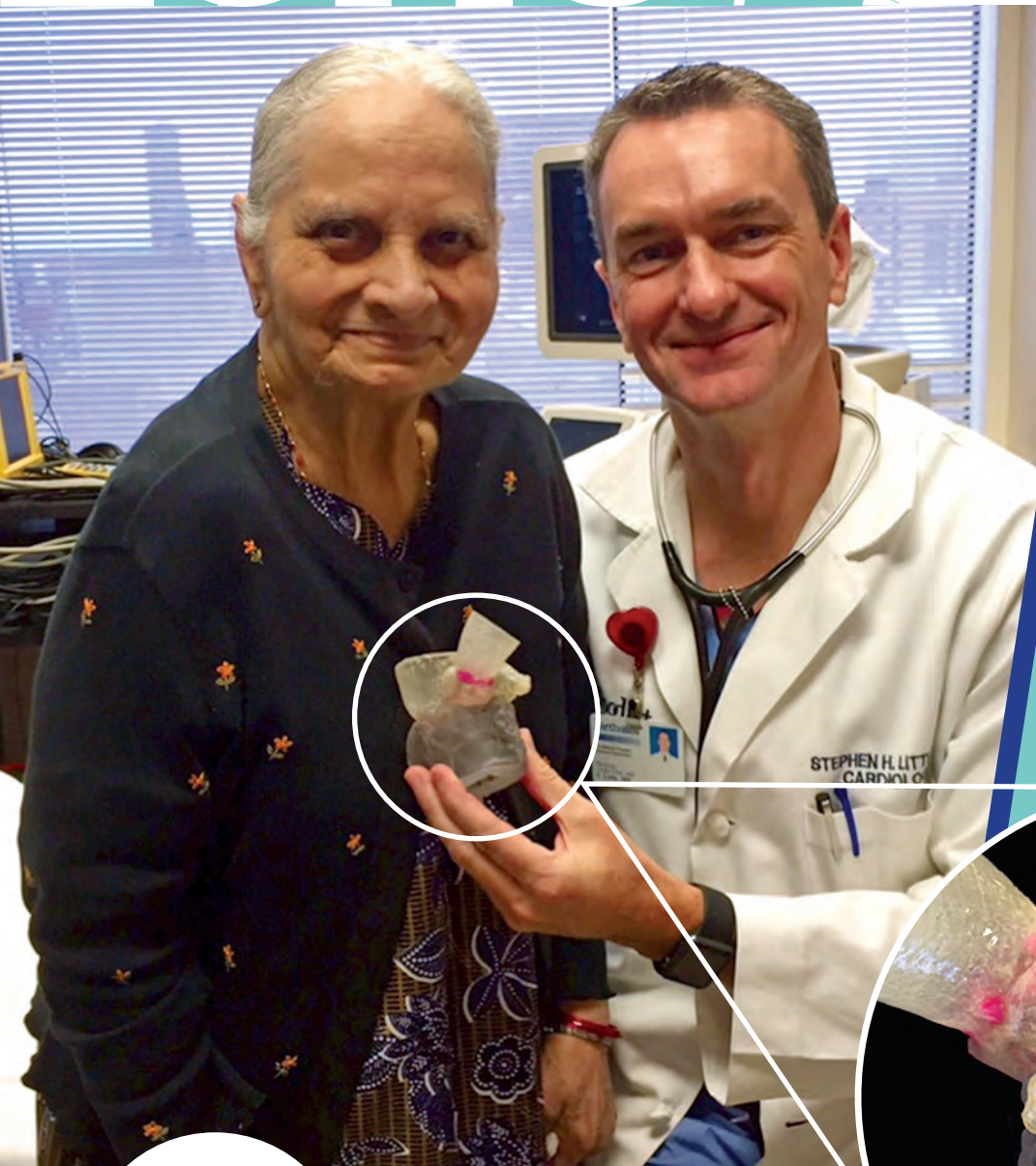


ECHO



p.10

**3D
PRINTING**

p.15

**HUMANITARIAN
MISSIONS**



p.18

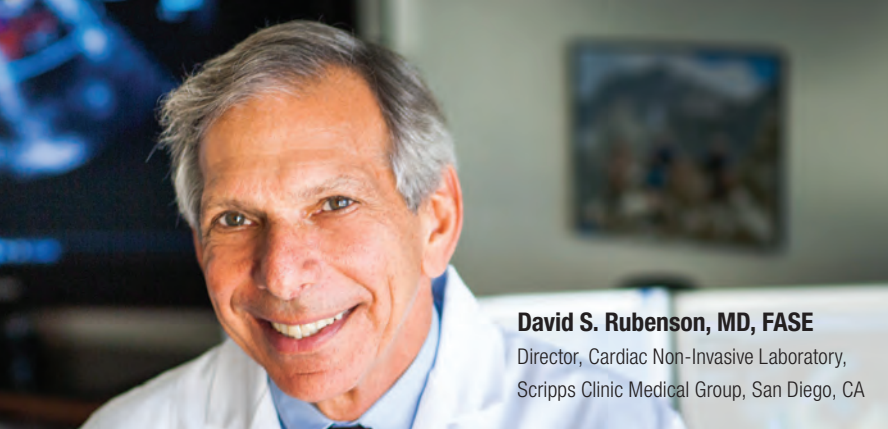
40

YEARS OF ASE



Aldo Prado, MD, FASE

Chief of Echocardiography Department,
Centro Privado de Cardiología,
Tucumán Argentina



David S. Rubenson, MD, FASE

Director, Cardiac Non-Invasive Laboratory,
Scripps Clinic Medical Group, San Diego, CA



Esther S.H. Kim, MD, FASE

Associate Director, Non-Invasive Vascular
Laboratory, Cardiovascular Medicine,
Cleveland Clinic, Cleveland, OH



Colin K. Grissom, MD, FASE

Critical Care Medicine, Shock Trauma ICU,
Intermountain Medical Center, Murray, UT



Madhav Swaminathan, MD, FASE

Clinical Director, Division of Cardiothoracic
Anesthesiology & Critical Care Medicine,
Duke University Health System, Durham, NC

Experts in the field hold the designation of FASE

Want to achieve a FASE designation?
A variety of specialists, in
addition to cardiologists, can
now meet application criteria.
Apply at www.asecho.org/fase.



American Society of Echocardiography –
40 years of representing the best in the field.

ABOUT ASE

The American Society of Echocardiography (ASE) is a professional organization of physicians, cardiac sonographers, nurses, and scientists involved in echocardiography, the use of ultrasound to image the heart and cardiovascular system. The Society was founded in 1975 and is the largest international organization for cardiovascular ultrasound imaging.

ASE'S MISSION

ASE is committed to excellence in cardiovascular ultrasound and its application to patient care through education, advocacy, research, innovation, and service to our members and the public.

COMMENT & CONTRIBUTE

Like what you read? Have an idea for a future article? We want to hear from you!
Email echo@asecho.org.

Managing Editors

Deborah R. Meyer and Angie Porter

Contributors

Robin Wiegerink, Hilary Lamb, Andie Piddington, Rhonda Price, Lorna Siegal, Andrea Van Hoever, and Ronna Yates

Guest Contributors

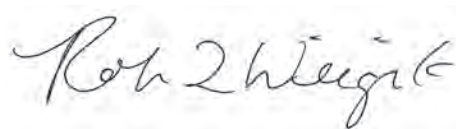
Marija Vukicevic, PhD Houston Methodist DeBakey Heart and Vascular Center, Houston, Texas; Stephen H. Little, MD, FRCPC, FACC, FASE, Houston Methodist DeBakey Heart and Vascular Center, Houston, Texas; Randolph P. Martin, MD, FACC, FASE, FESC, Piedmont Heart Institute, Atlanta, Georgia; Harvey Feigenbaum, MD, FACC, FASE and Founder of ASE, Indiana University School of Medicine Krannert Institute of Cardiology, Indianapolis, Indiana; Michael L. Main, MD, FACC, FAHA, FASE, FESC, Saint Luke's Mid America Heart Institute, Kansas City, Missouri; and Denise Garriss, The Korris Group, Washington, DC

ASE MEMBERS:

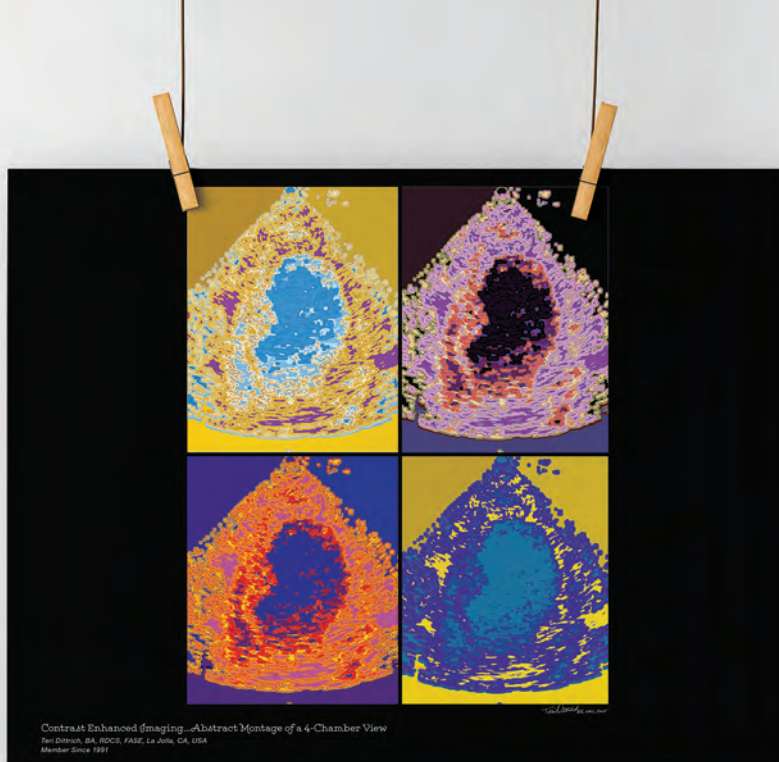
As ASE celebrates its 40th Anniversary, *(page 18)* it's interesting to look back to draw inspiration from what has happened in the past as we move forward with a new strategic plan. ASE's new plan, *(page 9)* approved in June 2015, is built on the foundation of what we have in place, what we do well, and where we have succeeded before.

We are recalibrating to make these aims a reality. With this new plan comes a renewed focus on the patient side of the medical equation—patient outreach will be key to our ability to make cardiovascular ultrasound widely accepted and valued. We have put effort in this area in the past when we created the SeeMyHeart.org website and launched the ASE Foundation to assist our outreach to patients. Moving forward, we are partnering with organizations like WomenHeart *(page 32)*, which offers a peer-to-peer network to support and educate those afflicted with heart issues. These partnerships will help spread a prevention message to make sure diagnostic choices are known. Our recent missions to Vietnam and Argentina *(page 14)* also are driven by this desire to directly impact patient care. From new advances in 3D printing *(page 10)* to the "Echo Test and Teach" product *(page 28)*, ASE is working to make sure the field aims for both quality and innovation as it moves forward.

We are certain our next 40 years will be as productive and ground-breaking as our first 40!



Robin Wiegerink, CEO



RENEW YOUR MEMBERSHIP

by December 31
 and receive the
 2016 ECHO IMAGE
 CALENDAR

Renew today at
asecho.org/renew

JANUARY 2016						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
DECEMBER 2015 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	FEBRUARY 2016 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28				1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
	26th Annual Echo Hawaii KOHALA COAST, HI	26th Annual Echo Hawaii KOHALA COAST, HI	26th Annual Echo Hawaii KOHALA COAST, HI	26th Annual Echo Hawaii KOHALA COAST, HI	26th Annual Echo Hawaii KOHALA COAST, HI	
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

TABLE OF CONTENTS

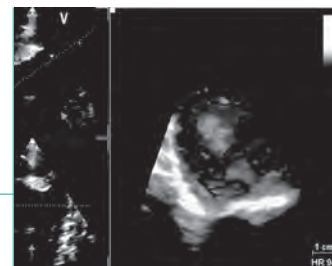


6

Focus on Leadership

25

ASEUniversity:
Echo Education at
Your Fingertips



10

3D Printing at the Crossroads of
Heart Imaging and Intervention

14

ASEF's Humanitarian Missions



28

Echocardiography
Test and Teach:
A Measurement
and Interpretation
Simulator

26

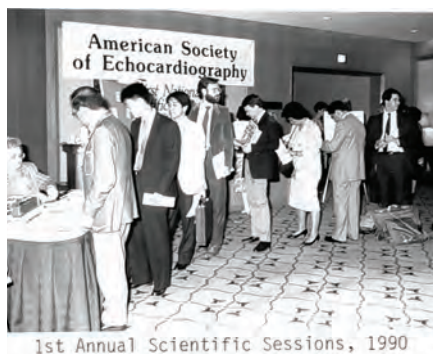
Echocardiography:
Technology and
Applications for Today
and Tomorrow

30

Education Corner

18

Forty Years of ASE –
Keeping Up with
the Rapid Pace
of Technology



1st Annual Scientific Sessions, 1990

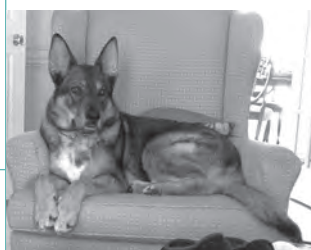


32

Partnering to Raise
Cardiovascular
Awareness

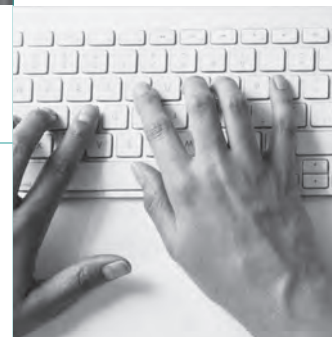
22

My Admiration for the World
of Veterinary Medicine –
Courtesy of Echo



34

Know Your
Echo Coding



AMERICAN SOCIETY OF ECHOCARDIOGRAPHY

2100 Gateway Centre Blvd, Suite 310
Morrisville, NC 27560

asecho.org | asefoundation.org

Phone: 919-861-5574 | Fax: 919-882-9900

FOLLOW US



facebook.com/ASECHO



twitter.com/ASE360



connect.asecho.org



American Society of Echocardiography

EDITOR'S NOTE

ASE is very grateful to our members who contribute to Echo magazine and values their willingness to share personal insights and experiences with the ASE community, even if they may not be in total alignment with ASE's viewpoint.

[Focus] ON LEADERSHIP

What are your thoughts on how ASE's new strategic goals will add value to the members' experience while driving the field forward?

ASE's 2015-2016
Executive Committee
Responds

“ The American Society of Echocardiography plans to broaden its focus by representing the cardiovascular ultrasound community to important groups including patients and payers as well as other healthcare providers. This is our new Strategic Goal 2. Many of us have had patients who have left the office after their ECG, thinking that they had already had their “ECHO.” Much of the public and even health journalists do not understand the unique value of cardiac ultrasound. Our public service announcement in the Stroke and Heart Attack Awareness supplement of *USA Today* in June described cardiovascular ultrasound as a “safe, non-invasive exam that uses reflected sound waves to provide moving pictures of your heart and valves. It provides your doctor with moving images ... that will help evaluate your heart health...Echocardiography uses the same technology that allows doctors to see an unborn baby inside a pregnant mother. No radiation is involved...”

Why start this education now? **As healthcare moves to a patient-centered and value driven system, it is important for the decision makers to understand the power of cardiovascular ultrasound in contributing to patient outcome.** It isn't enough for our own community of expert physicians and sonographers to appreciate the unique place of ultrasound in cardiovascular imaging. It is time for other decision makers – increasingly patients and payers – to learn about that value. Our Society has been invited by the American Heart Association/American Stroke Association to attend the Cryptogenic Stroke Public Health Conference in Washington DC in October, which will be another opportunity to educate patients and journalists. Along with our support of the WomenHeart Congressional briefing on heart failure and women, work by our lobbyist, and other planned ventures, we will continue to make sure that the value of cardiovascular ultrasound in cardiac care is appreciated by everyone.

”



SUSAN E. WIEGERS, MD, FACC, FASE
President
Temple University School of Medicine



ALLAN L. KLEIN, MD, FACC, FASE
President-Elect
Cleveland Clinic



VERA H. RIGOLIN, MD, FACC, FASE
Vice President
Northwestern University Feinberg School of Medicine

“The ASE strategic plan is very timely in this changing imaging world. The four strategic goals encompass the plan of encouraging growth among new users, showing value among the different healthcare constituencies, facilitating research, and finally streamlining the governance body into a well-connected organization. Let me take you through each of these goals and what it means to me.

The first goal of attracting new point of care (POC) users, medical students, the structural heart team, and international members is crucial to the growth of our Society. POC users are already performing focused echocardiography in the ERs and ICUs, and it is important that ASE offers needed educational programs for these nontraditional users. Medical students will have an opportunity to learn physical diagnosis through hand-held echocardiograms. In time, stethoscopes will be obsolete and be replaced by the “echoscope,” and the student will have a mobile wireless transducer with the echo device in their pocket. It is important that ASE embraces its role as a vital member of the structural heart team with the expanding role of TAVR, percutaneous valve repair, and LAA closure devices. **The “world is flat” for global cardiovascular ultrasound technology, and collaborations through the new International Alliance Partners program will be important in order to maintain ASE as a global leader.**

The second goal of demonstrating the “value proposition” of echocardiography to patients, payers, and healthcare providers is essential in the multimodality imaging world and future cutbacks by payers in imaging services. Expanding our presence on the web, providing educational programs to patients and payers, and mounting an effective media relations campaign will be very timely.

The third goal of embracing and facilitating research is vital to our Society. The growth of new technologies, outcomes studies, as well as data registries will be very beneficial.

The fourth goal of streamlining our governance structure including the executive leadership, committees, and councils will allow for increased communication. As I become President one year from now, each of these strategic goals will make ASE stronger and take us soaring to new heights as a Society.

“The practice of medicine is changing at an unbelievable pace. In part, this change comes from the enhancements and improvements in technology. As cardiovascular ultrasound systems become smaller and easier to use, the opportunities for utilization of this technology grow. As a result, the users of cardiovascular ultrasound now extend well beyond the field of cardiology and the walls of our hospitals and clinics. Novel applications of cardiovascular ultrasound and new users open opportunities for education and quality standards. ASE is already known in the field of cardiology as the source for education and standards. The first strategic goal is for ASE to attract all users of cardiovascular ultrasound so the entire field maintains a high standard of care. The second strategic goal is to promote the value of cardiovascular ultrasound to be well known by patients, payers, and healthcare providers. Although this statement may seem obvious, the value of cardiovascular ultrasound is sometimes overlooked. **Demonstrating the value of our technology should promote continued interest in appropriate utilization and reimbursement. Heightening the interest in cardiovascular ultrasound amongst all users also facilitates the development and application of new technology, which is strategic goal 3.** Novel technology helps drive the field forward. It also helps keep the field fresh and exciting. Finally, strategic goal 4 maintains ASE’s commitment to representing its membership and supporting an efficient and effective organization.

The four strategic goals demonstrate ASE’s commitment to the field of cardiovascular ultrasound. Life is full of change. By embracing change, ASE is preparing for the future. The four strategic goals promote the positive and proactive measures that will benefit cardiovascular ultrasound healthcare providers, payers, and most importantly, patients.



BENJAMIN W. EIDEM, MD, FACC, FASE
Treasurer
Mayo Clinic College of Medicine



DEBORAH A. AGLER, RCT, RDCS, FASE
Secretary
Cleveland Clinic

“

Echocardiography is the signature imaging modality to evaluate cardiovascular disease. The creation and implementation of ASE's 2015 strategic goals places our Society's emphasis

squarely on promoting the significant value and high quality of cardiovascular ultrasound in today's multimodality imaging environment while also recognizing the strategic importance of developing new innovative imaging techniques to better define and serially evaluate cardiovascular disease in the fetus, child, and adult.

I believe that our Society's members will benefit from our strategic goals in several ways:

1. ASE's central focus and dedication to provide to our members high quality and value in their education and research endeavors will enable them to have access to the most up-to-date clinical guidelines and cutting-edge science in cardiovascular imaging through our publications, scientific sessions and other courses, as well as webinars and educational materials.
2. ASE's advocacy efforts to educate our patients, payers, and other healthcare providers about the quality and value of cardiovascular ultrasound will benefit our members in several ways including increased cardiovascular ultrasound utilization, improved reimbursement, and improved understanding and recognition of cardiovascular disease.
3. ASE's strategic vision to lead the way in developing new technologies will drive and grow our field's clinical applications and will invigorate research efforts with these novel innovations.
4. ASE's commitment to create a governance structure within our Society will help to better identify and support the clinical, educational, and research needs of our members.

Overall, I hope that these new strategic goals will provide our ASE members with many potential avenues of participation within our Society and our field to promote cardiovascular imaging as the primary imaging modality for our patients.

”

“

This is a very exciting time to be a sonographer on the executive committee implementing the new strategic goals.

In our commitment to expand the membership, I feel that it is pertinent to support and mentor those entering the field of cardiovascular ultrasound and provide them with opportunities for professional growth. The future of the Society depends on retention and the addition of new members.

By continuing to be on the forefront of development of the continuing educational needs of our members, we can ensure quality and value for our patients. I personally utilize the educational tools provided by ASE in my day-to-day work related activities. I encourage my peers to also take advantage of these excellent tools.

As an organization it is important that we become more visible in the promotion of education to our patients, payers, and healthcare providers. They need to be informed how essential ASE's commitment is to the field of cardiovascular ultrasound.

Continuing to give support to young investigators and research teams to engage in the creation of novel cardiovascular ultrasound is imperative to our technological growth.

ASE has so much to offer its members. Let's join forces and charge ahead promoting our new goals.

”



JOE R. KREEGER, RCCS, RDCS, FASE
Council Representative
Children's Healthcare of Atlanta



NEIL J. WEISSMAN, MD, FASE
Past President
MedStar Health Research Institute

“

The use of cardiovascular ultrasound is becoming much more prolific within medical imaging, sometimes practiced by providers with very little or no formal training. The resources for these users are limited at best and do not provide long-term support for continued learning and skill development. Being a Society that's focused on promoting excellence in the field by providing education and mentorship, ASE is in a position to fill this gap by reaching out to all users of cardiovascular ultrasound and developing the very best in targeted education and support for these groups. ASE has also developed a forum with industry in a collaborative effort to push the boundaries of innovation and development of new technologies in cardiovascular ultrasound. The Industry Roundtable and Pediatric Think Tank meetings have been very successful in providing venues for discussions and ideas to flourish.

I envision our new strategic goals changing the face of who we have traditionally been and promote our Society as a kind of “one-stop shop” for all stakeholders in cardiovascular ultrasound. This will undoubtedly increase our international renown as the authority in cardiovascular ultrasound training as well as help ensure that providers and patients realize cardiovascular ultrasound as the premier and most valuable imaging modality for cardiovascular disease.

”

“

I am excited about ASE's new strategic plan. Through this plan, ASE will be well positioned to support our members in their use of CV ultrasound, from education, innovation, quality, and advocacy. **It will also help us navigate the rapidly changing world to stay ahead of these changes and drive them in a manner that helps our patients.**

”

ASE STRATEGIC GOALS JUNE 2015-JUNE 2018

- 1** Attract all users of CV Ultrasound by creating quality and value.
- 2** Promote the value of CV Ultrasound to be well-known by patients, payers, and healthcare providers.
- 3** Facilitate the development and application of novel CV Ultrasound technology.
- 4** Create a governance structure that is representative of our membership and supports an efficient and effective organization.

3D PRINTING

at the Crossroads of Heart Imaging and Intervention

Contributed by Marija Vukicevic, PhD and Stephen H. Little, MD, FRCPC, FACC, FASE, Houston Methodist DeBakey Heart and Vascular Center, Houston, Texas



Figure 1. Dr. Little and a valve clinic patient discuss her anatomy with the help of a multi-material life-size 3D printed model of her heart (right).



As therapeutic cardiac interventions become increasingly more complex, the ability to create patient-specific physical models prior to intervention has become an area of intense interest. Models of normal anatomy, congenital abnormalities, acquired pathology, and even abnormal valve function have all recently been reported. Here we discuss how these models are created, discuss some of the strengths and limitations of each fabrication method, and provide

examples of how these methods are being applied to teach, plan, and improve patient care.

Three-dimensional (3D) printing, also called “additive manufacturing” or “rapid prototyping,” is a novel manufacturing technology that translates a digital 3D image data-set into a physical 3D object.¹ 3D printing technology in the form of Stereolithography (STL) was introduced by Charles Hull in 1983. Stereolithography is based on the technique of exposing specific photopolymers to ultraviolet light (UV) to

create rapid material hardening. By printing successive layers of these polymers with synchronized UV light exposure, a 3D model is constructed. Following this initial technique, many more 3D printing methods have been created and refined so that today, a 3D model can be created using a number of different (and competing) technologies including building successive layers of material by polymerization, by bonding agents, or by melting layers of material powder. An overview of these methods and applications are provided in [Table 1](#).

Technology		Characteristics				
		Durability	Surface Finish	Detail	Material Selection	Application
Build through Polymerization	Stereolithography	Lower	Smoother	Higher	Plastic, Ceramic, Silver	Prototypes, Casting patterns, Large parts with good accuracy
	PolyJet				Full color composite, Digital materials (450 options), Heavy metals, Biocompatible materials	Prototypes, Presentation models, Medical devices, Casting, Low temperature parts, Form and fit testing
Build through Bonding Agent	Binder Jetting	Fair	Fair	Fair	Plastic, Metal, Send, Ceramic, Full color materials	Prototypes, Parts for further processing, Molds and cores, Casting patterns
Build through Melting	Fused Deposition modeling	Higher	Rougher	Lower	Biocompatible materials, Full color composites, Fiberglass	Strong parts for Aerospace, Automotive, Medical Industries Functional testing
	Laser Melting				Ceramic, Metal	

Table 1. Classification and Characteristics of 3D Printing Technologies

A Brief History

In 1986, another 3D printing technology called Selective Laser Sintering was introduced by Carl Dechard and Joe Beaman from University of Texas. This method uses a laser for selective sintering of a wide range of material powders. In 1986, Charles Hull with 3D Systems introduced the first commercial printer along with standard STL file format that could translate a 3D digital model into 3D printable information. This was followed by development of Fused Deposition Modeling technology, invented by Scott Crump in 1988. This method relied on heating and extruding a thermoplastic filament to build up object layers. 3D printing technology has been increasingly commercialized with a new technique of agent binding introduced by MIT in 1993. Thermoplastic models and bio-printed scaffolds appeared in

1999, and the first research program on printing cells into the organs started in 2002. The first color high-definition 3D printer was introduced in 2005, and in 2007 PolyJet technology first offered the possibility of 3D printing using multiple different materials. However, many of these emerging technologies remained prohibitively expensive for widespread use.

After 2010, these technologies became more cost effective, and there has since been an explosion in interest and applications. The first 3D printed car was made in 2010 and was soon followed by a bio-printed blood vessel (2010), chocolates and aircraft parts (2011), and the first patient-specific 3D printed lower jaw (2012). In the last few years, significant improvements in 3D printer resolution and the ability to print using a wide range of colors and materials, and material mixtures, have helped fuel the growing scientific interest in these new

methods and their application in medicine.

While initially utilized for commercial manufacturing and engineering applications, 3D printing soon found its way to the medical environment for the fabrication of dental implants,² bone reconstruction,³ manufacturing specialized surgical instruments and customized prosthesis,⁵ and most recently for the printing of patient-specific complex anatomical structures.^{4,6} This technique is suitable for 3D printing the anatomically accurate, multi-material cardiac structures. Today, the choice of appropriate 3D printing technique depends on the specific features that the 3D printed object should contain. In Table 1, we linked each 3D printing technology with its main characteristics and applications.

3D Patient-specific Model Reconstruction from CT Data

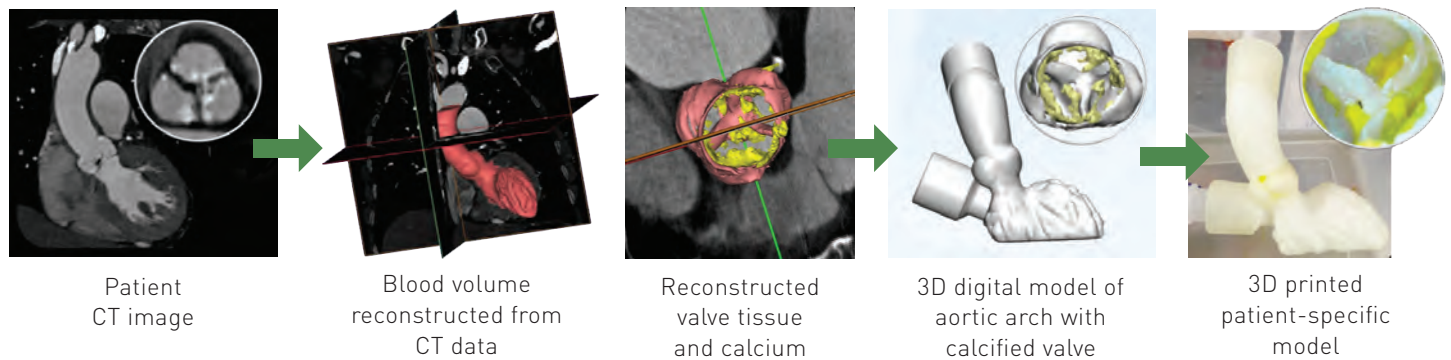


Figure 2. Construction process for a 3D patient-specific aortic valve

Clinical Images Exports

The process to create a 3D patient-specific anatomic model starts by acquiring volumetric (3D) images with the highest possible spatial resolution. Typically, magnetic resonance imaging (MRI) methods and computed tomography (CT) data sets have been employed for the reconstruction of anatomically accurate cardiovascular structures. More recently, 3D echocardiography has also been used as a source imaging method.^{1, 4, 8} The choice of imaging modality reflects the nature of the 3D model to be constructed but is often guided by the clinical indication for the imaging study. For example, MRI data for modeling congenital heart defects; CT data for modeling orthopedic replacements; and 3D echocardiographic data to model patient-specific mitral valve dysfunction.⁸

Using any of these clinical imaging modalities, the next step is to export a target image using the Digital Imaging and Communication in Medicine (DICOM) standard format into a specialized image processing software such as Mimics (Materialize, Belgium). Within this software environment, a skilled user performs anatomic identification and structural segmentation to ultimately create a digital model of the anatomy of interest. The complexity in creating these digital models can vary widely depending on their size and the nature of the target tissues for replication (e.g. bone only or a mixture of different “hard” and “soft” tissues). The final 3D digital model is transformed into the STL file format and fabricated using one of the several different 3D printing technologies

discussed above. The development of these 3D printing methods is proceeding so rapidly that the state-of-the-art method is impossible to define. An outline of the design and fabrication process for a 3D printed patient-specific model is shown in Figure 2.

Examples

At our institution, we have partnered with a local company (3D Print Bureau of Texas) to fabricate patient-specific cardiac models used for pre-surgical planning to address congenital diseases (right ventricular outflow tract obstruction); to assess the size and attachment site of a right atrial malignancy; and to explore a method to replicate the severity of aortic valve stenosis by coupling a patient-specific 3D model of aortic stenosis to a functional flow loop and subjecting the modeled aortic valve to Doppler interrogation.⁴ We used clinically acquired CT data sets for reconstruction of the left ventricular outflow tract, aortic root, aortic valve leaflets, and ascending aorta (Figure 2). All our patient-specific models (Figures 2,5), were fabricated using a PolyJet based 3D printer (Figure 4). We have demonstrated that an anatomically accurate 3D model of a specific patient's aortic pathology can be replicated using multiple materials to represent the calcified and non-calcified anatomic elements within the aortic valve and root complex. In addition, when matched to a clinically determined stroke volume, the 3D printed model replicated the degree of aortic stenosis recorded during a clinical Doppler echocardiogram. This was one of the first reports to show that a

patient-specific 3D printed model could replicate both anatomy and function.⁴ It is important to note that aortic valve stenosis is a condition with relatively fixed valve motion, and the replication of anatomic function using 3D printing would be significantly more challenging if motion of the printed structures were required (e.g. mitral valve regurgitation). Nonetheless, we and other investigators are actively exploring the role of 3D printing for the replication of increasing complex functional challenges.

Our group at the Houston Methodist DeBakey Heart and Vascular Center has begun to use 3D print methods to replicate functional, patient-specific models of the entire mitral valve apparatus (leaflets, annulus, and papillary muscle geometry) reconstructed from 3D transesophageal data. Our preliminary results have been encouraging and the developmental process of 3D patient-specific mitral valve models is outlined in Figure 3. Ultimately, we aim to employ these models to test current and emerging Doppler echocardiographic methods for the quantification of mitral valve regurgitation against in vitro flow reference standards.

Future Application

Although introduced three decades ago, 3D printing technology has now become widely available and cost effective. The number of 3D printing applications has grown exponentially and is now defining its role in the medical sector. 3D printed patient-specific models of cardiac structures can be used as a novel 3D visualization tool to facilitate the

3D Patient-specific Model Reconstruction from 3D TEE

planning of surgical procedures before entering the operation room. Having access to a fully functional valve model before performing an interventional procedure may prove to be remarkably beneficial to both surgeon and patient when the repair involves complex cardiac anatomy. In addition, the role of 3D printed models for the improvement of percutaneous procedural challenges continues to evolve.

Without a doubt, 3D printed patient-specific models represent a powerful teaching tool for the education of residents and fellows, as well as a very intuitive tool to explain structural pathology or a planned procedure to a patient. (Figure 1) The integration of 3D modeling and in vitro studies represents an innovative path for medical device testing and optimization and may ultimately lead to the creation of customized prosthetics for the cardiac patient much like what is already offered to the orthopedic patient. We predict that for at least the next several years, 3D printing will remain at the crossroads of advanced cardiac imaging and structural interventions with a direct impact to improve clinical outcomes.

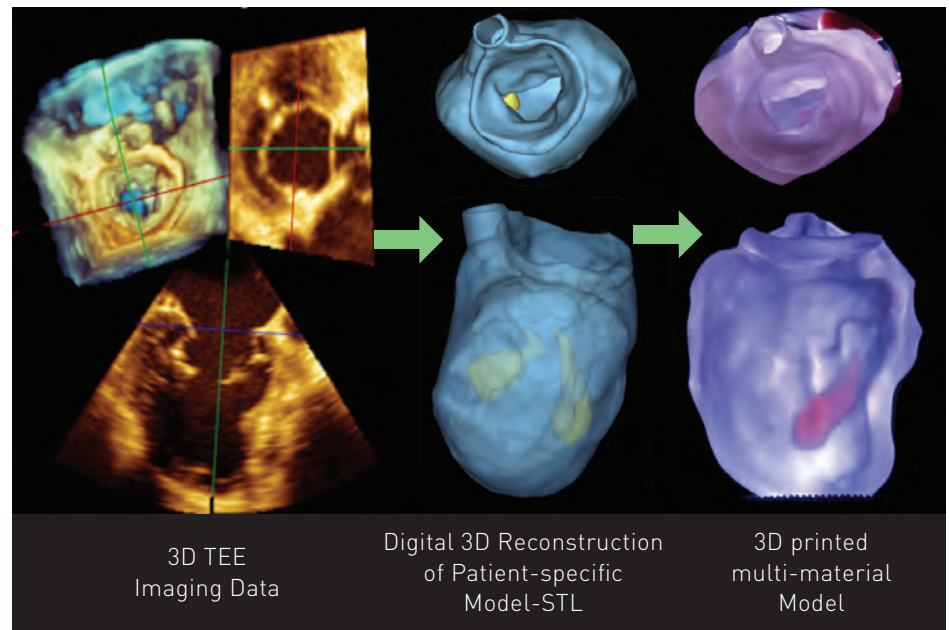


Figure 3. Reconstruction of a functional, multi-material model of the mitral valve with papillary muscles from 3D TEE images.

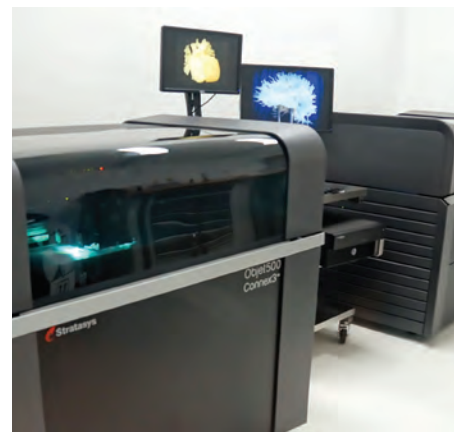


Figure 4. 3D printer – Object500 Connex3TM

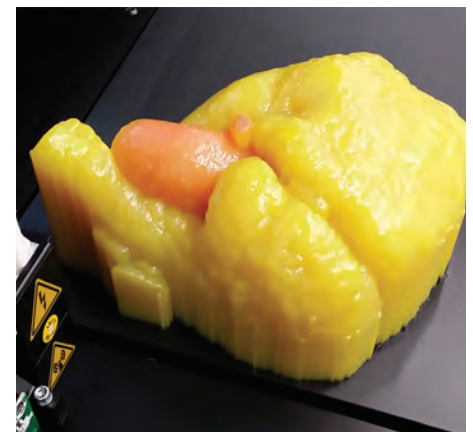


Figure 5. Printing a model of Tetralogy of Fallot

Marija Vukicevic, PhD, is a Postdoctoral fellow (Bioengineering), Cardiovascular Imaging Section, Department of Cardiology, Houston Methodist DeBakey Heart and Vascular Center, Houston.

Stephen H. Little MD, FRCPC, FACC, FASE is director of the Houston Methodist Valve Clinic, and director of the Cardiovascular Hemodynamics Imaging Laboratory (CHIL). He is an associate professor of Medicine, Weill Cornell Medical College, Department of Cardiology, Houston Methodist DeBakey Heart and Vascular Center, Houston.

REFERENCES

- [1] Farooqi KM, Sengupta PP. Echocardiography and three-dimensional printing: sound ideas to touch a heart. *J Am Soc Echocardiogr.* Apr;28(4):398-403, 2015.
- [2] Ernault C, Bouletreau P, Meyer C, Aubry S, Breton P, Bachelet JT. Reconstruction assisted by 3D printing in maxillofacial surgery, *Rev Stomatol Chir Maxillofac Chir Orale.* 2015 Apr;116(2):95-102.
- [3] Batson ER, Cooper LF, Duqum I, Mendonça G. Clinical outcomes of three different crown systems with CAD/CAM technology. *J Prosthet Dent.* 2014 Oct;112(4):770-7
- [4] Maragiannis D, Jackson MS, Igo RS, Chang SM, Zoghbi WA, Little SH. Functional 3D Printed Patient-Specific Modeling of Severe Aortic Stenosis, *JACC* 2014; 64(10), 0735-1097.
- [5] Malik HH, Darwood AR, Shaunak S, Kulatilake P, El-Hilly AA, Mulki O, Baskaradas. Three-dimensional printing in surgery: a review of current surgical applications. *A.J Surg Res.* 2015 Jun 26. pii: S0022-4804(15)00729-5.
- [6] <http://3dprinting.com>
- [7] <http://www.3dsystems.com>
- [8] Mahmood F, Owais K, Taylor C, Montealegre-Gallegos M, Manning W, Matyal R, et.al. Three dimensional Printing of Mitral Valve Using Echocardiographic Data, *JACC: Cardiovascular Imaging*, 2015; 8(2), 226-31.



TARTAGAL, ARGENTINA:

AN UNLIKELY DESTINATION

Contributed by Rhonda Price, ASE Chief Standards Officer and International Relations Specialist

Tartagal, Argentina is not a tourist destination. You won't find much about it on TripAdvisor, and it's unlikely to be included on any of the bucket lists in the glossy travel magazines. The 60,000+ inhabitants make their living primarily from the production of oil, natural gas, or agriculture, a fact that is noted during the four-hour drive north from Salta city, the location of the nearest commercial airport. **For 34 lucky people from seven states in the U.S. and 10 provinces in Argentina in mid-August, Tartagal was the unlikely destination for the journey of a lifetime.**

The occasion, a humanitarian event organized by the American Society of Echocardiography Foundation (ASEF) and the Argentina Federation of Cardiology (FAC) to identify and treat cardiovascular disease in native populations in northern Argentina, near the Bolivian border. These populations, each with its own unique language and personality, include the Wichis, Guaranis, Tobas, Chorotes, Matacos, and Chulupis. Due to their lifestyle, most have never received healthcare from a physician – at most, their care comes from the healthcare agents with basic skills.



Dr. Alejandro Diaz of Tandil, Buenos Aires Province and Dr. Juan Alberto Martina of Rafaela, Santa Fe Province with young members of the indigenous communities. Community members, young and old, immediately felt at ease as a result of the affection and dignity extended to them by the medical team.

HOW IT HAPPENED

Inspired by ASE's humanitarian events in India, conducting a similar event in rural Argentina or Brazil had been an on-going topic of discussion with Dr. Ricardo Ronderos (Argentina), Dra. Marcia Barbosa (Brazil), and Dr. Roberto Lang, who is originally from Argentina. In September 2014, we decided to test the possibilities for such an effort with the indigenous communities in Argentina. With the help of Leda Kantor, a cultural anthropologist who has been serving the indigenous communities in northern Argentina for 25+ years, and two cardiologists from the Salta Province - Dr. José Antonio Le Favi of Salta and Dr. Mario Yellamo of Orán - we arranged a meeting in Tartagal with the leaders of the regional indigenous groups to test their level of acceptance for a medical event with their communities. Such an event would not be possible without their support.

When we arrived in Tartagal, where a meeting had been arranged at the radio station, "La Voz Indígena," there were 27 leaders waiting for us. We gained their support and the radio station was offered as the clinic site. Next step ... to obtain funding from ASEF for an event in 2015.

PLANNING FOR THE UNKNOWN

Our proposal was approved by ASEF in early 2015, and we immediately started recruiting volunteers and soliciting equipment. We made plans to examine 300 individuals during the week, based on five to six ultrasound stations, six to eight sonographers, and 14 physicians.

Philips Latin America and their South American distributor, Agimed, committed to loaning five medium-to-high-end machines, covering transportation to and from the remote location of Argentina, and providing technical support for the week.



Left to right: Dr. Roberto M. Lang of Chicago, IL, Dr. Ricardo Ronderos, and Dr. Gustavo Avegliano of La Plata, Argentina. Drs. Lang and Ronderos led the efforts in Tartagal on behalf of ASE and FAC.

WHAT WE FOUND

In the words of Dr. Roberto Lang

One of the situations that we were confronted with was the fact that we were dealing with indigenous populations in a remote area who have minimal access to medical care. As we suspected, we found a lot of congenital heart disease. On the first day, we found an Epstein disease with severe tricuspid regurgitation, a previously undiagnosed aortic coarctation, two or three cases of atrial septal defects, and a case of endocardial fibroelastosis. These are cases where an activity like ours had a major impact on these patients by having access to really advanced echocardiography.

We had the opportunity to study six indigenous populations that had been pre-screened in the previous months by local healthcare agents. Each group came on separate days, so the "personality" of the day changed with the population we were serving. Initially, they had a clinical examination in which their vital signs were obtained, and an EKG and a complete physical examination were performed. Then, if determined by the examining physicians, those patients were given a full echocardiogram following the ASE guidelines of how to perform a study and how to quantify a study. All of these results were placed into a database. The first day we studied 140 patients.

By the end of the four-day event, we had seen 653 individuals.



(left) Dr. Federico Asch of Washington, DC entertains a young family in the waiting area with his camera and a few funny faces.

(right) Lunch provided the group an opportunity for sharing stories and community! The U.S. sonographers (seated in front) are shown with and some of the physicians from Argentina. Shown seated are (left to right) Georgeanne Lammertin, Danny Rivera, Veronika Rodriguez, Bharat Patel, Hector Busto, and Cecilia Juarez. Standing (left to right) are Drs. Mario Yellamo, Ricardo Ronderos, Walter Stoermann, Jorge Tazar, Aldo Prado, Miguel Tibaldi, Rigo Boccanera, and Alejandro Diaz.

In the words of Dr. Ricardo Ronderos

We enjoyed a very good relationship between all the team members. We more than doubled the projected number of studies, and at the same time, the quality of the work was really good. After we saw how many patients we would realistically be examining, we adapted by streamlining the scanning protocols slightly. Not only did we have to think about many pathologies we could find and fix, we also had to think about and respect the culture of the indigenous communities. In the beginning we were a little concerned about how they would accept our help, and certainly the first day was a little tough because that was the day the Wichi community came, and they are really shy. If they became scared or concerned about the diagnosis, they tried to go away rather than stay and talk. Another thing that was difficult was that the women don't speak Spanish so we needed the help of the translators. The translators not only had the ability to speak Wichi language and Spanish but they also had the personality to influence the Wichis to trust our indications. At the end of the first day, we had a high risk baby with a cardiac tamponade we had to refer to a children's hospital 400 km away. In the Wichi culture, the women cannot go alone. They should go with their husband. The husband had the dilemma of having three other sons on the Pilcomayo River, which was really far in the jungle. The translator went with the mother and baby to the hospital. When the baby arrived in Salta, the doctors urgently treated the pericardial situation, and the baby became better. Now, I can report the baby is doing well, undergoing treatment with a good prognosis.

FROM THE HEART

I heard this phrase several times toward the end of the week ... "Something has changed." Sometimes it was about themselves, sometimes about the organization they represented. **It was a subtle change, a shift that comes from helping a stranger, doing things that give us joy, having a new friend.** In between examinations, members of the medical team would pass the time by scooping up a child in their arms, posing for silly pictures, or paying quiet attention to an elderly woman. Our team not only gave the indigenous communities the medical care they needed, they gave them dignity and affection. They respected their cultures. It did not go unnoticed.

On the last night, the Council of Governments for the City of Tartagal called a special session to recognize the group of volunteers with a special resolution and the presentation of handcrafted plaques. It was not a common event in Tartagal.

Through it all, and despite our best intentions, we somehow managed to receive more than we gave and learn more than we taught.

ASEFOUNDATION.ORG/ARGENTINA

PROJECT ONSITE PARTICIPANTS

Federico M. Asch, MD, FASE*
Washington, DC, USA

Gustavo Avegliano, MD, PhD
La Plata, Argentina

Marcia M. Barbosa, MD, PhD, FASE*
Belo Horizonte, Brazil

Rigo Boccanera, MD
San Francisco, Provincia de Cordoba, Argentina

Hector Busto, RDCS*
Ogden, Utah, USA

Mario Cerruti, MD
Tartagal, Argentina

Julieta Alvarez Daneri
Agimed clinical support
Buenos Aires, Argentina

Alejandro Diaz, MD, PhD
Tandil, Provincia de Buenos Aires, Argentina

Julia Diaz Carrizo (Tecnica)
Salta, Argentina

German Dubs
Ultrasound Manager, Agimed
Buenos Aires, Argentina

Analia Fuentes, MD
Salta Argentina

Pablo Ernesto Garófalo, MD*
Rosario, Santa Fe, Argentina

Narcisca Gutierrez, MD
Salta, Argentina

Martín Ibarrola, MD*
Buenos Aires, Argentina

Cecilia Juarez, BS, AAS, RDCS*
Tewksbury, Massachusetts, USA

Leda Kantor
Tartagal, Argentina

Georgeanne Lammertin, RDCS, RCS, FASE*
North Salt Lake, Utah, USA

Lili Lang
Chicago, Illinois, USA

Roberto M. Lang, MD, FASE*
Chicago, Illinois, USA

José Antonio LeFavi, MD
Salta, Argentina

Juan Alberto Martina, MD
Rafaela, Provincia de Santa Fe, Argentina

Miguel Angel Chavez Medina, MD
Salta, Argentina

Jimena Miragaya
Ultrasound BL Manager
Philips Argentina
Buenos Aires, Argentina

Leonardo Mora, MD
Tartagal, Argentina

Carlos Olivello, MD
Resistencia, Provincia de Chaco, Argentina

Bharatbhusan Patel, RDCS, RDMS, RVS, FASE*
Nutley, New Jersey, USA

Aldo Prado, MD, FASE*
Tucumán, Argentina

Rhonda Price**
Raleigh, North Carolina, USA

Rodrigo del Rio
Philips truck driver
Buenos Aires, Argentina

Jose Daniel Rivera, RCS*
Durham, North Carolina, USA

Veronika Rodriguez, BS, RDCS, FASE*
Long Beach, California, USA

Alejandra Rolón
Agimed clinical support –
Buenos Aires, Argentina

Ricardo E. Ronderos, MD, PhD, FASE*
La Plata, Argentina

Carina Scicoli, MD
Salta, Argentina

Jorge Secchi, MD
Salta, Argentina

Walter Stoermann, MD*
San Juan, Argentina

Jorge Tazar, MD*
Tucumán, Argentina

Miguel Ángel Tibaldi, MD
Cordoba, Argentina

Mario Yellamo, MD
Orán, Argentina

*ASE Members **ASE Staff Representative



EAST MEETS WEST:

★ ASEF GOES TO HÀ NỘI, VIỆT NAM ★

Contributed by Andrea M. Van Hoefer, ASE Vice President of Research

It takes 24 hours to travel from the East Coast of the United States to northern Vietnam. Prior to that, the American Society of Echocardiography Foundation (ASEF) spent seven months working with colleagues at the Vietnam National Heart Institute (VNHI), Bach Mai Hospital in Hanoi to prepare for our team's arrival. We also spent months coordinating with Mindray's North America and Vietnam divisions to arrange a loan of six M7 portable cardiac ultrasound systems and expert technical support. In the end, the few hours it took our U.S.-based team of 11 to finally arrive in Vietnam didn't feel like much time at all.

WHY VIETNAM?

Vietnam is a very young country, with over half of its population under 30 years of age. A study done by the VNHI showed that incidence rates of hypertension are increasing significantly.¹ Smoking, diabetes, and obesity are also on the rise, reflected in increasing mortality rates due to cardiovascular diseases. Rheumatic heart disease also remains endemic, yet cardiovascular ultrasound technology is primarily limited to centers in major cities.

Our purpose was to participate in an exchange of educational lectures and training with clinicians at the VNHI and provide clinical care for patients in a rural village outreach. Vietnamese cardiologists perform their own echocardiograms. They do not have sonographers, in part because they do not use a PACs system for archiving. **Bach Mai Hospital performs 70,000 echocardiograms a year; each cardiologist performs 45+ studies per day!** In light of this, our first core aim was to provide training to help optimize image acquisition and demonstrate the benefit of using laptop size echo platforms, such as Mindray's M7, in resource-poor settings.

Outside the major urban cities, local health stations provide the primary access point for healthcare. These rural clinics are staffed by nurses, with a general practitioner directing treatment. Knowing this, our second core aim was to demonstrate the feasibility of training nurses to use focused cardiac ultrasound to screen for heart disease. We hypothesized that training non-cardiologist clinicians to screen for important cardiovascular disorders would allow for more effective triage of the use of full echocardiography at the hospital. Travel to the city hospital is expensive, so we saw a correlating benefit in facilitating early identification of disorders that can be treated locally without requiring travel to the city for care. Knowing that the VNHI has the technical and procedural resources to treat the pathologies our team might find in the villages was also a key factor in our decision to go to Vietnam.

FOCUS ON TRAINING

On the morning of our first day, our team met with Prof. Dr. Do Doan Loi, Dr. Hoai Nguyen (Ms.), and Dr. Thanh Le Tuan to finalize our plan for the week. The afternoon was spent in lectures and scanning demonstrations for 90 trainees. Trainees were often standing three or four deep around the scanning stations.

The second day was devoted to the Vietnam-America Cardiac Ultrasound Symposium, sponsored by Mindray. **Our team presented a full program of lectures to 130 physicians from Bach Mai and its sister provincial hospitals**, ranging from "Optimizing Echocardiographic Views" to "Imaging for Structural Heart Disease Interventions" and "Cardiac Masses & Tumors."

Day three our team focused on a group of eight nurses in preparation for the village outreach the next day. After lectures, discussions, and reviewing cases of normal and symptomatic pathologies side-by-side, our

sonographers trained the nurses in a very basic image acquisition. While our attention was primarily on the nurses, an additional 45 clinicians were observing.

By the end of our three days at the hospital, we had provided lectures and image acquisition training to over 150 clinicians.

A GIFT FROM MINDRAY



Day three culminated with Mindray making an extremely generous donation of an M7 portable cardiac ultrasound system to the VNHI, Bach Mai Hospital. **It was a first for the Foundation's humanitarian mission and training events program.** Mindray's leave-behind gift is a crucial component that will further the week's training and clinical efforts long after our team has left.



During the rural outreach, patients underwent two assessments: first a brief, focused scan by a non-cardiologist clinician trained by Team Hanoi to assess normal or symptomatic pathology; followed by a full echocardiogram and assessment from our team members.



ASEF team leaders Dr. Jose Banchs and Dr. Jim Kirkpatrick presented our friends at the VNHI/Bach Mai Hospital with a gift of ASE's complete guidelines poster set.



Vietnamese clinicians gather around one of ASEF's six scanning stations. Our sonographer team members offered training on how to optimize images in multiple scanning demonstrations throughout the week.

VISITING THE VILLAGE

On our fourth and final day, we traveled to Dong Anh village, about 45 minutes outside of Hanoi. Local health officials had invited elderly people from the area to the clinic that day. Each patient was first scanned by one of the eight nurses we had trained, who made her own assessment of normal versus abnormal. Our team then performed their own scan, assessment, and patient report. The patients were each then assessed by clinicians from Bach Mai to discuss whether any follow-up care was necessary before they left the health center.

At the end of the day, we had scanned 279 individuals.

In the weeks to come, we'll analyze the data collected and assess the accuracy of the nurses in detecting clinically important cardiovascular findings. But we've already learned that Bach Mai Hospital is now seriously considering adding an imaging component to its nursing program – a program that trains 500 nurses each year. **This is a significant step that has the potential to forever change access to echocardiography across Vietnam.**



ASEF's Team Hanoi. Back row, L to R: Team leader Dr. Jim Kirkpatrick, Liza Sanchez, David Adams, Jill Inafuku, Andrea Van Hoever, and Nova Sprague. Front row, L to R: Thanh Kirkpatrick, Tu Nguyen, Rachel Quang, team leader Dr. Jose Banchs, and Dr. Rebecca Hahn.

REFERENCE

[1] Son PT, Nguyen QN, Viet NL, Khai PG, Wall S, Weinehall L, Bonita R, Byass P. Prevalence, Awareness, Treatment and Control of Hypertension in Vietnam-Results from a National Survey. J Hum Hypertens 2011;26(4):268-80.

WHAT WE LEARNED

The Foundation's humanitarian mission and training events are not easy to put together. Coordinating funding, equipment, and logistics across multiple time zones; navigating a myriad of governmental permissions and required forms; calling in favors to local friends to have them check out the team hotel before booking rooms to confirm that yes, the hotel does exist; these are not simple endeavors. We had to adjust for the effects of severe flooding, visa processing delays, and a typhoon disrupting shipping routes the week before our event. In addition, it's important to note that our team members not only volunteer their time and professional expertise for these events, but also cover their own international travel expenses, leave their families and busy lives, and use their own personal leave to do so. So why do we do this?

Because the Foundation's humanitarian events are about more than just providing training to developing countries or patient care to those in need. **We are building a global community, full of connected, inspired, and dedicated cardiovascular ultrasound professionals.** It is a sense of common purpose, unexpected acts of kindness, and bonded friendships cemented by hard work. You can see it growing through the meals that are shared, through the smiles and laughter that spontaneously erupt across barriers of language or culture, barriers that ultimately end up just being a perception and not a reality.

A global community woven together by knowledge exchange and mutual respect is not what the Foundation set out to create when we first conceived these events, but in the end it's exactly what we are building. These programs will continue to make a world of difference long after our teams come back home. And that is a beautiful thing.

If you would like to support future ASEF humanitarian missions and training events, please visit ASEFoundation.org/donate.

TEAM HANOI ONSITE PARTICIPANTS

ASEF TEAM LEADERS

Jose Banchs, MD, FASE
Houston, Texas

James Kirkpatrick, MD, FASE
Philadelphia, Pennsylvania

VIETNAM NATIONAL HEART INSTITUTE, BACH MAI HOSPITAL TEAM LEADERS

Prof. Do Doan Loi, MD, PhD

Hoai Nguyen, MD, PhD

Thanh Le Tuan, MD

David Adams, RCS, RDCS, FASE
Durham, North Carolina

Rebecca Hahn, MD, FASE
New York, New York

Jill Inafuku, BS, RDMS, FASE
Kaneohe, Hawaii

Thanh Kirkpatrick, MD, MPH
Translator, Philadelphia, Pennsylvania

Tu Nguyen
Translator, Houston, Texas

Rachel Quang, RDCS
Brunswick, Maine

Liza Sanchez, RCS, FASE
Houston, Texas

William Song
General Manager, Mindray Medical Vietnam, Ho Chi Minh City, Vietnam

Nova Sprague, RDCS
Houston, Texas

Andrea Van Hoever
ASE Staff, Raleigh, North Carolina

Kin Wen
Mindray clinical support, Shenzhen, People's Republic of China

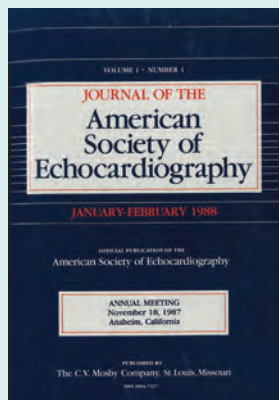
ASEFOUNDATION.ORG/VIETNAM

40 YEARS



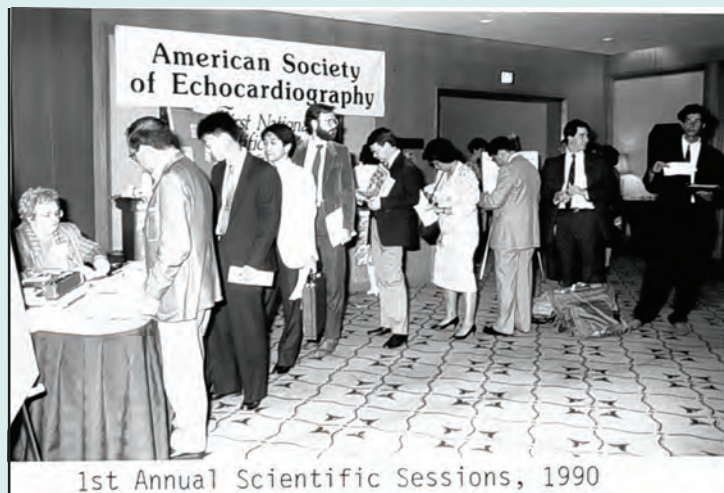
1975

ASE Incorporated



1987

JASE launched



1990

Inaugural Scientific Sessions

ASE Elects First Officers

The American Society of Echocardiography, under its existing by-laws, elected in October 1976 its first permanent officers. The Executive Officers' terms will expire in 1978 and will consist of Harvey Feigenbaum, M.D., President; Raymond Gramiak, M.D., Vice-President; James C. Dillon, M.D., Secretary, and Richard Meyer, M.D., Treasurer. The entire Board of Directors was elected at this first election. Members of the Board whose terms will expire in 1977 are: Betty C. Corva, M.D.; Robert Kraus, M.D.; David J. Sahn, M.D.; Pravin M. Shah, M.D.; Robert E. Solinger, M.D., and Louis E. Teichholz, M.D. Members of the Board whose terms will expire in 1978 are: Sonia Chang, B.A.; Anthony N. De Maria, M.D.; Reginald C. Eggleston, M.S.; Claude R. Joyner, Jr., M.D.; Richard E. Kerber, M.D., and Donald L. King, M.D. Terms to expire in 1979 are: Arthur D. Hagan, M.D.; Walter L. Henry, M.D.; Joseph Kisslo, M.D.; Richard L. Popp, M.D.; and Robert E. Solinger, M.D.

1983

ASE hits 2000 members

Sharon Perry, CAE named first Executive Director

ASE contracts for official management at Olson Management Group

1988

First Exhibit Presence (at AHA)

1996

First ASE Research Grant Awarded

NBE formed

ICAEL formed



1997

First ASE website asecho.org

Industry Roundtable (IRT) formed

2001

Robin Wiegerink, CAE named second CEO

ASE hits 7,500 members

ASE's first international exhibit

Fellow of the American Society of Echocardiography (FASE) program established



If "40 is the new 30," then by human aging standards the American Society of Echocardiography (ASE) has hit adulthood but is still developing. This adage seems pretty appropriate considering the maturity of the field of echocardiography too. Dr. Harvey Feigenbaum has reported that his impetus to start ASE in 1975 was to combat the skepticism cardiac ultrasound faced from the medical community. He reported that *"as late as 1971 there was still considerable skepticism as to whether ultrasound was a useful technique for the detection of pericardial effusion."*¹ When filing for ASE's incorporation, he wrote that the organization was

established "to promote, maintain, and pursue excellence in the ultrasonic examination of the heart." Since that time echocardiography has become a gold standard in cardiac care and has been increasingly adopted by an array of health practitioners to care for patients. In fact, in 2003 which marked Echocardiography's 50th birthday, Dr. Pamela S. Douglas wrote in her March JASE President's Message that *"Echocardiography is firmly established as an indispensable diagnostic tool in the practice of cardiovascular medicine."* Along with this practice growth, the scope of the Society and its role have evolved.



2003

ASE Celebrates
Echocardiography's "50th
Anniversary"



2012

Echo magazine debuts

First international humanitarian missions (India)
combining POC and training

Second World Summit in India

Launched ASEUniversity online education portal

ASE joins *Choosing Wisely®* campaign

2010

ASEF Research Gala Launched

Published first ASE textbook
(*Dynamic Echocardiography*)

First Technology &
Research Summit

2014

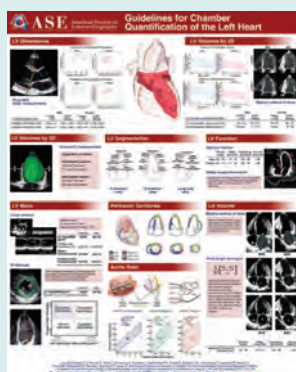
ASE Industry Think Tank established

Value-Based Healthcare: Summit 2014
Convened in Washington, DC



2006

First ASE guideline
poster distributed
in JASE



2008

ASE moves to its
stand-alone
Headquarters in
Research Triangle Park

2011

First Annual Appeal for
the ASEF

World Summit of Echo
in Argentina launched to
spread excellence in Echo
around the world

2013

Robert Wood Johnson Grant Awarded
for \$50,000 to create and distribute
Echo AUC app

ASE hits 16,000 members

"Best of ASE" DVD series debuts

2015

ASE Celebrates its
40th Anniversary

AMERICAN SOCIETY OF ECHOCARDIOGRAPHY
40th ANNIVERSARY
established 1975

In contrast to many other medical societies that are formed to support a particular constituency of members, ASE was established to push a scientific technique forward and influence the medical and research community to develop its application. In this regard, one of ASE's biggest accomplishments has been in establishing a world-class journal to feature echocardiography research and advances. A funny historical story highlights this: *"Feigenbaum collaborated in 1968 with Harold Dodge at the University of Alabama, whose laboratory at that time had the greatest expertise in measuring angiographic volumes. Together, Feigenbaum and Dodge applied*

*the M-mode technique to the measurement of ventricular dimensions—which today is one of the most common uses of echocardiography. Yet their work was rejected by every major cardiology journal at that time, because reviewers were unable to comprehend the method."*²

REFERENCES

- [1] Circulation J. 1996. *Evolution of Echocardiography*. Harvey Feigenbaum, MD. *Circulation*. 1996; 93: 1321-1327
- [2] Tex Heart Inst J. 2007; 34(4): 431-438. PMID: PMC2170493. *The Origin of Echocardiography: A Tribute to Inge Edler*; Siddharth Singh and Abha Goyal

In 1987, the Society decided to publish the *Journal of the American Society of Echocardiography* (JASE), a scientific journal devoted solely to echocardiography, and have the publication owned by the Society. The Mosby Company was selected as publisher, and 1988 was the first year of publication for the bimonthly journal. Dr. Feigenbaum was appointed the first Editor-in-Chief of JASE and served for 20 years in that role. In the late 1990s, Mosby morphed into Elsevier, and the Journal became a monthly publication in 1998. Dr. Alan S. Pearlman was appointed the Journal's second Editor-in-Chief in 2008 and has helped to usher JASE into the digital age. The Journal has attained recognition in the medical publishing field and is now ranked in the top 25% of all cardiology journals and was chosen by cardiologists as a "Top Ten Essential Journal" in their practice of medicine. What will the future hold for JASE? Medical publishing has been an area of rapid change, and many organizations are now offering open access publications and hybrid journals. JASE will undoubtedly continue to evolve in tandem with the field.

Another area of the Society's impact and growth has been on medical guidelines and standards. For its first ten years, the Society concentrated on developing standard nomenclature for the fledgling field of cardiac ultrasound. Reports describing recommended procedures for obtaining optimal views of the heart were written by Society committees and published in various medical journals and as stand-alone documents by the Society. Over time ASE guideline and standards publications have become a mainstay of the organization, now with over 60 published recommendations; 40 of these are still in circulation. To guide the dissemination of this knowledge, the organization began to create educational products in the early 2000s and distributed the Society's first guideline poster in 2006. The first dissemination project was as an insert in the Journal; now ASE has over 20 guideline posters that are independently sold on ASEMarketPlace and Amazon. Based on the poster's initial success, the product line expanded and Guideline Pocket guides debuted in 2007; today, offerings include online versions and digital apps. The products have become so widespread that they can be found in research labs all over the world, influencing practice and standards on a daily basis. Today, physicians in Asia, South and Central America, and throughout North America have contributed their time and expertise to translate ASE guideline documents to Mandarin, Portuguese, Georgian, Spanish, and French to allow greater use by our colleagues worldwide.

In the general area of cardiovascular ultrasound proficiency assessment, ASE launched the premier organizations for these assessments. Under the tutelage of Past President



Dr. Arthur E. Weyman, the Society organized the development of an examination of special competence providing a voluntary mechanism for physicians to demonstrate their proficiency in echocardiographic interpretation. Under his direction, the ASEeXAM Parent Committee provided physicians with an objective means to test their performance and to stimulate continuing quality improvement in

echocardiography. After ASE administered the first pilot exam in 1996, the responsibility for the evolution and administration of the ASEeXAM was transferred from the Society to an independent corporation named ASEeXAM, Inc. (eventually renamed the National Board of Echocardiography, NBE; renamed ASCeXAM®). A related project started in 1996: the development of a voluntary process for the accreditation of echocardiography laboratories. This process was undertaken by ASE's Accreditation Committee, under the direction of Dr. Linda J. Crouse. ASE joined with the American College of Cardiology and the Society of Pediatric Echocardiography to form an independent, multispecialty organization named the Intersocietal Commission for the Accreditation of Echocardiography Laboratories (ICAEL). Although these activities began as the work of an ASE committee, they were spun off from the Society and were pursued by an independent organization, now known as the Intersocietal Accreditation Commission (which ASE co-sponsors and endorses).

The organization's growth has also flourished by creating training and education resources for the field's practitioners. The inaugural Scientific Sessions was held in Washington, DC in 1990. Over time the organization has added additional live meetings to meet its members' educational needs. Until 2000, the organization just planned the review course for studying for the NBE's exam, but now hosts six annual courses: Echo Hawaii, State-of-the-Art Echocardiography: Echo Southwest, ASCeXAM Review Course, Echo Florida, Echo ASEAN, and the Annual Scientific Sessions. In addition, ASE co-sponsors and endorses live courses around the world including in India, Hong Kong, and Brazil to meet the demand for quality cardiovascular ultrasound education worldwide. ASE has also established a dynamic online education portal, ASEUniversity, which houses CME and non-CME resources for the cardiovascular community. Recent entries include webinars in Spanish and Portuguese, and in 2014 over 25,000 individuals received training from ASE. ASE was awarded an "Accreditation with Commendation" in 2014 from the Accreditation Commission on Continuing Medical Education, recognizing its excellence in programming, one of the few medical organizations to hold this high stature.



As the Society advanced, it became apparent that its research and scholarship role needed to expand to stem the tide of decreasing research funding from the US government and institutional resources. As such, the organization founded a charitable arm, the ASE Education and Research Foundation (ASEF, a 501(c)(3) entity), in 2003 to support research and education initiatives and began direct fundraising in 2006. The Annual Appeal now raises over \$200,000 a year to help offer scholarships, provide research grants, support humanitarian missions, and spread the adoption of ASE guidelines. This has led to the publication of important studies that, without such funding, might never have been undertaken. Studies include the role of stress echocardiography in women, contrast perfusion studies, and the use of telemedicine for pediatric heart disease, to name a few. ASEF's main fundraising event, the Research Awards Gala, was launched in 2010 and is now "the" event for the field, simultaneously lauding ASE's award winners and raising money for cardiovascular research. The 2015 event, held in Boston, attracted over 350 patrons and raised over \$70,000 for the Foundation's Research Awards Program.

As noted in Dr. Harry Rakowski's December 2000 President's Message in JASE: *"Both Harvey Feigenbaum and Rich Popp credit Tom Davis, a physician who was the assistant medical director at Smith Kline Instruments, with getting them started with loaned equipment at a time when echocardiography was in its infancy. The collaborative role between manufacturers and practitioners of echocardiography remains an essential part of new discoveries and applications."* From its infancy, ASE has looked to the industry for help and guidance to allow the organization and its members to keep up with the pace of technology. During his term as president in 1997, Dr. Alan S. Pearlman developed the ASE Industry Roundtable (IRT) to improve the dialogue we have with our industry partners. This group has ebbed and flowed as the industry has changed and experienced many mergers and acquisitions. Yet it retains their role in adding knowledge and invigorating new aspects of the field as they evolve, such as 3D, non-radioactive contrast (image-enhancing) agents, strain rate imaging, and less invasive valve repair and replacements. Over time, ASE, in conjunction with our partners, has helped develop technical and application industry standards that facilitate optimal system use. For instance, the transition to digital systems required the development of a common digital output, which was accomplished by the

establishment of a Digital Imaging and Communications in Medicine (DICOM) standard. Past President Dr. James D. Thomas led ASE's efforts to develop this common industry standard for digital communication to ensure that all instruments could "speak" the same language and facilitate digital storage and retrieval of echocardiographic information. In addition to these key IRT partners and efforts, ASE regularly has over 50 exhibitors at its annual meeting, and thus hosts the largest gathering of manufacturers and vendors specifically dedicated to cardiovascular ultrasound equipment in the world.



In 2005, the Society embarked on a large-scale strategic planning retreat and established new long-range goals for the organization, an overall vision, values, and branding. These items were the underpinning for a number of changes including an emerging international focus and strengthened advocacy program. In addition, it began the planning for ASE to take a new step. In 2008, the Society established a stand-alone association structure, moving to self-management after 24 years of retaining an outside management firm (Olson Management/FirstPoint Resources). The organization also launched its international exhibit program, first at EuroEcho and later at the European Society of Cardiology annual meeting, leading to visibility in the international market. In addition, ASE leaders began regular presentations at international conferences, and ASE's influence abroad correspondingly grew. Although ASE's membership has always been open to anyone with an interest in echo, based anywhere in the world, international membership started to take off and grew from approximately 1,300 in 2005 to over 2,800 today (over 15% of ASE members). And now over 40% of the research abstracts for the Scientific Sessions originate from outside the United States. Recently the organization launched the ASE International Alliance Partners program, which has been developed to create a pathway for collaborations and shared resources among participating membership-based echocardiography societies. This program is open to established and recognized cardiology or ultrasound organizations based outside the United States. Echocardiography sections/councils of cardiology societies outside the US may also be recognized as participants. The goal of the alliance program is to share knowledge, expand thought leadership, and enhance standards and practices based on the best thinking worldwide for improved patient care. Ten organizations have become charter members including: Asian-Pacific Association of Echocardiography, Canadian Society of Echocardiography (CSE), Chinese Society of Echocardiography, Department of Cardiovascular Imaging of the Brazilian Society of Cardiology (DIC-SBC), European Association of Cardiovascular Imaging (EACVI), Indian Academy of Echocardiography (IAE), Indonesian Society of Echocardiography, InterAmerican Association of Echocardiography (ECOSIAC), Japanese Society of



**International
Alliance Partner**
OF THE AMERICAN SOCIETY OF ECHOCARDIOGRAPHY

Echocardiography (JSE),
and Korean Society of
Echocardiography (KSE).

In Dr. Harry Rakowski's July 1997 JASE President's Message he wrote of a Gulliver's travels-type future vision by Dr. Bijoy K. Khandheria that imagined ASE's role in the medical world by 2005: *"I see that members are from a diverse group of the healthcare community. I see my neighbor who is an ED physician.... I see Pamela Douglas talk about the successes achieved in attaining reimbursement for contrast... and members have logged onto the member site and could chat with others about a fantastic case."* His future has been realized as these items have come to fruition now, and it seems clear that the organization has had a vast impact on the field. What does the future hold for ASE and the field? This remains to be seen, but you can bet that ASE is going to be actively engaged to make it a bright future for all echo practitioners.

My Admiration for the World of Veterinary Medicine - COURTESY OF ECH



Contributed by Randolph P. Martin, MD, FACC, FASE, FESC, Piedmont Heart Institute, Atlanta, Georgia

So what's my connection to the world of veterinary medicine? Well, first my disclaimer. I love dogs and, in fact, we have a wonderful rescue Belgian Malinois named George (see picture) which we adopted from the Atlanta Humane Society (with the help of our youngest child, Dr. Edith Martin Rogers, who's a fabulous veterinarian and person). I also serve on the Board of the Atlanta Humane Society, so animals – but especially dogs – are very close to my heart.

“Dog HIPAA rules prevent me from giving you all the details, but picture me on the floor of the Echo Lab with this person and his significant other, as well as the dog, who was in florid congestive heart failure (bubbling pulmonary edema).”

As many of you may not be aware, I was fortunate, back in the mid-1970s, while a Fellow in Cardiology at Stanford, to be in on the ground floor of the development of many of the advances in echocardiography. It was at this time that I was under the tutelage of my dear friend and wonderful mentor, Dr. Richard Popp, who was then Director of the Echo Lab at Stanford. We were fortunate in that we had a chance to really pioneer the field of two-dimensional echocardiography, as we had one of the very earliest phased-array echo machines produced by Varian Associates. Not only did I begin to figure out how we could use 2D echo to look at humans, but I also began using it on canines. We were able to figure out a way to noninvasively image the canine heart – predominantly from the sub-xiphoid approach – and use that in some early research in coronary artery disease.

Moving from Stanford to the University of Virginia in the late 1970s, I was able to continue utilizing cardiovascular ultrasound (now with Color Doppler and Spectral Doppler) to aid in looking at various cardiac abnormalities of human as well as canine hearts – and there are lots of amusing stories about that. One includes an “emergency” late night call asking me to evaluate the heart of the favorite dog of a very prestigious leader and faculty member at the University of Virginia School of Medicine. Dog HIPAA rules prevent me from giving you all the details, but picture me on the floor of the Echo Lab with this person and his significant other, as well as the dog, who was in florid congestive heart failure (bubbling pulmonary edema). I quickly did an echo and

discovered that this favorite dog had not only a dilated cardiomyopathy, but an ejection fraction that was 5% at best. The significant faculty member asked me what I was going to do, to which I said, “I’m a human cardiologist.” He said, “Do something.” So the story continues with

Dr. Martin serves on the Board of the Atlanta Humane Society and also rescued his Belgian Malinois, George, (pictured below) from there.



IV diuretics being administered (yes, I could start an IV on a small dog). How many of you know the proper intravenous Lasix dose to use in a 30-pound dog in congestive heart failure at twelve o'clock at night? Not only that – getting that from the pharmacy was a feat. The Lasix dose that we chose ended up making this cute 30-pound dog urinate like he was trying to put out all of the California brush fires single-handedly. I had the pleasure of watching him not only flood the floor, but also turn from appearing to be a 30-pound small dog into an anorexic Chihuahua. You would have had to have been there. Fortunately, the dog and I both survived. Also, during my years at the University of Virginia, I was called upon – at the request of a prominent citizen of Charlottesville and a prominent donor to the University of Virginia – to bring my echo machine out to help evaluate a pregnant mare. The request was not to see the mare's heart, but to check on the contents of her uterus. But, then, that may be more than you want to know.

Having been fortunate to be in the early phases of the development of 2D echocardiography, both while at Stanford and at the University of Virginia, I had the good fortune to be active on the lecture circuit, teaching many of our colleagues about the clinical usefulness of echocardiography. It was fun for me in those days to begin to realize that there were veterinarians in the audience who were very interested in the use of echocardiography for both small and large animal cardiovascular medicine. Because these individuals were outstanding clinicians and academicians and because of my love for all animals, but especially dogs, I always tried to do anything I could to help them advance their field.

Flash forward to my time at Emory University, where I was the Director of the Echo Lab and Professor of Medicine for 20 years. I continued to be very active on the lecture circuit and because of this had a chance to really get to know two very prominent veterinary cardiologists who came to visit us in the Echo Lab at Emory. The first was Virginia (Ginny) B. Reef, DVM, DACVIM. Ginny is a world famous equine cardiologist, who has one of the premier books

The “mouth guard” looked like a 2 x 4 board, but it was put in Gaspar’s mouth, and I basically got up to my shoulder in Gaspar’s mouth while I passed the TEE probe.

on equine cardiology and diagnostic ultrasound. Ginny spent time with me in the echo lab and then went back to the New Bolton Large Animal Hospital, outside of Philadelphia, where she was the Director of Large Animal Cardiology and Diagnostic Ultrasound. She not only continued to use standard transthoracic echo for equine cardiology diagnosis, but she also developed a transesophageal approach to evaluating the equine heart both at rest and on



Dr. Martin performing an echo on Gaspar, a beluga whale at the world renowned Georgia Aquarium. (Photo provided courtesy of the Georgia Aquarium.)

a treadmill. Talk about stress echo. The thing that's wonderful about Ginny is not only her expertise, but she was also a tremendous teacher to her veterinary students and trainees. She won the Robert W. Kirk Award for being an outstanding educator from the American College of Veterinary Medicine. Also during my time at Emory, I had the pleasure of having Clarke Atkins, DVM, a Board Certified Internist and Cardiologist from the North Carolina State University College of Veterinary Medicine, come and spend time with me. Clarke, like Ginny, is a fantastic veterinarian, educator, and person.

These are just two of the outstanding academicians-clinicians in veterinary medicine who have utilized echocardiography to diagnose and treat numerous small and large animals.

The wildest (not really the wildest, but close to it) experience I have had in using echoes to look at the hearts of animals within the veterinary world was with the Georgia Aquarium. During my time at Emory, when I was the Chief Medical Correspondent for Cox Communications' WSB-TV Channel-2 in Atlanta, I had the chance to meet many of the leading veterinarians at the Georgia Aquarium. As you may or may not be aware, the Georgia Aquarium is the world's largest aquarium (funded and built through the generosity of Mr. Bernie Marcus, the former CEO of Home Depot). The Georgia Aquarium has a phenomenal veterinary staff and veterinary hospital, and I was able to do a couple TV stories on that. One day I received a call from the then-head of the veterinary services

asking if I could perform an echo on Gaspar, one of their beloved beluga whales, who was not doing well. They were concerned that Gaspar might have endocarditis. Through the courtesy of the Siemens folks,

a state-of-the-art Siemens system (transthoracic echo, but TEE ready) was delivered to the aquarium. With Gaspar out of the water, I began trying to image his heart with the transthoracic transducer through what seemed like 17 feet of blubber (see the picture). While I couldn't locate the heart, one of the most interesting facts was that every time I got the transducer near Gaspar's head, Gaspar would turn to me because, as many of you may not know, beluga whales have the ability to use sonar - echo location - to navigate. So it was obvious that Gaspar was "hearing" the ultrasound transmission from my transthoracic probe.

“It’s been a real thrill for me in my career to have known outstanding academic veterinarians and local practitioners, all of whom take care of the wonderful creatures whom we all love.”

I had brought a TEE probe with me and since I was not able to see the heart via transthoracic echo, I suggested that we do a transesophageal echo on Gaspar. I knew that veterinarians commonly use endoscopes to examine the gastrointestinal tract, hence, the rationale for doing a TEE. My only concern – and those of you who do TEEs know this – was not to be “bitten” by Gaspar. A bite from Gaspar would have left me as an aging one-armed echocardiographer. The “mouth guard” looked like a 2 x 4 board, but it was put in Gaspar’s mouth, and I basically got up to my shoulder in Gaspar’s mouth while I passed the TEE probe. I was able to get spectacular images of Gaspar’s gigantic (at least in human terms) heart, and the good news is that Gaspar did not have

endocarditis or any other major cardiac abnormalities. Quite a memorable event!

So echocardiography has played and continues to play a major role in veterinary medicine, especially small animal veterinary medicine. The cardiologists and practitioners of veterinary medicine are able to detect the spectrum of cardiovascular abnormalities that affect small animals (cats and dogs), including endocarditis, hypertrophic cardiomyopathy, and congenital defects. By doing so, they, like all of us, are providing outstanding care for their “clients” – patients.

It’s been a real thrill for me in my career to have known outstanding academic veterinarians and local practitioners,

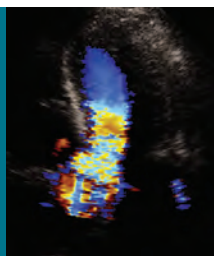
all of whom take care of the wonderful creatures whom we all love. I have learned from many of my veterinary colleagues and, in fact, Ginny Reef kept challenging me by sending me these unusual cases from her horses – and I’m not sure I was ever able to help her very much. But by working with and knowing veterinarians around the country, my admiration for what they do continues to grow.

We, in the echo world, should be happy and proud that not only has our technology helped many of our patients, but our technology has been picked up and used by many outstanding colleagues in the world of veterinary medicine to do exactly the same.



Randolph P. Martin, MD, FACC, FASE, FESC is Chief of the Structural and Valvular Center of Excellence at the Piedmont Heart Institute and Physician Principal Advisor, Educational Programs at the Marcus Heart Valve Center. From 2003-2004, Dr. Martin was ASE’s President. In addition to his service to the Atlanta Humane Society, Dr. Martin is on the board of the HEALing Community Center and also volunteers there reading echocardiograms.

26th
ANNUAL



January 18-22, 2016

Hapuna Beach Prince Hotel
Kohala Coast, Big Island, HI

ECHO
HAWAII



Course Director

Thomas J. Ryan, MD, FASE
Past President, ASE



Co-Director

Neil J. Weissman, MD, FASE
Immediate Past President, ASE

“Wonderful conference with outstanding faculty presenters. Overall, the talks were clinically applicable and will help me improve the way I practice echocardiography.” Echo Hawaii Attendee

asecho.org/EchoHawaii



Jointly provided by the American Society of Echocardiography and the American Society of Echocardiography Education and Research Foundation, and held in cooperation with the Canadian Society of Echocardiography.

ASEUNIVERSITY:

Echo Education at Your Fingertips

Contributed by Ronna Yates, ASE Associate Manager, Education & CME and Lorna Siegal, ASE Director of Membership

Here's what ASEUniversity participants are saying:

- "Exceeded my expectations! I have never participated in a webinar before - will definitely do it again."
- "Very informative and excellent resources for clinical work."
- "Excellent talk and useful for clinical work in our field. I will communicate these new techniques to my colleagues so we can all begin to implement them."

In the words of Elliott Masie, learning technology expert, "we need to bring learning to people instead of people to learning." The creation of ASEUniversity, just over two years ago, was ASE's way of bringing the learning to anyone interested in cardiovascular ultrasound whether they are a seasoned professional or just starting out.

This extensive online educational tool is utilized by approximately 25,000 people every year, both ASE members and nonmembers. ASEUniversity is recognized by ASE members as one of their top member benefits. It provides a source for practitioners to stay up-to-date on all the new and emerging topics in the field. Expert content in the form of live and on-demand webinars, conference session recordings, content bundles (3D, Strain, Diastology, etc.), journal articles, self-study recordings, and a searchable online library can all be found with the click of a button.

Currently, ASEUniversity houses more than 30 free, on-demand continuing medical education (CME) activities, in both article and webinar formats, and new activities are added each year. The newest additions are *Proper Echocardiographic Measurements* and *Transesophageal Echo in Perioperative Care*. ASE is also currently working on a *Pediatric and Congenital Heart Disease Lecture Series* with a fall 2015 release date. Each of these educational products is designed to help relieve practice and performance gaps.

ASE has its first ever *Focus on Congenital Heart Disease* Maintenance of Certification (MOC) and CME product. This product is approved by both ABIM and ABP towards Part II MOC requirements and provides cases reviewing the role of echocardiography in diagnosis and follow-up of a wide variety of different congenital heart diseases and defects.

New ASE guideline documents are produced every year to provide the foundation for the daily clinical practice of echocardiography worldwide. ASEUniversity offers live, guideline-based CME webinars with every new guideline that is published. These live webinars offer registrants an opportunity to learn directly from the lead author(s) of the guideline. By offering world-class speakers presenting focused, guideline-driven content, these live webinars draw a global audience.

ASE also hosts several live, in-person, educational conferences throughout the year. For those who are not able to attend or just want to refresh their knowledge, ASEUniversity offers non-CME conference session libraries of all recorded conferences.

ASE listens to the current needs of the echo community and continues to develop new products to help meet those needs through ASEUniversity. If you have ideas for new content that would be beneficial to you and your colleagues, please email education@asecho.org.

The top 10 countries outside the US using ASEUniversity include Canada, Australia, Brazil, India, United Kingdom, Japan, New Zealand, Argentina, Italy, and Singapore.



Other countries represented on ASE's live webinars.

Angola	Mexico
Austria	Myanmar
Bangladesh	Netherlands
Bulgaria	Nigeria
Chile	Norway
China	Pakistan
Colombia	Panama
Czech Republic	Peru
Dominican Republic	Philippines
Egypt	Poland
France	Portugal
Georgia	Qatar
Germany	Romania
Greece	Saudi Arabia
Honduras	Serbia
Hong Kong	Slovenia
Indonesia	South Africa
Iran	Spain
Iraq	Swaziland
Ireland	Switzerland
Israel	Taiwan
Korea	Thailand
Latvia	Trinidad and Tobago
Lebanon	Turkey
Lithuania	United Arab Emirates
Malaysia	Venezuela

ECHOCARDIOGRAPHY:

TECHNOLOGY & APPLICATIONS - FOR - TODAY & TOMORROW

Contributed by Andie Piddington, ASE Corporate Relations Specialist

In today's fast-paced world, technology continues to evolve at "warp speed," often making established technologies obsolete in the blink of an eye, creating a consumer culture which prioritizes the newest, most-advanced gadgets available. This cultural shift tends to bleed over into the healthcare world at times, especially in mobile health such as smartphone applications, but also in the application of equipment used to diagnose and treat various diseases.

Advances in imaging technologies such as CT and MRI are often touted in both the healthcare and general media, while echocardiography seems to lack attention, possibly being dismissed as a "mature" technology. For instance, in a *New York Times* piece last fall, Dr. Eric Topol of Scripps Translational Science Institute opined that echo is "a stable technology that hasn't changed much in decades."

Contrary to this positioning in the media, ASE members know that cardiovascular ultrasound technology has and continues to evolve at a rapid pace. Since the inception of M-mode echocardiography by Inge Edler and Hellmuth Hertz in

1953, developments such as Doppler, two-dimensional echo, contrast, and transesophageal echocardiography have allowed clinicians to image the cardiovascular system in real-time in an increasingly comprehensive manner. In the past decade, miniaturization has led to portable and handheld echo systems, potentially revolutionizing the way medicine is taught and practiced; three-dimensional echocardiography can now provide unparalleled real-time visualization of the heart and deformation imaging, commonly known as "strain," is moving from a research application into clinical relevance, especially in the growing field of cardio-oncology.

Industry represents a vital component of research and development in the cardiovascular imaging field, and collaboration between researchers, clinicians, and industry can often advance the field further and faster than individual efforts. "ASE has partnered with industry through our Industry Roundtable program for over a decade, and continues to foster cooperative endeavors. Recently we held Think Tank meetings which allow a wider variety of industry players to gather and discuss

problems, challenges, and potential solutions," said Dr. Steven Lester, Chair of Innovation and Entrepreneurship at Mayo Clinic Arizona and Chair of ASE's Industry Relations Committee.

One of ASE's new strategic goals is to facilitate the development and application of novel CV Ultrasound technology. At the recent ASE Scientific Sessions in Boston this June, members were able to explore a wealth of new technological advances in the Exhibit Hall, and when surveyed, over 40% of the attendees expressed interest in educational initiatives focused on new and emerging technology. Famed Nobel Peace Prize winning scientist Linus Pauling once said, "The best way to have a good idea is to have a lot of ideas." Taking this maxim to heart, ASE has worked to increase dialogue with our industry partners to help identify potentially disruptive technological innovations in the field of cardiovascular ultrasound. To enhance our understanding of these advances, we asked our IRT partners to discuss what they believe are the most significant innovations in recent years, and what practices should be applying now in clinical care.

"THE BEST WAY TO HAVE A GOOD IDEA IS TO HAVE A LOT OF IDEAS."

3D IMAGING

Since its development in the 1990's, three-dimensional echo has added tremendous value to clinicians' ability to image the beating heart in real-time; while initial adoption for clinical use progressed slowly, the pace has picked up in the last decade. This growing utility and clinical value is also reflected in the Scientific Sessions responses, as more than 60% of attendees indicated a desire for more 3D echo education. Dr. Ivan Salgo, Senior Director of Clinical Science at Philips Healthcare, commented that "Three-dimensional echocardiography has been transformational in the practice of cardiology and cardiac surgery. What has enabled this has been fundamental technology development in new solid state xMATRIX transducers that can create 3D images of the heart."

One of the areas in which 3D echo technology has truly revolutionized practice is in structural heart disease management, highlighted with the introduction of TAVR and more recently with transcatheter therapies for mitral valve regurgitation. "First launched in 2007, Live 3D TEE has enabled significant advancements in structural heart disease treatment," Dr. Salgo noted. "The ability to see the mitral valve beating in its living state in 3D has allowed cardiologists and cardiac surgeons to assess defects accurately. The ability to repair the valve confidently is important since patient outcome and avoiding lifelong blood thinners are key components in making the correct therapeutic decision."

IMAGE QUALITY

One of ASE's primary missions has always been to foster quality in cardiovascular imaging, through training, research and education. Image quality has become particularly imperative as the field moves from a volume to value dynamic, with a lessening of resources for each patient. As such, it is important to keep our members up-to-date on the latest advancements in this area from industry. Our IRT partners are approaching this fundamental objective

from various angles, continuing to build on the feedback they receive from ASE to provide important clinical advances.

Al Lojewski, General Manager Cardiovascular Ultrasound at GE Healthcare, agrees that image quality remains paramount. "Given the increasing complexities of cardiovascular care today, it's crucial to achieve images with excellent quality in an efficient manner," he remarked. "One of today's biggest challenges is patients' echo exams that are non-diagnostic. GE Healthcare's new software beamformer architecture "cSound™" aims to make imaging less patient body habitus dependent, and has the potential of not only helping to reduce non-diagnostic scans but also unlocking a new generation of software algorithms to further enhance the clinical capabilities of ultrasound."

Before Hitachi introduced the world's first cardiovascular color Doppler system in 1983, cardiologists had limited choices for determining the speed and direction of blood flow in the heart and vascular system. According to David Famiglietti, President and General Manager of Hitachi Aloka Medical America, "one of our most recent and exciting innovations in the area of hemodynamics is Vector Flow Mapping (VFM). VFM demonstrates flow dynamics in the heart and vessels in a whole new way, by using 2D cross-sectional images obtained by B-mode color Doppler and speckle tracking information in a method to present blood flow as a vector distribution. Evaluating pre- and post-surgical ventricular and trans-valvular blood flow, cardiomyopathies, along with LVAD compliance are just some of the ways VFM may help clinicians assess complicated hemodynamics and determine surgical strategies."

MYOCARDIAL DEFORMATION IMAGING

Commonly referred to as "strain," the echocardiographic technique known as myocardial deformation imaging has opened up new avenues for assessing ventricular wall motion via echocardiography. While there have been

barriers to clinical uptake, particularly intervender differences, ASE's collaborative efforts with the European Association of Cardiovascular Imaging (EACVI) and industry to standardize strain measurements continue to change that paradigm.

"The ability to precisely track the position of acoustic speckles, independent of angle and in three dimensions has revolutionized the way we look at myocardial function," notes Paulo Ucio, Senior Manager, Market Development Ultrasound at Toshiba America Medical Systems. "Toshiba's 3D Wall Motion Tracking addresses one of the biggest challenges in echocardiography: accurate quantification of cardiac chamber size and function, volumetrically and in a reproducible way."

There are many potential applications for strain imaging; the ability to detect subclinical disease resulting from cardiotoxic chemotherapy regimens may have the most significance in the near term. Since cardiologists and oncologists began to recognize the potential for chemotherapy and radiation to affect the heart, they have been working on ways to accurately detect these effects before they cause irreversible damage, so that they can tailor treatment. Strain imaging offers an efficient and robust method to assess LV function and detect subclinical markers of heart disease.

"At ASE 2015 in Boston, I had an opportunity to see some very exciting innovative new technologies that promise to enhance the field of cardiovascular ultrasound and ultimately, improve patient care," Dr. Lester commented. "But more importantly, the efforts by ASE over the past couple of years to convey our community's needs to industry are starting to bear fruit. With the next Industry Think Tank in March 2016, and some other interesting new collaborative efforts, we hope to continue to foster innovation and cooperation among both providers and vendors. ASE has many exciting events happening in the coming year, and I look forward to announcing additional events in the near future."

Echocardiography Test and Teach:

A MEASUREMENT AND INTERPRETATION SIMULATOR

Contributed by Harvey Feigenbaum, MD, FACC, FASE and Founder of ASE, Indiana University School of Medicine Krannert Institute of Cardiology, Indianapolis, IN

What is the most expensive test? One that gives incorrect information. The second most expensive test is one that gives incomplete or non-diagnostic information. These statements have always been true. Medical tests, especially examinations as commonly utilized as echocardiography, will be and are being more closely scrutinized than ever before as we move from fee for service to outcome reimbursement. In addition, the competition in cardiac imaging is growing rapidly with increasingly greater sophistication. Echocardiography should be and continues to be highly competitive for a variety of reasons, but only if the echocardiographic information is accurate and reproducible.

I recognized a need to address the accuracy and reproducibility issues and talked with the CEO and Founder of Ke Labs, who also happens to be my son Tom Feigenbaum, to help create a solution that could help echo labs all over the world. Ke Labs' Unit Modeler® Development Environment was used to create an echocardiographic measurement and interpretation simulator. This technology permits the creation of libraries of software tools and applications covering a wide breadth of subject matter, including data analytics, mathematics, physics, economics, search capabilities, etc.

Collaborating with the American Society of Echocardiography (ASE) was ideal because we could call on the expertise of the members to help build the library of case studies and the product could be sold through ASEMarketPlace.com along with all their other echo products. After a year and a half of development and continued refinement, Echocardiography Test and Teach debuted at the 2015 ASE Scientific Sessions where Tom and I provided demonstrations of the software to very interested ASE members.

CREATIVE LEARNING; BETTER OUTCOMES

The basic concept behind Echo Test and Teach is that it should be an interactive learning experience for the individual. **I like to think that, "one will remember that which they got wrong longer than that which they got right."** This teaching technique is analogous to training an airplane pilot in a cockpit simulator. The goal is to simulate real-world echocardiograms with the exception that the number of images per case is usually far fewer than would normally be in a full study. The purpose of the case is to highlight specific teaching points rather than to make a complete diagnosis for patient management. The Echo Test and Teach application includes several pre-loaded cases with measurement and interpretation focus (Figure 1). Cases will continue to be added to create a very robust and changing teaching platform. Institutions can also upload cases of their own to use as a training tool.

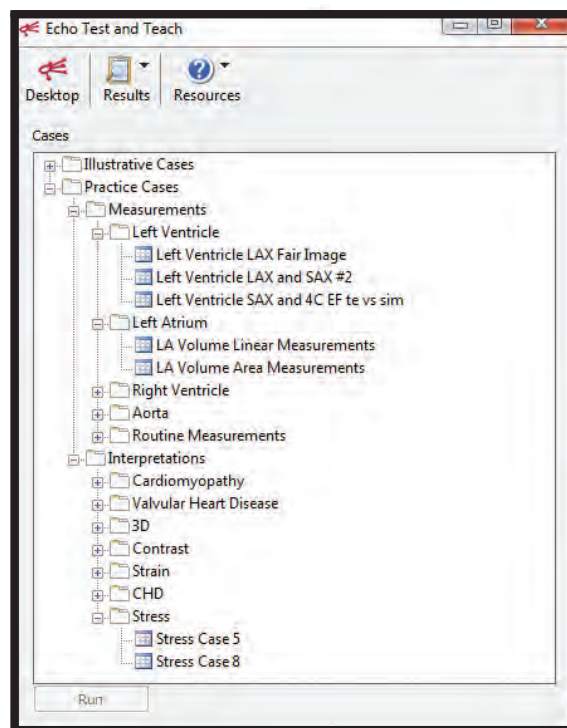


Figure 1: Example list of Cases

There are three components to Echo Test and Teach: cases, results, and terms. The cases include images, measurements, interpretations, annotations, and quizzes. For each case, the creator and user results are displayed side-by-side both for individuals and for groups (Figures 2 and 4). The terms feature contains all of the measurement and interpretation lists. De-identified images are imported from actual echocardiograms into Echo Test and Teach. The images can be of any type or any disease entity.

Some of the cases are solely designed to evaluate the accuracy and variability of measurements made by multiple individuals. As you can see in Figure 2, multiple tracings of the left ventricular cavity in the 4-chamber view without (left image) and with (right image) contrast are shown. The green tracing is that of the creator. Other cases concentrate on diagnostic features. Each case should take the user five minutes or less to complete.

PURCHASE ECHO TEST AND TEACH TODAY AT ASEMARKETPLACE.COM

66

THE USE OF CONTRAST IMPROVED THE COEFFICIENT OF VARIATION FROM 14.3% TO 4.4%.

99

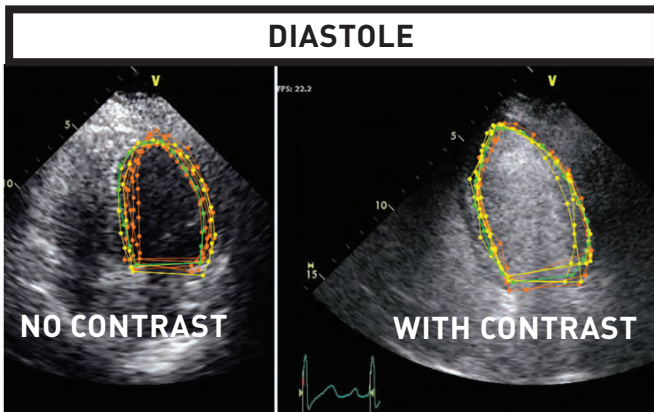


Figure 2: Multiple tracings of the left ventricular cavity

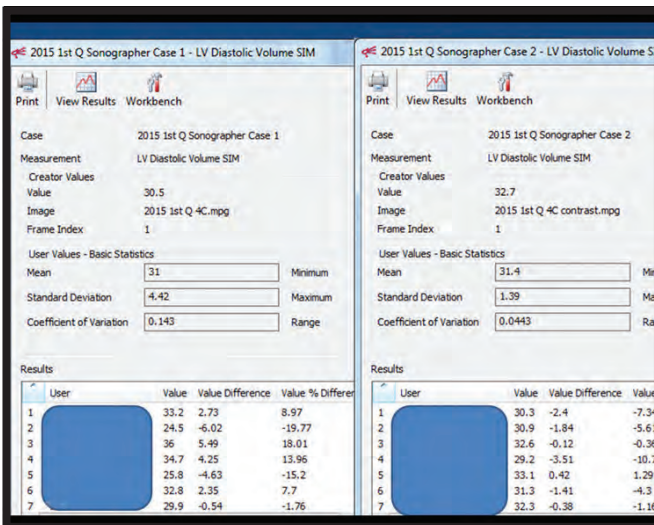


Figure 3: Statistical analysis of the tracing in Figure 2

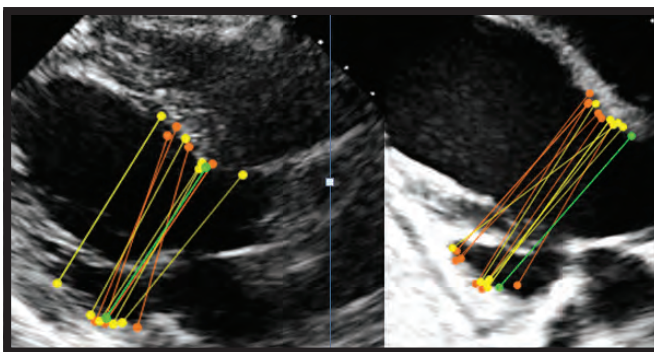


Figure 4: Before (left image) and after experience using Test and Teach.

IMPROVING QUALITY

Echo Test and Teach also assesses the accuracy and variability of a laboratory's sonographers and readers. **Echocardiography measurements are not easy. Small differences can have a significant effect on interpretations.** More than a year ago, the echocardiography laboratories at IU Health (Indiana University Medical Center/Krannert Institute of Cardiology) began using the Echo Test and Teach application. The sonographers and readers complete several cases every quarter as part of their quality assurance program. The group Echo Test and Teach results are the centerpiece of the lab's required quarterly meeting. Attendance has markedly improved, and the results have prompted some changes and have also been used as a part of their laboratory certification requirements.

Figure 3 represents an example of one of those changes. The use of contrast improved the coefficient of variation from 14.3% to 4.4%. On the basis of these Echo Test and Teach results the use of contrast at IU Health increased significantly.

Figure 4 shows how measurement variability can be improved with Echo Test and Teach experience. Notice the variability of a standard echocardiographic measurement before (left image) and after experience using Echo Test and Teach. The green line is that of the case creator.

The program results may be used as part of laboratory certification requirements.

Features and Benefits of Echocardiography Test and Teach Software

- Serves as a training tool to enhance the skills of sonographers and physicians in the measurement and interpretation of cardiac ultrasound images (echocardiograms)
- Supports quality improvement standards, including variability and correlation between different modalities in the measurement and interpretation of cardiac ultrasound images
- Facilitates and enhances patient care
- Offers a hands-on, real-world training experience without being tied to an imaging device
- User results can be analyzed and viewed individually or as a group
- Includes preloaded case studies covering multiple areas created by experts in the field
- New case studies can be added by an institution (requires design mode version)
- Includes analytic tools to enable administrators to analyze collective results
- Supports the fulfillment of accreditation requirements
- Cloud-based so users can access the software anytime and anywhere
- Scalable to fit any size lab or practice
- Requires minimal resource allocation
- The application, with different case content, can be applied to any area of medical imaging

Dr. Harvey Feigenbaum is the founder of ASE as well as a past president and founding editor of the Journal of the American Society of Echocardiography. He is widely recognized as the "Father of Echocardiography" for pioneering the most widely used cardiac imaging technique in the world. Dr. Feigenbaum is a distinguished professor of medicine at the Indiana University School of Medicine. Additional contributions Dr. Feigenbaum has made to the medical profession include training many early pioneers and the first cardiac sonographers, organizing the first and numerous other courses in echocardiography, and writing the first textbook with multiple editions and translations.



“In terms of being state-of-the-art and integrating current echo practices with clinical practice, this is the best echo course I have attended.”

2014 State-of-the-Art Echocardiography Attendee

“This is one of the best echo conferences in the world due to its comprehensive content, excellent faculty, and outstanding presentations.”

2014 State-of-the-Art Echocardiography Attendee

education corner

Contributed by Hilary Lamb, MPA, ASE C00



cornerstone of ASE's mission is to provide education opportunities in a variety of formats for anyone interested in echocardiography. Now in its 29th year, the State-of-the-Art Echocardiography: Echo Southwest course will be held February 13-16, 2016, in Tucson, Arizona. Led by course director Dr. Steven J. Lester and an outstanding faculty from all over the country, this course is designed to focus on new technologies and techniques in echocardiography and will provide practical training on strain imaging, 3D echocardiography, valve disease, and echocardiography in interventions. Live imaging will allow attendees to watch experts perform new imaging techniques. Particular attention will be given to knobology and how to incorporate these techniques into practice. This course will allow participants to spend time viewing a recorded case and reviewing complications.

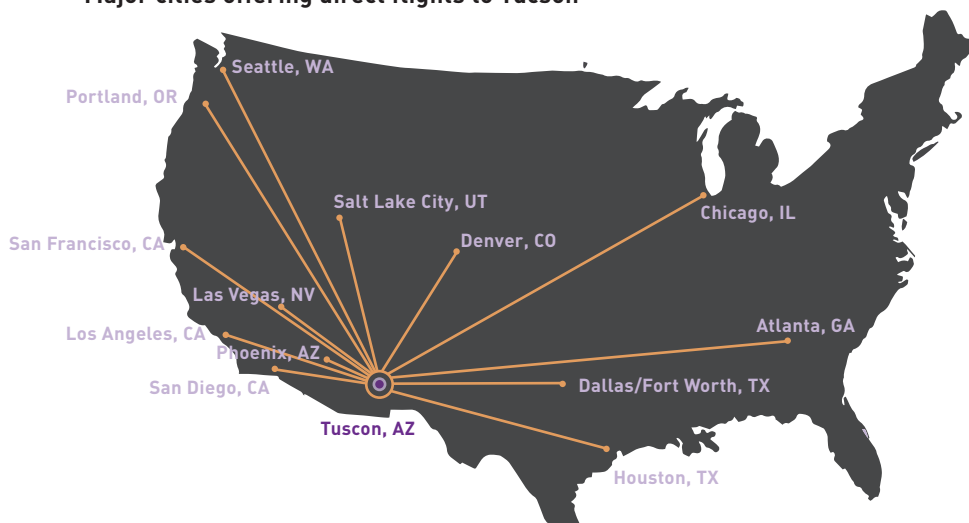
Dr. Lester noted, "As patients become more familiar with valve disease and intervention and more centers are performing these complicated procedures, it is important for practitioners to become more comfortable with diagnosis, intervention, and monitoring."

This course offers an additional opportunity to participate in the very popular Learning Lab experience for a day and a half beginning on February 12. This intimate workshop, featuring easy access to faculty members, will be led by Dr. Bijoy Khandheria and Dr. Roberto Lang. Individual computer workstations are provided allowing each participant to learn to quantitate fundamental aspects of clinical echocardiography, including 3D and strain. The small group environment provides the opportunity for nearly private instruction from top practitioners in the field.

The Hilton Tucson El Conquistador Golf and Tennis Resort, which is surrounded by five mountain ranges and rests in the shadow of the Santa Catalina Mountains, is the fantastic new location this year. In order to provide attendees with the best possible experience, the hotel room rate includes free WiFi, bottled water, time on the putting green, driving range, tennis court, and mountain bike rental. What makes Tucson so special is that despite being a growing metropolis, it still retains its friendly, typically Arizonan, western charm. Discover 19th century architecture or visit local Tucson attractions like Tohono Chul Park, Catalina State Park or Biosphere 2. Boasting more than 350 days of sunshine a year, Tucson is one of the sunniest cities in the United States. Tucson is also known as the "astronomy capital of the world" because the clean air and clear, dark skies allow sights of the universe in a way most people will never experience. Make your plans now to join us in Tucson.

Registration is open at asecho.org/livecourses.

Major cities offering direct flights to Tucson



Setting Guidelines & Standards

ASE strives to write guidelines and standards that are significant and long-lasting. In 2015, ASE published six guidelines and recommendations in the *Journal of the American Society of Echocardiography (JASE)*.

Guidelines for the Echocardiographic Assessment of Atrial Septal Defect and Patent Foramen Ovale

From the American Society of Echocardiography and Society for Cardiac Angiography and Interventions, JASE, August 2015

Echocardiography in the Management of Patients with Left Ventricular Assist Devices

Recommendations from the American Society of Echocardiography, JASE, August 2015

Recommendations on the Use of Echocardiography in Adult Hypertension

A report from the European Association of Cardiovascular Imaging (EACVI) and the American Society of Echocardiography, JASE, July 2015

Multimodality Imaging of Diseases of the Thoracic Aorta in Adults

From the American Society of Echocardiography and the European Association of Cardiovascular Imaging, JASE, February 2015

Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults

An update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging, JASE, January 2015

This document has been endorsed by the following ASE International Alliance Partners: Canadian Society of Echocardiography, Indian Academy of Echocardiography, Indonesian Society of Echocardiography, and the Japanese Society of Echocardiography.

Guidelines for the Use of Echocardiography as a Monitor for Therapeutic Intervention in Adults

A report from the American Society of Echocardiography, JASE, January 2015

Partnering to Raise Cardiovascular Awareness

Contributed by Angie Porter, ASE Marketing & Communications Department Manager

ASE's new three-year strategic plan includes a charge to promote the value of cardiovascular ultrasound to be well-known by patients, payers, and healthcare providers. Partnering with WomenHeart: The National Coalition for Women with Heart Disease seemed like the perfect place to start, since its mission is devoted to advancing women's heart health through advocacy, community education, and the nation's only patient support network for women living with heart disease.



Lesley Stahl (left) accepts the Wenger Award for Excellence in Communications from Dr. Nanette Kass Wenger (right), for whom the Wenger Awards were named a pioneer in women's cardiovascular medicine and research. Photo courtesy of: Richard Greenhouse Photography

A highlight of the evening was when CBS News Correspondent Lesley Stahl was recognized with the Wenger Award for Excellence in Communications. She was lauded for educating viewers about the importance of sex differences in medical and scientific research in her 60 Minutes report: 'Sex Matters: Drugs Can Affect Sexes Differently' which contributed to a dramatic increase in awareness of the importance of sex differences to women's cardiovascular health.

The news report, which initially aired on February 9, 2014, addressed medication variations, physiologic changes, and even Food & Drug Administration oversight as it relates to women. It raised awareness among legislators, regulators, industry, and healthcare providers about the importance of sex differences when doing research, prescribing treatment, and educating about cardiovascular disease.

This theme continued on April 28 when ASE was present on Capitol Hill, in a room packed with people, as WomenHeart held a Congressional briefing announcing the findings from its first national survey on heart failure and women. The survey results point to a need for better training for clinicians regarding the diagnosis and treatment of heart failure in women, more careful consideration of the financial and mental health consequences of heart failure among women as part of their treatment plan, and better patient education for women who have heart failure.

WomenHeart launched the first national patient education campaign on heart failure and women in November 2014 to address an urgent need to improve care for women heart failure patients. As part of the launch, WomenHeart introduced this national patient survey designed to gain a better understanding of how women are managing their heart failure. Additionally, between November 2014 and April 2015, WomenHeart also conducted two telephone focus groups and two in-person roundtable discussions composed of women heart failure patients to learn how heart failure affects women's health and their lives.

ASE was proud to co-sponsor WomenHeart's 15th Annual Wenger Awards event and the Congressional briefing announcing findings of patient research on heart failure and women, held April 27-28, 2015, in Washington, DC. "This was an opportunity for our Society to partner with an organization that is devoted to patient care and advocacy and focus on the very real and unique needs of women. We are committed to helping to educate our government representatives on this population's special risk factors to focus on improving care in the future," said ASE CEO, Robin Wiegierink.

The WomenHeart Wenger Awards honor those making extraordinary contributions to advancing women's heart health. ASE members Dr. Theodore Abraham, Dr. Federico Asch, Dr. Susan Mayer, Dr. Jonathan Patrick, Susan Phillip, and Dr. Zuyue Wang represented ASE at the awards dinner.

Research participants identified key areas where improvements are needed to help women manage their heart failure:

- ♥ Reduce misdiagnoses of heart failure in women, which are preventing or delaying proper treatment
- ♥ Address mental health issues associated with heart failure
- ♥ Enhance patient education for women heart failure patients
- ♥ Remove barriers to cardiac rehabilitation
- ♥ Improve access to support groups for women heart failure patients
- ♥ Improve two-way doctor-patient communication
- ♥ Expand access to insurance coverage
- ♥ Provide information to women heart failure patients on how they can get involved in heart health awareness activities

The research findings also point to a need for more sex-specific and multicultural research involving women with heart failure. "We want to use these important research findings on women and heart failure as a platform to work with our partners in the public and private sectors to increase awareness about heart failure in women and improve the diagnosis and care of all women living with this life-threatening condition," said Mary McGowan, Chief Executive Officer, WomenHeart. "By working together, we can make a difference in the lives of women living with heart failure and improve outcomes," she added.



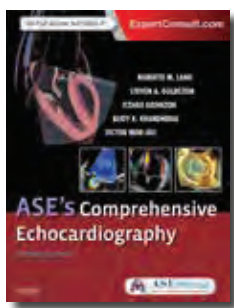
U.S. Representative Debbie Dingell (MI-12) spoke to a packed room at the WomenHeart Congressional briefing on April 28, 2015 announcing the findings from its first national survey on heart failure and women.

ASE plans to partner with additional organizations like WomenHeart in the coming year and has begun creating patient education videos on subjects like cardio-oncology. Dr. Juan Plana has provided two videos, one in English and one in Spanish, to help oncology patients understand the risks associated with chemotherapy on their heart health. These are available on ASE's website SeeMyHeart.org.

"Of all my echo textbooks, this one is my favorite..."

This textbook is truly comprehensive!... I could sell all the other textbooks and be perfectly happy keeping this book and Reynold's pocket reference."

- Amazon Reviewer



- Written by world experts from the American Society of Echocardiography.
- A unique multimedia resource with text, case studies, and online components.
- Over 200 chapters covering the latest uses of echocardiography, including the most recent 2D and 3D advances.
- Everything you need to assess cardiac anatomy and function for more accurate diagnosis and evaluation of heart disease.
- Includes an online version with an outstanding library of slides and videos of case presentations allowing you to view dynamic echocardiographic clips of various cardiac pathologies.



Visit ASEMarketPlace.com to purchase **ASE's Comprehensive Echocardiography** textbook.

Contributed by Michael L. Main, MD, FACC, FAHA, FASE, FESC, Saint Luke's Mid America Heart Institute, Kansas City, Missouri and Denise Garris, The Korris Group, Washington, DC

Physicians today face declining reimbursement and increased scrutiny of their coding practices. Gone are the days when third-party reimbursements meant physicians could overlook revenue opportunities. In physician-owned practices, lost revenue opportunities directly impact physician salaries. For hospital system employed physicians, reduced revenue can mean reduction in support staff, limitations on supplies and equipment, and ultimately reduced physician compensation.

Coding accurately for the services you provide is essential. **The best coding support staff and the latest electronic health record (EHR) cannot substitute for physician involvement in the coding and documentation process.** Who knows better than you what care you provide? In the next few paragraphs we will update you on new echocardiographic CPT® codes and the concept of medical necessity.

Over the past several years, new echocardiographic technologies (including myocardial strain imaging) and new echocardiography services (interventional transesophageal echocardiography) have been integrated into routine clinical practice. Recently, the American Society of Echocardiography (ASE) submitted Code Change Proposals (CCPs) to the American Medical Association Current Procedural Terminology Panel which describe these technologies/services. Based on ASE's proposals, two new CPT® codes have recently been published.

CPT® CODE 93355

TEE plays a critical role in guiding structural heart interventions including transcatheter aortic valve replacement, transcatheter percutaneous edge-to-edge mitral valve repair, left atrial appendage closure, and atrial septal defect closure. The existing diagnostic TEE CPT® code (93312) does not adequately describe the additional physician time and intensity necessary to provide this service. On January 1st 2015, a new Category I CPT® code (reimbursed by the Centers for Medicare and Medicaid Services) went live. This code should be reported when providing transesophageal guidance for transcatheter interventions.

93355 is reimbursed at a higher level than the diagnostic TEE code, is reported only once per procedure, and can only be submitted by a physician not involved in performance of the structural heart procedure itself. If you are performing TEEs to guide structural heart procedures, make sure you are appropriately submitting this code. Also - update your EHR and routing slips with the new CPT® code.

CPT® CODE +0399T

Myocardial strain imaging has emerged as a sensitive tool for assessing regional and global left ventricular contractile function. On July 1st 2015, a new Category III add on code was published, and will go live on January 1st 2016. +0399T is to be reported once per encounter in addition to the appropriate echocardiography base codes 93303-93351.

While Category III codes are not reimbursed by the Centers for Medicare and Medicaid Services, these codes are sometimes reimbursed by private payers—ASE has already met with private payers this year in an effort to establish reimbursement. Additionally, CMS will track submission of this code beginning in January 2016. There will be an opportunity for this code to progress to Category I status over the next few years based on 1) utilization and 2) additional peer-reviewed publications demonstrating efficacy. Unlike the stand alone interventional TEE code, +0399T is an add-on code and can be reported in conjunction with transthoracic, transesophageal, and stress echocardiography. This code is reported once per examination.

It is important to note that payers are placing increased emphasis on medical necessity. CMS generally defines medically necessary services as those that are "reasonable and necessary for the diagnosis or treatment of illness or injury or to improve the functioning of a malformed body member." **Other payers have their own variations on the definition, but in short, medical necessity is doing the right thing, for the right patient, at the right time and place.** Claims for services that don't meet medical necessity requirements are typically denied. If they are paid in error, the reimbursement may be recouped in the future. The denial explanation may be "non-covered service" or "not medically indicated." Careful documentation helps to avoid this issue; for example in the case of CPT® code 93355, including a statement like "TEE performed intra-procedurally to guide left atrial appendage closure" tells the payer that this higher level of coding is appropriate.

Remember, CPT® codes are updated annually. Be certain your practice's encounter forms and billing software are reviewed and up-to-date with services you and your colleagues perform. Although these updates can be time consuming, they are an essential link between your professional services and accurate reimbursement. You may be surprised how simple awareness and focused education can impact the financial health of your practice. ASE offers a free webinar every year to update members on coding changes once the proposed rules are out. Be sure to take advantage of this key member benefit.

ASTE



Save the Date:

JUNE 10-14

2016

Washington State Convention Center | Seattle, WA

Abstract submission closes February 3, 2016

asescientificsessions.org



AMERICAN SOCIETY OF ECHOCARDIOGRAPHY

2100 Gateway Centre Blvd, Suite 310
Morrisville, NC 27560

NON PROFIT ORG
US POSTAGE
PAID
RALEIGH, NC
PERMIT #1854



VOLUME 4, ISSUE 1 | OCTOBER 2015

ASE'S MISSION

ASE is committed to excellence in cardiovascular ultrasound and its application to patient care through education, advocacy, research, innovation and service to our members and the public.

asecho.org