

# Real-time volume imaging of hearts

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Acuson SC2000 Prime Edition is the first to offer live full-volume color Doppler imaging of heart valve anatomy and blood-flow using a new true volume transesophageal echo (TEE) probe.

A new ultrasound system from Siemens enables doctors to carry out heart examinations through the esophagus for the first time. The system supplies 3D images of the heart as well as additional real-time information about the blood flow throughout the heart. Moreover, these examinations can even be made in patients suffering from ECG irregularities. Surgeons could, for example, use the system to see whether heart valves are closing properly during the corrective procedure. Because a lot of computing power is needed to generate

blood flow information in real time, it could previously only be done for small volumes. That's why the new solution, called Acuson SC2000 Prime Edition, has more computing power and an imaging ultrasound scan head that passes through the esophagus to create images of a large part of the heart with a single scan. Siemens presented the new system at this year's congress of the European Society of Cardiology.

The insertion of an endoscope-mounted scan head into the esophagus to make 3D ultrasound examinations is referred to as a transesophageal echocardiogram. It allows measurements to be made right next to internal organs, and, in particular, to the [heart](#). Such examinations supply far more detailed pictures than can be provided by ultrasound scan heads outside of the body. In order to record the [blood flow](#) inside the heart, the ultrasound device measures the frequency of the sound waves reflected by the blood cells.

The Doppler effect provides the physician with information on whether the blood is flowing toward or away from the ultrasound scan head. Until recently, such color Doppler imaging could only be computed for small three-dimensional volumes. Until now, in order to create a color Doppler image for a clinically informative volume, measurements had to be carried out over several cardiac cycles, after which the partial volumes were stitched together. A prominent peak in the ECG, the R wave, is used as a reference point for this stitching process. However, this approach generally only works with patients who don't have any ECG anomalies. Other drawbacks are that the data isn't available in [real time](#) and the combined volumes can contain artifacts.

The new device is equipped with an extremely high performance computer architecture so that it can generate color Doppler images of larger, and thus diagnostically relevant volumes in real time. Engineers from Siemens have also developed a completely new scan head. Instead of the usual linear arrays, in which the piezoelectric elements that

generate the ultrasound are placed next to each other, the new TEE scan head Z6Ms uses a sheet-like matrix consisting of more than 2,000 piezoelectric elements.

This new scan head enables full-volume color Doppler images to be generated for 90° x 90° sections with a depth of 10 to 12 centimeters. The new system enables doctors who are surgically correcting a mitral valve, for example, to immediately see whether blood continues to flow back into the lung so that the inserted clip or implant has to be readjusted. Thanks to this new system, full-volume color Doppler images can for the first time also be used for patients suffering from ECG anomalies.

Provided by Siemens

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