From the President:

Welcome to the 2019 ISMICS Meeting

Welcome to the 2019 Annual Scientific Meeting. We are sure this meeting will exceed your expectations for an innovative and exciting scientific program. Our Program Committee - Drs. Marc Ruel and Tom Nguyen on the cardiac side and Drs. Mara Antonoff and Sudish Murthy on the thoracic side have organized an outstanding program. The meeting will include all of the traditional sessions you have come to expect, including master classes, focused sessions, the technical challenges session, late-breaking news, and the ever popular poster competition.

We are fortunate to have exceptional guest lectures. The Keynote Address will be presented by Amir Benson, MD on Friday and the Kit Arom Lecture will feature a live interview with Dr. Mihaljevic in “Innovations in Healthcare.”

I would like to recognize Dr. Ralph Damiano for his leadership as the Editor of the Society’s journal INNOVATIONS for the past decade. Dr. Damiano is completed his term and I thank him for the continued success of the journal. I strongly urge you to submit your manuscripts for publication in the journal, innovjournal.com.

ISMICS has continued to expand its educational outreach throughout the year, offering co-sponsorship of courses and meetings held around the world. The ISMICS 2018 Workshop was held in conjunction with the 12th Congress of the Hellenic Society of Thoracic & Cardiovascular Surgeons in Athens, Greece. The 2019 Workshop will be held in Mexico City, the 2020 Workshop in New Delhi, India and the 2021 Workshop in Cairns, Australia.

ISMICS is committed to lead and promote innovation and technological advancement in cardiothoracic and cardiovascular surgery through scientific analysis and education.

Enjoy the meeting!
The Best Moderated Poster Competition is a peer-review session conducted in two rounds. One of the most popular and exciting session of the ISMICS Annual Meeting, the first round will be held on Thursday at 17.00 in the Lyceum Complex. Chief Moderator, Simon Moten, will oversee the competition and direct the judges.

First round presentations are divided into topic groups, with several groups presenting concurrently. Topic groups include: Aortic and Endovascular Therapies; Arrhythmia Surgery; Heart Failure Surgery Perfusion and Assist Devices; Revascularization Procedures; Aortic Valve Minimally Invasive Approaches, Technologies and Techniques; Mitral Valve Minimally Invasive Approaches, Technologies and Techniques; Thoracic Surgery; Imaging and Facilitating Technology for Cardiac Surgery; Valve Transcatheter Techniques; and Pediatric.

The highest scoring posters in each group become the semi-finalists and compete in the Final Round on Friday at 16.15, making their presentations to the entire audience. Topic moderators score the semi-finalists to select the Best Moderated Poster, which will be announced on Saturday.
2019 INDUSTRY SYMPOSIA:

Thursday - 30 May
Luncheon Symposium (12:15 - 13:45)

Friday - 31 May
Breakfast Symposium (06:30 - 07:50)

Friday - 31 May
Luncheon Symposium (12:20 - 13:50)

West Side Salon 2

West Side Salon 1 & 3

West Side Salon 4

INTUITIVE

Medtronic

SIEMENS

AtriCure

LivaNova

2019 SOCIAL EVENTS:

Welcome Reception
Wednesday - 29 May (17:00 - 18:30)
Exhibition Hall

Friday Evening Reception
A Taste Of New York
Friday - 31 May (18:30 - 20:30)
Skylobby - 16th floor

Exhibition Hall Reception
and Poster Competition
Thursday - 30 May (17:00 - 18:15)
Exhibition Hall
ISMICS Research and Educational Awards

**Subramanian Innovation Award**

The Subramanian Innovation Award was developed in 2016 through a generous donation to the ISMICS Research and Education Fund made by ISMICS Past President and Founding Member Dr. Valavanur A. Subramanian. The winner of the Subramanian Innovation Award shall receive a grant funding to be used toward taking their innovation and bringing it to reality for implementation. Recipient is awarded $5,000 USD. Dr. Subramanian also generously contributing up to $1,800 per finalist for reimbursement of the finalists’ travel expenses to the annual meeting.

Past Recipients: 2018 - Faouzi Safadi, MD, Dubai Hospital and 2017-Muralidhar Padala, PhD, Emory University.

**The Gründeman Scientific Research Award**

The Gründeman Scientific Research Award is granted for demonstration of basic research or an early clinical concept that outlines a new innovation suited to Minimally Invasive Cardiothoracic Surgery (MICS). Research must show sound concept, its applicability to minimally invasive cardiothoracic surgery, meet a clinical need and show feasibility of introduction into clinical practice. The research may be in the area of new techniques for MICS or may facilitate the application of MICS with current procedures.

The first annual Gründeman Scientific Research Award was presented to Kyongjune B. Lee, George Washington University, at the 2018 ISMICS Annual Scientific Meeting. The award is available through a generous donation from Medtronic in honor of Paul F. Gründeman, MD, PhD, past Secretary of ISMICS. Recipient is awarded $5,000 USD.

**Chitwood Educational Travel Awards**

These travel awards are granted annually by the ISMICS Research and Education Fund, through a generous contribution by former ISMICS President, Dr. W. Randolph Chitwood, Jr. In order to be eligible, you must be a Resident or Fellow attending the ISMICS Annual Scientific Meeting. The two selected winners will also receive complimentary Annual Meeting registration and a year’s complimentary Candidate membership in ISMICS, which includes a subscription to ISMICS journal, INNOVATIONS. Each recipient is awarded $1,000 USD.


**How You Can HELP......**

The International Society for Minimally Invasive Cardiothoracic Surgery (ISMICS) was formed in 1997 to enhance, promote and support research and education in, and related to, the field of minimally invasive cardiac surgery. In 2004 the Society expanded its scope and mission to include research and education in minimally invasive thoracic surgery.

ISMICS is helping shape the future of less invasive cardiac and thoracic surgery on a global basis. The mission of the Society is to lead and promote innovation and technological advancement in cardiothoracic and cardiovascular surgery through scientific analysis and education. The Society has over 800 international members which include Active, Candidate, Honorary, Allied Health Professional and Senior members. ISMICS is governed by a Board of Directors which meets three times a year and INNOVATIONS, which is MEDLINE indexed, is its official journal.

ISMICS created the Research and Education Fund, formerly the Leadership Fund, in 2006 to fund the Presidents’ Awards at the ISMICS Annual Meetings and Winter Workshops. The Officers of ISMICS have taken the lead in supporting the ISMICS Research and Education Fund and invite you to assist them in their goal of funding its annual awards. Your generous gift will help them to attain that goal.

**VISIT WWW.ISMICS.ORG TO CONTRIBUTE.**

Accreditation Statement

In support of improving patient care, this activity has been planned and implemented by Ciné-Med and ISMICS. Ciné-Med is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for healthcare team. Ciné-Med designates this live activity for a maximum of 23.75 AMA PRA Category 1 Credit(s)™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Claim CME Credits/Letter of Attendance

CME certificates will be sent via the online tracking form. For attendees who require a letter of attendance or CME certificate, you will be able to submit an application electronically the week following the meeting.

ISMICS requires an email address to forward you the link to apply. If you registered via fax, post or carrier pigeon, and are not an ISMICS member, the Society may not have your email address. Please stop by the Registration Desk to update your email address. All CME credits must be claimed within 90 days of the meeting.

Submitted your Manuscript to INNOVATIONS yet?

As a reminder, ISMICS offers all Annual Meeting Presenters who submit a manuscript to INNOVATIONS for consideration for publication a chance to receive one of two cash awards. All papers submitted up to and including the last day of the meeting are eligible for consideration for a $2,000 Best Paper Award, which will be selected by the Awards Committee and announced prior to next year’s meeting.

Papers submitted after the Annual Meeting are also eligible for consideration for a $1,000 Best Paper Award. The winner will also be announced prior to next year’s meeting.

Finalize your manuscript TODAY and take advantage of this opportunity to help them to attain that goal.
A Message From Your ISMICS Executive Director

I am delighted to welcome our ISMICS members, attendees and guests to our 22nd Annual Meeting, here in the heart of New York City at the Marriott Marquis Times Square. ISMICS has not been in New York City since 2005, and we are delighted to return to the vibrant city that never sleeps, celebrating yet another year of innovation and advances in the care of cardiothoracic patients. We hope that you have time while you are here to enjoy the city and its attractions, in addition to enjoying the fellowship, camaraderie and inclusive spirit that is truly unique to ISMICS.

Our ISMICS President Dr. Niv Ad has worked tirelessly this year to ensure that ISMICS advances as the leader in minimally invasive and innovative cardiothoracic surgery, as well as to take our journal, INNOVATIONS, forward in his first year as Editor-in-Chief. The scientific program for 2019 again is a bit different; ISMICS never follows the same format and always seeks to integrate new concepts and ideas to keep each annual meeting fresh and innovative, much like the Society itself. This year’s 4 Program Co-Chairs, Drs. Marc Ruel and Tom Nguyen on the Cardiac side, and Drs. Sid Murthy and Mara Antonoff on the thoracic side have done an outstanding job crafting a full and diverse program packed with superb faculty. The cardiac sessions incorporate abstracts with a session overview as well as “Live in a Box” presentations, Cross Fire Sessions, and a Saturday session entitled “Back to High School; debating three topics: SAVR versus TAVR, MV Repair Minimally Invasive versus Sternotomy and Minimally Invasive Sternal-Sparing CABG: Conventional versus Robotic. The Thoracic Program begins with a Thoracic Masters Day on Thursday, Friday and Saturday sessions of diverse oral presentations focused on multiple MI thoracic procedures, and ending with the Thoracic Movie Session moderated by our Program Co-Chairs Drs. Antonoff and Murthy.

For the second year in a row, ISMICS will be partnered with CTSNet on a live webcast transmission, broadcasting some of our most exciting sessions to the global CT community; these will then be archived on the CTSNet website and accessible via a link from ISMICS meeting. ISMICS always seeks to incorporate interesting lecturers, and this year Dr. Ad has invited Dr. Amir Belson from Israel as the 2019 Keynote Speaker, who will present the talk “Out of the Box – The Journey from Initial Idea to a Successful Product.” For the Kit V. Arom Lecture, longtime ISMICS member and cardiac surgeon-turned CEO of the Cleveland Clinic, Dr. Tommy Mihaljevic, will be joining Dr. Ad on stage for a fireside chat around Innovations in Healthcare, answering questions from Dr. Ad as well as our audience.

Our Annual Meeting also has traditions which continue, including a Welcome of all New Members, the 2-phase Poster Competition, with Chief Moderator Dr. Simon Moten, the third year of our Subramanian Innovation Award final competition and winner selection, where the audience as well as a panel of judges has a vote, and announcements of the Grunderman Award Winner, the Chitwood Award Winners, and then our Poster Competition finalists and Grand Prize Winner. ISMICS continues to offer full-text abstracts, and also through the upcoming INNOVATIONS abstract issue. Dr. Ad and our new Managing Editor, Dr. Shaila Holmes, are taking the foundation of INNOVATIONS and making our journal even more relevant, innovative and representative of the best of the specialty and what makes ISMICS so unique among its peers.

For our newer attendees, I want to remind you that ISMICS offers so much more than a meeting; in addition to our journal, which members receive via complimentary subscriptions, we have midyear workshops around the world, held in the fall or early winter in collaboration with an ISMICS member and a collaborative organization. This year we are delighted to bring the ISMICS Workshop to Mexico City under the guidance of Dr. Jorge Catrip. ISMICS also co-sponsored multiple educational programs around the globe, and partners with the Kit V. Arom Lecture, longtime ISMICS member Dr. Mahesh Ramchandani and his team at Methodist DeBakey in Houston on the ever-popular Re-Evolution Summit, which offers state of the art hands on training at MITIA, the Methodist Institute for Technology Innovation and Education.

ISMICS also produces white papers, which have been published over the past 15 years in the form of Expert Consensus Statements. The latest one, on TAVR, is almost complete and Dr. Vinod Thourani will be presenting a summary of the work to date during our meeting, and our most recent to be published, on VATS lobectomy, demonstrates ISMICS’ recognition of the cardiac and thoracic sides of the minimally invasive specialty.

ISMICS is a living Society, that its focus develops as the cardiothoracic specialty moves forward, and in that even its most senior members welcome and embrace their newest colleagues. ISMICS never follows the same format and always seeks to integrate new concepts and ideas to keep each annual meeting fresh and innovative, much like the Society itself.
## EXHIBITORS

### EXHIBITION HALL HOURS

<table>
<thead>
<tr>
<th>Day</th>
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<tr>
<td>Wednesday</td>
<td>17.00 – 18.30</td>
<td>Exhibit Hall OPENS with ISMICS Welcome Reception</td>
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<td>Thursday</td>
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### ABBOTT

6300 Bee Cave Road, Building 2, Suite 100, Austin, TX, USA www.abbott.com

Abbott is a global healthcare leader that helps people live more fully at all stages of life. Our portfolio of life-changing technologies spans the spectrum of healthcare, with leading businesses and products in diagnostics, medical devices, nutritionals and branded generic medicines. Our 103,000 colleagues serve people in more than 160 countries.

### ANSABERE SURGICAL


Ansabere Surgical, Spanish company dedicated to design and manufacture medical devices such as Surgical retractors and Orthopaedic positioners. We have more than 20 years of experience and our R&D department has developed and patented innovative medical devices in almost all the specialties, in collaboration with prestigious professionals.

### ATRICURE

7555 Innovation Way, Mason, OH, USA www.atricure.com

Atricure provides innovative technologies for the treatment of Afib and related conditions. The Isolator® Synergy™ Ablation System is FDA approved for the treatment of persistent Afib. Atricure’s AtriClip Left Atrial Appendage (LAA) Exclusion System products are the most widely sold LAA management devices worldwide, with more than 170,000 implanted.

### BIOM’UP USA, INC

413 W 15th Street, NY, NY, USA www.biomup.com

Biom’up, a specialist in collagen-based absorbable medical devices for biotherapy, is creating innovative and clinically proven products used in many surgical specialties such as cardiological and general surgeries. Biom’up is committed to the design, development, and delivery of novel, high-performing solutions that make life easier for surgeons and better for patients.

### DELACROIX-CHEVALIER


Delacroix-Chevalier is proud of marrying the famous French manufacturer know-how to surgical excellence. We are dedicated to creating instrumentation with the vision of tomorrow and convert surgical acts into successes. Our worldwide clients’ confidence comes from our legendary quality and passion to simply bring you innovations, such as the new, stemotomy (Low Profile) and tricuspid valve repair for adult and pediatric surgery.

### FEHLING SURGICAL INSTRUMENTS

509 Broadstone Lane, Acworth, GA www.fehlingsurgical.com

Fehling Surgical Instruments is the leader in finely crafted surgical instrumentation, having focused on cardiothoracic surgery for over thirty years. We feature minimally invasive valve sets including NEW retractor designs for unmatched exposure of the left atrial appendage and valve retractors for adult and pediatric surgery.

### EDWARDS LIFESCIENCES

One Edwards Way, Irvine, CA, USA www.edwards.com

Edwards Lifesciences, based in Irvine, Calif., is the global leader in patient-focused medical innovations for structural heart disease, as well as critical care and surgical monitoring. Driven by a passion to help patients, the company collaborates with the world’s leading clinicians and researchers to address unmet healthcare needs, working to improve patient outcomes and enhance lives. For more information, visit www.edwards.com and follow us on Twitter @EdwardsLifesci.

### ESSENTIAL PHARMACEUTICALS, LLC

1009 Slater Road, Suite 210B, Irvine, Calif., is the global leader of endovascular solutions that improve everyday lives. For more information, visit www.essentialpharma.com

Essential Pharmaceuticals, LLC is a specialty pharmaceutical company devoted to the development and sales of pharmaceutical products used in many surgical specialties such as cardiological, general and vascular surgeries. Biom’up is committed to the design, development, and delivery of novel, high-performing solutions that make life easier for surgeons and better for patients.

### GETINGE

45 Barbour Pond Dr., Wayne, NJ, USA www.getinge.com

Getinge is a leading global provider of innovative solutions for operating rooms, intensive-care units, hospital wards, sterilization departments and for life sciences companies and institutions. Based on first-hand experience and close partnerships, Getinge offers innovative healthcare solutions that improve everyday lives for people, today and tomorrow.

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JACE Medical is the leader in finely crafted surgical instrumentation, having focused on cardiothoracic surgery, providing the thin, strongest screw and valve retractors for adult and pediatric surgery. JACE Medical is the leading manufacturer of medical devices for cardiac surgery. JACE Medical is a class manufacturer of medical devices for cardiac surgery.

### KARI STORZ ENDOSCOPY-AMERICA, INC.

2151 E. Grand Avenue, Saginaw, MI, USA www.karlstorz.com

Karl Storz has been a leader in endoscopy for nearly 75 years in producing reliable endoscopy and related technologies, delivering enterprise-wide, scalable solutions for surgical and endoscopic video imaging and operating room integration, combined with best-in-class service. In addition, we offer a wide array of products to solve a variety of clinical needs at a variety of price levels.

### GENESEE BIOMEDICAL

700 W. Mississippi Avenue, Unit D5, Denver, CO, USA www.geneseebiomedical.com

Genesee BioMedical is a world-class manufacturer of medical devices for cardiology, including products for aortic, mitral, tricuspid valve repair and valve retractors for adult and pediatric surgery.

### KEARSEY

One Edwards Way, Irvine, CA, USA www.edwards.com

Edwards Lifesciences, based in Irvine, Calif., is the global leader in patient-focused medical innovations for structural heart disease, as well as critical care and surgical monitoring. Driven by a passion to help patients, the company collaborates with the world’s leading clinicians and researchers to address unmet healthcare needs, working to improve patient outcomes and enhance lives. For more information, visit www.edwards.com and follow us on Twitter @EdwardsLifesci.
KLS Martin Table 12  
PO Box 16369, Jacksonville, FL  
www.klsmartinnorthamerica.com

KLS-Martin, a responsive company, is focused on the development of innovative fixation products for use in the chest wall. New product developments in our fixation systems allow these products to be used for fracture fixation, reconstruction and chest wall stabilization.

LivaNova Table 17  
14401 W 65th Way, Arvada CO  
www.Livanova.com

LivaNova is a world leader in the treatment of cardiovascular disease. Our innovative product portfolio includes aortic and mitral valve replacement and repair, perfusion equipment, cannulae and advanced circulatory support. LivaNova’s technologies and breakthrough treatments provide meaningful solutions for the benefits of patients, healthcare professionals and healthcare systems.

LSI Solutions Table 16  
7796 Victor-Mendon Rd, Victor NY, USA  
www.lsisolutions.com

LSI SOLUTIONS® is a medical device company dedicated to advancing minimally invasive therapeutics through research, development, and manufacturing of minimally invasive surgical instruments. Our customer is ultimately a patient. Our technology challenges human illness. Our mission is to lead the world in medical production innovation.

Medistim Table 11  
14000 25th Ave. N. #108, Plymouth, MN, USA  
www.medistim.com

Medistim is the market leader in intraoperative ultrasonic guidance and quality assessment focused on improving surgical outcomes. Our MiraQ™ platform offers the unique combination of transit time flow measurement (TTFM) and high-frequency ultrasound imaging. This technology enables surgeons to execute necessary corrections during surgery.

Medtronic Table 19 & 20  
710 Medtronic Parkway, Minneapolis, MN, USA  
www.medtronic.com

Patients are at the center of everything we do — and we believe medical technology can play an even greater role in improving people’s lives. Join us in our commitment to take healthcare Further, Together. Be inspired at medtronic.com.

Peters Surgical Table 3  
10 Cordage Park Circle, Suite 100/200, Plymouth, MA, USA  
www.peters-surgical.com

The Peters Surgical and the Geister Group will be presenting their full range of Minimally Invasive and Open CV Surgical Products including quality PETERS CV Sutures, SLS™ and 9™ Ligation Clip Systems; the Vitalitec Intrack® Atraumatic Clamps and Cygnet® Flexible Clamps along with the Greyhound™, Novaclip™ and Sofia™ bulldogs. Also on display will be the Vitalitec Enclose II Anastomosis Assist Device and a full range of the GEISTER open and ValveGate® MIS CV instrumentation. Unique, Innovative, quality products backed by industry leading customer service.

Quest Medical, Inc. Table 1  
One Allentown Parkway  
Allen, TX 75013  
www.questmedical.com

Quest Medical, Inc. is a medical device manufacturer and worldwide distributor specializing in protecting the heart during cardiac surgery with the Quest M2® and Microplegia. Quest Medical offers a unique variety of aortic punches, perfusion safety valves and vascular loops designed for optimum cardiovascular surgery.

PRE-FUNCTION AREA

ELEVATORS

Scientific Sessions

ELEVATORS

Medtronic Scanlan LivaNova LSI Solutions Abbott Ansa Vascular Fehling

Genesee Wexler Peters Edwards

T06 T05 T09 T10 T11 T12 T13 T14 T15 T16 T17 T18 T19 T20 T21 T22 T23 T24 T25 T26 T27 T28 T29 T30

Biom Up Delacore Chevalier JAZ Medical AngioDynamics Sonitec Geisinger T12 A T12 T11 T10 T28 T27 T26 T25 T24 T23 T22 T21

entrance from guest rooms
From Your ISMICS Executive Director (continued from page 5)

who may be presenting their work for the first time. We are interna-
tional, with future workshops planned in India (2020) and Australia (2021), and our 2020 Annual Scientific Meeting traveling to Warsaw, Poland in Eastern Europe. Our members come from over 20 countries around the world. For our non-member attendees, I urge you to join and become part of this dynamic and inclusive group. The hierarchy found in many cardiothoracic societies does not exist in ISMICS – only an atmosphere of welcome and genuine interest in what is happening in our field.

It has been my pleasure to serve as your Executive Director for ISMICS for 18 years now. In the spirit of ISMICS, I am proud to say that I count so many members, leaders and Past Presidents not only as professional partners, but as friends. For that is the nature of ISMICS – a welcoming Society, with a boundless trajectory and some of the most dedicated leadership I have had the privilege of working with. What makes ISMICS truly unique is the passion and commitment of its members who is dedicated to the health and Society’s special synergy with the industry. If this is your first time joining us, I am confident that you will be returning to ISMICS for many years to come.

Our ISMICS team onsite in New York consists of myself, S. Alger, EJ Weldon, Yvonne Grunebaum, Brittany Fiore, and Lorraine O’Grady. Stop by Registration and say hello – and learn more about how you can become a part of ISMICS. And once again, Welcome to the Big Apple!

Aurelie

What makes ISMICS truly unique is the passion and commitment of its members and its leadership, its absolute...
ISMICS wishes to thank these companies for their support of the Society and for their commitment to developing minimally invasive surgery techniques and technologies:

PREMIER PLATINUM LEVEL
AtriCure
LivaNova

PLATINUM LEVEL
Medtronic

GOLD LEVEL
Abbott

SILVER LEVEL
INTUITIVE SIEMENS

BRONZE LEVEL
biom’up
Edwards

INNOVATIONS:
TECHNOLOGY AND TECHNIQUES IN CARDIOThorACIC AND VASCULAR SURGERY

Innovations: Technology and Techniques in Cardiothoracic and Vascular Surgery is the first journal whose main mission is to disseminate information specifically about advances in technology and techniques that lead to less invasive treatment of cardiothoracic and vascular disease. It delivers cutting edge original research, reviews, essays, case reports, and editorials from the pioneers and experts in the field of minimally invasive cardiothoracic and vascular disease, including biomedical engineers. Also included are papers presented at the annual International Society for Minimally Invasive Cardiathoracic Surgery (ISMICS) meeting.

Editor-In-Chief:
Niv Ad, MD
Division of Cardiac Surgery
University of Maryland
School of Medicine

Published in Association with

Why publish in Innovations?

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- Rapid publication process
- Indexed in MEDLINE
- Special focus on new technology and techniques
- A targeted audience that includes surgeons, trainees, and industry interested in minimally invasive cardiothoracic and vascular techniques

journals.sagepub.com/home/in
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ISMICS

Innovation, Technologies, and Techniques in Cardiothoracic and Cardiovascular/ Vascular Surgery

Warsaw
4 - 6 June 2020
Hilton Warsaw
Hotel & Convention Centre
Warsaw
POLAND

ANNUAL
SCIENTIFIC
MEETING

International Society for Minimally Invasive Cardiac Surgery

www.ISMICS.ORG
97% Successful Left Atrial Appendage (LAA) Closure Rate*

- No AtriClip Device Migrations
- No AtriClip Device Related Complications
- With More Than 5 Years Follow-Up

The body of clinical evidence for the AtriCure AtriClip LAA exclusion systems identifies an average LAA closure success rate of 97% (93-100%) including more than 5 years of follow-up (peri-procedure to 8 years) and including 991 cardiac surgery patients. In these peer-reviewed and pre-market clinical science reports, success was defined as no residual blood flow from the LAA into the left atrium and less than 1 cm residual LAA neck (0 to less than 10 mm). AtriClip implants were stable with no reports of device migrations and no reports of device related complications.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ailawadi (2011)¹</td>
<td>• 98.4% successful LAA closure</td>
</tr>
<tr>
<td></td>
<td>• 3 month follow-up</td>
</tr>
<tr>
<td>Caliskan (2017)²</td>
<td>• 100% successful close rate</td>
</tr>
<tr>
<td></td>
<td>• More than 5 years follow-up</td>
</tr>
<tr>
<td>van Laar (2018)³</td>
<td>• 95% successful LAA closure rate</td>
</tr>
<tr>
<td></td>
<td>• 6 month follow-up</td>
</tr>
<tr>
<td>Ellis (2017)⁴</td>
<td>• 93.9% successful LAA closure rate</td>
</tr>
<tr>
<td></td>
<td>• 183 patient years follow-up</td>
</tr>
<tr>
<td>Kurfirst (2017)⁵</td>
<td>• 98% successful LAA closure rate</td>
</tr>
<tr>
<td></td>
<td>• 18 month follow-up</td>
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<tr>
<td>Emmert (2013)⁶</td>
<td>• 100% successful LAA closer</td>
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<tr>
<td></td>
<td>• 3.5 year follow-up</td>
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<table>
<thead>
<tr>
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<th>Results</th>
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<tbody>
<tr>
<td>Ad (2015)⁷</td>
<td>• 100% successful LAA closure</td>
</tr>
<tr>
<td></td>
<td>• 1 year follow-up</td>
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<tr>
<td>Gerdisch (2017)⁸</td>
<td>• 98.7% successful LAA closure</td>
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<tr>
<td></td>
<td>• 30 day follow-up</td>
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<tr>
<td>Mokracek (2015)⁹</td>
<td>• 93% successful LAA closure</td>
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<tr>
<td></td>
<td>• 11 month follow-up</td>
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<td>Page (2017)¹⁰</td>
<td>• 100% successful LAA closure</td>
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<tr>
<td></td>
<td>• More than 1 year follow-up</td>
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<tr>
<td>Beaver (2016)¹¹</td>
<td>• 100% successful closure</td>
</tr>
<tr>
<td></td>
<td>• 1 year follow-up</td>
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*weighted average based on the number of patients

References:


Results from case studies are not predictive of results in other cases. Results in other cases may vary.

U.S. Indications: The AtriClip LAA Exclusion System is indicated for the occlusion of the heart's left atrial appendage, performed under direct visualization and in conjunction with other cardiac surgical procedures.