized by damage to, and/or loss of function of, heart muscle and blood vessels. Initial signs of CVD manifest as hypertension, elevated blood glucose, worsened blood lipid profile, increased body weight and obesity. While the overall incidence and all-cause mortality associated with CVD has decreased in Canada from 2000-01 to 2012-13, the absolute number of people living with CVD is increasing, thereby highlighting the importance of management, and need for improved therapeutic strategies to combat CVD.

Risk factors for CVD include an unhealthy diet, lack of physical activity, smoking and excessive alcohol consumption. Encouraging healthy life practices coupled with pharmaceutical intervention is the mainstay of CVD therapy. Interestingly, lack of physical activity has been identified as the key risk factor for CVD, even after controlling for its effect on other predisposing factors such as diabetes, hypertension and hyperlipidemia (3). Not to be confused with a regimen of habitual, structured, repetitive exercise, physical activity refers to any body movement produced by skeletal muscle that requires the use of cellular energy. The Canadian Society for Exercise Physiology (CSEP) recommends adults aged 18-64 years to engage in 150 min of moderate to vigorous aerobic exercise per week, with each bout lasting a minimum of 10 minutes (4). This, in conjunction with twice-weekly muscle and bone strengthening activities, has been shown to reduce the risk of heart disease, stroke, high blood pressure, certain types of cancer, type 2 diabetes, obesity, and osteoporosis (4). The exercise prescription remains the same for adults aged 65 years and over. Bike riding, brisk walking, jogging, and swimming are appropriate activities that will cause the subject to sweat and breathe a little more than usual.

Regular exercise has been illustrated to have potent systemic beneficial adaptations in various organ systems within the body such as skeletal muscle, peripheral vasculature, adipose tissue, brain as well as within the heart itself (5-8). Health benefits associated with regular endurance exercise include (5, 6, 9, 10, 13):

1. Reduced risk of cancer incidence and progression;
2. Lower risk of CVD, atherosclerosis, hypertension, and improved circulation;
3. Better lipid profile, strengthened immune system, metabolism and endurance;
4. Lower risk of type 2 diabetes, obesity and metabolic syndrome;
5. Improved muscle, and bone health, thereby leading to lower risk of falls and related injuries;
6. Enhanced self-esteem, mood, and cognitive function, and decreased stress (oxidative cellular stress as well as psychological);
7. Reduced rates of anxiety, depression, and risk of dementia, lessened risk of stroke, delayed risk of Alzheimer and Parkinson's disease; and
8. Augmented sleep, increased lifespan, and improved quality of life.

The magnitude of the changes highlighted above depends on the type, intensity and frequency of exercise. The pleiotropic health benefits accrued with exercise leaves one breathless with admiration. No existing pharmaceutical strategy comes close to recapitulating the plethora of systemic benefits as potentiated by exercise training, nor can one envision the development of an exercise mimetic in future that will induce all of the above. Nevertheless, elucidating the molecular mechanisms underpinning exercise-induced adaptations may lead to therapeutic interventions that can serve population groups that are unable to perform physical activity. In the context of exercise training countering CVD, research has demonstrated that exercise improves blood lipid profile by lowering triglyceride levels, and increasing beneficial lipids such as high-density lipoprotein and apolipoprotein A1 (11, 13). Additionally, glucose intolerance, and insulin resistance is rescued with exercise training (11), likely due to the well-characterized increase in mitochondrial biogenesis as orchestrated by the activation and up-regulation of key enzymes and

proteins canonically involved in this process (12). Changes at the cellular level are coupled with remodeling of the heart with exercise training. Physical activity increases left ventricular mass, leading to physiological eccentric cardiac hypertrophy. With a larger heart, and stronger cardiac walls, the end diastolic volume increases, thereby improving cardiac output (6). Exercise also improves coronary blood flow, and induces angiogenesis.

The data presented thus far beg the question - how does physical activity, which involves and relies on the contractile function of skeletal muscle fibers, produces whole body systemic adaptations in tissues that have little to do with performing the work involved with exercise? While originally proposed by Goldstein in 1961 (14), research conducted in the past 10 years has confirmed that skeletal muscle serves as an endocrine organ that releases a plethora of factors (including proteins, lipids, mRNA species, DNA and metabolites) that travel in the blood stream to evoke adaptations in distal tissues (6, 15, 16). Termed as myokines, these factors are involved in organ cross talk, play a crucial role in executing the metabolic plasticity as induced by chronic exercise, and can exert indirect effects on improving heart physiology and function. Since some of these released factors are labile to the environment, it is also highly likely they are secreted packaged in vesicles known as extracellular vesicles (EVs, 16).

EVs constitute an evolutionary conserved mode of prokaryotic and eukaryotic intercellular communication. EVs differ from each other based on size, site of origin and cargo content. EVs include i) exosomes (40-120 nm) formed by the inward budding of the endosomal membranes, ii) microvesicles (100-1000 nm) derived from the outward budding of plasma membrane, and iii) apoptotic bodies (500-5000 nm) formed by plasma membrane blebbing usually associated with cell death (17). EVs contain different types of biochemical messages, an EV signature, that differs based on the cell type of origin, and on cellular conditions (18). Once the exercise-induced EVs are released into the bloodstream, they travel through the body and are taken up by distal recipient tissues (16). Depending on the EV signature and the recipient cell, there will be subsequent downstream activation of cellular signalling cascades leading to the modulation of pathways usually affected by exercise-induced signalling such as improvements in cardiovascular function. Hence, elucidating the exercise-induced EV signature is of paramount importance due to a growing appreciation of the role it can play in translating the systemic effects of physical activity (16, 18). If we know the precise biochemical content of EVs that promote whole body adaptations, we can target it mechanistically and deduce nature's exercise pill. Future studies investigating the role of EVs in modulating

beneficial cardiac adaptations and suppressing CVD are clearly warranted.

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