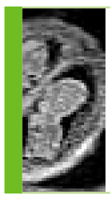
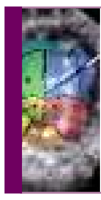
ultrasound post

technical development and medical research – NEWS and FACTS.

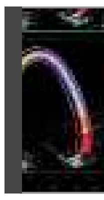
2006 / 3rd edition **No. 14**



New High-Resolution Vaginal Probe for 1st Trimester Examinations 2



Easy, Fast and Accurate Assessment **4D Left Ventricle Volume** 3



From Research to Clinical Routine **Automated Function Imaging (AFI)** 4

VCAD - Volume Computer Aided Diagnosis in Ob/Gyn 5

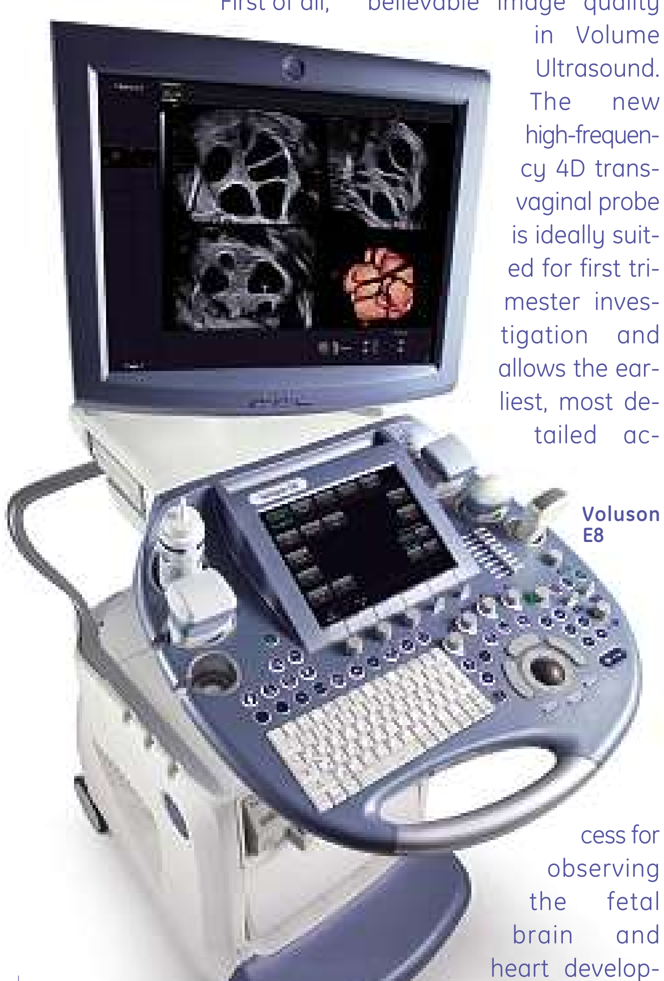
Women's Health and Echocardiography – GE proves Global Leadership

Solingen, Germany. In the past decade, ultrasound technology has made tremendous progress in terms of possible new applications and precise results within these applications. GE Healthcare has established itself as a trendsetter in this market by setting milestone after milestone, such as TruScan Architecture, Speckle Reduction Imaging, Strain and Strain Rate Imaging, Real Time 4D or Volume Ultrasound, all of which have had a huge impact on all branches of medicine in which ultrasound is a relevant tool for diagnostic confidence.

Another challenge in ultrasound research is the ability to diagnose any finding as early as possible. And here again, GE Healthcare is the trendsetter. Thanks to the development of Active Matrix Transducer and technologies with the highest possible frequencies, physicians can evaluate the most relevant organs of a fetus as early as during the first trimester of pregnancy with precision that was unimaginable just one year ago. This objective fact marks another milestone and demonstrates the continuity of our leadership on the ultrasound market. In women's health, we are pleased to launch a brand new system - Voluson E8 - with outstanding image quality and an ergonomic concept that meets the demanding requirements of sonographers and physicians. And in the field of cardiology, we are proud to introduce the Vivid 7 Dimension Breakthrough 06 with unique features for both diagnostic confidence and workflow efficiency.

Voluson E8 – A brand new concept in women's health

First of all, the Voluson E8 concept contains a revolutionary and outstanding 2D image quality that many would argue has never been seen before. This 2D image quality is based on our Matrix Array Volume Transducer technology which allows you to focus the region of interest in all depths simultaneously and with the highest levels of precision. This advanced technology generates perfect 2D images which are the basis for obtaining unbelievable image quality in Volume Ultrasound. The new high-frequency 4D trans-vaginal probe is ideally suited for first trimester investigation and allows the earliest, most detailed access for observing the fetal brain and heart development. In addition, the success of fertilization can be validated earlier than ever before. Other innovations are improving workflow efficiency and providing better ergonomics to help physicians and sonographers in terms of physical comfort. Volume Computer Aided Diagnosis (VCAD), for instance, is an automated STIC software tool for fast and easy access to the most relevant views of the fetal heart. After a standard 4-chamber view volume sweep, the software automatically offers 4 render views required for a standard examination of the fetal heart. Another aspect of the Voluson E8 concept is the unique ergonomic design of the system. According to the latest research results, the majority of sonographers and physicians who perform frequent ultrasound examinations suffer from musculoskeletal discomfort after a number of years. With Voluson E8's ergonomic design, we are able to offer all of the recommended ergonomic parameters for ultrasound systems. Thanks to the electric and magnetic technique and the user-friendly ergonomic handling of the small and compact machine, we offer you, the Ultrasound user, a solution that meets your demands.



Voluson E8

AFI – Automated Function Imaging – Vivid 7 Dimension is bringing research to clinical routine

One highlight of the Vivid 7 Dimension Breakthrough 2006 is the 2D-Strain Speckle Tracking-based ventricular wall motion assessment tool, AFI. Leveraging data acquired from numerous studies with the 2D-Strain research tool of the EchoPAC workstation, Automated Function Imaging was developed and migrated into the Vivid 7 Dimension as an easy-to-use clinical routine tool. From three standard apical views, all information is gathered to generate a color-coded bull's-eye plot, instantly displaying the myocardial deformation in every ventricular segment. Undoubtedly, this is the most promising tool for rapid quantitative LV wall motion assessments. Other new functionalities are derived from the 4D and Multidimensional imaging modalities. The new Advanced Tissue Synchronization Imaging tool, based on simultaneous Tri-Plane Imaging, is universally accepted for CRT. Real time 4D rendering provides a new level of clarity of cardiac anatomy. In addition, new Real time 4D Color Flow imaging gives excellent understanding of flow jet morphology. From TOMTEC, the global leader in 4D echocardiography, we have adapted the extensively validated 4D LV Volume quantification package into our EchoPAC workstation environment. Vivid 7 Breakthrough 2006 is clearly the system to see.

Vivid 7 Dimension

On the pages that follow, our Ultrasound Post authors have gathered together for you more information and results currently available from initial clinical trials that showcase both cardiac and women's health-care innovations along with many more interesting facts from other ultrasound-related topics such as bone densitometry. I wish you enjoyable reading.

Yours

Heinz GLOOR
Vice President / General Manager
GE Healthcare Technologies
Ultrasound & PCD
Europe, Middle East & Africa

Performance in the First Trimester of Pregnancy

The New High-Resolution Vaginal Ultrasound Probe


Fig. 1

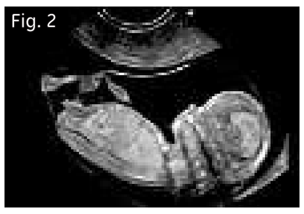


Fig. 2


Fig. 3a


Fig. 3b


Fig. 4


Fig. 5

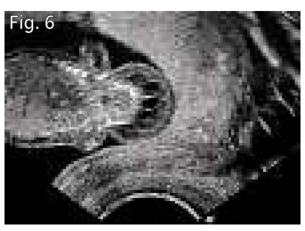


Fig. 6


Fig. 7

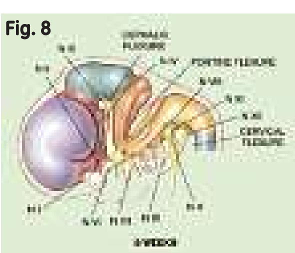


Fig. 8

Picture from Prentice Hall -cwx.prenticehall.com


Fig. 9

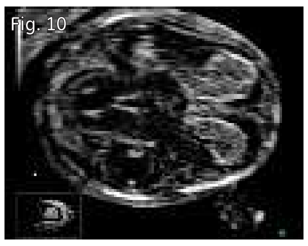


Fig. 10


Fig. 11


Fig. 12


Fig. 13


Fig. 14


Fig. 15

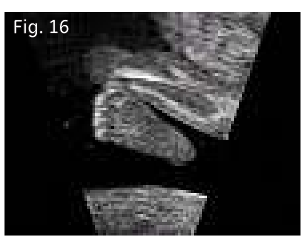


Fig. 16


Fig. 17


Fig. 18

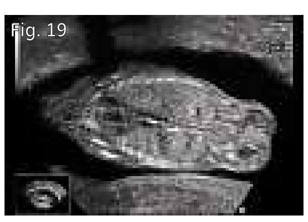


Fig. 19

Figures 1 and 2:
In a sagittal section, observations can be made regarding the size of the fetus and its proportions. The basic anatomy is clearly seen with clear imaging of both thoracic and abdominal organs, lungs, liver, bowels, bladder and the facial profile.

Figures 3a and 3b:
The fetal head, brain, nuchal translucency and the nasal bone can be examined. However, it is extremely difficult to obtain an exact midsagittal section due to the limited range of movements that are possible with the vaginal probe compared to a transabdominal probe. Figures 3a and 3b show how close a slightly parasagittal section through the choroid plexus (Fig. 3a) and a midsagittal section through the third ventricle of the brain are (Fig. 3b).

Figure 4:
A case with increased nuchal translucency measurement. Typical septations are demonstrated in the subcutis running in a radial fashion between the skin and the deeper fascia layers.

Figures 5 and 6:
The high-resolution probe demonstrated that the same kind of septations are present in the subcutaneous fluid collection around the trunk .

Figures 7 and 8:
At a CRL of 23mm (8 weeks and 5 days), the developing pontine flexure of the brain with the cranially positioned mesencephalon is well defined.

Figure 9:
12 weeks of gestation: ossification of the skull, the two hemispheres and the choroids plexus with irregular posterior contour and small cysts can be seen.

Figure 10:
Developing 3rd and 4th ventricles in the 11th week.

Figure 11:
Thalami, cerebral pedunculi and the cerebellum at 12 weeks of gestation.

Figure 12 and 13:
Case of acrania, where the bones of the neurocranium failed to develop, disrupting the development of the brain. This fetus also demonstrated facial defects, with otherwise normal somatic development.

Figure 14:
Hand buds in the 8th week

Figure 17:
Images of the fetal thorax at 12 weeks with the normal relation of the lungs and the heart. The 4-chamber view of the heart is seen with the intact septum, the equal-sized chambers and the normal offset of the atrioventricular valves.

Figures 18 and 19:
The fetal kidneys appear more echogenic than in mid-trimester, and can be delineated at 11 weeks (Fig. 18), and are highly visible at 12 weeks (Fig. 19).

We were recently given the opportunity to test the new high-frequency probe for transvaginal ultrasound examinations, designed for the Voluson E8. Initial experience at 9 to 14 weeks of pregnancy showed striking detail due to the high frequency with excellent penetration. It offers the same options for pre- and post-processing image enhancement as earlier models (SRI – Speckle Reduction Imaging, and CRI – Compound Resolution Imaging). Ultrasound technology has been improving continuously since the first publications on nuchal translucency appeared in the early 1990s. This has enabled clinicians to move screening and diagnosis from mid-trimester to earlier stages of pregnancy. The availability of such a high-resolution probe will further improve screening for chromosomal abnormalities and fetal malformations in the first trimester.

First trimester screening

Studies have shown that parents prefer early screening for chromosomal abnormalities. It has become widely possible to screen for trisomy 21 by first trimester ultrasound and maternal serum biochemistry with a detection rate of more than 90% at a 5% false-positive rate (OSCAR). During this ultrasound examination, it is now possible to assess most of the fetal anatomy in the first trimester in detail that was only possible at 16-22 weeks just 10-15 years ago. The high-resolution images of the new vaginal probe improve the accuracy of the scan and make it faster and easier (Fig. 1, 2).
The organs can be assessed according to their stage of development during the routinely offered screening for Down's syndrome in the first trimester. (Fig. 1, 2, 3a, 3b)

Increased nuchal translucency

In case of abnormal findings, the probe is capable of depicting detail that is otherwise rarely, if ever, seen. This is a case with an increased nuchal translucency measurement. The high resolution shows the typical septations in the fluid collection behind the neck. The septa run between the skin and the deeper fascia layers in a radial fashion and therefore cannot be seen on the routine midsagittal views used for the measurement of CRL and the evalation of NT and the nasal bone (Fig. 4). In cases of severely increased nuchal translucency such as the one presented, the increased fluid collection is extended to a generalized skin edema. The high-resolution probe demonstrated that the same types of septations are present in the subcutaneous fluid collection around the trunk (Fig. 4, 5, 6).

Development of the brain

The brain undergoes rapid morphologic development in the late embryonic and early fetal period. The new probe is able to provide images where this process can be better understood. (Fig. 7, 8, 9)
At a CRL of 62mm (12 weeks and 4 days) the ossification of the skull, the two separated hemispheres of the telencephalon and the choroid plexus in the large ventricles can be seen (Fig. 9). The choroid plexus always has irregular edges and small cysts at this early gestation which seem to be part of normal brain development.
As we tilt our transducer towards the posterior fossa, the developing pons can be visualized, along with 3rd and 4th ventricles (Fig. 10). There is a small, choroid plexus cyst in the lateral ventricle.
At 12 weeks, thalami, pedunculi cerebri, and the completely formed cerebellum can be seen. (Fig. 11)
Understanding the normal development of the brain also helps in diagnosing developmental problems. The following case was referred to our unit because of "insufficient views of the head". With the new probe, acrania became evident. (Fig. 12, 13, 14)
It is not only possible to examine the brain with great detail, but also the major organs and the extremities. The small buds of the extremities appear around week 8 and can be seen here (Fig. 14). The hands and feet including fingers and toes are visible in the first trimester, here, for example, at 12 weeks. (Fig. 15, 16)
Technical development is of particular importance when it comes to the examination of the fetal heart and abdominal organs. Despite detailed first and second trimester ultrasound examinations, heart abnormalities are still the most common congenital defects. As seen in Fig. 17, the probe is capable of providing us with images of the heart that are comparable with views seen in the second trimester. (Fig. 17, 18, 19)

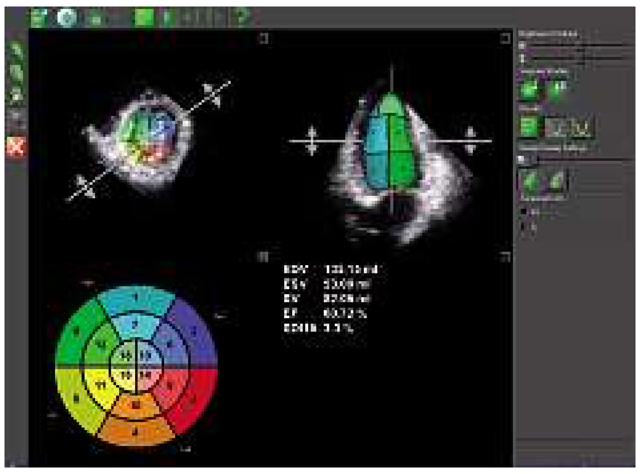
Summary

The high resolution of this transvaginal probe will provide amazing opportunities in first trimester screening for structural abnormalities. However, some structures have a different outline and echogenicity compared to images obtained with lower frequency probes. The normal appearance of the anatomy needs to be studied before more subtle abnormalities can be identified.

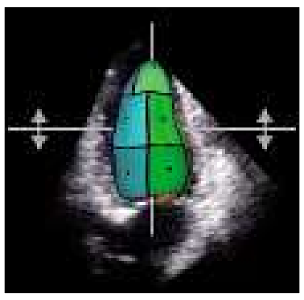
Univ.-Lect. Dr. Elisabeth KRAMPL
Dr. Bence CSAPO
General Hospital - University Clinics
Vienna

Easy, Fast and Accurate Assessments

4D Left Ventricle Volume

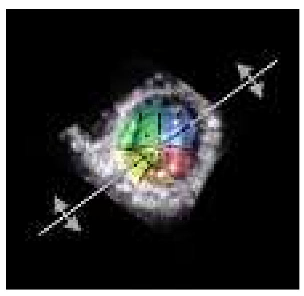


Quantifying left ventricular volumes
Echocardiography is reaching new dimensions with Real-time 4D imaging and quantification.
Now EchoPAC™ Dimension gives users the ability to quantify volume information, increasing their clinical confidence by providing clinically relevant information for routine patients. Using the exceptional real-time full volume image quality produced by Vivid™ 7 Dimension, the 4D LV volume tailored package from TomTec Imaging Systems can provide a full assessment of the left ventricle, free of geometric assumptions and shape, in less



than a minute. 4D LV volume features advanced volume finding algorithms for an easy, fast, accurate and highly reproducible functional analysis of the left ventricle.

4D LV volume rendering
4D LV volume tracks the endo-cardial border of the ventricle in three dimensions, thus providing a model that represents the true geometry of the ventricle instead of relying on shape assumptions. Stroke Volume and Ejection Fraction are derived from those measurements with higher accuracy than 2D methods allow.
Using a 16-segment model, a subdivision of the ventricle is performed for regional volumetric analysis. Not only can resting transthoracic information be analyzed, but stress echo datasets can be analyzed as well from the Vivid 7 Dimension.



4D LV volume analysis:
The following global and regional measurements are derived:
EDV - End Diastolic Volume
ESV - End Systolic Volume
SV - Stroke Volume
EF - Ejection Fraction

Prof. A. FRANKE, Aachen, Germany: **"The LV-Volume tool is quick, robust and intuitive, also for non experienced users. The way from EchoPAC to the 4D LV function tool works good. We will use it for patients with reduced LV function, wall motion abnormalities or asynchrony.**
It has a good chance to become a routine tool for these cases, because the controlled 4D acquisition with V7 is relatively easy. The result, reliable volumes and the SDI (Systolic Dysynchrony Index), are worth additional 3 minutes overall time (transfer from EchoPAC to 4D LV-Volume, plus time for the LV function assessment itself."

Free Access to Cardio Image Gallery

Due to the high demand for clinical ultrasound images for internet websites, practice marketing, presentations or educational purposes, GE Healthcare offers a cardio image gallery on the Internet. Under the URL: **www.vividlibrary.com**, cardiologists are able to register completely free of charge in order to download ultrasound images for their personal needs. Currently, the database contains over 250 clinical cardiovascular ultrasound images with normal and pathological cases of 2D, Color Doppler, Tissue Doppler or Strain Rate Imaging and finally 4D and 4D Color Imaging for the entire VIVID ultrasound system family.

In the folder "V7 Dimension", technical animations are also available demonstrating Bi-plane Imaging, Tri-plane Imaging, 4D Rendering, 4D Volume Color, and 6- and 9-Slice Imaging. All images can be downloaded in various formats such as JPEG, MPEG, AVI and even Raw-Data, so don't hesitate to visit **www.vividlibrary.com** and get your free access password within 24 hours.

www.**VIVID**Library.com

Digital Ultrasound Network in a Mixed Environment

Digital ultrasound acquisition and especially storage has profoundly changed the way we perform echocardiography. In 1996, the first System Five arrived at the Department of Clinical Physiology in Linköping. We had previous experience with digital ultrasound for stress echo (Vingmed 800C) and even earlier from connecting a Macintosh computer to a CFM 750 to transfer image loops for analysis in the Vingmed EchoDisp software.

However, the pressure to acquire digital technology came from the need to speed up our clinical work, saving digital loops for more rapid review and also having quicker access to earlier studies, without the time-consuming review of video tapes.

The first pitch for digital storage was made in 1998, but it wasn't until 2000 that the first image server was operational.

Early on, we realized the need to look for a solution that would incorporate echo machines at the two other hospitals in the county of Östergötland. Patients were frequently transferred between hospitals in the county and a common database became necessary just as we were implementing a county-based EKG database. Not having the server in the local hospital required considerable trust from the other hospitals along with our cooperation in order to provide committed service to all users. In addition, we wanted to store vascular studies in a similar way, also from ultrasound equipment using the DICOM standard.

Fortunately, GE had a development project to accommodate DICOM images in addition to the GE Raw Data. This allowed us to begin storing data from other vendors' equipment in 2001. Since we are a tertiary care hospital, it also became necessary for us to be able to receive images for consultation and for early decisions on treatment options for patients being treated as far as 250 km away.

With the ImageVault Server, we had a DICOM-based solution that could store cardiovascular ultrasound for 440,000 people as well as receive review requests from 6 hospitals serving 570,000 people. As of now, we have 49,000 studies and 3.7 terabits of images in the database.

We also discussed the final storage of the ultrasound images in the PACS with the PACS provider at Linköping University Hospital, but we found it to be more advantageous to have the long-term storage in the ImageVault set-up.

The web browser functionality provided in the ImageVault server allows images to be displayed on the internal web server and has proven to be a very useful productivity tool. As with all network-based solutions, we had occasional issues at the outset due to heavy network traffic over switches, routers and servers.

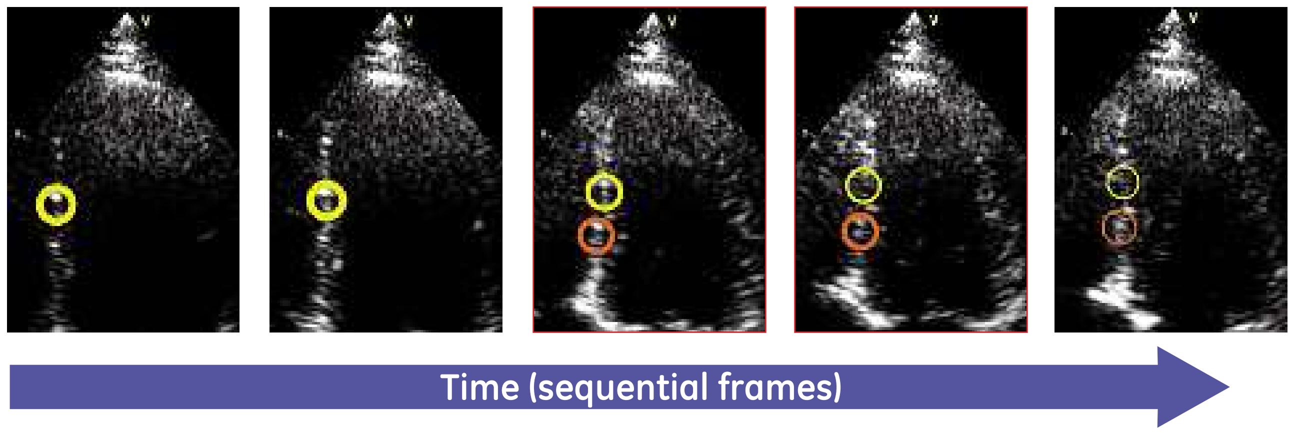
Today we are extremely satisfied with digital data storage and management, with the ability to respond to requests for second opinions from cooperating hospitals and with all of the advanced post-processing functions of the EchoPAC PC workstations enabled by the Raw-Data concept. It has significantly improved workflow and productivity in our echo department.

Jan ENGVALL, MD, PhD
Linköping University Hospital, Sweden

From Research to Clinical Routine Automated Function Imaging (AFI)

Overview
Automated Function Imaging (AFI) provides a clinical decision support tool for assessing left ventricular function at rest. When left ventricular function can be visualized, yet assessment is questionable, AFI uses computerized quantitative assessment to highlight potential wall motion abnormalities. AFI can also potentially be used to differentiate disease from non-disease segments and to learn more about the various strain patterns indicative of specific disease types.
The computerized assessment presents the data in four different modes: a parametric image, an anatomical M-Mode, a strain graph and bull's-eye display. The AFI algorithm non-invasively tracks and analyzes peak systolic strain based on 2D strain.

In addition to providing clinical decision support, AFI also decreases LV function assessment variability and streamlines workflow while improving laboratory quality assurance. The clinician selects the views to activate the algorithm, marks aortic valve closure timing critical to accuracy, and then anchors three points inside the myocardial tissue. The algorithm differentiates tissue from blood space to improve accuracy when defining the region of interest.
The three-click method minimizes variability potentially created in a manual tracing process. Two points placed at the base along the mitral valve annulus and one at the apex trigger the automated process. The clinicians can override the processed image results at any time. AFI is available on Vivid 7 Dimension and EchoPAC with Breakthrough 2006. It can process and analyze data acquired on any GE Vivid product that meets the algorithm's minimum requirements.



How AFI Works
The algorithm tracks the percent of wall lengthening and shortening in a set of three longitudinal 2D-image planes (apical long, two chamber and four chamber) and displays the results for each plane. It then combines the results of all three planes in a single bull's-eye summary, which presents the analysis for each segment along with a global peak systolic value for the left ventricle.
Similar in concept to MRI tagging, AFI objectively analyzes myocardial motion by tracking features ("natural acoustic tags") in the ultrasonic image in two dimensions (see Figure 1). AFI could potentially be used to differentiate disease from non-disease segments and to learn more about the various strain patterns indicative of specific disease types. AFI is not a border detection program.

Fig. 1: Motion and velocities are analyzed by calculating frame-to-frame changes using "natural acoustic tagging". New features (orange circles) keep coming into the image as old ones (yellow circles) fade away.

Integrating into Clinical Practice
AFI is easily integrated in routine clinical practice. The following steps require little time to become proficient.

Vivid 7 Dimension AFI Acquisition
- Acquire APLAX, A4-C and A2-C and store. Acquiring all views at the same time will assure similar heart rate.

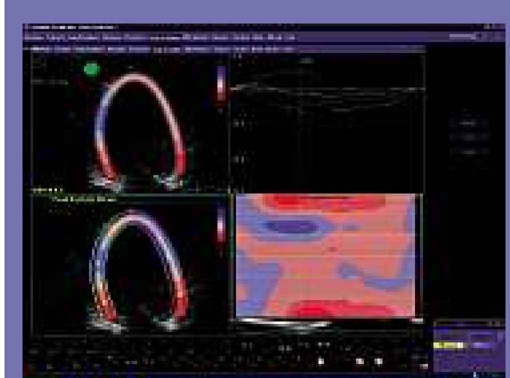
Vivid 7 Dimension and EchoPAC Analysis
Measurement:
- Load APLAX view, press Measure and select AFI folder. Then define APLAX view.
- Define ROI by following instructions on screen.
- Assess tracking, then press Approve.
- Adjust AVC closure by preferred method.
- Repeat the define and assess process for A4C and A2C.

Analysis:
- Press bull's-eye display key and Lower Panel Assign key. Then press Store.

Clinical Case Study / Evaluating Cardiomyopathy Correlating AFI with MRI

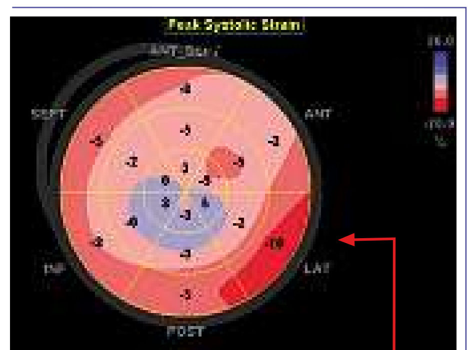
This patient had an MRI study showing diffuse scar with a regionally viable area that localized very well on the AFI strain bull's-eye.

Optimization tip:
Acquire all three apical views sequentially to get similar heart rate. The algorithm accepts 40-70 frames per second with or without dual focus.



Display of the 2D parametric image, anatomical m-mode, strain graph and bull's-eye for each plane helps the clinician build knowledge of the patient's heart before the three planes are combined for the final result.

Workflow tip:
The bull's-eye button is active when all three apical views are analyzed.



The patient has non-ischemic cardiomyopathy with global hypokinesis and akinesis on MRI. AFI displays viable tissue in the lateral wall.

The contrast-enhanced MRI in the short axis shows an extensive transmural scar with relative preservation of the lateral wall.

Optimization tip:
AVC, which is critical to the accuracy of results, can be set by the user before AFI processing and adjusted after processing.

Workflow tip:
To adjust AVC once it is defined and confirmed:
1. Use the AVC rotary on the scanner
2. Move cursor AVC marker on the EPPC

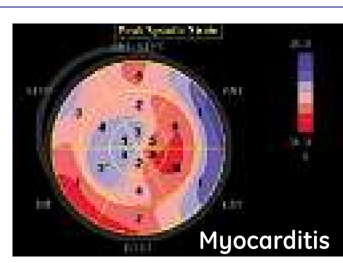
Workflow tip:
Store the quad screen to the clipboard for documentation and use later in the report.

Clinical Case Study / Evaluating Myocarditis

The bull's-eye parametric image of the peak systolic deformation (strain) is from a patient with myocarditis.

The left image was taken at the onset of the disease. The right image is after recovery.

Quick tip:
A full set of data is stored to the worksheet when storing bull's-eye.



Susan PHILLIP, RCS
Zvi FRIEDMAN, PhD
Elizabeth HARRISON, MS, RDCS

List of references on page 6

The Time has Come for its Clinical Application

Volume Computer Aided Diagnosis (VCAD) in Obstetrical Sonography

Ultrasonography is an operator-dependent imaging modality, with the quality of the final image dependent in part on the manual skills of the operator performing the ultrasound examination. This inherent limitation of ultrasonography has resulted in lack of consistency, standardization and reproducibility of images especially when compared to other imaging modalities, such as computed tomography and magnetic resonance imaging. In obstetrical ultrasonography, the limitation of the technology is compounded by a constantly moving target; the fetus, which adds a technical difficulty to the examination. Several studies have documented that the efficacy of obstetrical ultrasonography, is dependent on the expertise of the operator and a significant difference has been reported between tertiary and non-tertiary centers in the detection of fetal abnormalities (1, 2).

Furthermore, for anatomically complex organs, such as the fetal heart, population-based studies have shown poor detection of abnormalities (1-4). In a recently published study on the detection of congenital heart disease in a non-selected population, less than half of major cardiac malformations were detected prenatally and the experience of the operator had a significant impact on the prenatal detection rate of congenital heart disease (4).

Figure 1. 3D volume of fetal chest acquired at the level of the four-chamber view at 18 weeks gestation. The volume is initially standardized in plane A, by rotating along the Z axis until the spine is at 6 o'clock (thick arrow) and by placing the reference point on the ventricular septum at the insertion of the tricuspid valve (thin arrow).

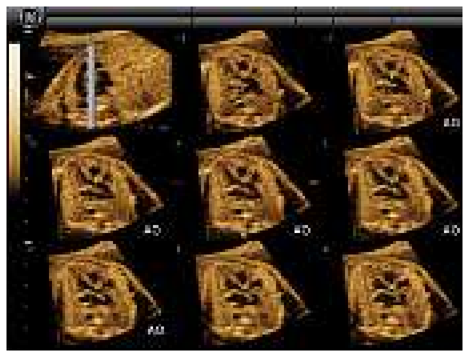


Figure 2: VCAD applied at cardiac 1 level which best shows the left ventricular outflow tract. Note that the aorta (AO) is clearly seen in 5 planes (labeled).

The introduction of volume sonography (3-dimensional [3D] sonography) to obstetrical imaging provided an advance in imaging technology. With 3D ultrasonography a volume of a target anatomic region, which contains an infinite number of planes, can be acquired. Such volume can be displayed in 3 orthogonal 2D planes representing the sagittal, transverse and coronal planes of a reference 2D image within the volume. Using various rotations along the X, Y, and Z anatomic axes, the operator has the ability to display any reconstructed 2D plane within the volume. Despite these obvious advances afforded by 3D ultrasonography, the acquisition, display and manipulation of 3D volumes is a technique that requires a substantial learning curve.

In obstetrical ultrasonography, the variable position of the fetus within the uterus further adds to this technical difficulty and limits its clinical applicability especially as it involves complex anatomic structures such as the fetal heart.

The ability to automate the retrieval of 2D diagnostic planes out of a 3D volume has significant advantages in clinical practice. This application, which is made available by the advances in 3D ultrasonography, has the potential to allow for an automated display out of a volume of all the 2D planes that are required for a complete anatomic evaluation of the target organ within the acquired volume.

Furthermore, the automated retrieval of planes out of a 3D volume results in a more standardized display of anatomic 2D planes and reduces the operator dependency and technical difficulty of obstetrical 2D sonography.

This approach, when applied to the fetal heart, is based on the determination of the spatial relationships of the various diagnostic planes (left ventricular outflow tracts, right ventricular outflow tracts, stomach, others) to the four-chamber view plane within a volume of the fetal chest. The consistency in the relationships between the diagnostic planes and the four-chamber view plane in the second trimester of pregnancy allowed us to write a software, termed Volume Computer Aided Diagnosis (VCAD), which automatically displays the 2D diagnostic planes out of a 3D volume acquired at the level of the four-chamber view of the fetal heart. The addition of Tomographic Ultrasound Imaging to VCAD improves software performance as it minimizes the inherent variability between fetuses. Figures 1-4 illustrate the VCAD software.

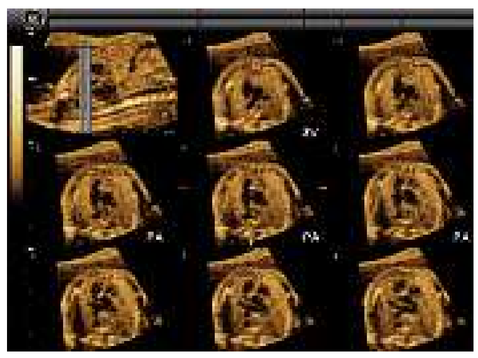


Figure 3: VCAD applied at cardiac 2 level which best shows the right ventricular outflow tract. Note that the pulmonary artery (PA) is clearly seen in 3 planes (labeled) and the 3-vessel (3V) view is seen in one plane (labeled).

Figure 4: VCAD applied at cardiac 3 level which best shows the stomach at the level of the abdominal circumference. Note that the stomach (STMK) is clearly seen in 4 planes (labeled).

The advancing 3D technology, will allow for an enhanced reliability and ease of use of the VCAD software in the near future. By standardizing the approach to image acquisition and display and by substantially reducing the possibility of human error and reducing scan time, VCAD will improve the diagnostic acumen of ultrasound imaging and thus prove advantageous to clinical practice.

Alfred ABUHAMAD, MD.
Professor and Chairman, Department of Obstetrics & Gynecology Eastern Virginia Medical School

List of References on page 6.

Comment by **Pierre RADZIKOWSKI,** Marketing Manager GE Healthcare Ultrasound Europe, Middle East & Africa

The Future is just Beginning – Exciting Developments in Ultrasound Technology

The responsibility carried by physicians in their everyday practice in making diagnostic decisions is unparalleled because there is nothing more important than human life. As far as possible, GE tries to help you by sharing at least part of this responsibility. All of our teams are committed to continuous improvement for the benefit of both patients and physicians, because in the end, all of us are, or can be patients ...

All of this, what was, is and will be happening within our industry would not be possible without close collaboration with you, the medical professional. Thank you for sharing your ideas, providing constructive criticism when needed, and constantly driving us to improve.

It's just the beginning

Excitement is the first word that comes to my mind when I think of medical technology. Not only because we currently provide the latest innovations in ultrasound available on market today, but also because this is just the beginning of our journey. By setting up application-focused research groups (Voluson line for Ob/Gyn, Vivid line for Cardiology, LOGIQ line for Radiology) we have been able to increase the speed and the effectiveness of solutions introduced to the market. As a technology provider capable of making Volume Ultrasound available across all platforms, this marks the very beginning of our collective journey of diagnostic discovery with medical professionals like you. When I look toward the future, I am convinced that we are just starting to discover what information can do, and what acquired ultrasound volume is capable of delivering.

Within the next few years, Volume Ultrasound will become a standard part of routine examinations in every field of application. At the same time, technology will allow us to provide you with more powerful ultrasound diagnostic tools in a much smaller "box" than just a few years ago. With new ultrasound capabilities and smaller size, ultrasound systems may become the stethoscopes of the future. **How is it possible not to be excited about all of this!?!**

Introducing the New Lunar Prodigy Primo™ Bone Densitometer for Seamless Osteoporosis Management in Everyday Clinical Practice

Completing its Lunar BMD portfolio of excellence in the performance segment, GE Healthcare proudly introduces the new Lunar Prodigy Primo™ system. Built on the foundation of the industry gold standard Lunar Prodigy, proven to be the most precise method for bone density diagnosis and fracture risk assessment, the Lunar Prodigy Primo™ offers the breakthrough of direct digital narrow-angle fan-beam technology, including best precision and accuracy, in a redesigned and streamlined package to meet the needs of everyday clinical practice.

"We are incredibly proud of our technology's role in the important fight against osteoporosis," said Jennie Hanson, president of GE Healthcare's Lunar BMD business. **"With the Lunar Prodigy Primo™, we can now take BMD to a broader spectrum of clinicians to help detect BMD issues earlier, diagnose more precisely and make better treatment decisions."**

At the heart of the Lunar Prodigy Primo™ are the revolutionary enCOREXpress and OneScan easy operation techniques and the breakthrough digital narrow-angle fan-beam technology. This enables easy yet confident operation for bone specialists:

- Perform a BMD exam on AP Spine and DualFemur in six clicks, from measurement to final results.
- OneScan helps to perform a BMD exam in about three minutes, with as few key strokes and as little patient positioning as possible, without compromising precision or accuracy.
- TruView eliminates the inherent magnification and distortion effects of wide-angle fan-beam densitometry.
- Direct-Digital technology delivers high-resolution and rapid imaging in seconds, at a fraction of the dose of scintillating detector fan-beam technologies.

With the Lunar Prodigy Primo™ GE Healthcare continues its leadership and commitment in developing the world's most precise DXA measurement equipment.

Pascal SITTER,
Product Manager Lunar BMD for Europe, Middle-East & Africa

List of references of page 4 and 5:

Computer Assisted Diagnosis in Obstetrical Sonography

Becker M, Bilke E, Kuehl H, Franke A, Katoh M, Hanrath P, Hoffmann R. Quantitative analysis of regional myocardial function based on pixel tracking in 2D echocardiographic images. University Hospital Aachen, Aachen Germany.

Becker M, Bilke E, Kü'9fhl H, Franke A, Hanrath P, Hoffmann R. 2D strain computer vision analysis allows accurate evaluation of regional systolic left ventricular function as defined by magnetic resonance imaging. University Hospital Aachen, Medical Clinic I, Aachen, Germany.

Becker M, Bilke E, Kuhl H, Katoh M, Kramann R, Franke A, Bucker A, Hanrath P, Hoffmann R. Analysis of myocardial deformation based on pixel tracking in 2D echocardiographic images allows quantitative assessment of regional left ventricular function. Heart. 2005 Dec 30;published online.

Korinek J, Wang J, Sengupta P, Miyazaki C, Kjaergaard J, McMahon E, Abraham T, Belohlavek M. Two-dimensional strain–doppler-independent ultrasound method for quantitation of regional deformation: validation in vitro and in vivo. J Am Soc Echocardiogr. 2005;18(12):1247-1253.

Lopez CS. Two-dimensional strain imaging echocardiography for the evaluation of global left ventricular function: early validation studies. Rush University Medical Center, Chicago, IL.

Marwich T. Automated analysis of regional LV function: definition of a normal range with 2D strain. Queens Hospital, Brisbane, Australia.

Reisner SA, Lysyansky P, Agmon Y, Mutlak D, Lessick J, Friedman Z. Global longitudinal strain: a novel index of left ventricular systolic function. J Am Soc Echocardiogr. 2004;17(6):630-633.

From Research to Clinical Routine Automated Function Imaging (AFI)

1) Ewigman BG, Crane JP, Frigoletto FD, Leferve ML, Bain RP, McNellis D. Effect of prenatal ultrasound screening on perinatal outcome: the RADIUS Study Group. N Engl J Med 1993;171:821 – 827

2) Chitty LS. Ultrasound screening for fetal abnormalities. Prenatal Diagnosis 1995;15:1241 - 57

3) Klein SK, Cans C, Robert E, Jouk PS. Efficacy of routine fetal ultrasound screening for congenital heart disease in Isere county, France. Prenatal Diagnosis. 1999;19:318 – 322.

4) Buskens E, Grobbee DE, Frohn-Mulder IME, Stewart PA, Juttmann RE, Wladimiroff JW, Hess J. Efficacy of routine fetal ultrasound screening for congenital heart disease in normal pregnancy. Circulation 1996;94:67-72.

5) Stoll C, Dott AB, Meyer MJ, Pennerath A, Peter MO, De Geeter B. Evaluation of prenatal diagnosis of congenital heart disease. Prenatal Diagnosis. 1998;18:801-807.

6) Tegnander E, Eik-Nes SH. The examiner's ultrasound experience has a significant impact on the detection rate of congenital heart defects at the second-trimester fetal examination. Ultrasound Obstet Gynecol 2006;28:8.

CONGRESSES 2006

2006	LOCATION	DATE
ACUTE CARDIAC CARE 2006	Prague, CZ	21 - 24 October
MEDICA	Duesseldorf, GE	22 - 25 November
EUROECHO 10	Prague, CZ	6 - 9 December

International Academy of Medical Ultrasound DATES for 2006

TOPIC	CHAIRMAN	LOCATION	DATE
3D/4D ULTRASOUND IN CLINICAL PRACTICE (engl.)	Prof. Dr. M. Momtaz	Cairo, Egypt	11 - 13 Sept.
ECHOCARDIOGRAPHY AND MYOCARDIAL VELOCITY IMAGING (engl.)	Prof. G. Sutherland	Vienna, Austria	5 - 6 Oct.
VISUS 3D/4D (engl.)	Prof. A. Kratochwil	Vienna, Austria	23 - 26 Oct.

» REGISTRATION: www.SonoPortal.net email: iamu@med.ge.com phone: +43-7682-3800-380

GE ULTRASOUND OFFICE ADDRESSES:

AUSTRIA
GE Medical Systems Ultrasound
Donau-City-Str. 6/10, 1220 Wien
Phone: (+43) 1 26016 351
Fax: (+43) 1 26016 300

BELGIUM
GE Medical Systems Ultrasound
Eagle Building, Kouterveldstraat 20
1831 DIEGEM
Phone: (+32) 2 719 7204
Fax: (+32) 2 719 7205

CZECH REPUBLIC
GE Medical Systems Ultrasound
Vyskocilova 1422/1a
140 28 Praha

DENMARK
GE Medical Systems Ultrasound
Park Allé 295, 2605 Brondby
Phone: (+45) 43295 400
Fax: (+45) 43295 399

FINLAND & ESTONIA
GE Medical Systems Ultrasound
Malmin Kauppatie 18
00700 Helsinki
Phone: (+358) 985 606896

FRANCE
GE Medical Systems Ultrasound
Primary Care Diagnostics France
11 Avenue Morane Saulnier,
78457 Velizy
Fax: (+33) 13 449 52-02
General Imaging
Phone: (+33) 13 449 52-43
Cardiology
Phone: (+33) 13 449 52-31
Service:
8, Rue Paul Dautier
F-78140 Velizy-Villacoublay
Phone: (+33) 1-69-18-54-02
Fax: (+33) 1-64 46 32 48
Lunar:
1, Avenue d'Aix en Provence
F-13410 Lambesc
Phone: (+33) 4-42-57-17-97
Fax: (+33) 4 42 57 17 99

GERMANY
GE Medical Systems Ultrasound
Beethovenstr. 239, 42655 Solingen
Phone: (+49) 212– 28 02-28
Fax: (+49)212– 28 02-47

GREECE
GE Medical Systems Hellas
156 Kyprou Av.& 91 Konstantinoupoleos
Str. Argyroupolis, 164 51 Athens
Phone: (+30) 210 9690990
Fax: (+30) 210 9625931

ITALY
GE Healthcare Ultrasound
Via Galeno 36
20126 Milano
Phone: (+39) 02 2600 111
Fax: (+39) 02 2600 1416

NETHERLANDS
GE Medical Systems Ultrasound
Cobaltstraat 7
2718 RM Zoetermeer
Phone: (+31) 79 363 1616
Fax: (+31) 79 363 1615

NORTHERN IRELAND
G.E. Healthcare,
Victoria Business Park,
9, Westbank Road,
Belfast BT3 9JL.
Phone: 028 90229900

NORWAY
GE Medical Systems Ultrasound
Tasenveien 71
0873 Oslo
Phone: (+47) 2202 0800

NORWAY
GE Medical Systems Ultrasound
Strandpromenaden 45,
P.O. Box 141, 3191 Horten
Phone: (+47) 33 02 11 16

POLAND
GE Medical Systems Ultrasound
Al. Wilanowska 372
02-665 Warszawa
Phone: (+48) 330 83 00

PORTUGAL
General Electric Portuguesa,
SA. Avenida do Forte, n° 4, Fraccao F
2795-502 Carnaxide,
Phone: (+351) 21 425 1309
Fax: (+351) 21 425 1343

REPUBLIC OF IRELAND
G.E. Healthcare,
Unit F4, Centrepoint Business Park,
Oak Drive, Dublin 22
Phone: 01 4605500

RUSSIA
GE Medical Systems Ultrasound
Kosmodamianskaya nab., 52
113045 MOSCOW

SPAIN
GE Medical Systems España
Avda. Europa 22
(Parque Emp.La Moraleja)
28108 Alcobendas-Madrid
Phone: (+34) 91 663 2500
Fax: (+34) 91 663 2501

SWEDEN
GE Medical Systems Ultrasound
PO Box 314
17175 Stockholm
Phone: (+46) 0855950010

SWITZERLAND
GE Medical Systems Ab
Europastrasse 31, 8152 Glattbrugg
Phone: (+41) 1 809 92 92
Fax: (+41) 1 809 92 22

U.A.E
GE Healthcare Holding
Suite 1101
11th Floor City Tower 2
Sheik Zayed Rd. Dubai, U.A.E
Phone: (+971) 4 3131 207
Fax: (+971) 4 3321802

UNITED KINGDOM
GE Medical Systems Ultrasound
2, Napier Road
Bedford MK41 0JW
Phone: (+44) 1234 340881
Fax: (+44) 1234 266261

IMPRINT:

Publishers:
GE Healthcare
Marketing Department Europe
Beethovenstraße 239
42655 Solingen

Editor-in-chief:
Pierre Radzikowski
gepost@med.ge.com
Tel: +48 2275 14103

Concept and Production:
ICS Media GmbH
A-4860 Lenzing, Austria
E-mail: office@ics-media.at

Printing:
Kroiss & Bichler GmbH & CoKG
Römerweg 1
A-4844 Regau
office@kb-offset.at

300-06-U020E