

## Medical Solutions

For the daily and trade press

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### **Fifty years of echocardiography in medicine**

In 1953, Siemens and Swedish scientists developed the first ultrasound system for cardiac diagnosis.

**Echocardiography celebrated its 50<sup>th</sup> year in medicine as the most preferred method for the non-invasive diagnosis of cardiac disease. Modern ultrasound technology offers today's physician many ways to directly visualize the patient's heart, reach a more precise diagnosis, and act swiftly in the interest of the patient. It has been a long journey. In 1953, the Swedish physician Dr. Inge Edler and physicist Dr. Carl Hellmuth Hertz became fascinated by the notion of using ultrasound waves for more precise cardiac diagnoses. With support from Siemens in Erlangen, the first echocardiography device was eventually developed. Siemens Medical Solutions is now the leading provider of diagnostic ultrasound equipment in the world. Medical solutions from the field of ultrasound improve patient care, optimize workflow, and help the physician obtain the desired clinical information for diagnosis.**

From the first medical applications of ultrasound technology in 1926 up to the modern-day ultrasound probe that directly visualizes the heart, Siemens has been committed to the research and development of this technology. Ultrasound waves and their many versatile applications were already being used in the first half of the 20<sup>th</sup> century, and not just in medicine. For example, Siemens equipment was being used in the shipyards in Malmö, Sweden to check welding seams.

In 1952, a physician and a physicist met over lunch at the then small Lund University in Sweden. Inge Edler, director of the cardiology department at the Lund University Hospital,

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was looking for a way to make more accurate cardiac diagnoses prior to surgical interventions. At the time, cardiac catheterization and contrast medium imaging were still in their infancy. Carl Hellmuth Hertz, a doctoral candidate in the university's nuclear physics department, had the idea of using physical means to accomplish this. He conducted the initial experiments on his own heart at the shipyard in Malmö. The results from this experiment were so successful, that he and Edler performed initial patient exams in Lund using a borrowed echo test control device.

Painstaking study and elaborate improvements followed, resulting in this safe new form of cardiac diagnosis. Gustav Hertz<sup>1</sup>, Carl Hellmuth's father and then director of the Siemens research lab in Sweden, used his connections to help optimize the process for cardiac diagnosis. Initial contacts with the Siemens Reiniger facilities in Erlangen were positive, enabling Edler and Hertz to borrow an optimized ultrasound device for cardiac applications. The results of the initial tests presented in Erlangen in December of 1953 were very promising. The decision to patent the new process was made in March of 1954, even before Edler and Hertz first published "The Use of Ultrasonic Reflectoscope for the Continuous Recording of the Movements of Heart Walls."

A number of other discoveries and publications related to this new cardiac diagnostic technology followed later. In 1956, for example, Edler and Hertz were able to verify fluid in the pericardium. In 1958, the renowned cardiologist Professor Sven Effert, at that time still an assistant physician in Düsseldorf, was able to image cardiac tumors, particularly in the left atrium. Siemens improved recording in 1959 through the Cardirex-Tintenschreiber (Cardirex Ink Recorder). Siemens introduced the successful Echopan KS echocardiograph on the market in 1976, which was augmented in 1978 with a mechanical sector scanner. The first Siemens echocardiograph with color Doppler sonography (Sonoline CF) was unveiled in 1988.

Today, the Acuson and Sonoline products from Siemens Medical Solutions offer a broad spectrum of echocardiography systems, from the mobile, high-tech ACUSON Cypress™ echocardiography system to the ultra-premium ACUSON Sequoia™ echocardiography

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<sup>1</sup> Hellmuth's father Gustav Hertz received the Nobel prize for physics in 1925. His grandfather discovered electromagnetic waves in 1886-1888. The unit of frequency known as Hertz is named after him.

system. The latest addition to the ACUSON line is the ACUSON CV70™ echocardiography system for premium performance solutions. The latest all-digital technology and high-performance mobile systems complete the ultrasound spectrum from Siemens. Designed for interdisciplinary applications in medical practices and hospitals, these systems support numerous clinical applications.

The ACUSON AcuNav™ diagnostic ultrasound catheter, with a diameter of only 3.3mm, introduces the full potential of modern ultrasound techniques directly inside the right heart. The catheter allows real-time imaging of the heart and blood flow. The AcuNav catheter has also been used during procedures which treat cardiac arrhythmia.

Further developments in echocardiography include the use of contrast media, the miniaturization of ultrasound probes and catheters as well as the 3D imaging. Since the heart is a dynamic organ, the temporal dimension is extremely important in diagnosis. The latest investigations at Siemens are therefore focused on developing virtual 4D imaging\* of cardiac movements. In parallel, the quality of echocardiographic data is constantly being improved through new technologies such as Native Tissue Harmonic Imaging, Coherent Pulse Formation and Tissue Equalization Technology.

Cardiac disease is the leading cause of death in Europe, claiming nearly four million lives every year. "Our orientation to cardiac disease patterns ensures that our medical solutions are optimized for the special requirements of doctors and patients. This improves our chances of saving lives," said Prof. Dr. Erich E. Reinhardt, President of Siemens Medical Solutions. "Ultrasound technology has enormous potential for cardiology and will become increasingly important in the future." Ultrasound exams are relatively inexpensive, easy to perform, and noninvasive to the patient. According to current estimates, over 25 million echocardiographic exams are performed each year. Ultrasound exams are a critical diagnostic procedure that assists cardiologists in choosing the right course of treatment for the patient. The objective is to detect complications early, thereby reducing the risk of developing cardiovascular disease.

### Background information

## **Echocardiography**

An ultrasound examination of the heart is called echocardiography. The exam is the preferred first method of examination in cases of suspected heart disease, particularly because it is a convenient and non-invasive method. Ultrasound waves are acoustic waves at a frequency not detectable by humans. Echocardiography uses frequencies from 1 to 15 megahertz (MHz). The ultrasound waves are generated by a transducer. They are either absorbed or reflected – depending on the tissues – in the body. The transducer receives the reflected echo from the body, and the ultrasound device amplifies the signal, converting it into ultrasound images.

For pictures related to this press release, go to: <http://www.siemens.com/medical/pictures/50yoursechocardiography>

\*Virtual 4D imaging is under development as a works in progress and is not yet commercially available, and its future availability can not be ensured.

**Siemens Medical Solutions** is one of the world's largest suppliers to the healthcare industry. The company is known for bringing together innovative medical technologies, healthcare information systems, management consulting, and support services, to help customers achieve tangible, sustainable, clinical and financial outcomes. From imaging systems for diagnosis, to therapy equipment for treatment, to molecular medicine to hearing instruments and beyond, Siemens innovations contribute to the health and well-being of people across the globe, while improving operational efficiencies and optimizing workflow in hospitals, clinics, home health agencies, and doctors' offices. Recent acquisitions in the area of in-vitro diagnostics – such as Diagnostic Products Corporation – mark a significant milestone for Siemens as it becomes the first full service diagnostics company. Employing approximately 36,000 people worldwide and operating in more than 130 countries, Siemens Medical Solutions reported sales of 8.23 billion EUR, orders of 9.33 billion EUR and group profit of 1,06 billion EUR for fiscal 2006 (preliminary figures). Further information can be found under: <http://www.siemens.com/medical>