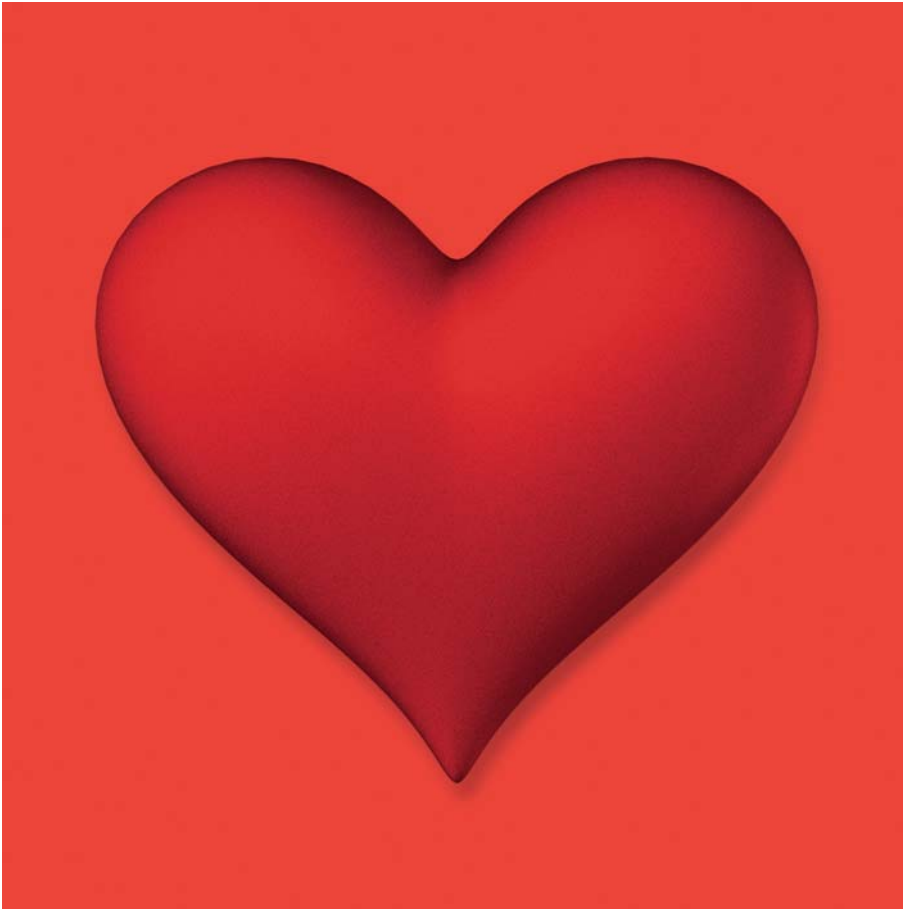


Echo in a Heartbeat

Recently, Siemens introduced a new echocardiography system that has the potential to change the way echocardiography is practiced. The ACUSON SC2000 volume imaging ultrasound system delivers instantaneous full-volume image acquisition of the entire heart in one single heart cycle, allowing physicians to assess cardiac function more comprehensively and accurately. The Hospital Clínico San Carlos in Madrid, Spain, has been one of the pioneering centers using this new technology.



Two years ago, José Luis Zamorano, MD, PhD, was invited to join the development and advisory board team for the ACUSON SC2000™ system, Siemens new volume imaging ultrasound system. He recalls how excited he was to accept. He did not know at the time that he would be the only Spaniard and one of only two European clinicians to be part of this select group. Zamorano, Director of the Cardiovascular Imaging Unit of the Hospital Clínico San Carlos in Madrid, and President of the European Association of Echocardiography, has a world-renowned reputation as a specialist in the field of echocardiography.

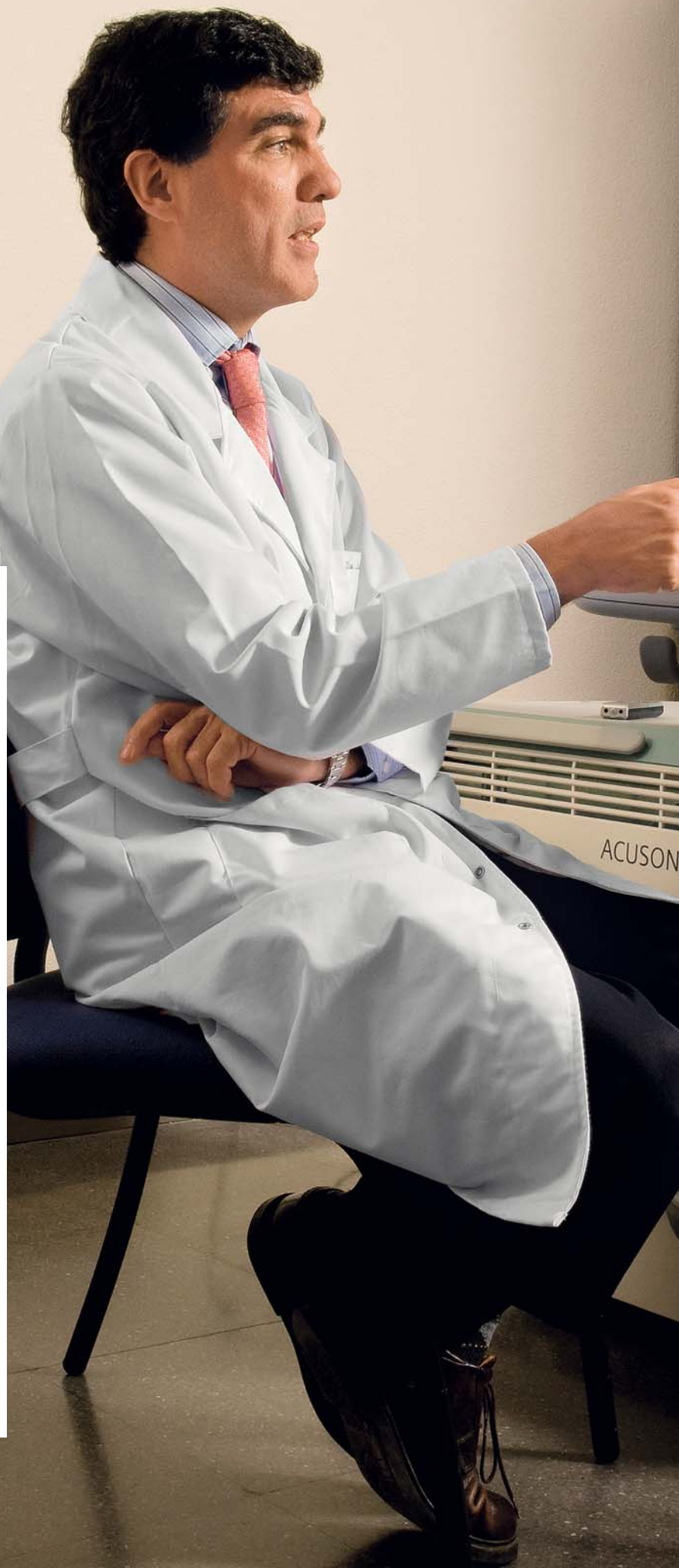
The project required Zamorano to make several intense trips of little more than 48 hours to the Siemens Ultrasound Headquarters in Mountain View, California, USA, where he and his fellow participants reviewed the clinical and workflow aspects

of the new system to be applied later by Siemens engineers. "For me, it was a new and gratifying experience to take part in the development of this groundbreaking technology and to later see the final results," says Zamorano. "Besides, it allowed me to see how much the company involves clinical specialists in the development of a product."

According to Zamorano, echocardiography studies are the cornerstones of non-invasive diagnosis in cardiac pathology. "Personally, I can't think of a patient who came to see me for the first time and didn't get an echocardiogram. This is standard procedure."

Recently, the Cardiovascular Institute of the Hospital Clínico San Carlos received its ACUSON SC2000 system as one of the first clinical sites in Europe. Zamorano's team immediately realized the potential the new technology can bring to the cur-

rent practice of echocardiography. "The heart is three-dimensional per se, with movement adding yet another dimension. So it's only natural that clinicians want to see and diagnose it in 4D," says Zamorano. And with the ACUSON SC2000 system, now they can. "While 2D imaging is predominantly used today, I believe that in the not-too-distant future, we will only do four-dimensional echocardiography. It's the natural way to look at the heart. And with this system, the technology that enables us to do that is there. It is only going to be a matter of time until this will be the standard of care." Current approaches to traditional 3D echocardiography require the recordings of four to seven heart cycles to stitch together a volume of the heart. With the ACUSON SC2000 system, it is now possible to capture a full volume of the heart in one single heart cycle,



Summary

Challenge:

- Accurate study of cardiac anatomy and function
- Obtaining real-time 4D acquisition of the heart
- Using echocardiography in a wider range of patients, including those with cardiac arrhythmias, obese patients, and those who can't hold their breath or stay still for long periods of time
- Improving workflows in echocardiography

Solution:

- Genuine, real-time volumetric imaging
- Acquisition of 4D images in one heartbeat
- Perfecting the color Doppler
- Knowledge-based workflow applications

Result:

- Innovative technology that improves diagnostic accuracy for each patient
- Instantaneous full-volume acquisition of the heart in one single heartbeat
- Equipment designed for adaptation to any clinical setting

“Instantaneous full-volume imaging is an element in the continuing evolution of diagnostic tools, and today is the ultimate technological advancement for the diagnosis of the heart.”

José Luis Zamorano, MD, PhD, Director, Cardiovascular Imaging Unit, Hospital Clínico San Carlos, Madrid, Spain; President of the European Association of Echocardiography

90 degrees x 90 degrees at 40 or more volumes per second at a depth of 16 centimeters.

Instantaneous Full-volume Imaging

“It’s easy to see why this technology is superior,” says Zamorano. “In patients with heart failure, no one heartbeat is exactly like the other. So to assume that an accurate diagnosis is possible from a stitched image is inconclusive.” He adds, “With this system, we can now speak of true volume imaging of the heart. The advantage is that it provides a much more realistic image. It optimizes our vision of the heart from an integral point of view: physiologically, functionally, and pathologically. Until now, when we wanted to reconstruct volumes with the available technology, we would select a series of segments of the heart and, later, would stitch them together to obtain a complete image. The ACUSON SC2000 system provides instantaneous full-volume acquisition in one heartbeat delivering a genuine representation of the beating heart.”

Advantages in Clinical Application

“Echocardiography is a wonderful tool. It’s noninvasive, it’s readily available, it’s real-time, and it does not use radiation. Traditionally, echocardiography focused on 2D-view acquisitions. But technology has progressed and, in this case, with the instantaneous volume acquisition of the heart in one single heart cycle, it overcomes some of the limitations echocardiography had in the past,” says

Zamorano. “As a result, not only patients with arrhythmia benefit, but also obese patients or those who can’t hold their breath long enough or stay still for longer periods of time.”

Volumetric imaging allows a more accurate assessment of ejection fraction and overall cardiac function than is available with standard 2D imaging acquisition. Specifically, volume imaging measures how the heart is pumping. This precision is very important because it directly relates to the patient’s health, organ function, and quality of life.

Another highlight of the ACUSON SC2000 system is its color Doppler performance. “The color Doppler just looks amazing,” says Zamorano. “It allows us a more exact and precise analysis of valve pathologies. The study of ventricular volume is very similar to that used in MRI [magnetic resonance imaging], but faster and with less stress for the patient.”

In Zamorano’s opinion, the use of the new Echo in a Heartbeat™ technology enhances the role of echocardiography: “Echocardiography has always been very safe and comfortable for the patient. Unlike other noninvasive cardiological diagnostic techniques, we could use it every day with no risk for the patient. And while some colleagues argue that interventional procedures are faster, I believe that the advantages of echocardiography by far exceed saving a few minutes.”

One-stop Shop

With the ACUSON SC2000 system, Siemens has ushered in a new era in cardiology. It has given impetus not only to technological innovation, but also to



Typical Study Time

TRADITIONAL ECHO EXAM



ECHO IN A HEARTBEAT



With the ACUSON SC2000 system, direct full-volume acquisition and knowledge-based workflow software make for great time savings in echocardiography while at the same time delivering more accurate and reliable results.

At a Glance: the Benefits of Full-volume Imaging

Unparalleled Information Rate Full-volume imaging, 90 degrees x 90 degrees at 40 volumes or more per second. No more ECG-gating, no more breath-holding, no more uncertainty. Derived reference plane images from the full-volume cardiac dataset give clinicians more information in less time.

Knowledge-based Workflow Knowledge-based workflow applications use learned pattern recognition and an expert database of real clinical cases to recognize anatomical patterns and landmarks as well as perform automatic measurements. This includes customizable protocol-driven workflow, automated reference plane extraction from the cardiac volume dataset, automated volume contouring of ejection fraction, and automated measurements of imaging modes.

Adaptive Ergonomics Compact and highly mobile, the system adapts to all clinical environments, providing clinicians with the ultimate in simple and stress-reduced operation. The 4Z1c single transducer solution gives them all the information they need and more – volume imaging, 2D, spectral Doppler, and color Doppler. It features a patented ergonomic Palmar grip designed to reduce repetitive stress injuries.

Innovative Technologies Advanced next-generation architecture is strengthened by breakthrough technologies. Coupled with high-volume rate acquisition, Coherent Volume Formation technology delivers excellent image resolution. Advanced cardiovascular applications and compliance with 3D DICOM Open Standard extend the versatility of this next-generation system.



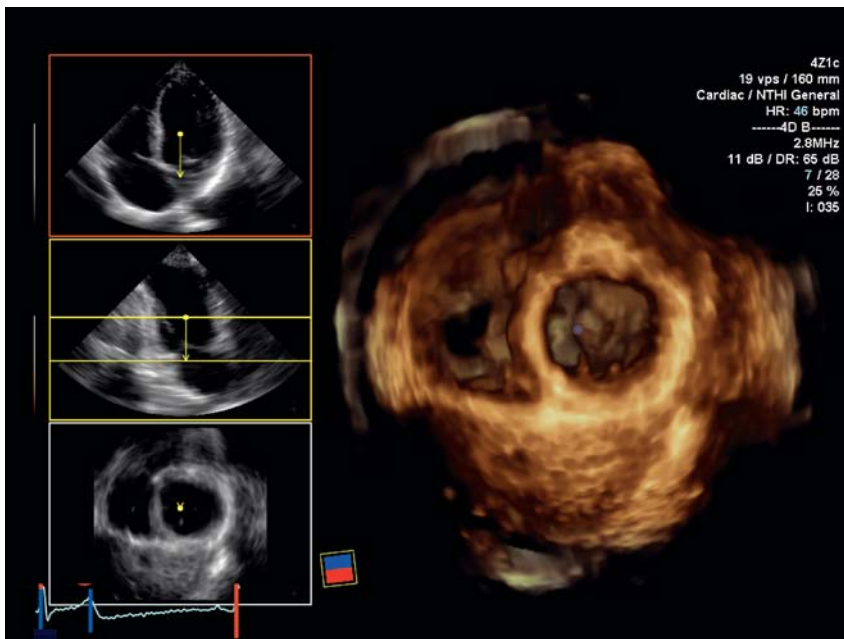
The single transducer solution with the 4Z1c transducer captures all the information that is necessary for a comprehensive cardiac study – volume, 2D, color Doppler, and spectral Doppler.

strategy. We are not just focusing on the technology itself, but rather establishing a global strategy of cardiovascular imaging as the center to the service that is really most important: treating the illness of the patient.”

Time, Space, Flow

The ACUSON SC2000 system changes the current practice of echocardiography. With this technology, Siemens presents a system that delivers the highest level of information density backed up by knowledge-based workflow applications that help achieve the highest level of diagnostic confidence. Says Zamorano: “The remarkable thing about this new echocardiography system is that it combines the concepts of time, space, and flow. In one single heartbeat it acquires a full volume of the heart, automatically extracting all the information that is needed to conduct a complete study.”

For all of his enthusiasm for the ACUSON SC2000 echocardiography system, Zamorano believes that the Echo in a Heartbeat technology is not the last word in cardiovascular diagnosis. “If this were true, our activity would have reached an end. However, I do see it as a turning point from which we will continue to grow. Developments of new techniques are milestones. And the ACUSON SC2000 system is one more that enhances our view of and into a patient’s heart. Instantaneous full-volume imaging is an element in the continuing evolution of diagnostic tools and today is the ultimate technological advancement for the diagnosis of the heart.”



A unique view from the apical position only possible with instantaneous full-volume imaging: transverse view at the level of the mitral and tricuspid valves.

diagnostic and workflow innovation. According to Zamorano, Siemens provides much more than an ultrasound system.

“Echo in a Heartbeat is a new concept of seeing the heart, a first step in strengthening this new line of work,” he says. From the beginning, the design of the ACUSON SC2000 system was also centered around workflow improvement. With instantaneous full-volume acquisition, imaging becomes the shortest part of the exam. Once the volumes are acquired, all the required 2D reference-plane images can be derived from the volume dataset. The single transducer solution with the 4Z1c transducer captures all the information that is necessary for a comprehensive cardiac study – volume, 2D, color Doppler, and spectral

Doppler. In addition, no ECG-gating is needed.

Cardiovascular diagnosis is undergoing a changing trend. “Without a doubt, echocardiography is one of the most important pillars of noninvasive diagnostic technique,” says Zamorano. “In the Cardiovascular Institute of the Hospital Clínico San Carlos, we have already acknowledged and changed in this direction. The Echocardiography Laboratory has become the Cardiovascular Imaging Department, where the patient can be offered echocardiography, cardiac CT [computed tomography], or cardiac MRI. Our physicians decide in favor of the appropriate technique for the study of each patient’s pathology. The focus of our work is not the technique, but the patient and the process. In my opinion, this is the right

Further Information

www.siemens.com/echoinaheartbeat