



Resona 7

New waves in Ultrasound Innovation



Synergy Spark Premium | Innovative | Evolving

Industrial Milestone
New Waves in Ultrasound Innovation

Revolutionary Sonography



New Waves in Ultrasound Innovation

New innovation in ultrasound technology

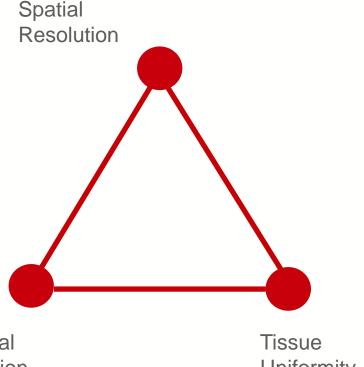


- New capabilities in clinical research and diagnosis
- New image optimization solutions for enhanced diagnostic confidence
- New tools for clinical intelligence
- New user experience for scanning comfort and streamlined workflow





Challenge #1:Trade off between three key ultrasound parameters



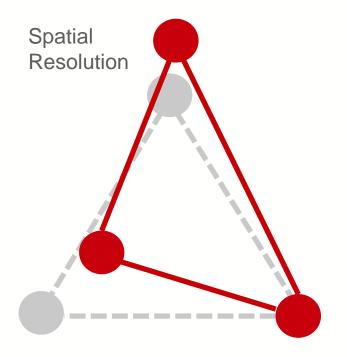
The key ultrasound parameters: Spatial resolution, Tissue Uniformity and Temporal Resolution are tightly linked among each other

Uniformity





Challenge #1:Trade off between three key ultrasound parameters



The key ultrasound parameters: Spatial resolution, Tissue Uniformity and Temporal Resolution are tightly linked among each other

Higher Spatial Resolution:

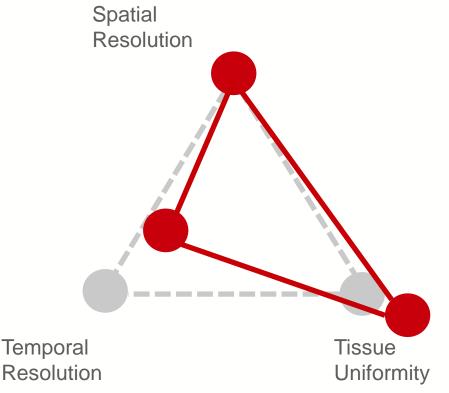
- Increase TX lines
- But decrease temporal resolution

Temporal Resolution

Tissue Uniformity



Challenge #1:Trade off between three key ultrasound parameters



The key ultrasound parameters: Spatial resolution, Tissue Uniformity and Temporal Resolution are tightly linked among each other

Higher Spatial Resolution:

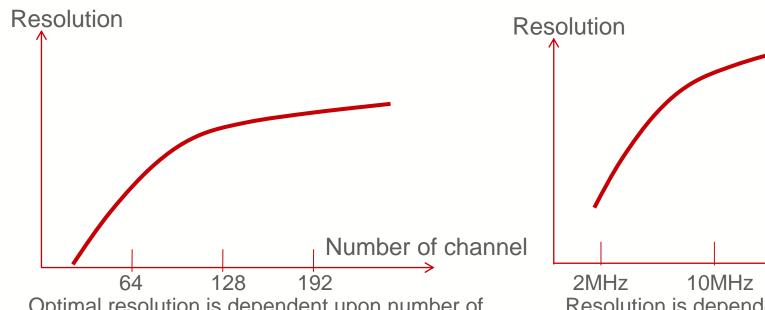
- Increase TX lines
- But decrease temporal resolution

Increase Uniformity:

- Multi focuses TX
- But decrease temporal resolution

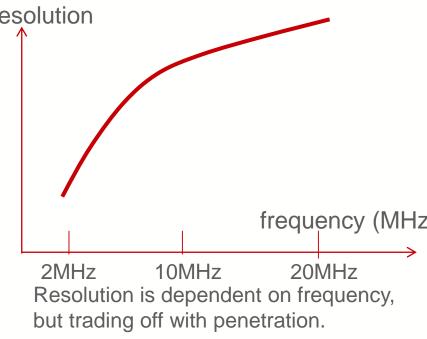


Challenge #2: Bottleneck of Resolution



Optimal resolution is dependent upon number of channels, but conventional architectures do not provide an increase in image quality by increasing channels.

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mindray

What is ZONE Sonography®

ZONE Sonography®

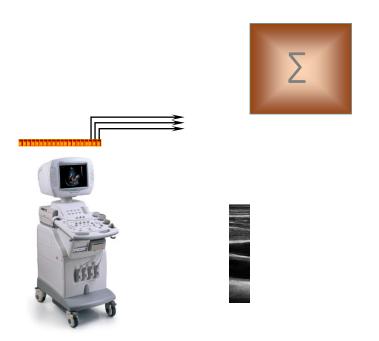
ZONE Sonography® Technology is a revolutionary, software-driven approach to acoustic data acquisition and image formation that breaks the barriers of conventional ultrasound imaging based on innovative channel data processing methods.



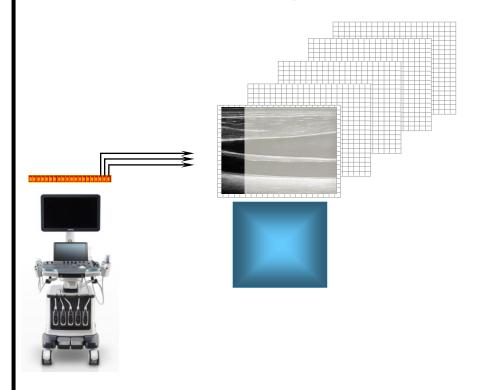
"The next industry standard method of generating ultrasound images.

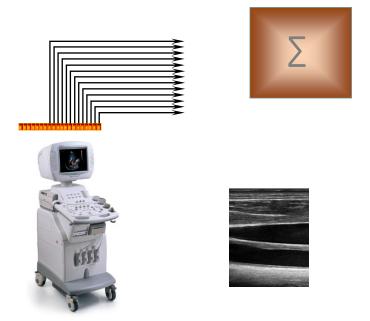
Two generations ahead of traditional digital beam formation technology."

Frost & Sullivan, November 2011 Leaders in Market Research

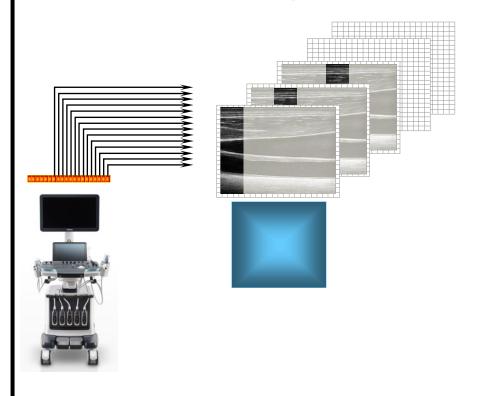


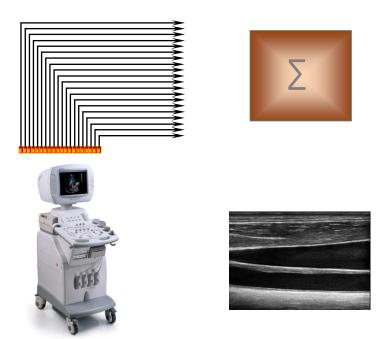
ZONE Sonography®



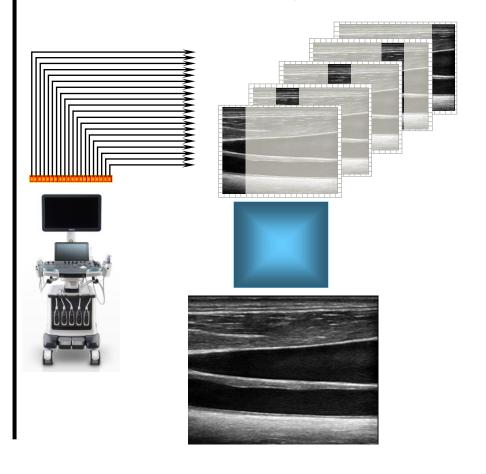


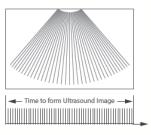
ZONE Sonography®





ZONE Sonography®





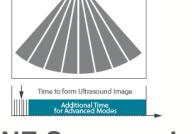
Data acquired in ZONES, 10x faster acoustic acquisition

Data acquired line by line, limited acoustic acquisition

Hardware-based Beamformer, limits to upgrade

Limited Focal Depth and Number

Sound speed assumption = 1540 m/sec



ZONE Sonography®

Software-based Beamformer, easily upgradable

Full Field of View Focus

One button digital sound speed compensation



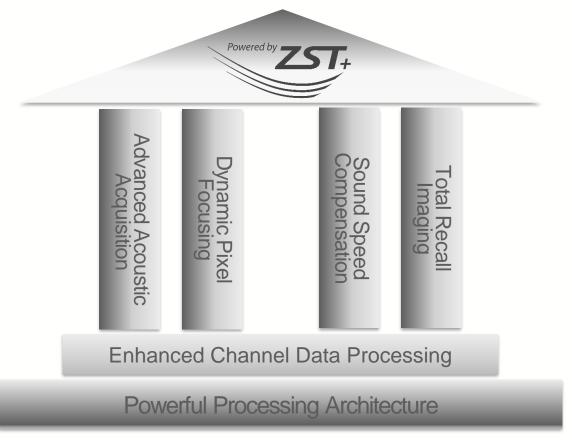


ZONE Sonography® Technology Plus (ZST+)

ZST⁺ is the most premium and innovative ultrasound platform, it is evolving with powerful processing architecture and enhanced channel data processing based on ZONE Sonography®



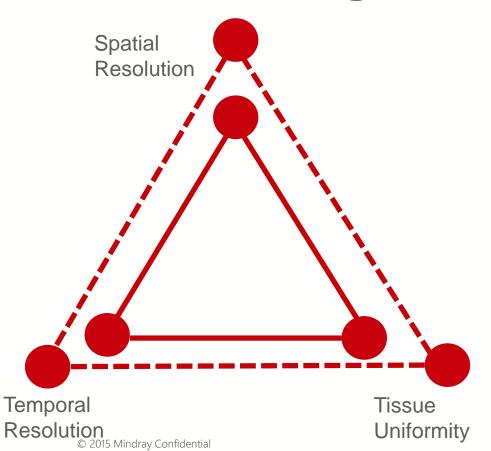
Key Pillars of ZST+ Platform





Break Challenge #1





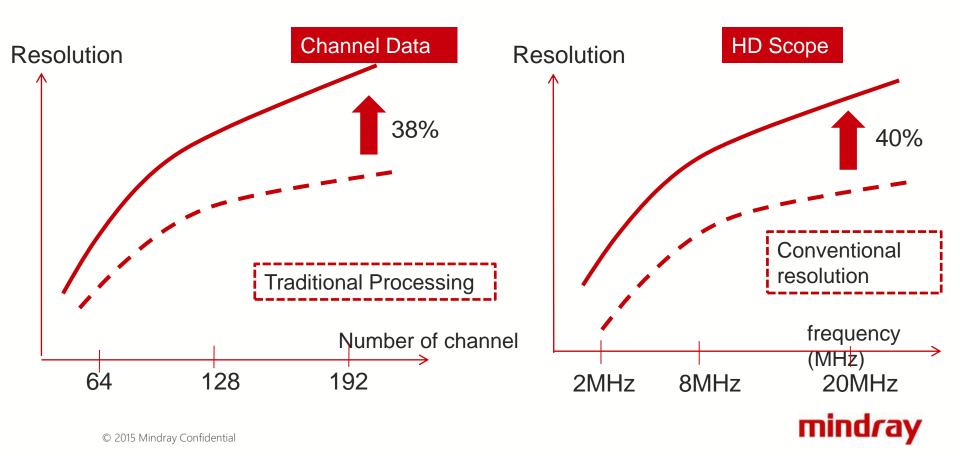
Advanced Acoustic Acquisition

Dynamic Pixel Focusing



Break Challenge #2



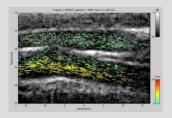




New Capabilities in Clinical Research and Diagnosis

V Flow

 Vivid Vector Flow for visualization of complex microhemodynamics



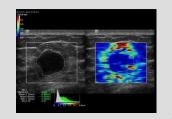
iFusion

 Fusion Imaging with respiration compensation



STE

 Shear wave elastography for more precise quantification of tissue stiffness



UWN+ Contrast

 Mindray's 2nd generation UWN CEUS



New Tools for Clinical Intelligence

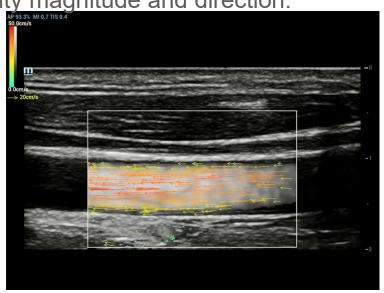
New User Experience for Scanning Comfort

V Flow

Innovative technology developed by Mindray

An novel approach for vascular hemodynamic analysis, using color coded vector arrows to follow up blood cell's moving velocity magnitude and direction.

- Qualitative analysis tool:
 - Grayscale: flow distribution
- Quantitative analysis tool:
 - Arrow color: flow velocity
 - Arrow direction: flow direction
 - Arrow length: flow velocity
 - Cursor on arrow: Instant flow velocity and angle number at any single point



New Tools for Clinical Intelligence

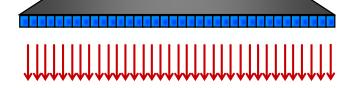
New User Experience for Scanning Comfort

V Flow

Innovative technology developed by Mindray

Traditional Color Flow

V Flow



Line-by-line acquisition:

- 1. Low frame rate (two digital FPS)
- 2. Angle dependent
- 3. Roughly display of blood velocity by color
- 4. Roughly display flow hemodynamics

Multiple lines (Plane Wave) acquisition:

- 1. Extremely high frame rate (over 300 FPS)
- 2. No Angle dependent
- 3. Precise display of blood velocity
- 4. Precise display of hemodynamics

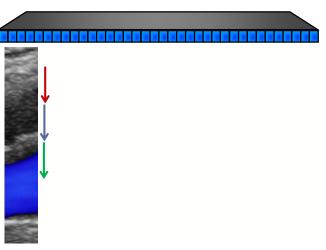
New Tools for Clinical Intelligence

New User Experience for Scanning Comfort

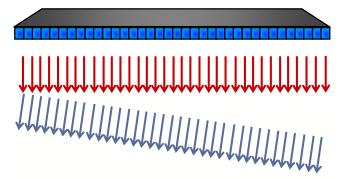
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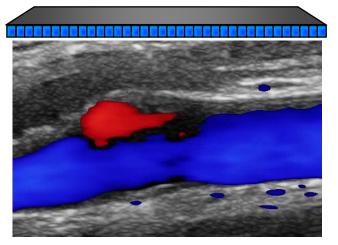
New Tools for Clinical Intelligence

New User Experience for Scanning Comfort

V Flow

Innovative technology developed by Mindray

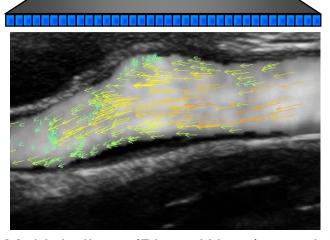
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V Flow



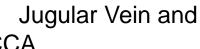
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- 3. Precise display of blood velocity
- 4. Precise display of hemodynamics

V Flow

Innovative technology developed by Mindray







Vortex Flow

Proven V Flow Clinical Benefits

- **True hemodynamic changes** in the vessels, not only in laminar flow, but well identified in turbulent and vortex flow and elevates diagnostic value.
- More accurate in velocity, easily compare and analyze velocity in different time of a single cardiac cycle from different points.

TO THE PERSON NAMED AND ADDRESS OF

Recent Advances in Blood Flow Vector Velocity Imaging

Jamen Arendt Jengen¹, Svetoslav Ivanov Nikolov², Jesper Udesen⁴, Feier Munk² Kristoffer Lindskov Hansen⁵, Mads Møller Pedersen⁵, Peter Møller Hansen⁵, Michael Bachmann Nielsen⁵. Niels Oddershede⁴, Jacob Korthek², Michael Johannes Pihl³ and Ye Li³ ¹Center for Fast Ultrasound Imaging, Dept. of Flec. Eng. Bldg. 349, Technical University of Denmark, DK-2800 Lyngby, Denmark ³BK Medical, Mileparken 34, DK-2730 Herley, Denmark Department of Radiology, Copenhagen University Hospital, DK-2100 Copenhagen, Denmark *GN ReSound A/S, Lautruphjerg 9, DK-2750 Ballerup, Denmark.

Abstract... A number of methods for altrasport votor votority and phase in the carrier cycle imaging an prosented in the paper. The transverse oscillareceived affraceased field. The approach has been thoroughly on 11 healthy volunteers comparing the TO method with magof these techniques are very fast imaging that can attain an order of magatitude higher procision than conventional methods. SA flow inquiry was implemented on the experimental scanner RASMIS ming an Semission spherical entrision sequence and recipiton of 64 channels on a BK Medical 8804 transducer. This necessary of 64 channels on a BK Medical 8804 transducer. This resulted in a relative standard divitation of 1.2% for a fully flow [6]. At constrictions e.g. atheresciensis or at hifureatransverse first. Plane wave imaging was also implemented on the storm entirely wrong selectity estimates can occur for spectral RASMUS scanner and a 100 Hz frame rate was attained. Several vector velocity image sequences of complex flow were accounted.

1. VILOCITY ESTIMATION AND ITS LIMITATIONS

All of the current systems find the utilal velocity alon tion (TO) method can estimate the velocity transverse to the utrassent beam by introducing a lateral oscillation in the component. In spectral systems this is compensated for by y rection utrasonal field. The approach has been thoroughly much be investigated using both simulations, flow rig measurements, and in-rob validation against MR scans. The TO method obtains to yield quantitative velocities. The underlying assumption is a relative accuracy of 10% for a fully transvene flow to field that there is one static direction, which can be compensated simulations and flow rig experiments. An rise studies performed for. This presupposes that the flow is familiar along the vessel walls. Clerical measurements by several authors (4), (5) have netic measure phase contract angiography (MRA) revealed a wealth. Choscal measurements by several authors [4], [5] have correlation between the droad-volume estimated by YO and MRA. the glob this is a gross simulation for most clinical sitof 0.91 (p < 0.01) with an equation for the lim of regression given unitors. No fully larming flow is found in a complex, pulsating as: MRA = 1.1 - TO-8.4 nd. Several clinical examples of complex. How system with short, curved and branching vessels. Other flow in e.g. bifurcations and around valves have been acquired. vortices are found in early of the cardiac cycle and helical using a commercial implementation of the method (EK Modical Professis Ultraview scanners, A range of other methods are also and secondary flow are found in most careing and branching presented. This metades synthetic operture tenging using other arteries. The motion will, thus, in general not follow the vessel milerical or thing was with velocity estimation performed with houndaries, and the direction varies over the carrier cycle and rectional beamforming or special tracking. The key advantages as a function of studied position. Static anale compressation estimation waters.

For spectral systems angle errors can moult in very errosystems. Only at part of the cardiac cycle for e.e. a valve will which demonstrates the housins of fact vector flow imaging. A the resulting spectrum be correct. In color flow mapping the method for extending the 20 TO method to 30 vector velocity images are very difficult, if not impossible, to interpret for the estimation is preented and the implications for future vector complex flow encountered in the human circulation. Changes which implicated in anale can result in dramatic changes in the appropriate of the image with sudden changes in cotor and often unrealistically

low velocities are show as seen in Fig. 1. The image shows

Fast Blood Vector Velocity Imaging using ultrasound:

In-vivo examples of complex blood flow in the vascular system

Hansen K.L. (3.7), Udesen J. (3.7), Gean R. (3.7), Jensen J.A. (7), Nielsen M.B. (7)

1) Department of Radiology, Section of Ultrasound, Rightespirate, Blagtamovei 9, 2100 Rbh. (f. Denmark 2) GBT Research, Lantrag strjerg 9, 2750 Ballerng, Denmark

5) Center for Fast Ultrasound Imaging, DTU Blokro, Bidg, 349, Technical University of Denmark, 1800 Lyngby, Denmark

color flow images of the blood motion are contricted by a relatively low frame rate and angle dependent velocity estimates The Plane Wave Excitation (PWE) method has been proposed to saive these Brothstons. The frame rate can be increased, and the 2.D vector velocity of the blood motion can be estimated. The blood can be acquired for each emission. A 13 bit Barker code is transmitted simultaneously from each transducer element. The 2-Director reducity of the bissed is found using 2-D speckle tracking between regments in consecutive speciale images. The flow patterns of six biforcations and two voins were investigated inyou. It was down: It that a dable verter in the constit both was retrograde flow was present in the superficial branch of the femical artery during dustrie, 3) that intrograde their was present in the subclavian artery and antigrade in the common curvide artery during disobole, 4) that vertices were formed in the buckets behind the visions valves in both antigrate and retrograde flow, and 5) that mountary flow was present in various vessels. The more results have revealed complex flow patterns not previously visualized with ultrasound imaging and indicate a flew complexity in both simple and complex yeard

Digital Object Mentifier: 10.1109/ULTSYM.2008.0257

I. Demonstrate

Color flow mapping (CFM) used for visualizing blood motion has two major limitations. The frame rate is low and the velocity estimates are anyte dependent

In conveniental ultrasound (US) each frame contains of a A. Perison number of lines. The frame rate is low as several value transmissions are necessary along each line to achieve a mable inure. 2-D distex made (B-made inure combined with CFM) in commercial scanners are performed at frame rates down to 8-10 Mr. This is exemplable for virtualizing rapid temporal changes in the blood flow. The problem is were acquired of two carolic histocations, two femoral

Abstract - Conventional ultrasound methods for acquiring tres velocities are obtained. However, it is impossible to predict the direction of a blood scatterer based on the B-mode image [2] as the flow profiles in the cartiovascular system never are purely lanunar and therefore impossible to angle correct. Hence, incorrect blood velocities are always given transmitted pulse is not licensed, and a full specials image of the mich the conventional Doppler methods and valuable information of the complexity of the blood flow is never documented even though restraince and vertices have predilection for atherosclerotic lexicos [4].

> A novel method for estimating blood motion will ultrasound has been proposed by Udesen et al. [4]. The method called Plane Wave Bucitation (PWE) acquires, with a high frame rate, 2-D vector velocities of the blood using a 1-D recalls. Examples of in-vive sequences have been produced of the casolid artery and restalts have been compared to MR. angiography measurements with mean deviation of volume

This paper presents involve vector velocity estimates of complex vessel recruedies obtained with the FWE method. The results are compared to the literature and perspectives for vector flaw are discussed.

II. MATERIALS AND METHORS

National Committee on Biamedical Research Biblica Four healthy volunteers with no history of vancular or cardiac disease (Otree males and one female, 26 - 45 y, mean age: 34 y) extered the study after influenced consent. Scan sequences



· Original Contribution

VECTOR PROJECTILE IMAGING: TIME-RESOLVED DYNAMIC VISUALIZATION OF COMPLEX FLOW PATTERNS

> BILLY Y. S. YIU, SIMON S. M. LAI, and ALPRED C. H. YU Medical Engineering Program, University of Hong Kong, Poldulam, Hong Kong (Aucatived 17 September 2013; revised 2 March 2014; in final from 10 March 2014)

Abstract-Achieving non-invasive, accurate and fine-resolved imaring of vacular flow with soutist emporal fluc fautions is well acknowledged to be an ongoing challenge. In this article, we present a new aftr assemble has difframe work called vector projectile imaging (WF) that can dynamically render complex flow patterns over an imaging view at millisceousd time resultation. VPI is founded on three principles: (8 high-frame-rate broad-vis w data acqui attion (based on steered plane wave firings); (ii) flow vector estimation derived from multi-angle Doppler analysis coupled with data regularization and least oppores fitting); (ii) dynamic visualization of color exceled vector projectiles (with the wopeckies displayed as adjunct). Catheration results indicated that by using three transmit as-storand three receive angles (-10°, 0°, +10° for both). VPI can consistently connecte flow we have in a multi-wave pleanton with three takes positioned at different depths (1.5, 4,6 cm), oriented at different angles (-10°,0°, +10°) and of different sixes (diluted diameter: 2.2, 4.4 and 6.3 mm; steady flow rate: 2.5 mL/s). The practical merit of VPI demond our old bifurcation prometries. For the healthy infurcation with 12-Hz carolid flow pulses, VPI was able to confer multi-directional and southetenmentally varying flow natures insing a maximal frame rate of 416 flow or 2.4-ms time resolution). In the case of standard bifur-cations (50% accountric nurrowing), VPI enabled dynamic visualization of flow jet and recirculation zones. These findings suggest that VPI holds promise as a new tool for complex flow amilysis. (E-mail: alfred y=0 bis.) b) © 2014 World Federation for Ultrasound in Medicine &

Key Words: Ultrasound flow imaging, Vector estimation, Dymanic visualization, Vector projectile, Complex flow

INTRODUCTION

Non-invasive visualization of flow dynamics in human asteries is widely considered to be of high diagnostic importance as it may foster clinical detection of abnormal vascular conditions (Steinman and Taylor 2005), For inches a manifestine floor name up in the countil a studies

rendered in real time in the form of color flow images. which provide 2-D maps of spial flow velocity (or flow power) over an imaging view (Evans 2010; Hoskins and McDicken 1997). This flow imaging made, when used together with the Donoler spectrogram mode that plots the temporal flow profile at a single more gate, can Vector Volume Flow in Arteriovenous Fistulas

Peter Moller Hansen, Serren Hourwagen, Mads Moller Pederson, Marianne Rix, Lurs Lönn, Michael Bachmann Nielsen University Hospital of Copenhagen

disease. The majority of patients with end stage renal disease are in hemodislysis, and therefore dependent on a well functioning vascular access. The arteriovenous fistula is the recommended access and in order to maintain and keep the fistule patent, regular monitoring of the function is necessary. The Ultrasound Dilution Technique is the reference method for volume flow measurement, but it only works in conjunction with the dialysis machine, and use is therefore restricted to dialysis sessions. Volume flow measurement with conventional Doppler ultrasound provides a non invasive, highly accessible solution, but a very challenging due to the angle dependency of the Doppier technique and the anatony of the fistula. The angle independent vector ultrasound technique Transverse Oscillation provides a new and more intuitive way to measure volume flow in an arteriovenous fistula. In this paper the Transverse Oscillation han been used to measure volume flow directly on four patients' arteriovenous fistulas, and the measurements were compared to subsequent measurements with the Ultrasound Dilution Technique. The results obtained with the Transverse Oscillation deviate -35.1 - 14.9 % from the reference method, and indicates

Kepwords—arteriorenous fitbala; rector altrasound; transverse oscillation; volume flow, ultrasound dilution. Doppler

The purpose of this paper is to demonstrate a new clinical use of a novel vector ultrasound technique. Patients suffering from and stage renal disease (ESRE) are completely dependent on dialysis or renal transplant to stay alive. In the U.S. the prevalence rate of ESRD is approximately 1750 per million and the incidence rate is approximately 350 per million per year. 90 % of the ESRD patients are in hemodialysis (HD), which makes it the predominant form of renal replacement therapy [1]. HD is dependent on a well-functioning vascular access with a low rate of complications and sufficient blood Jacob Bjerring Olesen, Michael Johannes Pihl, Jorgen

Center for Fest Ultrasound Imaging Technical University of Denmark Kes, Longby, Danmark

is essential to maintain and preserve the functionality of these modified vessels [2,3]. Up to 60 % of ESRD patients with AVF will experience some degree of fistula failure during the first 18 months after the surgical creation of the AVF [4]. The failure is offen due to varying degree of stenosis ultimately detection and treatment of secoses preserves the functionality and patency of the AVF. It is therefore recommended to perform regular surveillance of the AVF function, by measuring the volume flow through the AVF [5,6]. This can be resonance angiography (MRA), and ultrasound dilution technique (UDT). DU has several advantages. It is noninvasive, low-cost, oxick to perform, highly mobile, tolerated disadvantages to DU are the limited sample volume when performing spectral estimation and the angle dependency strick in combination with the superficial localization and often irregular course of the AVF, makes it difficult to use directly on the AVF [5]. MRA is based on magnetic resonance imaging and provides an accurate, non-invasive estimate of volume flow in an AVF, but is troublesome for the patient time concurring expensive, not as available as DU, and therefore not well suited for routine monitoring of the AVF [6] UDT is the preferred and most widely used technique for measuring volume flow in an AVF, and is considered the reference method [7]. The purpose of this study is to demonstrate how a novel vector ultrasound technique can be used to measure volume flow in an AVF. The new technique Transverse Oscillation (TO) [8] is capable of 2D quantitative angle independent blood flow estimation, and TO is implemented as "Vector Flow Imaging" (VFI) on several commercial ultrasound scamers from BK Medical

New Tools for Clinical Intelligence **New User Experience for Scanning Comfort**

iFusion



Ultrasound

Real time imaging

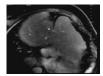
On-imaging procedure

CT/MRI

High-resolution imaging

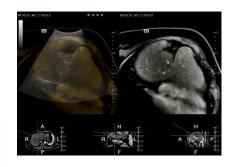
Accurate localization of lesion





Fusion **Imaging**

Pathology diagnosis Intervention procedure Treatment evaluation





New Tools for Clinical Intelligence

New User Experience for Scanning Comfort

iFusion

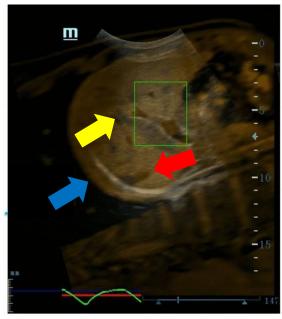
with Innovative Respiration Compensation

- Mindray's exclusive technology to minimize the limitations in fusion imaging:
 - More Sensitive: magnetic motion sensor with millimeter accuracy
 - More precise: effectively eliminates the matching distortion caused by unavoidable patient respiration
 - More confidence for tumor diagnosis and interventional procedure

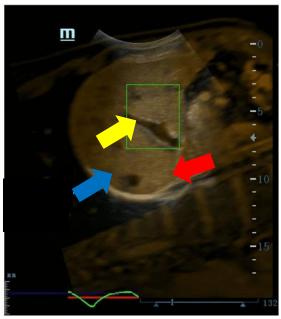


iFusion

with Innovative Respiration Compensation



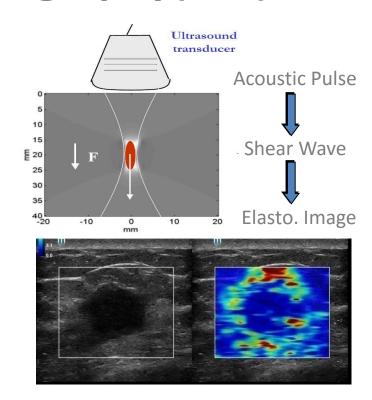
Before respiration compensation



After respiration compensation

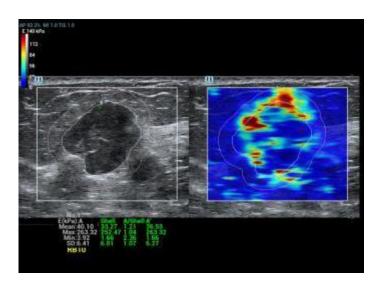
Sound Touch Elastography(STE)

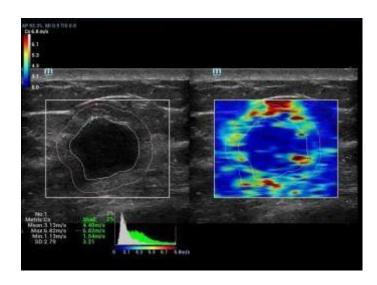
- Shear wave elastography with Mindray exclusive Ultra Wide Beam Tracking for faster and more precise imaging with higher penetration:
 - Unique Shell Analysis: for assessment of infiltratrion area
 - Real time imaging: for more diagnostic information
 - *HQE mode (one-frame):* for higher image quality and better penetration
 - More comprehensive evaluation: with different elasticity metrics, and multiple quantification tools



Sound Touch Elastography(STE)

Unique Shell Analysis for assessment of infiltratrion area





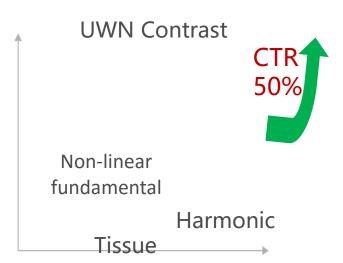
The shell area shows higher stiffness on malignant tumors

New Tools for Clinical Intelligence

New User Experience for Scanning Comfort

UWN⁺ Contrast Imaging

UWN+ Contrast

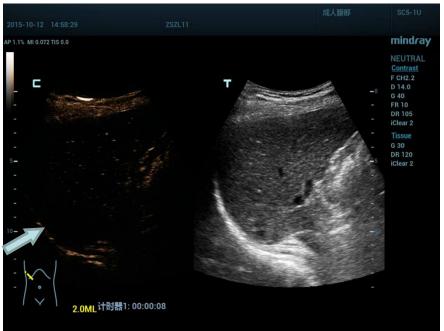


- Excellent contrast agent sensitivity
- Improved contrast imaging penetration
- Longer CEUS perfusion time with lower MI setting
- ZST⁺ improves the temporal resolution and delivers higher uniformity

New Tools for Clinical Intelligence

New User Experience for Scanning Comfort

UWN⁺ with higher contrast/tissue ratio few contrast dose



ZST⁺ improves the temporal resolution delivers higher uniformity



Case 1, HCC after treatment

Case 2, Metastatic hepatic carcinoma



New Image Optimization Solutions for Enhanced Diagnostic Confidence

SSC

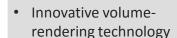


- Sound Speed Compensation for tissue-specific image optimization
- Better lateral resolution with a more precise sound propagation

HD Scope

- Optimize the image quality within ROI in real time
- Higher definition in micro-level for more precise detection

Depth VR



more vivid and realistic 3D/4D visualization of subtle anatomic structures

3D iClear

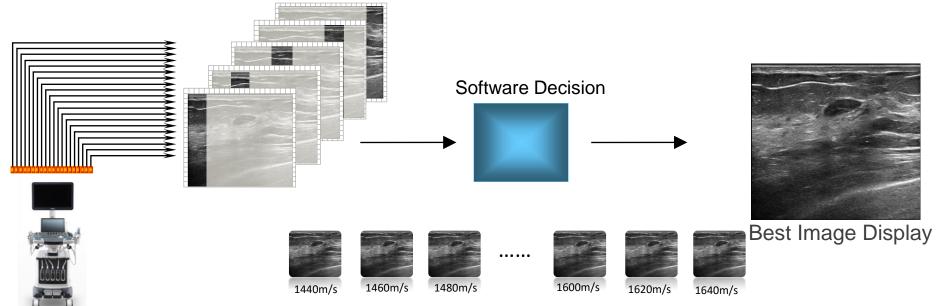
- 3D/4D speckle noisereduction imaging
- Higher image quality with an enhanced smoothing effect
- Improved contrast and edge definition

New Tools for Clinical Intelligence

New User Experience for Scanning Comfort

Sound Speed Compensation (SSC)

Sound Speed Compensation retrospectively processes channel data with various sound speed, and acquires the optimal tissue-specific image adaptively

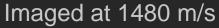


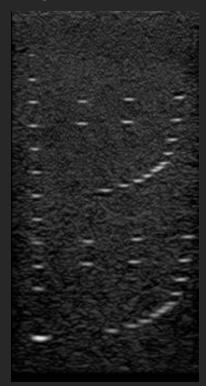
Trial Frames with Different Speed

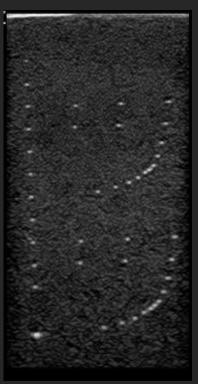


Sound Speed Compensation (SSC)

Imaged at 1540 m/s

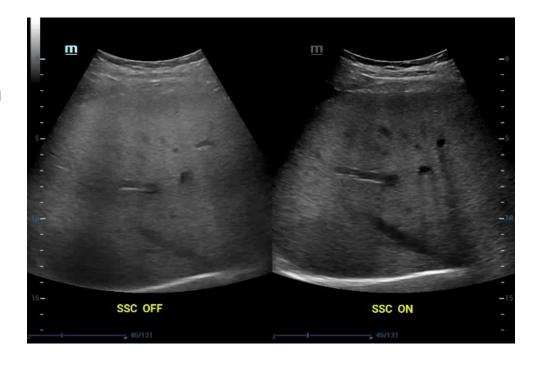






Phantom speed 1480m/s

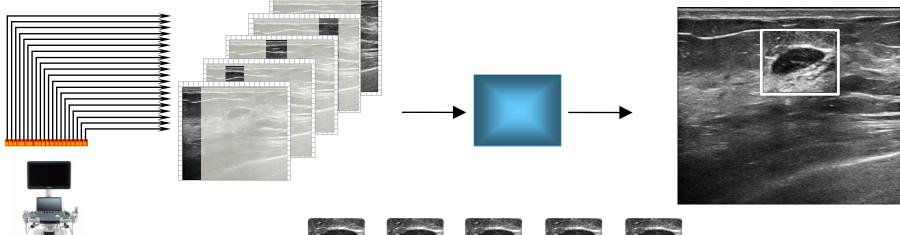
- Clinical Value
 - Improve the penetration of fatty liver
 - Better lateral resolution with a more precise sound propagation
 - Tissue-specific imaging



New Tools for Clinical Intelligence **New User Experience for Scanning Comfort**

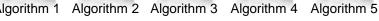
HD Scope

HD Scope: By processing channel data multiply and retrospectively, HD Scope can improve the detail information and image contrast on specific area maximally





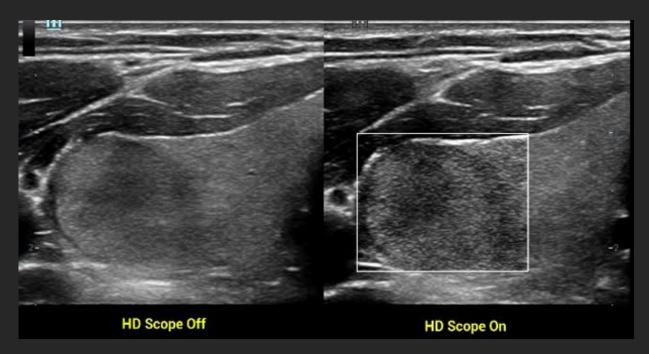




Multiple processing of channel data for enhancement



HD Scope



- Clinical Value
 - Unmatched spatial and contrast resolution can improve diagnostic confidence for complex structure, such as mass or other lesions

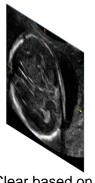
Depth VR



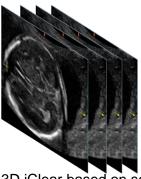
- Interactive lighting effect to generate more vivid rendering results
- Innovative new algorithm with depth information, to provide a better 3D effect
- Multiple depth tint for user's preference

3D iClear

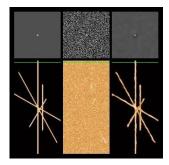
- Fully utilizes volume data information on X, Y, Z dimensional axes for 3D/4D speckle noise-reduction imaging
- Higher image quality with an enhanced smoothing effect on MPR and VR images
- Improved contrast and edge definition without compromising detail resolution



2D iClear based on single frame



3D iClear based on several frames



Principle of 3D iClear

New Tools for Clinical Intelligence

New User Experience for Scanning Comfort

3D iClear







New Tools for Clinical Intelligence

- Smart Acquisition
 - Smart Planes: Mindray's exclusive technology for fetal CNS study

- Smart detection and calculation
 - RIMT: RF-Data IMT measurement
 - Smart FLC: Automatic follicle detection and calculation
 - Smart OB: Auto measurement of OB biometrics
 - Smart NT: Auto NT detection and evaluation

Smart Aquisition

Smart PlanesTM

- Mindray's exclusive technology for fetal CNS study
- 5000 cases: self-trained with artificial intelligence
- 4 CNS planes and 6 measurements: accurate detection
- 1 second: fully automatic

New Image Optimization Solutions

New Tools for Clinical Intelligence

New User Experience for Scanning Comfort

Smart Planes

Mindray's exclusive technolgy for fetal CNS study

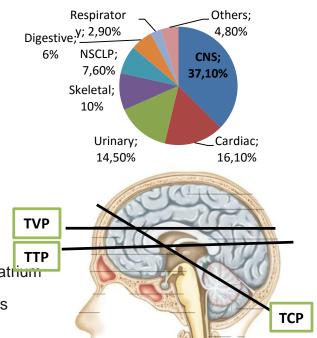
CNS (Central Nervous System) malformations :

- The highest incidence of fetal malformation;
- Encountering in about 1% of all births.

(From: The ISUOG Education Committee, Guidelines, Sonographic examination of the fetal central nervous system: guidelines for performing the 'basic examination' and the 'fetal neurosonogram', Ultrasound Obstet Gynecol, 2007.

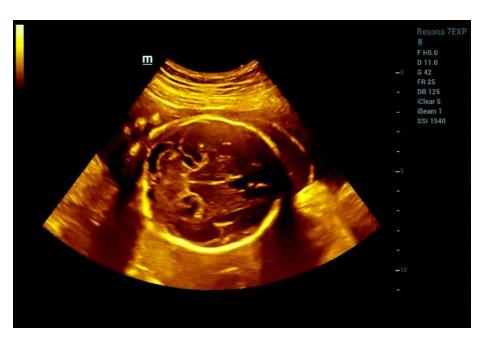
Important inspection planes in fetal CNS:

- TCP(Trans Cerebella Plane): cerebellum and cisterna magna
- > TTP(Trans Thalamic Plane): thalami and hippocampal gyruses
- > TVP(Trans Ventricular Plane): CSP, frontal horn, choroid plexus and attium
- MSP (Middle Sagittal Plane): corpus callosum and cerebellar vermis



Smart Planes

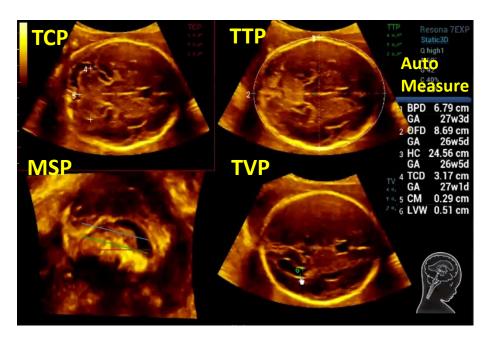
Mindray's exclusive technolgy for fetal CNS study



- Step 1: Acquire 3D fetal head dataset from the BPD view
- Step 2: Press the Smart Planes tab on the Touch
 Panel
- Step 3: Detect and display the TCP/TTP/MSP/TVP automatically.
- Step 4: Press the Auto Measure button on the Touch Panel and the system will automatically measure the BPD/OFD/HC/TCD/CM/LVW

Smart Planes

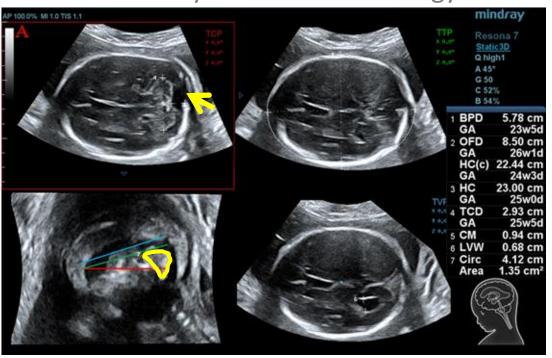
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Smart Planes

Mindray's exclusive technolgy for fetal CNS study



Clinical case:

• GA: 24w2d

Misdiagnosis as
Dandy-Walker
syndrome in 2D but
correct diagnosis from
Smart Planes

New Image Optimization Solutions

New Tools for Clinical Intelligence New User Experience for Scanning Comfort

Smart Planes

Mindray's exclusive technolgy for fetal CNS study

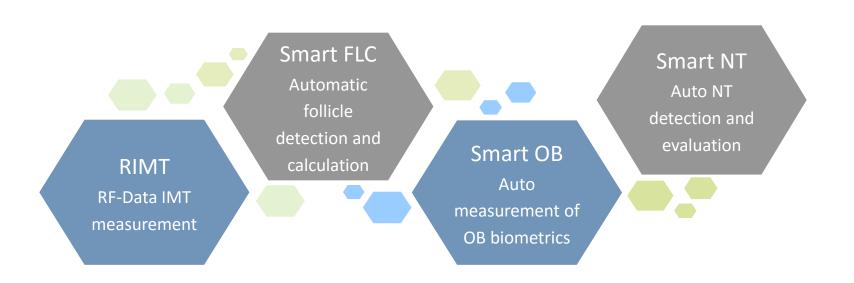
Intelligent: improve clinical efficiency and saving time

Confidence: Improve MSP acquiring rate and improve diagnosis confidence of CNS

Accurate: Improve accuracy of CNS anatomy

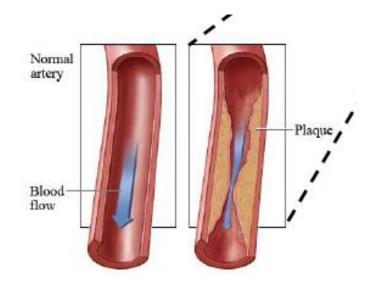
Automatic: Reduce operator's dependence

Smart Detection and Calculation



RIMT (RF-Data IMT)

- The IMT average growth is about 10 micrometres per year (ARIC study)
- The traditional IMT measurement is not accurate enough to detect the minimal changes during follow up procedure



RIMT (RF-Data IMT)

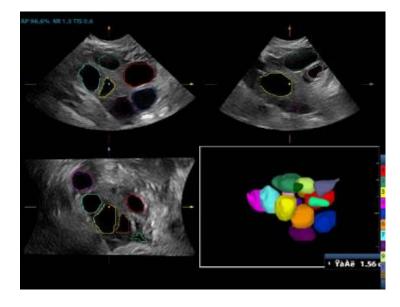


Traditional Auto IMT	RIMT	Clinical Value of RIMT
Accuracy: 80μm	Accuracy: 5μm	More accurate measurements to detect even minimal changes during follow up procedures
Processed data of stored image	RF data based	More accuracy, less dependence on image quality
quantification on one static image	Real time with quantification of 6 heart cycles	More information for Improved diagnostic confidence

Smart FLC

Automatically detect the number and calculate the volume of follicles from a 3D volume image

- Accurate assessment of the size of follicles
- Follicles are automatically sorted by sizes with color code
- Easy reporting with colorful graphic designed for follicle study

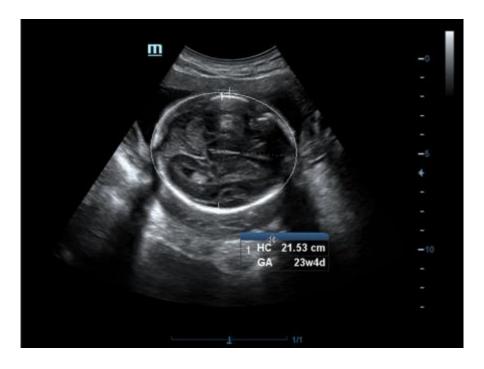


Follicle Rendering

Smart OB

Accurate auto measurements of most frequently examined OB parameters:

- BPD/HC/FL/AC/OFD
- Efficient and accurate
- Greatly reduces repetitive key strokes and streamlines workflow

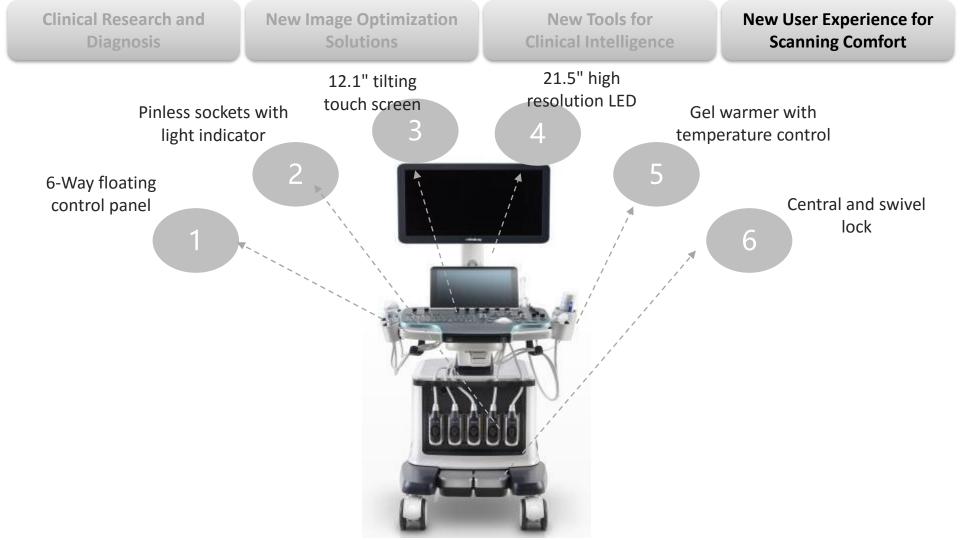


Smart NT

- Automatically traces the NT tube cavity edge and display max NT result by industry standard method of "In to In"
- Greatly simplifies NT
 measurements with ease of use
 and accuracy









Floating control panel





Electronic height adjustment

Tilting gesture-powered touch screen

New Tools for Clinical Intelligence

New User Experience for Scanning Comfort

Gesture Powered Operation

Following functions can be performed by gestures

Image adjustment

- •Slide parameter page up/down
- •Shift image to touch screen
- •Zoom in/out
- •3D/4D rotate&erase

•..

Measure on screen

- •2D Caliper & trace
- Manual spectrum trace
- Auto LV, IMT, Smart NT
- . . .

Image review

- •Image review
- •Cine review frame by frame
- . . .

User defined gestures to realize more functions with one swipe

- Initiate special functions: UWN+ CEUS, Elastography, iFusion, V Flow, iScape...
- iZoom, iTouch, measure, freeze, save, print...

Adjust menu layout on touch screen



Resona 7 is now ready

To Lead New Waves in Ultrasound Innovation

- New innovation in ultrasound technology
 - The most advanced image processing empowered by channel data
 - ZST+ breaks the bottlenecks of traditional ultrasound imaging
- New capabilities in clinical research and diagnosis
 - V Flow for visualization of complex micro-hemodynamics
 - iFusion with respiration compensation for more accuracy
 - Sound Touch Elastography with unique shell analysis
- New tools for clinical intelligence
 - Smart Planes provides fully automatic and accurate detection of the standard fetal CNS scanning planes
- New user experience for scanning comfort and streamlined workflow
 - Gesture powered operation allows more intuitive and effective workflow

Technology in Resonance with Healthcare

