

A New Frontier for Ultrasound

The advent of automated image acquisition in ultrasound has the potential to change the role of this modality forever. Siemens' ACUSON S2000 Automated Breast Volume Scanner (ABVS) is one of the first representatives of automated ultrasound systems developed to improve clinical workflow and take the operator dependence and variability out of ultrasound. *Medical Solutions* talked to Frank Stöblen, MD, one of the early adopters of this new technique.

By Andrea Röder

Biography of Dr. Stöblen

Frank Stöblen, MD, is the co-owner of three diavero Imaging Centers in North Rhine-Westphalia, Germany – one of which is a dedicated breast imaging center in the inner city of Essen. As one of the ten mammography screening locations in North Rhine-Westphalia, Stöblen operates it together with his colleague, Karlgeorg Krüger, MD. The practice offers the latest imaging technologies in the field of mammography, magnetic resonance imaging, and ultrasound, including an ACUSON S2000™ Automated Breast Volume Scanner (ABVS) from Siemens.

Stöblen received his postgraduate training at the University of Tübingen Medical School, Charité University Hospital, Berlin, and University of Essen Medical School, Germany. He specialized in the field of radiology. His medical background also includes a research internship at the University of Minnesota, Minneapolis, USA.

Mammography is the gold standard in breast imaging. However, it does have its limitations, especially in women with dense breast tissue. How do you assess the role of ultrasound for these patients?

STÖBLEN: For one, dense breast tissue increases a woman's risk of breast cancer considerably. This has been proven in many clinical studies around the world. Secondly, dense breast tissue makes the radiographic detection of small lesions more difficult – so we are actually faced with a dual challenge. This is why I always consider ultrasound as a meaningful adjunct to mammography when I have a patient with dense breasts. There have been studies on the evaluation of how many more carcinomas can be detected when combining mammography with ultrasound. However, the results vary from region to region because there is no worldwide standardization of breast screening programs. The breast cancer screening procedures in the United States are different from those in Europe or in Japan.

What are the main differentiators of the various screening programs?

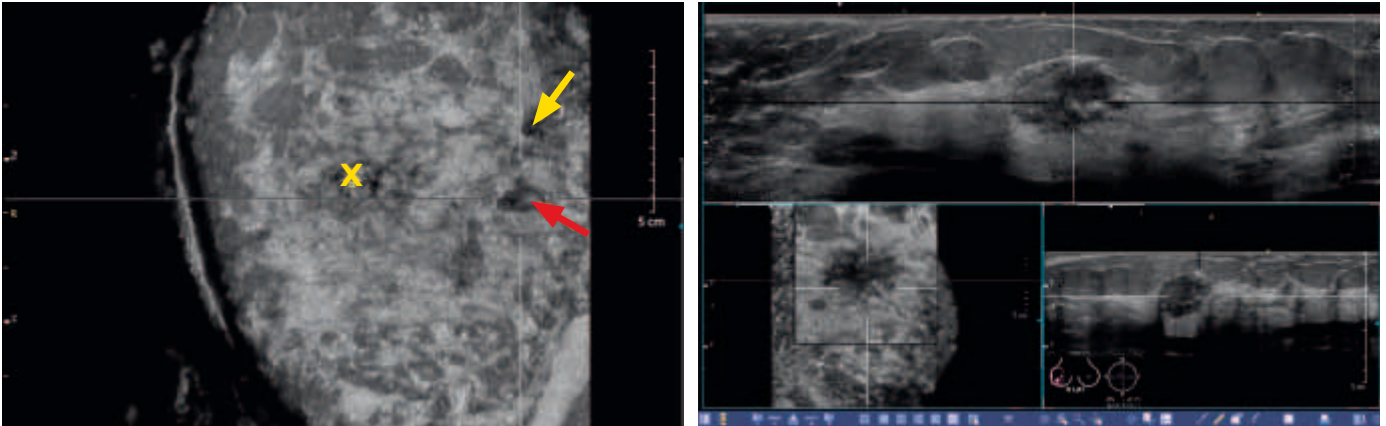
STÖBLEN: In many countries in Europe, screening mammography will be conducted every two years. In addition, the images require a double examination, with two independent radiologists analyzing the results. In the United States, the screening programs usually include an annual to biannual mammography starting at the age of 40, without double examination. However, I don't know of any screening program that includes a standard breast ultrasound. In any case, the German screening protocol currently requires the specification of breast density according to the BI-RADS®¹ density classification. This is important information to pass along to referring physicians and oncologists for continued surveillance and could ultimately lead to subsequent interval ultrasound examinations.

When do you routinely perform an ultrasound examination?

STÖBLEN: Whenever a patient comes to see me for a curative examination, for example, a mammography examination, which is not a part of the predefined

¹ Four progressively more dense patterns defined by the American College of Radiology (ACR) Breast Imaging Reporting and Data System (BI-RADS).





Coronal view of the breast in the lateral position demonstrates the location of a scar (yellow arrow) and a fibroadenoma (red arrow) in relation to the nipple (yellow X). The 3-on-1 hanging protocol reveals a complex malignant mass in the large acquisition plane (axial) and the corresponding orthogonal planes.

Summary

Challenge:

- Limitation of mammography for the visualization of irregularities in dense breast tissue
- Operator dependence and variability using conventional ultrasound

Solution:

ACUSON S2000 Automated Breast Volume Scanner (ABVS):

- Dedicated breast scanner acquires full-field volumes of the breast
- Visualization of anatomically intuitive coronal views
- Advanced handheld, high-resolution ultrasound capabilities for biopsy guidance
- ABVS Workplace supporting intuitive volume image analysis

Result:

- Streamlined clinical workflow, reduced acquisition time
- Accurate, reproducible, and efficient diagnoses for women with dense breast tissue
- Increased comfort for operator and patient

screening protocol. I usually provide an additional ultrasound for women with a density according to BI-RADS 3 and 4 to make sure that I have seen it all.

Where do you see the role of automated breast volume scanning?

STÖBLEN: I believe that this technique will play an important role in early detection. Patients with suspicious findings on mammography would automatically undergo automated breast ultrasound to better select further diagnostic procedures that might deliver additional information.

Automated breast volume ultrasound can also be used for examining high-risk patients, for example, women with a family history, women with increased genetic risk factors, or women who have had or are undergoing cancer treatment. Clinical studies need to be conducted to determine the benefits of automated volume ultrasound for young women, who tend to have denser breast tissue than older women.

You are participating in an international multicenter clinical trial that will compare automated breast volume scanning with handheld, physician-performed ultrasound examinations.

STÖBLEN: Yes, 1,500 patients will be examined in six leading breast imaging centers in the United States, Europe, and Japan. We will be conducting blind eval-

uations comparing the new automated technique with a handheld ultrasound when it comes to breast lesion detection: How sensitive is the new method? How specific? How efficient is the automated acquisition? We also hope to be able to define a specific workflow for optimal ABVS performance and usage in the clinical routine.

What was your first impression of the ACUSON S2000™ ABVS?

STÖBLEN: The system is a fascinating advancement of conventional, handheld ultrasound offering many advantages – for example, the reproducibility of images independent of the sonographer. In addition, it allows the complete coverage of the breast. Its automated image acquisition technique allows the examination to be performed without the physician present. The system delivers volumes of the breast that allow an evaluation of the images in all three dimensions. And finally, image analysis and reporting are performed at a workstation off the ultrasound system, increasing the system's patient throughput.

Reproducibility and standardization are becoming increasingly important in ultrasound. Do you agree?

STÖBLEN: The advantages of the reproducibility of examinations are quite obvious. In most countries, it is entirely up to the physician as to what he includes



The ACUSON S2000 Automated Breast Volume Scanner reduces operator dependence and variability.

it makes the results independent of the person who acquires the data. That way, the physician's time would not be tied up with image acquisition.

Do you see any other applications for automated ultrasound acquisition?

STÖBLEN: Absolutely. If automated volume acquisition proves to be efficient in breast imaging, I could imagine that the automated acquisition technique might be used for imaging other organs – for example, the thyroid or the liver, and also for the examination of peripheral vessels.

One of the major trends that influences general imaging is structured reporting, that is, the increased usage of standardized examination protocols. And automated acquisition techniques will ideally complement this trend. Knowledge-based workflow applications, such as

to perform a biopsy, I can do that right away with the same system using either the 14 or 18 MHz handheld transducers. Another factor that is increasingly influencing decision-making is, of course, reimbursement. Having the opportunity to expand the application versatility of our current systems with automated breast volume ultrasound is ideal from an economical point of view.

Volume imaging provides the unique coronal view of the breast. How important is this in your daily work?

STÖBLEN: I am trained in both radiology and surgery. This is why I can estimate the value of the coronal view, which has not been available using conventional ultrasound. It allows a surgical view of the breast, allowing the physician to go through the breast slice by slice, from the nipple all the way down to the chest

in the documentation. This may require another physician to completely evaluate the case on the basis of limited or very short image sequences. In the case of breast ultrasound, the automated image acquisition delivers full-volume images, which allow analysis and postprocessing at a workstation. Not only does this enable the presentation of the results to a larger audience or panel, it also offers views of the breast that couldn't be generated with a handheld 2D-ultrasound.

Do you think that the introduction of automated breast volume ultrasound will pave the way for the profession of a dedicated sonographer to be introduced in Europe and other places in the world?

STÖBLEN: Yes, automated breast ultrasound examinations could mark the beginning of a new, more physician-independent acquisition procedure, much like what is already done today in other radiology techniques. North American institutions have always had sonographers, who are usually very skilled and experienced. The automated acquisition of the full volume combined with the reproducibility of the images may introduce this standard in other countries, too, because

computer-aided analysis supported by expert databases of real clinical cases, will lead to significant improvements in workflow efficiency.

You have had the ACUSON S2000 ABVS system in clinical use for some time now. What's your assessment so far?

STÖBLEN: Compared to earlier generations of the system, I have noticed a great improvement in image quality. The concept of integrating the flexible arm construction to hold the transducer pod to design a multiuse system, which can also perform automated breast volume ultrasound, is very convincing. It allows us to use the examination room for other ultrasound examinations as well. If I need

wall. This is why it provides a more comprehensive and easily understandable representation of the global anatomy and architecture of the breast. The coronal view is extremely helpful in surgical planning, in preoperative, interdisciplinary councils of an intervention.

Andrea Röder is responsible for external communications, press, and media relations at Siemens Healthcare's Ultrasound Business Unit headquarters in Mountain View, California, USA.

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Frank Stöblen, MD, Diagnostic Radiologist, diavero Diagnostic Imaging Center, Essen, Germany

Further Information

www.siemens.com/breastcare