In this Issue

Report of the IACS India Section Meeting 2019, Bangalore, India 2
Recognition of Academy Fellows in India 9
Dr. Dhall Receives Lifetime Achievement Award from the Sri Jayadeva Institute of Cardiovascular Sciences and Research, Bangalore, India 10
Announcement of IACS India Section New Council 11
Announcement of the IACS South American Section New Council 12
Caribbean Heart Health Group in Partnership with the Academy Honours Dr. Karen Gordon-Boyle 17
Using 3D Bioprinting to Generate Replacement Cardiovascular Tissues 18
3D Bioprinting of Heart and Blood Vessels: A Near Reality 20
Officers and Council Members of the Academy 23
Officers of the Different Sections of the Academy 23
CV Network Editorial Board 24
Partnering Journals of the IACS 24
5th International Symposium on Adipobiology and Adipopharmacology 25
First Announcement of the Joint IACS 6th European Section and 7th North American Section Meeting in Vrnjacka Banja, Serbia 26
Announcement of the 29th Scientific Forum, Vitória, Espírito Santo, Brazil 31
Announcement of International Symposium on Cellular Therapy in Cardiovascular Medicine, Ankara, Turkey 32
Sri Jayadeva Institute of Cardiovascular Sciences & Research (SJICR), Bangalore, India; hosted the 11th Annual Meeting of International Academy of Cardiovascular Sciences (IACS), India Section. The conference was held from 15\textsuperscript{th} – 17\textsuperscript{th} February, 2019 at NIMHANS Convention Center, Bangalore. The theme of the conference was Translational Research in Cardiovascular Sciences.

The focus of the conference was translational research in cardiovascular and allied sciences – taking bench side research to bedside. The conference provided a platform for both the basic scientists and clinicians to meet, discuss and interact with each other and deliberate upon the recent developments and trends in the field of cardiovascular and allied sciences. Participants got an insight into the clinical perspectives, the scientific advancements and current trends from elite clinicians and cardiovascular scientists in the field.

The event was organized by Dr. CN Manjunath (Organizing Chairman and Director of SJICR) and Dr. SR Kalpana (Organizing Secretary and Professor & HOD of Pathology, SJICR) with the help of Joint Organizing Secretaries viz Dr. Ravi Math, Dr. Satvic Manjunath and Dr. Deepak Padmanabhan. Dr. Naranjan S. Dhalla (Founder Executive Director, IACS) and Dr. CC Kartha (President, IACS India Section) were the chief patrons.
The conference was constructed to house Orations viz SK Gupta Oration, Ramesh Goyal Oration, Harpal S. Buttar Oration and Rakesh Kukreja Oration, and several Symposia with panel discussions on various topics related to cardiovascular and allied sciences. To encourage the young scientists and clinicians, there were Dr. Suresh C. Tyagi Award for Young Faculty, Dr. Devendra Agrawal Award for Young Investigators, Dr. NS Dhall Poster Awards and CC Kartha Travel grant.

Translational research fosters multi disciplinary, multi directional integration of basic research and patient oriented research with the ultimate aim of improving the health of the community. As Translational Research is the need of the hour in cardiovascular field today, we thought it would be appropriate to select it as the theme for this conference.

The first day started with the invocation, invoking Lord Ganesha, the god of new beginnings, and seeking his blessings. The conference began with the prestigious SK Gupta Oration delivered by Dr. Mahesh P. Gupta (University of Chicago), chaired by Dr. Ramesh Goyal. Dr. Gupta talked about his work on “SirT6 activation promotes mitochondrial health and protects the heart from developing diabetic cardiomyopathy”. Dr. Mahesh Gupta was felicitated by Dr. Ramesh Goyal, Dr. CC Kartha and Dr. SR Kalpana with a plaque and a cash award in honour of his eminent work in the field.

This was followed by Ramesh Goyal Oration which was delivered by Dr. Paul K. Ganguly (Alfaisal University, Saudi Arabia) and chaired by Dr. KH Srinivas (Professor of Cardiology, Sri Jayadeva Institute of Cardiovascular Sciences & Research, Bangalore). Prof Ganguly spoke in depth about “Medical education and cardiovascular sciences: an innovative program for the 21st century professionals”. Dr. Ganguly was felicitated by Dr. Ramesh Goyal, Dr. CC Kartha, Dr. KH Srinivas and Dr. SR Kalpana and was presented with a plaque and the cash award.

The Inaugural Function
The conference was inaugurated by Dr. CN Manjunath, Director, Sri Jayadeva Institute of Cardiovascular Sciences & Research and a recipient of the prestigious Padmas shri and Rajyotsava awards, by lighting the lamp. The function was presided over by Dr. CC Kartha and Dr. NS Dhall was the guest of honour. Dr. SR Kalpana, the Organizing Secretary, accompanied the guests on the dais and welcomed the guests. Dr. CC Kartha delivered the presidential address focusing on the importance and
challenges of Translational Research in the current scenario. Dr. CN Manjunath talked at length about the present challenges in treating cardiovascular patients and the changing lifestyles of Indians leading to increased cardiovascular risk. Dr. NS Dhalla released the abstract book and addressed the gathering on the importance of cardiac research and education. Distinguished leadership award in Cardiovascular Sciences was awarded by Dr. NS Dhalla on behalf of the International Academy of Cardiovascular Sciences, Winnipeg Canada. Dr. NS Dhalla was felicitated with the Lifetime achievement award by Sri Jayadeva Institute of Cardiovascular Sciences & Research. Dr. Satvic Manjunath delivered the vote of thanks and acknowledged all the distinguished guests, delegates, sponsors and volunteers. The scientific session resumed after a short tea break.

Symposium 1
The first symposium for the conference was themed Translational Research in Cardiovascular Sciences and was sponsored by Sri Jayadeva Institute of Cardiovascular Sciences & Research, Bangalore. The symposium had four speakers talking about various topics in advancements of heart research from protein inhibition to valve reconstructions. This session was chaired by Dr. S Jayaprakash (Professor of Cardiac electrophysiology, Sri Jayadeva Institute of Cardiovascular Sciences & Research) and Dr. Kavitha Gulati (Professor of Pharmacology, Vallabhai Patel Chest Institute, Delhi).

Symposium 2
This symposium was chaired by Dr. Madhu Khullar (Professor, Experimental Medicine & Biotechnology, PGIMER, Chandigarh) and Dr. Tejal Gandhi (Principal, Anand Pharmacy College, Gujarat). The symposium had eminent scientists of the country presenting on Diabetes induced cardiovascular complications. It was sponsored by Riya and Paul Ganguly. The speakers were presented with Riya and Paul Ganguly Symposium Lecture Award.

Symposium 3
This symposium was sponsored by Micro Labs Ltd and was chaired by Dr. Muthuswamy Balasubramanyam (Madras Diabetes Research Foundation, Chennai) and Paul K. Ganguly. The speakers presented their talks on the topic of Cardiomyopathy.

Dr. NS Dhalla Poster Awards:
Thirty posters were put up by young scientists and researchers from all over India, displaying their work and enthusiastically explaining it to their audience. The posters were judged and evaluated for Dr. NS Dhalla Poster Awards by a panel of judges which included Dr. Arunabha Ray (Professor and HOD of Pharmacology, Hamdard Institute of Medical Sciences and Research, Delhi), Dr. Muthuswamy Balasubramanyam and Dr. Parimala Prasanna Simha (Professor of Cardiac Anaesthesia, Sri Jayadeva Institute of Cardiovascular Sciences & Research, Bangalore).
IACS-India Section Annual General Body Meeting:
The governing council meeting was held on 15th February 2019 from 6 pm. Dr. CC Kartha, President IACS (India section) welcomed the members and Dr. Surya Ramachandran, Secretary General briefed the audience about the activities of the academy. Dr. CC Kartha discussed about the election. Six people had nominated Dr. CC Kartha for the post of the President of the IACS-India Section which was unanimously approved by the members present in the general body meeting and. It was decided that Dr. CC Kartha will continue as the President of IACS (India Section). Prof. Ramesh Goyal, Vice President of IACS, offered to host the conference in February 2020 at Delhi and welcomed all the members. SriRaksha Aravind (Playback singer) along with her troupe took the gathering into the musical world with her melodious rendition of old Hindi classics and traditional Kannada folk songs.

Symposium 4
Day 2 began with symposium 4. This symposium was sponsored by Sun Pharma and themed Cardiology for the masses. The speakers spoke about recent advancements in the cardiovascular field, prevention of non-communicable diseases, congenital heart diseases. Old concepts were revisited and their newer impacts were discussed. This session was chaired by Dr. Ajit Mallasari.

Symposium 5
Dr. Asher Kimchi and Dr. S Sivasankaran chaired the symposium sponsored by Torrent Pharmaceuticals. This symposium was graced by the founder of IACS himself, Dr Naranjan S. Dhalla. This session had talk presented on vast array of topics from the cardiovascular research.

The next session was the Harpal Buttar Oration by Dr. Vijaya M. Nayak (Cardiac surgeon) chaired by Dr. Arunabha Ray. Dr. Nayak explained the evolution of the heart through visual aids compiled from her extensive research over the years. Her talk was titled “Comprehending human heart development through phylogeny”. Dr. Nayak was presented with the plaque and the cash prize by Dr. CC Kartha, Dr. Arunabha Ray and Dr. SR Kalpana.

Suresh Tyagi Young Faculty Award and Devendra Agrawal Young Investigator Award
Out of the many scientific papers submitted by Young Faculties and Young Investigators from different institutes in India, four finalists were selected by a panel of judges to present their work and compete for Suresh Tyagi Young Faculty Award and Devendra Agrawal Young Investigator Award.

Dr. Abhinav Kanwal (Assistant Professor, Manipal College of Pharmaceutical Sciences, MAHE, Manipal), Dr Kashif Hanif (Assistant Professor, CSIR- Central Drug Research Institute, Lucknow), Dr. Raghu Bhushan
(Assistant Professor, Yenepoya University, Mangalore) and Dr. Kalyani Barve (Assistant Professor, Shobaben Pratapbhai Patel School of Pharmacy and Technology Management, Mumbai) presented their study and findings under the category of Young Faculty. The session was evaluated by a panel of judges: Dr. Shivakumar (Scientist G, Sri Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum), Dr. Madhu Anand-Srivastava (Professor of Physiology, University of Montreal, Canada) and Dr. Dwaipayan Bharadwaj (Professor, School of Biotechnology, Jawaharlal Nehru University, Delhi).

Mahesh Krishna (Rajiv Gandhi Center for Biotechnology, Trivandrum), Parmeshwar Katare (Drug Discovery Research Centre (DDRC), THSTI, Faridabad), Kalaivani V (Rajiv Gandhi Center for Biotechnology, Trivandrum) and Bharath G (University of Madras, Chennai) presented their work under the category of Young Investigator in the session which was evaluated by Dr. Ashok Srivastava (Professor of Medicine, University of Montreal, Canada), Dr. Mahesh Gupta and Dr. Rakesh Kukreja (Professor of Internal Medicine, Virginia Commonwealth University, Virginia).

**Awards session:**
The award session and banquet dinner was hosted at Hotel La Marvella. It was an informal function where the winners of various sessions were presented with cash awards and certificates and Dr. Asher Kimchi, Dr. SR Kalpana and Dr. Madhu Khullar were felicitated by the Academy. Lifetime Achievement award in Cardiovascular Science, Medicine and Surgery to Dr. Asher Kimchi. Distinguished leadership award in Cardiovascular Science, Medicine and Surgery to Dr. Asher Kimchi. Distinguished service award in Cardiovascular Science, Medicine and Surgery to Dr. SR Kalpana.
The winner of Devendra Agrawal Young Faculty Award was Dr. Raghu Bhushan, Yenepoya University, Mangalore and the winner of Suresh Tyagi Young Investigator Award was Kalaivani V, Rajiv Gandhi Center for Biotechnology, Trivandrum.

**Winners of Dr. NS Dhalla Poster Awards:**
Anjali Roy, IIT Indore Hina Latef Nizami, Drug Discovery Research Center, Gurgaon; Vinitha A, Rajiv Gandhi Center for Biotechnology, Trivandrum and R. Dhanya, IIT Madras.

**Winners of Dr. CC Kartha Travel Grant:**
Gaurav Kumar, University Of Delhi, South Campus; Manisha Saini, University Of Delhi, South Campus; Aneesh Kumar, Rajiv Gandhi Center for Biotechnology, Trivandrum; Jayalekshmi, Rajiv Gandhi Center for Biotechnology, Trivandrum; Karthika CL, Rajiv Gandhi Center for Biotechnology, Trivandrum.

The third and the final day of the conference began with Rakesh Kukreja Oration by Dr. Shivakumar (Scientist G, Sri Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum). The session was chaired by Dr. Mahesh Gupta. Dr Shivakumar talked about his research interest “The DDR2 paradox: saving a cell and killing the organ”. Dr. Shivakumar was felicitated by Dr. CC Kartha, Dr. Mahesh Gupta and Dr. SR Kalpana with the plaque and the cash prize.

**Symposium 6**
Day 3 concluded with our last and final symposium, symposium on Vascular diseases sponsored by Lupin Ltd.
Awardees: from L to R standing: Parmeshwar Katare, Bharath G, Aneesh Kumar, Gaurav Kumar, Mahesh Krishna, Dr Surya Ramachandran, Dr Asher Kimchi, Prof CC Kartha, Dr Kalpana S R, Anjali Roy, Hina Lateef, Dr Ankita Bane, Dr Kashif Hanif, Dr Abhinav kanwal, Dr Raghu Bhushan

Sitting: Kalaivani V, Thushara Thulaseedharan, Jaylekshmi, Vinitha A, Manisha Saini, Binu Prakash, R Dhanya

The orators of all the orations were presented with plaques

Drs. SR Kalpana (L), Ramesh Goyal (2nd from L) and CC Kartha (R) presenting plaque to Dr. Mahesh Gupta

Drs. SR Kalpana (L), Ramesh Goyal (2nd from L), KH Srinivas (2nd from R) and CC Kartha (R) presenting plaque to Dr Paul Ganguly

Drs. Kalpana, Vijaya Nayak, Arunabha Ray, CC Kartha, Rakesh Kukreja, Shivakumar and Mahesh Gupta
This symposium also had the most number of speakers talking about different molecules aiding in vascular diseases to help find prognosis and was chaired by Dr. TR Raghu (Professor and HOD of Cardiology, SJICR) and Dr. Ravi Math (Associate Professor of Cardiology, SJICR).

**Valedictory Function:**
The Organizing Secretary, Dr. SR Kalpana concluded the function with the vote of thanks and thanked all our sponsors, delegates and colleagues for their support and participation in making the event a success. Dr. CC Kartha announced the venue of IACS 2020 to be Delhi which will be hosted by Dr. Ramesh Goyal, which was decided at the general body meeting.

**Recognition of Academy Fellows in India**

Dr. Kimchi was a special guest of the IACS-India Section and was recognized in Bangalore, whereas Dr. Suresh Gupta, Past President of the India-Section, who was unable to attend the meeting, was recognized in New Delhi, India. Both received the IACS Lifetime Achievement Awards.

**Dr. Asher Kimchi**

Dr. Asher Kimchi, MD, is the co-medical director of the Preventive and Consultative Heart Center of Excellence at the Cedars-Sinai Heart Institute. He is the immediate past clinical chief of the Cedars-Sinai Division of Cardiology. He also holds the academic title of clinical professor of medicine. He is also a past president of the Greater Los Angeles Affiliate of the American Heart Association. Dr. Kimchi, a former flight surgeon in the Israeli air force, is the founder and chair of the International Academy of Cardiology. He founded the world congress on heart disease and has served as its chair for 28 years. Through the organization, he has directed 24 international congresses on heart failure and heart disease. He is an editor or co-editor of 12 books, and his scientific articles on the diagnosis and treatment of coronary artery disease and heart failure have appeared in prestigious peer-reviewed journals, including Circulation, the American Journal of Cardiology, JAMA Internal Medicine and the American Heart Journal. He has presented his scientific work at numerous national and international conferences. He serves on the editorial board of the journal Cardiology. Over the past several years, Dr. Kimchi’s research has focused on the management of patients hospitalized with decompensated heart failure. The research involves designing and evaluating interventions to improve the care transition from hospital to home to reduce readmissions and potentially improve morbidity and mortality. In clinical practice, Dr. Kimchi provides comprehensive cardiology care with emphasis on the primary and secondary prevention of heart disease.

**Dr. Suresh K. Gupta**

Dr. Suresh Gupta has been associated with the International Academy of Cardiovascular Sciences (India section) since its inception in 2004 in India. He was secretary General from 2004 to 2011. During this period he organized various National and International Conferences to promote Cardiovascular Programs in...
Country. One of the major objective was to bring the Clinical and as well as basic Scientists on the same forum. From 2011 to 2015 Professor Gupta was elected President of the Society. During his tenure IACS India Section has established several orations and awards to encourage Eminent Scientists and Young Investigators.

One of the major research contribution of Professor Gupta has been to establish the scientific basis for the use of herbal medicines for various cardiovascular disorders. He has shown that these are useful in the prevention and treatment of cardiovascular disorders if used judiciously. He has published a large number of papers in National and International Journals on his research.

Currently Professor Gupta is National Advisor to the Pharmacovigilance Programme of India (Ministry of Health and Family Welfare). Dr. S K Gupta was formerly Head, Department of Pharmacology at All India Institute of Medical Sciences, New Delhi and has been Dean & Director General Institute of Clinical Research (India), which is one of the premier and pioneering Institute in the country. He is the founder of WHO National Pharmacovigilance Center at AIIMS. Dr. Gupta has been expert-member of a number of committees of DST, DBT, CSIR and Ministry of Health and Family Welfare; Govt. of India. He has been visiting Professor to several prestigious universities in UK, USA, Germany and Japan. In recognition of his outstanding contributions Dr. Gupta has been conferred the “Lifetime Achievement Award in Cardiovascular Sciences” and “Distinguished Services Award in Cardiovascular Science, Medicine and Surgery” by IACS, Canada and also “Human Care Award of The Millennium” for Excellence in Medical Profession and Care of Masses, by Eye Care Awareness Foundation, New Delhi. Dr. Gupta have thirteen national and international patents to his credit based on his research. Dr. Gupta is President of the International Society for Pharmacoeconomics and Outcomes Research-India Chapter and International Academy of Cardiovascular Sciences. Dr. Gupta has published more than 350 research papers and edited and authored seventeen books some of them include ‘Basic Principles of Clinical Research’, ‘Textbook on Pharmacovigilance’, ‘Drug Screening Methods’ etc. He has guided more than 140 postgraduate students. He is elected fellow of IPS (India), ISER (USA), IACS (Canada) and FRSC (Romania). Dr. Gupta has been awarded several research grants from DST, DBT, CSIR, ICMR and UK India Education Research Initiative (UKIERI) Educational grant this year to work on management of diabetes and its complications. He is President International Society for Pharmacoeconomics and Outcomes Research, India Chapter.

Dr. Naranjan Dhalla is a Distinguished Professor, Max Rady College of Medicine, University of Manitoba. He served for 19 years as Founding Director of the Institute of Cardiovascular Sciences at the St. Boniface Hospital, Winnipeg, Canada. He has been working in the field of Experimental Cardiology with a focus on pathophysiology, biochemistry and pharmacology of cardiac dysfunction. He was one of the first investigators to identify membrane defects during the development of heart disease. He has published 819 full length research papers and review articles, which are cited more than 26,733 times with h-index of 76 in addition to editing 56
books, and training 163 fellows and graduate students in biochemical and molecular medicine.

As Secretary General and then President during 1972-1996, he developed the International Society for Heart Research for promoting cardiovascular research. He has been the Executive Director of the International Academy of Cardiovascular Sciences, which he founded in 1996 for promoting the cardiovascular education and prevention of heart disease; he was elected as Honorary Life President in 2016 of this organization. For the past 32 years, he has been Editor-in-Chief of an international journal "Molecular and Cellular Biochemistry".

Dr. Dhalla has received 201 honours and awards, including 6 Honorary Doctorate Degrees and 4 Honoris Causa Professorships from different Institutions. He has been invited to give 523 talks at various conferences and institutions around the globe. He is Fellow of the Royal Society of Canada, Member of the Order of Canada, Member of the Order of Manitoba and Inductee into the Winnipeg Citizens Hall of Fame, and most recently will be inducted into the Canadian Medical Hall of Fame.

Announcement of IACS India Section New Council

India Section which has currently 163 life members, elected a new Council for a 3 year term, effective April 1, 2019 to March 31, 2022. The new Council has representations from different parts of the country and from educational and research institutions as well as large corporate hospitals. The members of the new Council are listed below:

<table>
<thead>
<tr>
<th>A. Officers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>President</strong>: Dr. CC. Kartha, Society for Continuing Medical Education &amp; Research, Kerala Institute of Medical Sciences, Trivandrum</td>
</tr>
<tr>
<td>2. <strong>Past President</strong>: Dr. SK. Gupta, Delhi Pharmaceutical Sciences &amp; Research University, New Delhi</td>
</tr>
<tr>
<td>3. <strong>Vice President</strong>: Dr. Ramesh Goyal, Delhi Pharmaceutical Sciences &amp; Research University, New Delhi</td>
</tr>
<tr>
<td>4. <strong>Vice President</strong>: Dr. Ajit Mullasari, Madras Medical Mission, Chennai</td>
</tr>
<tr>
<td>5. <strong>Vice President</strong>: Dr. Tejal Gandhi, Anand Pharmacy College, Gujarat</td>
</tr>
<tr>
<td>6. <strong>Vice President</strong>: Dr. Praveen Varma, Amrita Institute of Medical Sciences, Kochi</td>
</tr>
<tr>
<td>7. <strong>Secretary General</strong>: Dr. Surya Ramachandran, Rajiv Gandhi Center for Biotechnology, Trivandrum</td>
</tr>
<tr>
<td>8. <strong>Finance Secretary</strong>: Dr. G. Srinivas, Sree Chitra Tirunal Institute for Medical Sciences, Trivandrum</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Council Members:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dr. Rajesh Kumar, Postgraduate Institute for Medical Education &amp; Research, Chandigarh</td>
</tr>
<tr>
<td>2. Dr. Arunabha Ray, Hamdard Institute of Medical Sciences &amp; Research, New Delhi</td>
</tr>
<tr>
<td>3. Dr. Madhu Khullar, Postgraduate Institute for Medical education &amp; Research, Chandigarh</td>
</tr>
<tr>
<td>4. Dr. Kavita Gulati, Vallabhji Patel Chest Institute, New Delhi</td>
</tr>
<tr>
<td>5. Dr. Tester F. Ashvaid, PG. Hinduja Hospital, Mumbai</td>
</tr>
<tr>
<td>6. Dr. SR. Kalpana, Sri Jayadeva Institute of Cardiovascular Sciences &amp; Research, Bangalore</td>
</tr>
<tr>
<td>7. Dr. Addepalli Veeranjaneyulu, Shobhaben Pratapbhai Patel School of Pharmacy &amp; Technology Management, Mumbai</td>
</tr>
<tr>
<td>8. Dr. Santhosh Satheesh, Jawahar Lal Institute for Postgraduate Medical Education &amp; Research, Puducherry</td>
</tr>
<tr>
<td>9. Dr. Madhulika Dixit, Indian Institute of Technology, Madras</td>
</tr>
<tr>
<td>10. Dr. Sanjay K Banerjee, Translational Health Sciences &amp; Technology Institute, Faridabad, Haryana</td>
</tr>
<tr>
<td>11. Dr. Ravi Sundaresan, Indian Institute of Sciences, Bangalore</td>
</tr>
<tr>
<td>12. Dr. Regalla Kumaraswamy, Center for Cellular &amp; Molecular Biology, Hyderabad</td>
</tr>
</tbody>
</table>

The Society for the Promotion and Research of Cardiovascular Sciences in association with the Indian Pharmacological Society (Delhi Branch) hosted a dinner reception in honour of special guests; Drs. Naranjan Dhalla, Asher Kimchi and Mrs. Becky Kimchi on February 24, 2019. Dr. Dhalla gave a Distinguished Lecture on Sudden Cardiac Death at Delhi Pharmaceutical Sciences and Research University, New Delhi on February 25, 2019. Dr. Suresh Gupta, Vice Chancellor Dr. Ramesh Goyal, Dr. Arunabha Ray and Dr. Asher Kimchi presided over this event.
Announcement of the IACS South American Section New Council

The South American Section of the IACS adapted a New Council. The updated list of the Officers and New Council are listed below:

Officers of the South America Section of the IACS

Honorary Life President

Otoni Moreira Gomes MD PhD
Full Professor, Federal University of Minas Gerais.
Professor of Cardiovascular Institute São Francisco de Assis.
Address: Av. Desembargador Felippe Immesi, 12
Santa Monica, Belo Horizonte - MG, 31000-000
Brazil, Phone: (31) 3439-3000
Email: gomes@servcor.com.br

President

Melchior Luiz Lima MD MSc PhD
Professor of Cardiovascular Institute São Francisco de Assis
Member of the Deliberative Council of the Brazilian Society of Cardiovascular Surgery (SBCCV);
President of the Department of Cardiology of the Brazilian Society of Cardiovascular Surgery (DECARDIO);
Head of the Heart Transplant Center of the Meridional Hospital, Cariacica, ES, Brazil
Address: 60 Alfeu Alves Pereira, Enseada do Suá, Vitória, ES 29050-285, Brazil
Email: melchior.lima@me.com; melchior@centrocor.com.br

Vice President

Alexandre Ciappina Hueb MD PhD
Assistant Physician of the Surgical Division of the Heart Institute (InCor),
Hospital das Clínicas, Faculty of Medicine, University of São Paulo
Assistant Professor of the University of Sapucaí Valley and Director of the Cardiovascular Surgery Service of Samuel Libânio Clinical Hospital of the Sapucaí Valley University - UNIVÁS.
Address: 1707, Oscar Freire street, Jardins, São Paulo - SP – Brazil, 05409-011
Email: hueb@uol.com.br

Past President

Ricardo Jorge Gelpi MD, PhD
Full Professor, Director of the Institute of Cardiovascular Physiopathology (INFICA), Department of Pathology, Faculty of Medicine, University of Buenos Aires.
Institute of Cardiovascular Physiopathology (INFICA), Department of Pathology, Faculty of Medicine, University of Buenos Aires
Address: J. Uriburu 950 2nd Floor, Sector A - 1114 Buenos Aires, Argentina.
Email: rgelpi@fmed.uba.ar; rgelpi@gmail.com
Secretary General
Ms. Elaine G. Freitas
Address: Av. Desembargador Felippe Immesi 12 - Santa Monica, Belo Horizonte
Minas Gerais, Brazil
31000-000 – Brazil
Email: gomes@servcor.com.br

Advisor
Elias Kallás MD MSc PhD
Cardiovascular Surgeon of Samuel Libânio Clinical Hospital, Professor of Cardiovascular Foundation São Francisco de Assis, Full Professor at the Sapucaí Valley University
Professor of Medical School of UNIVÁS.
Address: 1707, Oscar freire street, Jardins, São Paulo - SP – Brazil, 05409-011
Email: eliaskallas@uol.com.br

Advisor
Enrique Castañeda Saldaña MD
Principal Professor of Surgery
Facultad de Medicina Alberto Hurtado
Universidad Peruana Cayetano Heredia
Address: Av. Honorio Delgado 430, Lima 31 AP 4314 Lima 100 Peru
Email: enrique.castaneda@upch.pe

Council Members of the South America Section of the IACS

Dalton Valentim Vassallo MD MSc PhD
Full Professor of the School of Medicine of Santa Casa de Misericórdia de Vitória
Retired professor at the Federal University of Espírito Santo
Professor of the Department of Physiological Sciences - UFES
Postgraduate Program in Physiological Sciences – UFES
Address: Av. Fernando Ferrari, 514
Goiabeiras, Vitória - ES, 29075-910, Brazil
Email: daltonv2@outlook.com

Antoinette Oliveira Blackman MD MSc PhD
Full Professor of the Faculty of Medicine of the University Center of Brasília;
Vice President of the Department of Respiratory Cardiovascular Physiology - DFCVR-SBC biennium 2016-17;
Address: SQS 212 bloco K apto 301, Edifício Via Montello, Asa Sul, Brasília – DF
Brazil –70275-110
Email: antoinette_blackman@hotmail.com
**Ricardo Adala Benfatti MD MSc PhD**  
President of the Department of Experimental Research of Cardiology of the Brazilian Society of Cardiovascular Surgery (DEPEX); Adjunct Professor, Faculty of Medicine, UFMS, Cardiothoracic Surgery Department, UFMS;  
Address: Rua Jintoku Minei número 101, apartamento 1001, bairro Royal Park, cidade Campo Grande, estado Mato Grosso do Sul  
Brasil, cep 79021-450  
Email: ricardobenfatti@gmail.com

**Henrique Barsanulfo Furtado MD MSc PhD**  
Director of Instituto do Coracao de Araguaina.  
Professor of Medicine at the Federal University of Tocantins  
Address: Palmas, Tocantins, Brazil  
Email: cardiologiahf@hotmail.com

**Michael Richard Dashwood PhD**  
University College London | UCL  
Surgery and Interventional Sciences  
Address: 156 Merry Hill Road  
Bushey, Herts WD23 1DG, UK  
Email: mickeydash@hotmail.com

**Sérgio Lima de Almeida MD**  
Cardiovascular Surgeon, head of the SOS Cardiovascular Surgery Service;  
Head of the Cardiology Institute of Santa Catarina, Brazil  
Address: Rua dr Francisco Van de Sande 318  
Florianopolis Santa Catarina 88030-140  
Email: pp5jr@terra.com.br; sergioalmeida4370@gmail.com

**Alfredo Inácio Fiorelli MD PhD**  
Associate Professor of Faculty of the University of São Paulo FMUSP, Medical Collaborating Professor of the Medical School of the University of São Paulo FMUSP, Professor of the University Nove de Julho  
Address: Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo  
Governo do Estado de São Paulo, Instituto do Coração.  
Av. Dr. Enéas de Carvalho Aguiar, 44 - 2º andar - Divisão Cirúrgica  
Cerqueira Cesar, 05403000 - São Paulo, SP - Brasil  
Email: alfredo.i.fiorelli@gmail.com
Eduardo Augusto Victor Rocha MD PhD
Adjunct Professor, Department of Surgery
Faculty of Health and Human Ecology
Vice President of the Brazilian Society of Cardiovascular Surgery
Address: Rua Paracatú, 838 - Barro Preto
Belo Horizonte - MG, 30180-090, Brazil
Email: eduardo.medico@terra.com.br

Domingos Ramos de Souza MD MSc PhD
Address: Department of Cardiothoracic and Vascular Surgery
Faculty of Medicine and Health Orebro
University Orebro, Sweden
Email: domingos.ramos-de-souza@oru.se; domingos.ramosdesouza@regionorebrolan.se

Juan A. Asensio, MD, PhD, FACS, FCCM, FRCS
Professor and Vice-Chairman of Surgery,
Chief, Division of Trauma Surgery & Surgical Critical Care
Professor of Clinical & Translational Science
Department of Translational Science Creighton University School of Medicine
Address: Creighton University Medical Center
7500 Mercy Rd, Ste. 2871, Omaha, NE 68124 USA
Email: Juan.Asensio@agleent.org; JuanAsensio@creighton.edu

Juan Alberto Cosquillo Mejia MD MSc PhD
Surgical coordinator of the Transplantation
Heart Failure and Circulatory Support Unit of the Hospital de Messejana
Professor of Surgery at the State University of Ceará (UECE)
Address: Av. Frei Cirilo, 3480, Fortaleza, CE
Email: mejia.juanc@gmail.com; juancmejia@secrel.com.br

Martín Donato MD MSc PhD
Associate Professor na empresa Facultad de Medicina
Universidad de Buenos Aires, Argentina
Address: Institute of Cardiovascular Pathophysiology
Faculty of Medicine, University of Buenos Aires
J. E. Uriburu 950, (1114)
Buenos Aires, Argentina
Email: mdonato@fmed.uba.ar
Verónica D’Annunzio MD MSc PhD
Associate Professor na empresa Facultad de Medicina
Universidad de Buenos Aires, Argentina
Address: Institute of Cardiovascular Pathophysiology
Faculty of Medicine, University of Buenos Aires
J. E. Uriburu 950, (1114)
Address: Viamonte 430, C1053 CABA, Argentina
Buenos Aires, Argentina
Email: vdannunzio@gmail.com

Walter José Gomes MD MSc PhD
Professor of Cardiovascular Surgery at Paulista Medical School (EPM)
UNIFESP; Head of the Cardiovascular Surgery Service of the General Hospital of
Pirajuussara OSS-SPDM; Head of the Cardiovascular Surgery Service of the Luzia
de Pinho de Melo Clinic Hospital OSS-SPDM
Address: Universidade Federal de São Paulo, Departamento de Cirurgia
Disciplina de Cirurgia Cârdio-Vascular
Rua Botucatu, nº 740 Vila Clementino, 04023900 - São Paulo, SP - Brasil
Email: wjgomes1012@gmail.com

Rui Manuel de Sousa Sequeira Antunes de Almeida MD PhD
Associate Professor, State University of Western Paraná (UNIOESTE)
Coordinator of the Medical Course of the Faculty Assis Gurgacz (FAG)
Address: Rua Maranhão, 790 - 2º Andar Sl 202
Centro - Cascavel/PR
Brazil, CEP: 85801-050
Email: ruimsalmeida@uol.com.br
Caribbean Heart Health Group in Partnership with the Academy Honours Dr. Karen Gordon-Boyle

Paramjit S. Tappia, PhD, Secretary General CCHHE
Asper Clinical Research Institute, St. Boniface Hospital, Winnipeg, Canada
Email: ptappia@sbrc.ca

On March 16, 2019, the Caribbean Canada Heart Health Education organization in collaboration with the International Academy of Cardiovascular Sciences hosted its 4th gala dinner in Winnipeg, Canada, in honour of Dr. Karen Gordon-Boyle from Georgetown, Guyana. About 300 community members were in attendance as the local Caribbean community reached out to assist the Caribbean countries in heart health education and practice. In her keynote address, Dr. Gordon-Boyle spoke about the structure of the public health system, the per capita expenditure on health in Guyana, as well as the disparity in the number of physicians and other health care personnel in Guyana as compared to other jurisdictions in the Caribbean. She also mentioned that diseases of the circulatory system (hypertension) and ischemic heart disease rank in the top 3 leading causes of death in Guyana. Dr. Gordon-Boyle summarized factors that contribute to heart disease and the primary measures undertaken to combat the epidemic. She concluded by stating that there is a need to raise awareness on healthy eating, to be active, to reduce/abstain from excessive use of alcohol, the need to overcome cultural barriers in primary prevention strategies, and mentioned legislation to enforce an anti-tobacco culture. There is a need to train and retain specialists and establish new effective partnerships to combat heart disease not only in Guyana, but across the Caribbean region.

Dr. Karen Gordon-Boyle is a results oriented, licensed medical practitioner of 29 years. Her contribution to Public Health in Guyana was recognized in 2016 when she received the PAHO/WHO Public Health achievement award. She is a qualified public health specialist with 20 years experience in programme and project management: From 1997-2001 she served as the director of the National Genito-Urinary Medicine Clinic where patients with HIV and STIs were cared for and treated. She received her Masters in Public Health from Columbia University in 2005 after which she served as The Community and Clinical Care Officer and then as the Prevention Director on two USAID/PEPFAR funded projects. In 2013 she served as the Chronic Disease Program Manager at the Ministry of Public Health where she was made some transformational changes by redesigning the medical records charts to direct physicians to include NCD risk assessments and plans for risk reduction to facilitate integrated management of NCDs. Integrated management – risk assessment, prevention and treatment -is now the standard of care for NCDs in the primary health care setting. From 2014 to May 2016 she served as the Country Director for Cicatelli Associates Inc. on a US 1.2 million dollar Global Fund project targeting Key Populations. She received her Doctor of Public Health Degree from the University of the West Indies in 2015. In June 2016 Dr Gordon-Boyle joined the Ministry of Public Health Guyana as the Deputy Chief Medical Officer Guyana where she provides policy and technical oversight to the chronic diseases, primary health care, mental and family health programs of the Ministry of Public Health.
Using 3D Bioprinting to Generate Replacement Cardiovascular Tissues

Stephanie Willerth, PhD
Department of Mechanical Engineering, Division of Medical Sciences
University of Victoria, Victoria, B.C. Canada
Email: willerth@uvic.ca

Introduction

Tissue engineering provides a way to generate replacements for diseased and damaged tissues, including those that make up the cardiovascular system [1]. Such tissues include cardiac tissue, blood vessels, and heart valves. Heart tissue, in particular, lacks regenerative capacity, making it urgent to develop novel methods for generating substitutes as current treatments focus on transplantation of donor tissues and organs. Supplies of these donor tissues remain extremely limited in comparison to the huge demand created by cardiovascular diseases. Recent advances in 3D bioprinting have made it possible to generate replacements for the different components of the cardiovascular systems, including the heart, heart valves, and blood vessels as recently reviewed by Cui et al.[2]. Such 3D printing systems can enable accurate replication of the appropriate microenvironments necessary for the different cells of the cardiovascular system to maintain the necessary cell-cell interactions for proper function. Figure One shows examples of the types of bioprinters used as well as the cell types present in the myocardium.

The various properties that can be modulated based on the design given for 3D bioprinting include 1) the number and placement of the desired cell types, 2) the structure being generated, 3) the mechanical properties of the final construct, and 4) the physiological properties of the resulting tissues. Interestingly, 3D printed heart models have served as valuable tools for surgeons to explore the geometries of a diseased cardiovascular system before performing surgery, though this article will focus on bioprinting implantable tissues [4]. The necessary components when bioprinting include 1) a design file containing the tissue specifications, 2) a bioink capable of supporting cell survival and the desired behavior, 3) the cells necessary to generate the target tissue, and 4) the bioprinting methods. The following sections will detail the considerations when selecting each of these components.

Types of bioprinting

Figure One shows the different types of bioprinting that can be used; the desired structure plays an important role in determining which type of printing process to use. Inkjet printing generates structure by positioning droplets of bioink in the areas specified in a digital file [5]. The mechanism of solidification can vary depending on the chemistry of the bioink being used. Extrusion printing occurs when pressure or mechanical forces push out the bioink to form the desired 3D structure [6]. In laser assisted printing, light from the laser triggers the bioink to

Figure 1: 3D bioprinting of the myocardium: (a) methods and (b) cell types. Taken from [3] and reproduced under the Creative Commons Attribution License.
be localized in the desired region. Higher resolution can be achieved using a variant of laser assisted printing called multiphoton excitation printing [7]. Again, the type of cells and bioink being used can inform what type of bioprinting system to use. Another exciting area for future work uses Lab-on-a-Printer technology from Aspect Biosystems [8]. These microfluidic based systems enable the printing of complex tissues as their process allows for switching between different materials and cell types with ease.

Producing an appropriate design file
Generating a 3D object requires a file containing the specifications for the target to be printed. Usually these files are in the STL format (an abbreviated form of stereolithography), which contains the information necessary to create the geometry for the target 3D structure [9]. These files are commonly used when doing computer aided design and such files can be produced using commercially available software such as Solidworks and AutoCAD as well as free software including TinkerCad. These files can also be produced by scanning existing tissues like whole hearts, individual heart valves or blood vessels to replicate these structures [10], or they can be designed from scratch. Cell placement should replicate the structures found in the target tissue when designing your engineered tissue [11]. When engineering cardiovascular tissue, it is important to mimic muscle fibers found in the heart while maintaining the appropriate cellular functions both physically and electrically. It is also important to use a printing method that enables alignment of the cells when engineering cardiovascular tissues as both the physical and electrical properties of the heart are directional. Accordingly, we must consider if the structure design and resolution can be achieved using the selected bioink and the bioprinting system. These considerations will be discussed in the following sections.

Considerations when selecting a bioink for engineering cardiac tissue
Bioink serves as the medium for constructing living tissues by encapsulating the cells during the bioprinting process [12]. While both natural and synthetic polymers can be used to 3D print tissues, most of the studies that have bioprinted cardiac tissue have used naturally derived polymers [2]. Some of these commonly used bioinks include decellularized extracellular matrix (ECM) derived from the heart, the polysaccharide alginate, and ECM proteins such as collagen. These naturally derived biomaterials provide important cues for the cells to ensure their survival and function after printing. Synthetic biomaterials are often used in combination with naturally derived biomaterials to generate bioinks as their chemistry can be altered to allow for chemical or light mediated cross-linking during the bioprinting process. Thus, both the needs of the cells and the chemistry necessary to achieve printability are important considerations when bioprinting cardiovascular tissues [6].

Considerations when selecting the cellular components for engineering cardiac tissue
A variety of cell types are necessary when bioprinting cardiovascular tissue, as seen in Figure One. Stem cells provide an intriguing area for future work in this field. For example, pluripotent stem cells can become any cell type found in the body, making them a powerful tool for engineering cardiovascular tissue [13]. Both embryonic and induced pluripotent stem cells possess the property of pluripotency [11]. Additionally, induced pluripotent stem cells can be derived from patients and can enable the bioprinting of tissues that exhibit disease phenotypes associated with cardiovascular disease [14]. Thus, bioprinting stem cell derived tissues holds great potential as a tool for drug screening. Other considerations when bioprinting include the number and type of cell to be printed and determining if the cells exhibit proper structure and function after printing.

Conclusions
Overall, 3D bioprinting serves as a powerful tool for engineering cardiovascular tissue. As the field continues to advance, such engineered tissues can be used to replace damaged tissue and as a tool for drug screening.

References
8. Bsoul, A., et al., Design, microfabrication, and characterization of a moulded PDMS/SU-8 inkjet dispenser for a Lab-on-a-Printer platform technology
The heart and blood vessels we are born with serve the most important function of supplying blood to every organ of the body. Oxygen, nutrients and essential elements are carried to the tiniest cell and toxic waste elements got rid off, thus ensuring good health for the individual. The cardiovascular system which is made up of the heart and blood vessels functions so precisely, that if anything goes wrong, target organs supplied by the diseased heart or blood vessels are compromised, leading to health problems. Today, doctors diagnose the problem, locate the exact area of the disease process and are able to repair this area, thanks to the development of various natural and artificial substitutes and devices. To name a few, we have childhood defects of the heart such as septal defects being closed with patches, pacemakers helping the heart to beat normally when there is a problem with the electrical conduction, stents implanted to widen diseased and clogged blood vessels and many more. We also have devices which completely take over the function of pumping blood during operations on the heart, thus helping the surgeon to operate on a bloodless organ. Of course, there are certain instances where the surgeon can operate on a beating heart too. But what happens when the heart totally fails in its function of pumping blood - the condition known as heart failure. Of course, medicines help to a certain extent. Help can be rendered with ventricular assist devices and artificial heart. There is however a limit. What happens when the stented vessel gets narrowed again? After all, medical devices and implants are made up of materials which do have a lifetime. There are also failures because of issues of corrosion of metals, sensitivity to materials, degradability of materials etc. These problems have been reduced to a certain extent by using both materials and living tissue in implants, what we call as tissue engineered implants. Tissue engineering is the technique of taking a material which has properties suitable for a specific use and growing in the laboratory site specific tissues on a material. This construct is then implanted where required. We have liver implants, endothelialized blood vessels (endothelial cells line the inner surface of the heart and blood vessels in the human body) and bone implants with bone cells. The living cells function and help the diseased organ.

The best solution is to replace the diseased vessel or heart or organ with a natural one from a donor. This needs perfect matching between the donor and the recipient and surgery to be done within a certain time frame. To reconstruct a diseased part or an entire organ is a very big challenge. Each organ or tissue however tiny it may be, has a precise geometry suited to its particular function, has precise location of the different cells in the organ and the products they secrete are specific which either act alone or in conjunction with those of other cells. Recreation of such tissue needs first and foremost an awareness of the structure and the technology to make it in exactly the same way.

Innovation and invention have seen the development of new technologies in the industry from manual processes.
to two dimensional and now to three dimensional products; medical device technology is not far behind. Industrial manufacturing procedures, particularly in the automobile industry have seen a great transition from use of moulds to the manufacture of various parts to currently, the implementation of three-dimensional technology to develop various products. This has been possible by first creating a design of the object and then using computer technology to build the object layer by layer. The recreated object is complete with all intricate designs and curves. The technologist works on this computerised model till the product is perfect.

Can a similar technology be utilized to recreate a human organ? The medical device industry is not far behind and surgeons and researchers since 1980 have been developing implants made from additive manufacturing (AM) technology otherwise known as rapid prototyping (RP) or three dimensional (3D) printing. The advantage of this is that instead of just mass production of implants of a particular type, the implant can be tailor made to suit a particular patient, i.e. an implant which is patient specific. The process is made possible using this technology along with computerised tomography (CT) scan data. The first step is to take a CT scan of the patient. A narrow beam of X rays is directed to the patient and quickly rotated around the body. The signals that are produced are processed by the computer in the machine and cross sectional images (slices) (tomographic images) of the body are produced. The computer collects a number of these slices and digitally stacks them together to form a three dimensional image of the patient. From this image, the location of basic structures and abnormalities can be identified. This process gives wide scope to make composite, hybrid structures which is so essential in organ substitutes. The geometry, porosity and permeability of such structures are thus controlled and mimic the natural organ. Recent advances in imaging have led to precise image capture. Magnetic resonance imaging (MRI) and micro computerised tomography scan (μ-CT scan) provide valuable data in creating these scaffolds. New technologies in segmentation software have also helped in automatic and semiautomatic extraction of surfaces of structures of interest from 3D medical imaging data. The US Food and Administration (FDA) has increased approval under the 510K premarket notification approval system to enable the use of such implants manufactured by 3D printing technology for surgical procedures.

This is just a part of the entire procedure. The next step is the bioprinting of cells onto this structure. Various advanced techniques are today available, such as direct ink printing (DIW), inkjet printing, laser induced forward transfer (LIFT), stereolithography (SLA) and many others. The first two are commonly used. In DIW, a highly viscous solution or a hydrogel or cell suspension is extruded out to obtain a 3D structure. Inkjet printing is carried out using low viscous solutions like cell suspensions or colloidal solutions are deposited as droplets at high shear rates.

The bioink used to carry out this 3D bioprinting is very important. Its properties are very specific because it has to be compatible with the living cells it carries, it has to be stable and it should have high resolution for perfect printing. This bioink can be a biomaterial with cells where the material degrades and the cells grow and occupy a well-designed space. It can also be only living cells which are printed directly, in a process mimicking normal embryonic growth. The cells grow into new tissues and these are later deposited in a specific predesigned arrangement and new functional tissue is formed with time. In the former, there is a biomaterial component and a biological component. In the first type, the bioink must have a specific biomaterial as well as biological properties. It should be biodegradable but neither be toxic to the cells nor initiate any immunological response. In a normal tissue, cells are in an extracellular matrix (ECM). Biodegradation should hence match with the tissue it is going to replace, so that as the material degrades, the functional cells can replace the construct with ECM. It also should have correct mechanical properties and be printable. It should have modifiable functional groups on the surface, so that different biochemical signals or biochemicals could be delivered to the cells. Post-printing maturation should also be proper. It should be compatible with living tissue, and allow cells to live and be active after printing. Further, the bioink should be able to retain the 3D printed structure on its own after printing. viscosity, surface tension and cross-linking ability are some of the important properties the bioink should have. Its stiffness also is important to allow the cells to live. It should allow cell attachment, growth and proliferation inside the scaffold. Thus, it is understandable how 3D bioprinting differs from 3D printing for industry where biological properties are not important. Hydrogels and more recently polymers have been used as the biomaterials. Natural and synthetic polymers have both been tried, each having their own distinctive advantages and disadvantages in properties.

In the recreation of normal human tissue where first there was tissue engineered implants, now this technology is complimented by 3D bioprinting to produce structures with specific geometrical patterns which are very similar to the normal tissues. To summarise, 3D bioprinting involves layer by layer deposition of biomaterials containing cells in a predesigned architecture to generate functional tissues or an organ. Thus the structure or product is more specifically controlled than in previous methods. Normal tissue being a complex live structure containing different cells in matrix and having an active
interplay of secreted molecules, a 3D bio-printed structure comes closest to tissue or organ from a donor.

Each organ in the human body is unique in the sense that each has a specific physical structure, properties and biological constituents. Pliability of blood vessels is an important property which permits free flow of blood. Diseases bring on changes in this pliability and vessels harden. Blood flowing through these hardened vessels is subjected to various changes in pressure. One thing leads to another and ultimately there is narrowing of the vessel with slowing of blood flow and closure of the lumen. A vessel supplying blood to the heart, if blocked can lead to death of heart tissue supplied by that vessel. Surgical interventions to bypass this block or opening up of the blocked vessel with stents are the usual reparative procedures carried out. A bypass is done using a segment of another vessel from another site in the same patient. Donor site morbidity and re-narrowing of stented blood vessel are some of the problems. Efforts to make blood vessels in the laboratory have led to use of vascular grafts made of different materials which are unseeded or seeded with endothelial cells. Maintaining pliability of such grafts matching that of the host vessel segment which is to be replaced has however been a challenge. Non pliability affects smooth blood flow leading to narrowing and blockage again.

3D bioprinting technique seems to be showing promise in making pliable blood vessels. Recent reports reveal that it is possible to precisely control certain specific constituents of the bioprinting procedure, enabling parts of the blood vessel structure to be solidified to be harder or softer, while at the same time preserving geometry of the structure.

Making heart tissue is a bigger challenge requiring interplay of so many biological and physical properties. Bioprinting heart tissue requires cardiomyocytes, fibrocytes, endothelial cells, mesenchymal cells, smooth muscle cells and leucocytes. The muscular component of the heart has the functional property of contraction and relaxation for pumping blood from the heart to all the other organs in the body. When diseased, this function is compromised. 3D bioprinting of myocardial tissue using biodegradable scaffolds and cells have been tried. Fast degradation of the scaffold material before the cells are able to grow and function properly, stability and issues of toxicity and immunogenicity of the degradeable material are some of the limitations.

Scaffold free 3D bioprinting is the current focus of attention in the development of myocardial tissue. Tissue made by a new technique called microcontact printing for bioprinting has resulted in myocardial tissue having very good anisotropic features which are important for mechanical and electrophysiological properties. Though not yet tested in vivo, it is a big step towards a 3D bio-printed myocardial tissue. Tissue spheroid based 3D bioprinting shows good promise. Tissue spheroids are clusters of cells which if placed close to each other, fuse together due to surface tension into a living material. This material has the physiological properties of the myocardial tissue. A contractile patch has been made using tissue spheroids of ventricular cardiomyocytes from new born rats, human skin fibroblasts and human coronary artery endothelial cells. The patch was found to be viable after transplantation in rats. There is hence hope.

Advanced techniques for precise deposition of many tissue spheroids have helped in fusing these spheroids together. Human induced pluripotent stem cell- derived cardiomyocytes, fibroblasts and endothelial cells have thus been fused together into cardiac patches. These patches can beat on their own and have throughout the patch, action potential waveforms and uniform electrical conduction as in ventricular muscle cells. When implanted into a rat model the patches were engrafted with new blood vessels, which are positive features of regeneration. 3D bio-printing technology is a boon for the field of organ replacements. With difficulties in obtaining a matched heart for transplantation and long-term problems with diseased blood vessel repair, the possibility of overcoming these obstacles with a 3D bio-printed patient specific organ is something definitely to look forward to in the very near future.

References
Officers and Council Members of the Academy

A. Officers:
1. President: Dr. Roberto Bolli, Louisville, Kentucky, USA
2. President-Elect: Dr. Grant N. Pierce, Winnipeg, Manitoba, Canada
3. Past President: Dr. Bohuslav Ostadal, Prague, Czech Republic
4. Executive Director: Dr. Naranjan S. Dhalla, Winnipeg, Manitoba, Canada

B. Council Members:
1. Dr. Michael Czubryt, Winnipeg, Canada
2. Dr. Dragan Djuric, Belgrade, Serbia
3. Dr. Dobromir Dobrev, Essen, Germany
4. Dr. Ricardo J. Gelpi, Buenos Aires, Argentina
5. Dr. Ramesh K. Goyal, New Delhi, India
6. Dr. Chandrasekharan Kartha, Trivandrum, India
7. Dr. Lorrie Kirshenbaum, Winnipeg, Canada
8. Dr. Melchior L. Lima, Vitoria, Brazil
9. Dr. Gary Lopaschuk, Edmonton, Canada
10. Dr. Naoki Makino, Beppu, Japan
11. Dr. Jawahar L. Mehta, Little Rock, USA
12. Dr. Tatiana Ravingerova, Bratislava, Slovak Republic
13. Dr. Pawan K. Singal, Winnipeg, Canada
14. Dr. Jan Slezak, Bratislava, Slovak Republic
15. Dr. Andras Varro, Szeged, Hungary

Officers of the 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 – Japan
President: Naoki Makino, Beppu, Japan
Hon. Life President: Makoto Nagano, Tokyo, Japan
Secretary General: Atushi Takeda, Tokyo, Japan
Editors: Paramjit S. Tappia
ASSISTANT EDITOR: Sukhi Bhullar

EDITORIAL ASSISTANTS

Simaran Kaur (Canada)
Teri Moffatt (Canada)
Andrea Edel (Canada)

EDITORIAL BOARD

Adriana Adameova (Slovakia)
Eman Ashgar (KSA)
István Baczkó (Hungary)
Muthuswamy Balasubramanyam (India)
Judit Barta (Hungary)
Monika Bartekova (Slovakia)
Harpal Buttar (Canada)
Budhadeb Dawn (USA)

Larry Fliegel (Canada)
Elaine Maria Freitas (Brazil)
Sanjay Ganapathi (India)
Vladimir Jakovljevic (Serbia)
Chandrasekharan Kartha (India)
Madhu Khullar (India)
Naoki Makino (Japan)
Rizwan Manji (Canada)
Paras Mishra (USA)
Ursula Muller-Werdan (Germany)
Danina Muntean (Romania)
Petr Ostadal (Czech Republic)
Tanya Ravingerova (Slovakia)
Taylor Salinardi (USA)
Ram B. Singh (India)
Dinender Singla (USA)
Belma Turan (Turkey)
Shelley Zieroth (Canada)

Official Partnering Journals of the International Academy of Cardiovascular Sciences

Editors: Dr. Ghassan Bkaily
Dr. Pedro D’Orléans-Juste
Email: cjpp@nrcresearchpress.com

Editors: Dr. Sidney Goldstein
Dr. Hani N. Sabbah
Email: Marjorei.Paran@springer.com

Editor: Dr. Amitabh Prakash
Email: amitabh.prakash@springer.com
5th International Symposium on ADIPOBIOLOGY and ADIPOPHARMACOLOGY
UNIVERSIDAD NACIONAL AUTONOMA de MEXICO
INSTITUTO de FISIOLOGIA CELULAR
BULGARIAN SOCIETY for CELL BIOLOGY
MAY 1 - 4 - 2019
MERIDA, YUCATAN
MEXICO

THEMES:
• Cellular and molecular biology of brown, beige and white adipocytes
• Adipose-targeted Pharmacology
• Adipose tissue development
• Hormonal and nervous control of the adipose tissue
• Overweight, obesity, type 2 diabetes, cardiometabolic and other diseases

Abstracts submission: maximum 300 words, ends on March 8th

FOR MORE INFORMATION:
bgsccb2019mx@gmail.com
Announcement of the Joint IACS North America and Europe Sections Meeting in Serbia, Vrnjacka Banja

6th Meeting of European Section and 7th Meeting of North American Section of the International Academy of Cardiovascular Sciences (IACS)

"CARDIOMETABOLIC DISEASES: HOW NEW RESEARCH MAY LEAD TO NEW CARDIOPROTECTIVE THERAPY"

Organized by the
International Academy of Cardiovascular Sciences - European and North American Sections
Serbian Association for Arteriosclerosis, Thrombosis and Vascular Biology Research

THE FIRST ANNOUNCEMENT

Venue for Main Meeting: Hotel Fontana, Vrnjacka Banja, Serbia (Date: September 11th – 14th, 2019)
Venue for Cardiology Pre-Meeting: Hotel Sumarice, Kragujevac, Serbia (Date: September 10th, 2019)

CME in progress to be accredited by the Health Council of Serbia
www.physiology.org.rs
## Meeting Chair & Co-Chair/Organizing & Program Committee

Jakovljevic Vladimir (Kragujevac, Serbia)  Djuric Dragan (Belgrade, Serbia)

## Meeting Co-Chairs/International Organizing & Program Committee

Bolli Roberto, President, IACS (Louisville, USA)  
Dhalla Naranjan, CEO, IACS (Winnipeg, Canada)  
Lopaschuk Gary, President, IACS-North America (Edmonton, Canada)  
Ostadal Bohuslav, Past President, IACS (Prague, Czech Republic)  
Pierce Grant, President-Elect, IACS (Winnipeg, Canada)  
Varro Andras, President, IACS-Europe (Szeged, Hungary)

## International Program Committee/Proposed List of Speakers

| Abramochkin Denis (Moscow, Russia) | Lazou Antigone (Thessaloniki, Greece) |
| Adameova Adriana (Bratislava, Slovakia) | Leyva Rodriguez Delfin (Holguin, Cuba) |
| Agrawal Devendra (Omaha, USA) | Lima Luiz Melchior (Vitoria, Brazil) |
| Ambrosio Giussepe (Perugia, Italy) | Lionetti Vincenzo (Pisa, Italy) |
| Andreadou Ioanna (Athens, Greece) | Makino Naoki (Beppu, Japan) |
| Baczko Istvan (Szeged, Hungary) | Maurice Don (Kingston, Canada) |
| Bkaily Ghassan (Sherbrooke, Canada) | Mehta Jawahar (Little Rock, USA) |
| Bartekova Monika (Bratislava, Slovakia) | Michalak Marek (Edmonton, Canada) |
| Beltowski Jerzy (Lublin, Poland) | Mitrovic Veselin (Bad Nauheim, Germany) |
| Bolevich Sergey (Moscow, Russia) | Morad Martin (Charleston, USA) |
| Chaldakov George (Varna, Bulgaria) | Muntean Danina (Timisoara, Romania) |
| Chlopicki Stefan (Krakow, Poland) | Ostadal Petr (Prague, Czech Republic) |
| Clichici Simona (Cluj-Napoca, Romania) | Papp Zoltan (Debrecen, Hungary) |
| Davidson Sean (London, UK) | Pechanova Olga (Bratislava, Slovak Republic) |
| Di Lisa Fabio (Padova, Italy) | Radovits Tamas (Budapest, Hungary) |
| Dobrev Dobromir (Essen, Germany) | Ravingerova Tatiana (Bratislava, Slovakia) |
| D’Orleans-Juste Pedro (Sherbrooke, Canada) | Saadeh Suleiman (Bristol, UK) |
| Feldman Ross (Winnipeg, Canada) | Singal Pawan (Winnipeg, Canada) |
| Gallayas Ferenc (Pecs, Hungary) | Singla Dinender (Orlando, USA) |
| Gelpi Ricardo (Buenos Aires, Argentina) | Slezak Jan (Bratislava, Slovakia) |
| Goyal Ramesh (Chennai, India) | Takeda Atushi (Tokyo, Japan) |
| Ferdinandy Peter (Budapest, Hungary) | Tappia Paramjit (Winnipeg, Canada) |
| Hausenløy Derek (London, UK) | Tuana Balwant (Ottawa, Canada) |
| Karmazyn Morris (London, Canada) | Turan Belma (Ankara, Turkey) |
| Kartha Chandrasekharan (Trivandrum, India) | Tyagi Suresh (Louisville, USA) |
| Kararigas Georgios (Berlin, Germany) | Virag Laszlo (Szeged, Hungary) |
| Kinscherf Ralf (Marburg, Germany) | Weiss James (Los Angeles, USA) |
| Kirshenbaum Lorrie (Winnipeg, Canada) | Werdan Karl (Halle, Germany) |
| Kolar Frantisek (Prague, Czech Republic) | Ziembas Andrzej (Warsaw, Poland) |
| Kukreja Rakesh (Richmond, USA) | 

Several Members of the IACS North American Section Council will be included in this list.
Local Program & CME Planning Committee

Alavantic Dragan (Vinca)                  Mihailovic Stanojevic Nevena (Belgrade)
Bragojevic Dusan (Belgrade)              Miloradovic Zoran (Belgrade)
Brkic Predrag (Belgrade)                 Milosevic Verica (Belgrade)
Bukarica Ljiljana (Belgrade)             Nedic Olgica (Belgrade)
Cupic Iric Violeta (Kragujevac)          Nezic Lana (Banja Luka, RS/BH)
Davidovic Goran (Kragujevac)             Novokmet Slobodan (Kragujevac)
Djordjevic Jelena (Belgrade)            Obrenovic Radmila (Belgrade)
Djuric Aleksandar (Kragujevac)          Ponorac Nenad (Banja Luka, RS/BH)
Djurasevic Sinisa (Belgrade)            Radenkovic Miroslav (Belgrade)
Djuric Dušan (Kragujevac)                Rosic Gvozden (Kragujevac)
Djuric Tamara (Vinca)                   Sabo Tibor (Belgrade)
Gajanin Radoslav (Banja Luka, RS/BH)   Simic Tanja (Belgrade)
Gopcevic Kristina (Belgrade)            Skrbić Ranko (Banja Luka, RS/BH)
Isenovic Esma (Vinca)                   Spasic Mihailo (Belgrade)
Ivanov Milan (Belgrade)                 Stankovic Aleksandra (Vinca)
Jovic Miomir (Belgrade)                 Stankovic Sanja (Belgrade)
Jovovic D (Belgrade)                   Stevanovic Predrag (Belgrade)
Kojic Zvezdana (Belgrade)                Stojiljkovic Milos (Banja Luka, RS/BH)
Korac Aleksandra (Belgrade)            Stojiljkovic Nenad (Nis)
Korac Bato (Belgrade)                   Vucic Vesna (Belgrade)
Labudovic Borovic Milica (Belgrade)   Todorovic Zoran (Belgrade)
Lalic Katarina (Belgrade)              Zigon Japundzic Nina (Belgrade)
Lalic Nebojsa (Belgrade)              Zivkovic Maja (Vinca)
Matavulj Amela (Banja Luka, RS/BH)                          

Local Organizing Committee

Bradic Jovana (Kragujevac)               Petkovic Anica (Kragujevac)
Jeremic Jovana (Kragujevac)               Srejovic Ivan (Kragujevac)
Jeremic Nevena (Kragujevac)              Zivkovic Vladimir (Kragujevac)
Nikolic Turnic Tamara (Kragujevac)                        

Scientific Topics

Advances in Cardiovascular Biology Research
Advances in Coronary Artery Disease and Heart Failure Research
Advances in Stroke and Peripheral Vascular Disease Research
Advances in Cardiac Arrhythmia Research and Treatment
Advances in Research of Cardiometabolic Disease
Advances in Treatment of Hypertension and Dyslipidemia
Advances in Cardiovascular Surgery: When Basic Meets Clinical Research
Advances in Cardiovascular Diagnostics and Biomarkers Research
Advances in Cardiovascular Drugs and Toxicity
Advances in Cardiovascular Rehabilitation: When Basic Meets Clinical Research

YOUNG INVESTIGATOR AWARD COMPETITION
(within 10 years of their professional degree, including post-doctoral fellows)

1. Roberto Bolli Young Investigator Award Competition
2. IACS-European Section Young Investigator Award Competition
3. Gary Lopaschuk Young Investigator Award Competition
   (Graduate students are also eligible)
POSTER AWARDS
IACS will provide 12 poster awards for participants in Young Investigator Awards Competition. All awards will be selected by a panel of judges appointed by the International Academy of Cardiovascular Sciences.

The following 12 poster awards will be given at the meeting:
Morris Karmazyn Poster Awards – 4
Margaret Moffat Poster Awards – 4
Keld Kjeldsen Poster Awards – 2
Karl Warden Poster Awards – 2

Abstracts to be send only to the email addresses of the program/organizing committee:
drdjuric@eunet.rs or drvladakgbg@yahoo.com

Only abstracts accompanied by the payment of the registration fee will be considered for inclusion in Final Program and publication in Abstract Book. The transmission of the abstracts via fax, sending floppy discs, CD or USB by standard mail is not acceptable. Late abstracts will NOT be accepted.

TRAVEL AWARDS
IACS will provide 15 travel awards to students for participation and poster competition.

REGISTRATION FEE

| PARTICIPANTS | 150 € |
| STUDENTS* | 100 € |

*Certificate/Confirmation required

CME Participants | 100 €

Full registration fee includes one reception, 3 lunches, two dinners, coffee breaks and local transport in addition to conference material. The registration fee for all invited speakers will be waived.

For attendees from abroad – payment in Euro to account of the Serbian Physiological Society:

<table>
<thead>
<tr>
<th>Intermediary Bank/Correspondent</th>
<th>Account with institution</th>
<th>Beneficiary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deutsche Bank AM Frankfurt Am, Main, Germany</td>
<td>Komercijalna Banka AD Beograd</td>
<td>DFS Beograd</td>
</tr>
<tr>
<td></td>
<td>Svetog Save 14</td>
<td>Dr. Subotića 8</td>
</tr>
<tr>
<td></td>
<td>11000 Belgrade, Republic of Serbia</td>
<td>Beograd - Savski venac, Republic of Serbia</td>
</tr>
</tbody>
</table>

ORGANIZING & PROGRAM COMMITTEE CONTACTS:

Vladimir Lj. Jakovljevic, MD, PhD, FIACS
Professor of Physiology
Department of Medical Physiology
Faculty of Medical Sciences,
University of Kragujevac
str. Svetozara Markovica 69, P.O.Box 124
34000 Kragujevac, Serbia
Tel. +381 34 34 29 44
Fax. +381 34 30 68 00 / ext. 112
Email: drvladakgbg@yahoo.com

Dragan M. Djuric, MD, PhD, FIACS
Professor of Physiology
Institute of Medical Physiology
"Richard Burian", Faculty of Medicine
University of Belgrade
str. Visegradska 26/II
11000 Belgrade, Serbia
Tel. +381 11 36 07 112
Fax. +381 11 36 11 261
Email: drdjuric@eunet.rs, dr_djuric@yahoo.com
## PROGRAM AT GLANCE

**International Academy of Cardiovascular Sciences (IACS)**

6th Meeting of European Section and 7th Meeting of North American Section

### Tuesday, September 10th 2019 (Venue: Hotel Sumarice, Kragujevac)

**Pre-Meeting on Clinical Cardiology Topics**

### Parallel Scientific Sessions including Young Investigator Awards Competition (Hotel Fontana, Vrnjacka Banja)

**Wednesday, September 11th 2019**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00-15:30</td>
<td>Arrival and Registration</td>
</tr>
<tr>
<td>15:30-16:15</td>
<td>Welcome Messages/Presidential Address</td>
</tr>
<tr>
<td>16:15-17:45</td>
<td>Keynote Speakers (three, 30 min each)</td>
</tr>
<tr>
<td>19:30</td>
<td>Get Together Reception</td>
</tr>
</tbody>
</table>

### Thursday, September 12th 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00-13:00</td>
<td>Two Parallel Scientific Sessions</td>
</tr>
<tr>
<td>13:00-14:30</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>14:30-17:30</td>
<td>Scientific Sessions (8 lectures, 20 min each, 20 min break)</td>
</tr>
<tr>
<td>17:30-19:00</td>
<td>Poster Session with Wine and Cheese</td>
</tr>
<tr>
<td>20:00</td>
<td>National Dinner with Music</td>
</tr>
</tbody>
</table>

### Friday, September 13th 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00-13:00</td>
<td>Two Parallel Scientific Sessions</td>
</tr>
<tr>
<td>13:00-14:30</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>14:30-17:30</td>
<td>Scientific Sessions (8 lectures, 20 min each, 20 min break)</td>
</tr>
<tr>
<td>17:30-19:00</td>
<td>Poster Session with Wine and Cheese</td>
</tr>
<tr>
<td>19:00</td>
<td>Free Evening</td>
</tr>
</tbody>
</table>

### Saturday, September 14th 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00-13:00</td>
<td>Two Parallel Scientific Sessions</td>
</tr>
<tr>
<td>13:00-19:00</td>
<td>Excursion to Serbia Countryside with Lunch and Wine Tasting</td>
</tr>
<tr>
<td>20:00</td>
<td>Gala Dinner/ IACS Awards Session/Poster Awards</td>
</tr>
</tbody>
</table>

### Sunday, September 15th 2015 (departure)
29º Scientific Forum

INTERNATIONAL CONGRESS OF CARDIOVASCULAR SCIENCES
SAN FRANCISCO DE ASSIS CARDIOVASCULAR INSTITUTE - SPPICOR
TRUTH IS JESUS • SAINT JOHN 14,6

ORGANIZATION: PROF. DR. OTONI MOREIRA GOMES - MG | PROF. DR. MELCHIOR LUIZ LIMA - ES

07-09 NOVEMBER 2019
SHERATON VITÓRIA HOTEL
ADDRESS: AV. SATURNINO DE LUIZ, 217 - PRAIA DO CANTO. VITÓRIA - ES.

XXV FORUM PROF. DR. NARANJAN S. DHALLA - SOUTH AMERICAN SESSION
OF THE INTERNATIONAL ACADEMY OF CARDIOVASCULAR SCIENCES

IV EXTRACORPOREAL CIRCULATION FORUM
XX INTERNATIONAL FORUM OF APPLIED
CARDIOVASCULAR FISONOMY

XXIX BRAZILIAN MEETING ON CARIOLOGY OF THE FAMILY
XXI FÓRUM ECUMENIC
"TO HEAL ALL WOUNDED HEARTS - ST. ISAIAH 61,1"
ARCHBISHOP DOM WALMOR OLIVEIRA DE AZEVEDO

XII ACADEMIC MEETING ON CARDIOVASCULAR SCIENCES

III MULTIDISCIPLINARY SIMPOSIUM ON CARDIOVASCULAR SCIENCES
INTERNATIONAL COURSE OF SCIENTIFIC RESEARCH ON
CARDIOVASCULAR SCIENCES - 30 HOURS

organization commercial support scientific support

INFORMATION
WWW.FORMCIENTIFICO.COM | SECRETARIASERVCOR@SERVCOR.COM | +55 (31) 3439.3004

Melchior Luiz Lima MD MSc PhD
Organizing Committee - Scientific Director of the 28th Scientific Forum - International Congress of Cardiovascular Sciences
Professor of Cardiovascular Institute São Francisco de Assis
Head of the Heart Transplant Center of the Meridional Hospital, Cariacica, Espírito Santo, Brazil
Titular Member of the Brazilian Society of Cardiovascular Surgery

Address: Alceu Alves Pereira Street, 60 - Enseada do Suá, Vitória, ES 29050-285, Brazil
Tel.: +55 27 3335-6345 and +55 27 99982-6172
Fax.: +55 27 3335-6345
E-mail: melchior.lima@rne.com
www.melchiorluizlima.com.br
ANKARA UNIVERSITY &
INTERNATIONAL ACADEMY OF CARDIOVASCULAR SCIENCES

AN INTERNATIONAL SYMPOSIUM ON CELLULAR THERAPY IN CARDIOVASCULAR MEDICINE: STEM CELL OPPORTUNITY

30 October-1 November 2019
Ankara University, Ankara, Turkey
www.ctcm_sco_2019.ankara.edu.tr

CO-ORGANIZERS
Prof. Belma Turan
Department of Biophysics, Ankara University Faculty of Medicine,
Ankara/TURKEY

Prof. Kamil Can Akcali
Stem Cell Institute, Ankara University
Ankara/TURKEY

CONFERENCE SECRETARIAT
Dr. Erkan Tuncay
Department of Biophysics, Ankara University Faculty of Medicine,
Ankara/TURKEY

Dr. Verda Ceylan Bitirim
Stem Cell Institute, Ankara University
Ankara/TURKEY

ctcmsco2019@gmail.com