Native* TEQ Dynamic Ultrasound Technology Simultaneously Improves Diagnostic Image Quality and Patient Throughput

Since the introduction of TEQ ultrasound technology in 2000, radiologists experienced improved diagnostic confidence through the automatic correction of the most common technical errors, leading to improved image quality and improved patient throughput.

By Amy Cook

When TEQ™ ultrasound technology was first introduced to the ultrasound community in 2000, the response was extremely positive and it was touted as a truly remarkable achievement that signified a new era in ultrasound. World-renowned radiologists remarked that TEQ technology, or the "button", would help every patient, in every scanning situation, in every laboratory worldwide because it could correct the most common technical errors in ultrasound including unbalanced gain, undergained or overgained images and refractive shadowing. Once the TEQ button is pushed on the ultrasound system, gain is balanced, overall gain is appropriated and lateral gain is adjusted automatically.

TEQ DYNAMIC ULTRASOUND TECHNOLOGY is available on ACUSON Sequoia and SONOLINE Antares ultrasound systems.

The result is improved overall diagnostic image quality, increased diagnostic confidence and simultaneous improvement in patient throughput.

New Value Demonstrated to Medical Community

TEQ technology has enabled sonographers and clinicians to produce superlative, optimized grayscale images instantaneously, with the push of a button. However, TEQ technology optimizes a single image and the scan is no longer optimized as soon as the operator moves the transducer. Now, Siemens' ultrasound engineers have developed Native* TEQ dynamic ultrasound technology, which enables the computer to read the signals that are returning from the individual patient, and then automatically adjust the parameters while the operator is scanning, so all images are optimized in real time and the sonographer or physician can scan freely without having to touch the keyboard. There are no gain or depth-gain-compensation (DGC) control adjustments needed while scanning. The computer is programmed to perform advanced real-time motion analysis in addition to accurately detecting and differentiating noise and artifacts from soft tissue. The image gain is automatically optimized in the axial and lateral dimensions in real time, once the transducer touches the patient or anytime it is moved to a new acoustic window.

Once again, the initial response to Native TEQ is overwhelmingly positive. The Siemens Ultrasound Division revealed the newest technology to the medical community during its 11-city "New Visions in Ultrasound" symposium tour throughout the United States this past summer.

Clinical Evaluations

According to one clinical evaluator, Richard G. Barr, M.D., Ph.D., of Radiology Consultants, Inc., in Youngstown, Ohio, there is no longer the need to go back and forth between an optimized image and an unoptimized image during the exam. "The new Native TEQ technology instantly and automatically optimizes the image for you on the fly," he says. "Now, we are able to pick up subtleties and lesions we never could have before."

It can be both time consuming and difficult, especially for inexperienced or new sonographers, to consistently produce high-quality, optimized sonographic images. Native TEQ technology corrects the most common technical scanning errors by instantaneously eliminating unbalanced, undergained and overgained images automatically. It converts unbalanced images to high-quality sonograms, with uniform brightness throughout the entire field of view. Undergained scans may result, for example, when the sonographer deletes real information in an attempt to delete artifact from a fluid-filled structure. When ambient room light is too bright, as in the neonatal intensive care unit (NICU), a sonographer may compensate by increasing the system gain to improve visualization on the monitor, resulting in overgained images on film or on a review station. Native TEQ technology corrects all these problems, resulting in a virtually error-free scan without any attention diverted from the patient during the exam.

[1] Scrotal hematoma without TEQ technology.

[2] Scrotal hematoma with TEQ technology. (Images courtesy of Richard G. Barr, M.D., Radiology Consultants, Inc., Youngstown, Ohio, U.S.A.)

Big Impact

There are certain clinical settings where Native TEQ technology really makes a huge impact on the way scans are performed and reduction in exam time. One is in the intensive

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care unit (ICU). There is no longer the need for the clinician to be next to the machine or have total access to the keyboard. Once Native TEQ technology is turned on and the sonographer places the transducer on the patient in the correct field of view, they can scan without having to operate the keyboard. Therefore, sonographers can spend more time focusing on the patient and answering the clinical question at hand.

Dr. Barr feels the Native TEQ technology is particularly helpful during portable exams such as in the NICU or the OR, when quick, diagnostic exams are important and overgained studies often occur due to bright lighting conditions. "When we scan in the NICU, often times the sonographers will turn up the gain very high to optimize the screen for their viewing, and the end result is film that comes out too dark or too light. With the new Native TEQ technology running in real time, you know the filming will be perfectly optimized when you leave the unit."

Additionally, performing scans and biopsies in the OR not only requires moving a needle and the transducer, but also a sterilized ultrasound system. "Now, you can set up the system, turn on the Native TEQ technology and the images will constantly be optimized," says Dr. Barr, adding that a sterile drape can be placed over the machine because there is no need to touch the keypad anymore.

The new technology also lends itself well to breast imaging. Imaging fatty and dense tissue in a small area used to require frequent use of the TEQ technology control to obtain a variety of optimized images. Most of the time, sonographers or physicians would scan without TEQ technology on until they noticed something suspicious, then they would optimize the image for a better view. With the image continuously optimized, a scanner's eye is always optimized as well, and there is more time to focus on the patient versus the technology of the ultrasound system.

This new technology may help physicians to compare images taken over time to evaluate for echogenicity changes in the liver, for example fatty liver, hepatitis and for pre- and posttreatment lesions. Additionally, it could play a vital role in the follow-up of renal transplants, as well as with contrast applications by helping to standardize the degree of enhancement.

It is safe to say that a majority of ultrasound sonographers and physicians use Siemens' TEQ technology routinely on all examinations. Some experts say that from the first day they began using the Tissue Equalization Technology on the ACUSON Sequoia™ ultrasound system, scanning has not been the same. It has helped experienced and inexperienced users alike to efficiently produce high-quality images. Today, TEQ technology is available on Siemens' SONOLINE Antares™ and ACUSON Sequoia ultrasound systems, and Native TEQ technology will be available on the Sequoia system in early 2005.

More Confident Diagnoses

Native TEQ technology consistently and continuously acquires images at a quality level difficult to achieve, even for the most experienced users. And, because with Native TEQ technology, the adjustment of system controls during an exam is eliminated, ultrasound studies are now completed much faster and more efficiently. Because Native TEQ technology helps to speed up the exam, workflow and throughput also increase, and the end result is a technically superior scan. This all translates into more confident diagnoses by sonographers and physicians alike.

Native TEQ technology lends itself well to a modality that is known for its operator dependence. With the new technology, the ultrasound image no longer depends on the user for gain adjustment: the technology automatically adjusts the system controls and constantly optimizes the images for you. Not only does this enable sonographers to spend more time focusing on the clinical exam, but it also alleviates the potential for repetitive stress injuries due to fewer keystrokes during exams.

*The Native TEQ Dynamic Technology requires 510(k) review and is not yet commercially available.

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