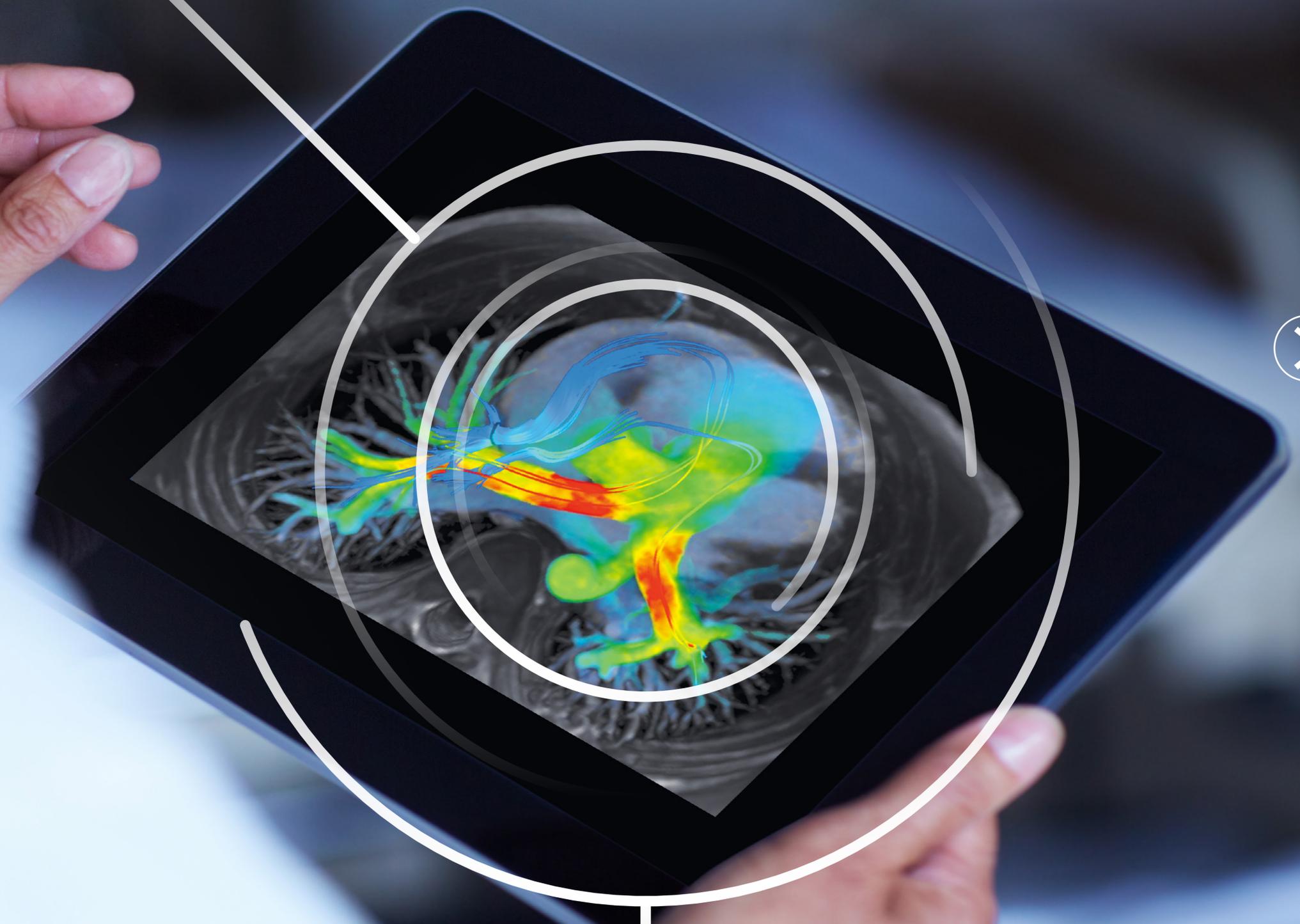


GE Healthcare
Tomorrow Today

CVWorks

SIGNA™Works
Fueling the future of MR



SIGNA™Works

The new standard is extraordinary

Our new SIGNA™Works productivity platform redefines productivity across the breadth of our core imaging techniques. It takes full advantage of Total Digital Imaging (TDI), further advancing diagnostics and quickening throughput, while improving patient outcomes and your ROI. It is upgradeable and customizable with additional applications to suit your growing practice.

Standard Applications

Energize your clinical capabilities with all the tools you need to complete an exam. Imaging solutions cover a variety of contrasts, 2D and 3D volumetric data and motion correction capabilities.



find out more

Innovative Applications

Expand your expertise to the next level, to deliver improved image quality, higher efficiency and a more streamlined workflow, so you perform better than ever before.



find out more

SIGNA™Works

The new standard is extraordinary



► Standard Applications Innovative Applications

BodyWorks

One of the fastest growing areas in MR, BodyWorks allows you to image abdominal and pelvic anatomy with user flexibility to adapt to different patient types.

CVWorks

Gain crucial insights into vascular structure and flow dynamics and access morphology, flow, function and tissue viability with CVWorks.

NeuroWorks

This one-stop solution enables you to image brain, spine, vascular and peripheral nerve anatomy with exceptional tissue contrast.

OncoWorks

Delivers robust tissue contrast, motion-insensitive, high temporal and spatial resolution imaging techniques that capture anatomical and morphological data for oncological assessment.

OrthoWorks

This extensive library of musculoskeletal imaging techniques enables you to image bone, joint and soft tissue with remarkable tissue contrast.

PaedWorks

Delivers distinctive child-centered imaging techniques that provide ease of use for the user and clinical excellence for your smallest, most fragile patients.

SIGNA™Works

The new standard is extraordinary



Standard Applications

► **Innovative Applications**

HyperWorks

HyperWorks means hyper scanning with astonishing imaging and impressive speed. It includes HyperSense, which can deliver higher spatial resolution images or reduced scan times.

ImageWorks

ImageWorks boosts your overall MR performance. READYView visualization and MAGiC one-and-done scanning help ensure consistent and clear results.

SilentWorks

SilentWorks is GE's most advanced noise reducing technology. Traditional exams can be extremely loud. SilentWorks brings the sound level down to ambient noise.

ViosWorks

ViosWorks reduces the complexity and cost of cardiac imaging. For the first time, all 7 dimensions of information can be captured in a cardiovascular scan in 10 minutes or less.

CVWorks

An intuitive set of cardiac applications that assess morphology, flow, function and tissue viability, and goes deeper into the analysis to gain crucial insights into the heart's vascular structure and flow dynamics. Adapts to a variety of different patient types.

- Standard Applications
- Elective Applications
- Innovative Applications

31%

Cardiovascular diseases (CVDs) are the #1 cause of death accounting for 31% of global deaths in 2015.



17.7 million
Deaths from CVDs in 2015

7.4 million
Deaths from coronary heart disease in 2015

World Health Organization, Cardiovascular diseases (CVDs) Fact sheet, Updated May 2017

CVWorks

Standard Applications

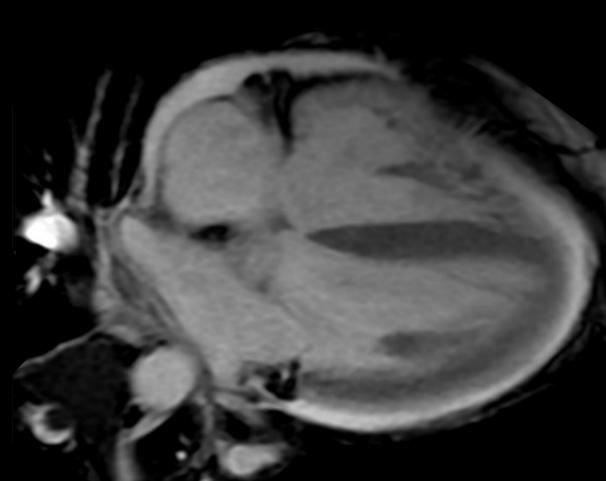
2D FIESTA Cine

The workhorse of functional cardiac imaging, 2D FIESTA Cine can be used as a gated functional sequence or non-gated quick localizer to assess the heart's anatomy and function by providing excellent tissue contrast between blood pool, myocardium and valves.

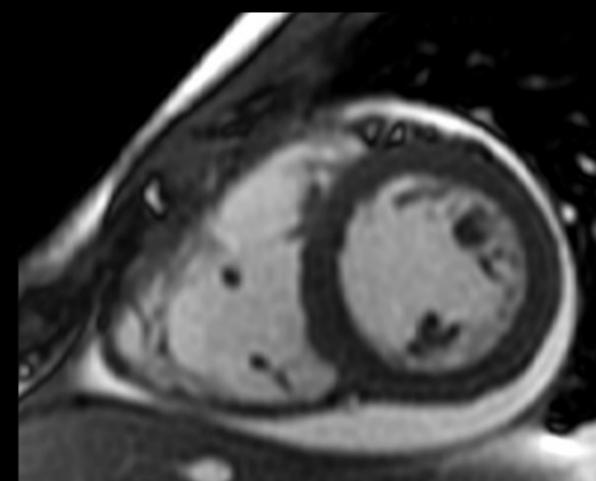
Clinical benefits:

- Qualitative assessment of valvular structure and anatomy
- Aids in evaluation of Arrhythmogenic Right Ventricular Dysplasia (ARVD) and tumors
- Used to calculate LV and RV function and cardiac output in tools such as cmr⁴² and Arterys™

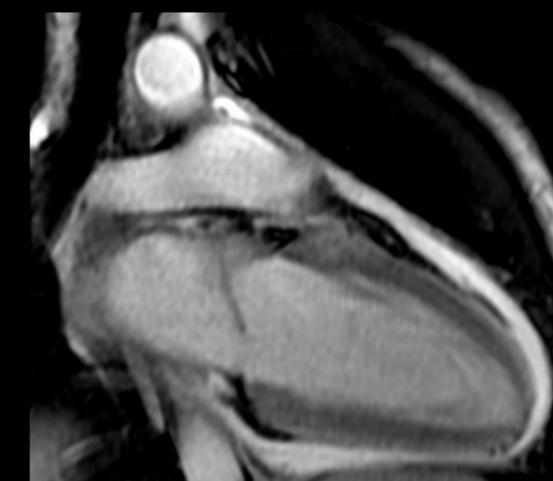
4-chamber



Short axis



Long axis



CVWorks

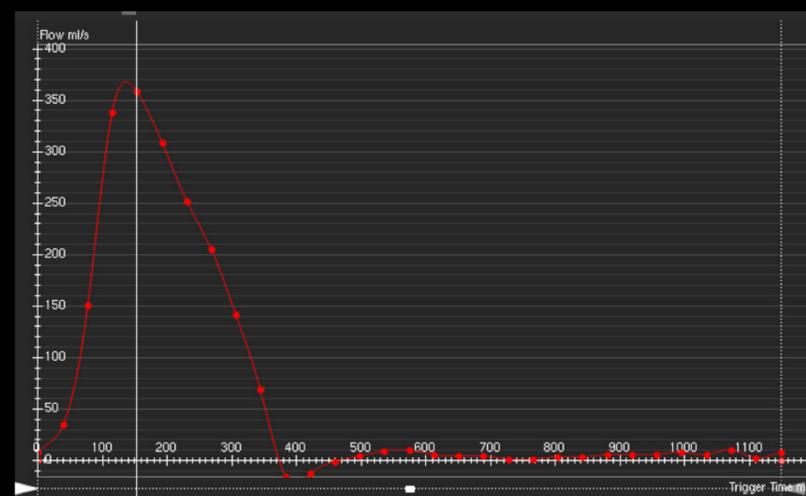
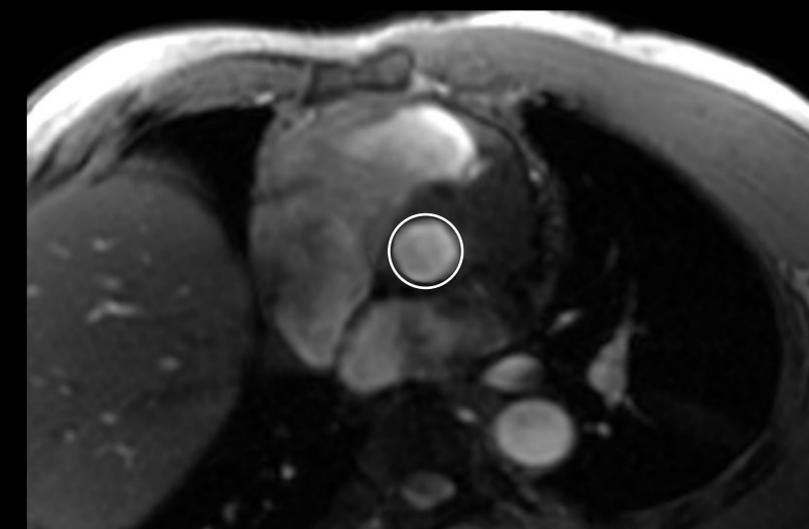
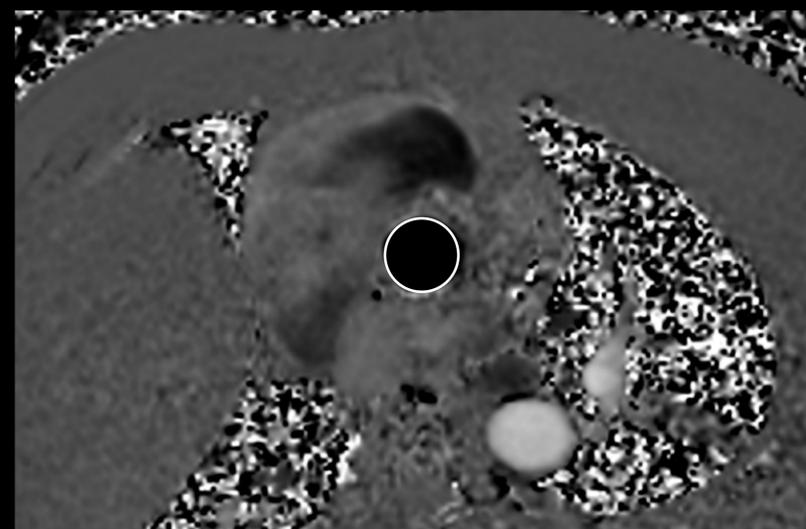
Standard Applications

2D Phase Contrast

A quantification sequence used to calculate flow velocity and measure regurgitation flow in heart valves or vascular structures.

Clinical benefits:

- Helps to assess aortic stenosis, regurgitation and shunt evaluation
- Aids in the measurement of anomalies, like septal defects, and obtaining pulmonary and systemic flow (Qp:Qs) ratios



CVWorks

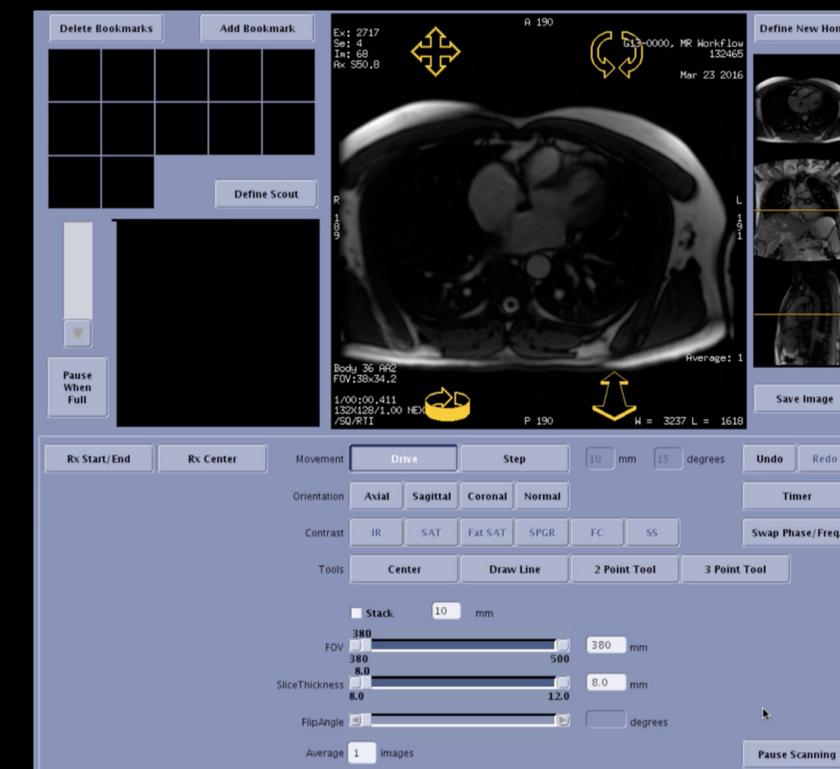
Standard Applications

iDrive

Free-breathing, real-time localization and quick imaging tool that simplifies exam workflow for cardiac exams with live interactive capability.

Clinical benefits:

- Streamlines cardiac workflow by acquiring free-breathing localizers
- Avoids breath-holds which elevates patient comfort throughout entire exam
- Extremely helpful for patients with skewed anomalies, particularly congenital defects



CVWorks

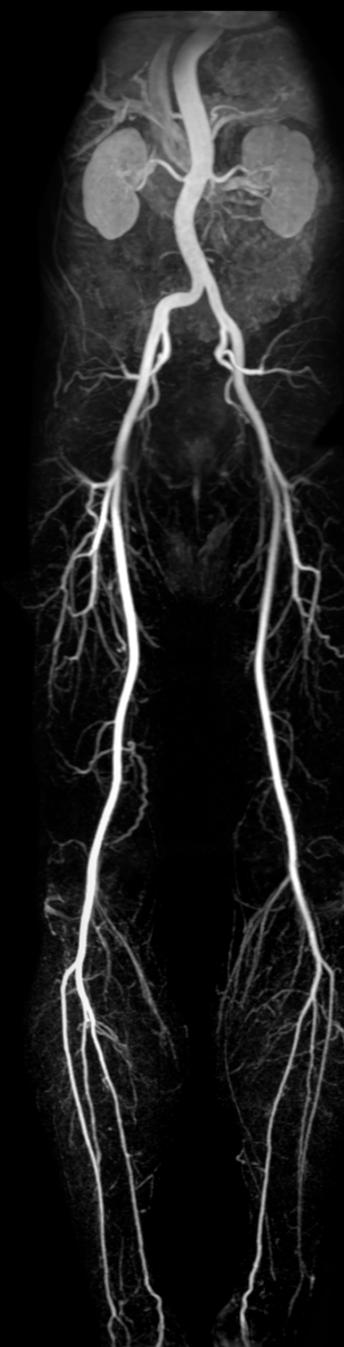
Standard Applications

QuickStep

An automated multi-station run-off acquisition with a simplified workflow that prescribes, acquires and combines images from multiple locations in a faster acquisition.

Clinical benefits:

- Allows for whole body vascular scanning in under 7 minutes
- Acquires mask datasets and provides subtractions from multiple stations without any user intervention
- Automatically pastes each station together to provide a unified data set



CVWorks

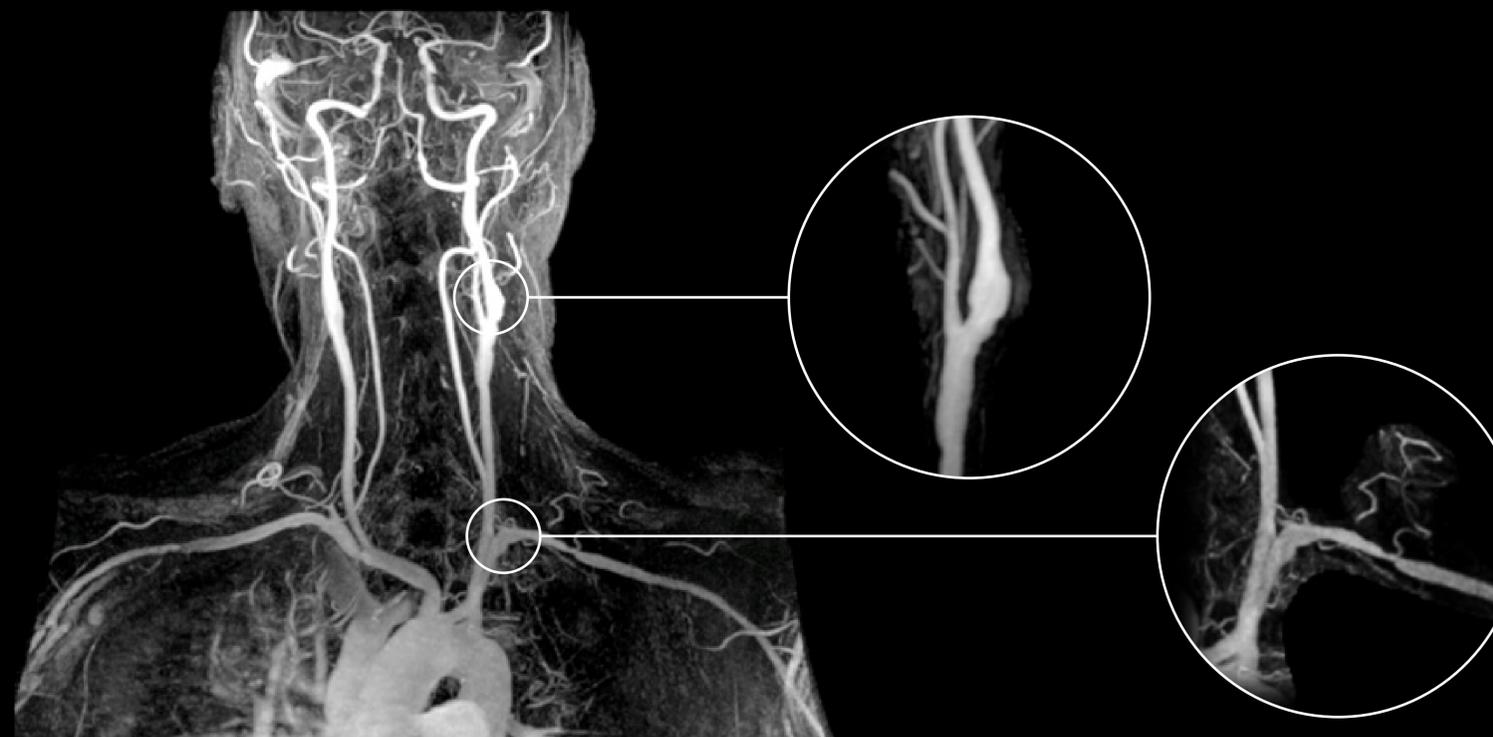
Standard Applications

Fluoro Trigger MRA

Fluoroscopic triggering is a real-time bolus detection method of contrast arrival for vascular scans.

Clinical benefits:

- Provides real-time detection of the bolus for right-time, every-time accuracy
- Minimally invasive with no exposure to ionizing radiation
- Particularly helpful for patients with slow cardiac output



Coronal Fast TOF SPGR
512 x 512
FOV 36cm
0.9mm
3:12 min



CVWorks

Standard Applications

Fluoro Trigger MRA

Thoracic aorta



CVWorks

Elective Applications

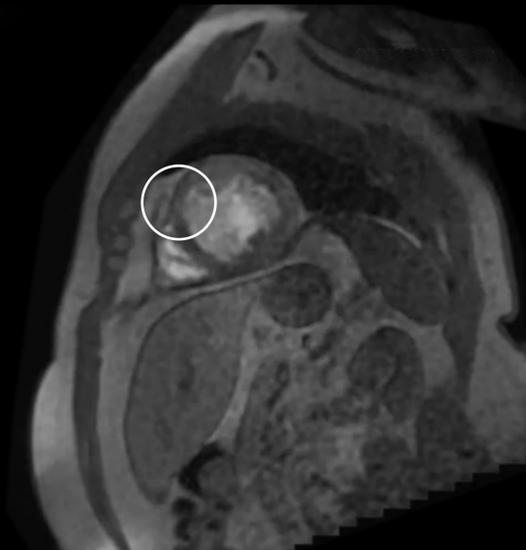
FGRE Time Course

The fundamental sequence for stress perfusion, FGRE Time Course delivers excellent temporal and spatial resolution images to help capture difficult-to-see pathologies. Utilized for cardiac first-pass analysis with bolus of contrast.

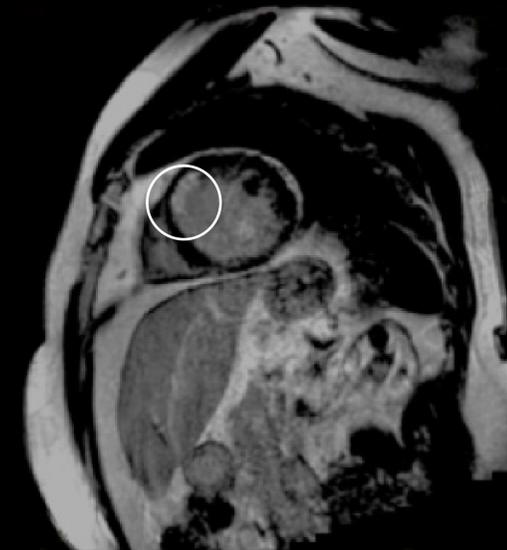
Clinical benefits:

- Ideal for stress study on stunned vs. infarcted myocardium
- Offers excellent temporal resolution – 3-4 slices per respiratory cycle
- Can be used in any plane for short and long axis visualization
- Resistant to off-resonance & eddy current effects

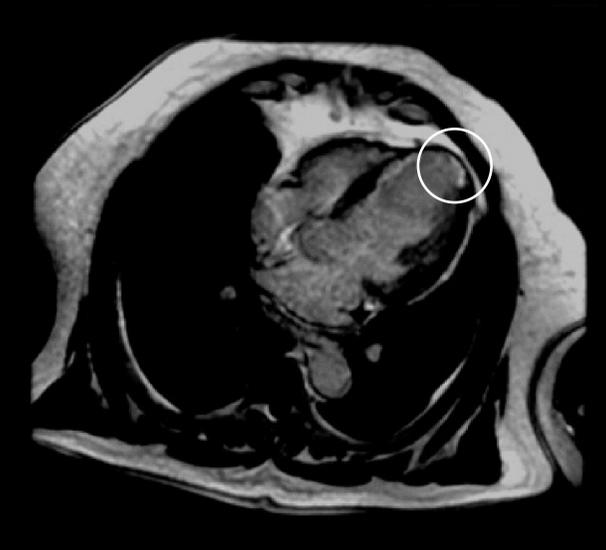
Perfusion



MDE Sequence



MDE Sequence



CVWorks

Elective Applications

MDE Plus

Myocardial Delayed Enhancement (MDE) is an inversion-based, segmented, cardiac gated acquisition that enhances the contrast between infarcted and normal myocardium. MDE Plus offers a variety of tools that accommodate even difficult-to-scan patients, such as those with arrhythmias.

MDE Plus includes:

2D MDE with Adiabatic Inversion pulse, 2D MDE FatSat, SS MDE, Phase Sensitive (PS) MDE, SS PS MDE effects

Clinical benefits:

- Drives up image contrast, while driving down exam time
- Provides uniform suppression of healthy myocardium and better contrast, especially at 3.0T and near implants
- Fat suppression helps to differentiate between enhanced tissue and epicardial fat

PS MDE



2D MDE FatSat



CVWorks

Elective Applications

Case Study: Assessing Hypertrophic Cardiomyopathy with T1 mapping

Clinical solutions

System: SIGNA™ Architect

Coil used: Large AA coil

Protocols used:

Short Axis (SA) FIESTA Cine, SA MOLLI FIESTA, Cine IR 2RR, SS PS MDE SPGR

Patient history

A 51-year-old patient with a clinical history of hypertrophic cardiomyopathy was referred to MR based on echocardiography results.

Procedure

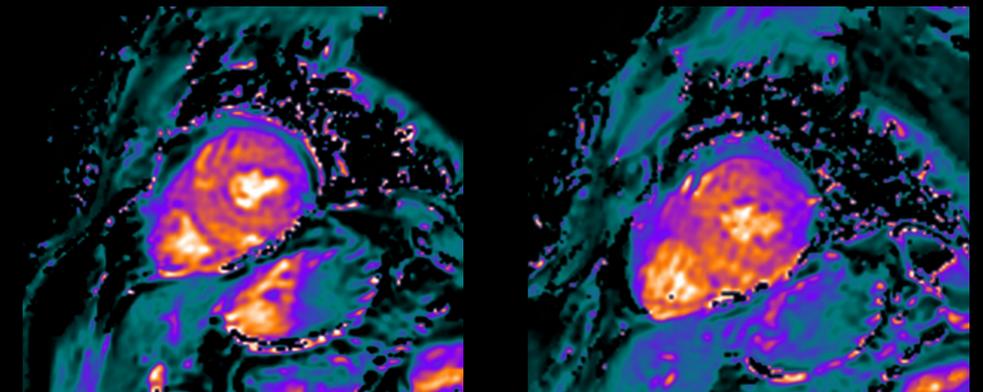
Patient positioned in the supine, feet-first position with vector gating leads applied in longitudinal and latitudinal directions. A large AA coil was positioned over the patient's chest and contrast was administered into the antecubital vein.

MR findings

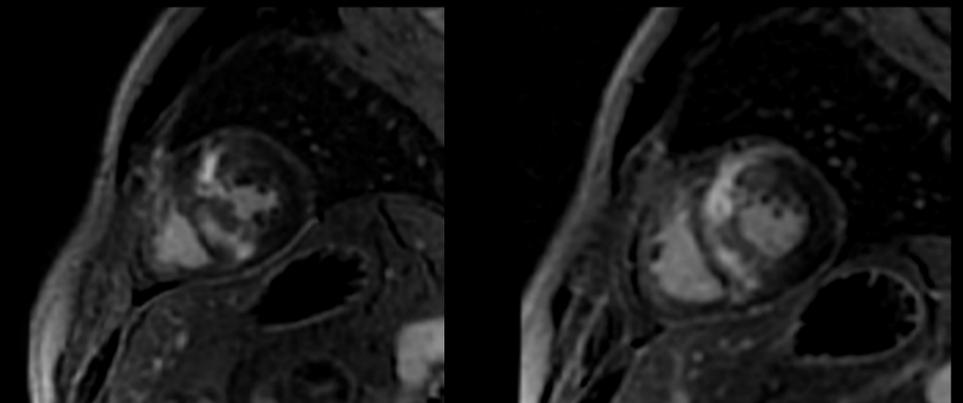
Exam concluded an asymmetric thickening of the interventricular septum measuring up to 24mm. No subaortic jet or anterior motion of the anterior mitral leaflet. There was extensive myocardial delay enhancement anteriorly at the base, and subendocardial delayed enhancement inferoseptally in the mid-myocardium.

T1 mapping correlates to delayed enhancement

Short Axis MOLLI FIESTA



SS PS MDE



CVWorks

Elective Applications

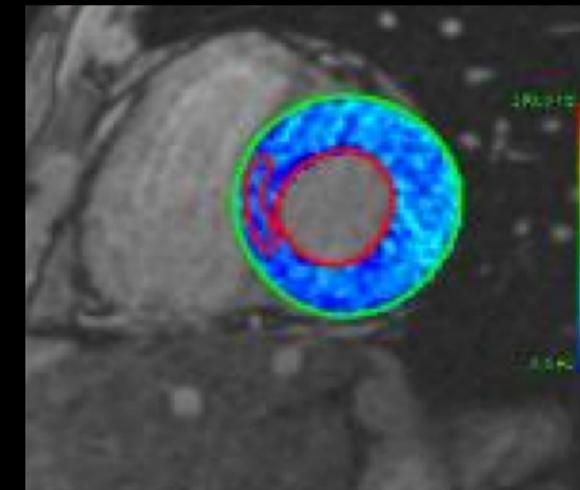
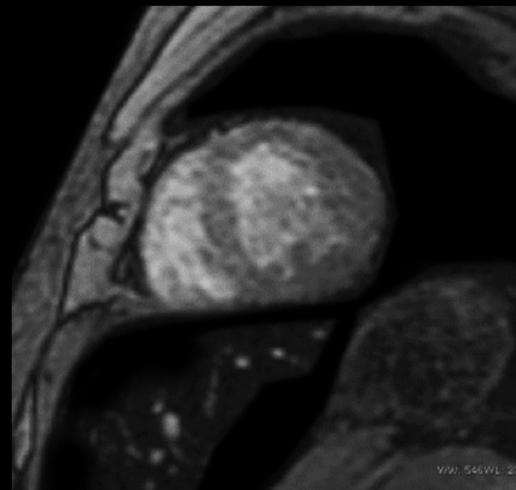
StarMap

A non-invasive technique that evaluates iron overload in the myocardium and liver.

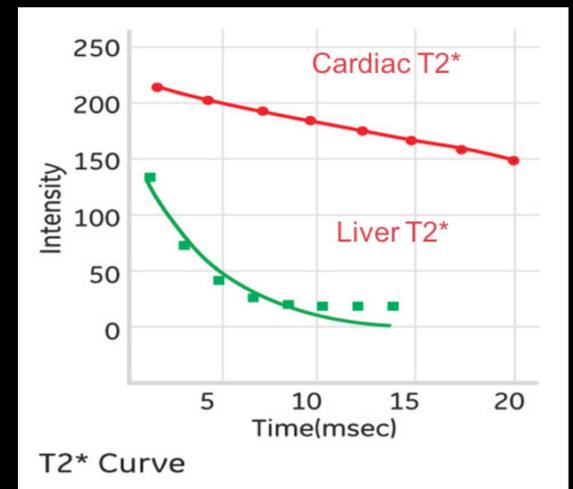
Clinical benefits:

- Helps to avoid an invasive biopsy
- Provides quantification of the heart with cmr^{42} post processing

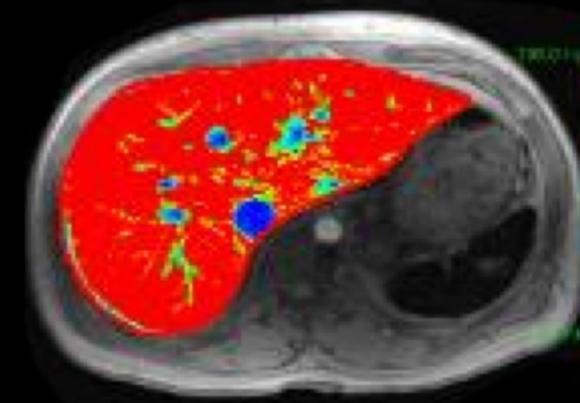
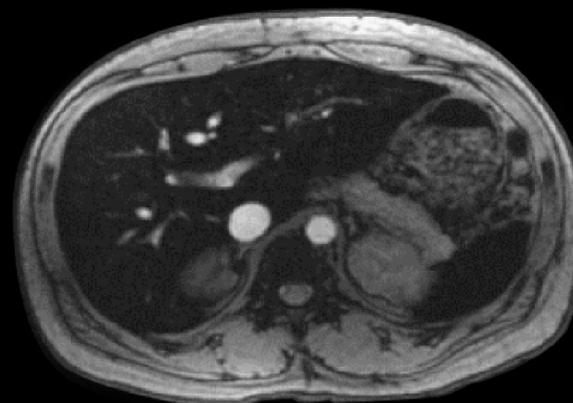
StarMap EKG gated



Fast signal intensity drop in the liver translates to short T2*, indicating iron overload.



StarMap ungated



CVWorks

Elective Applications

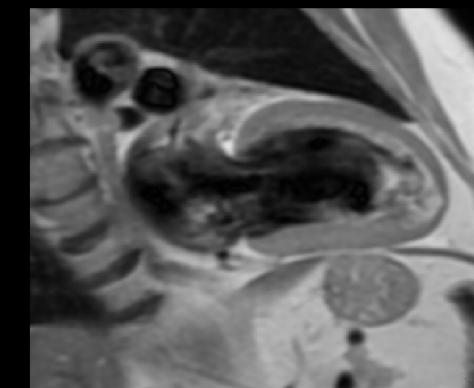
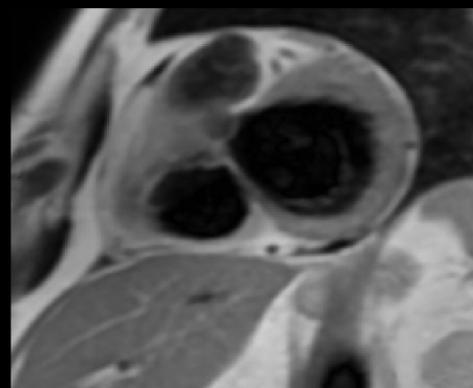
Black Blood SS FSE

A sequence used to suppress the signal of flowing blood which results in a faster scan compared to FSE. Scan can be acquired while free breathing or within a single breath-hold.

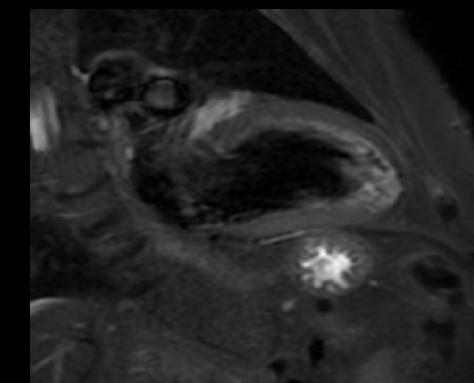
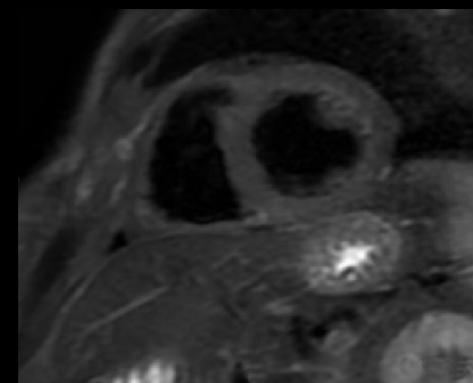
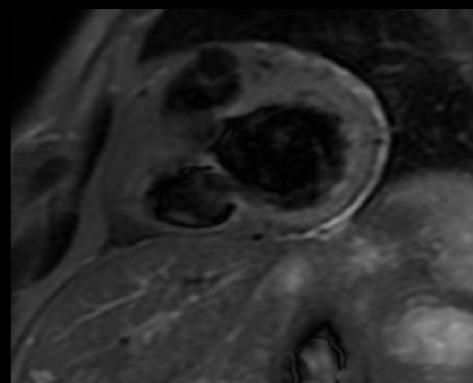
Clinical benefits:

- Helps to reduce scan time and repeats due to patient's condition or inability to hold their breath
- Provides whole heart coverage in one or two breath-holds for increased patient tolerance
- Aids in the evaluation of congenital heart disease and edema for Acute Myocardial Infarction

T1 SSFSE DIR Black Blood



T2 SSFSE DIR Black Blood



CVWorks

Elective Applications

Inhance Suite

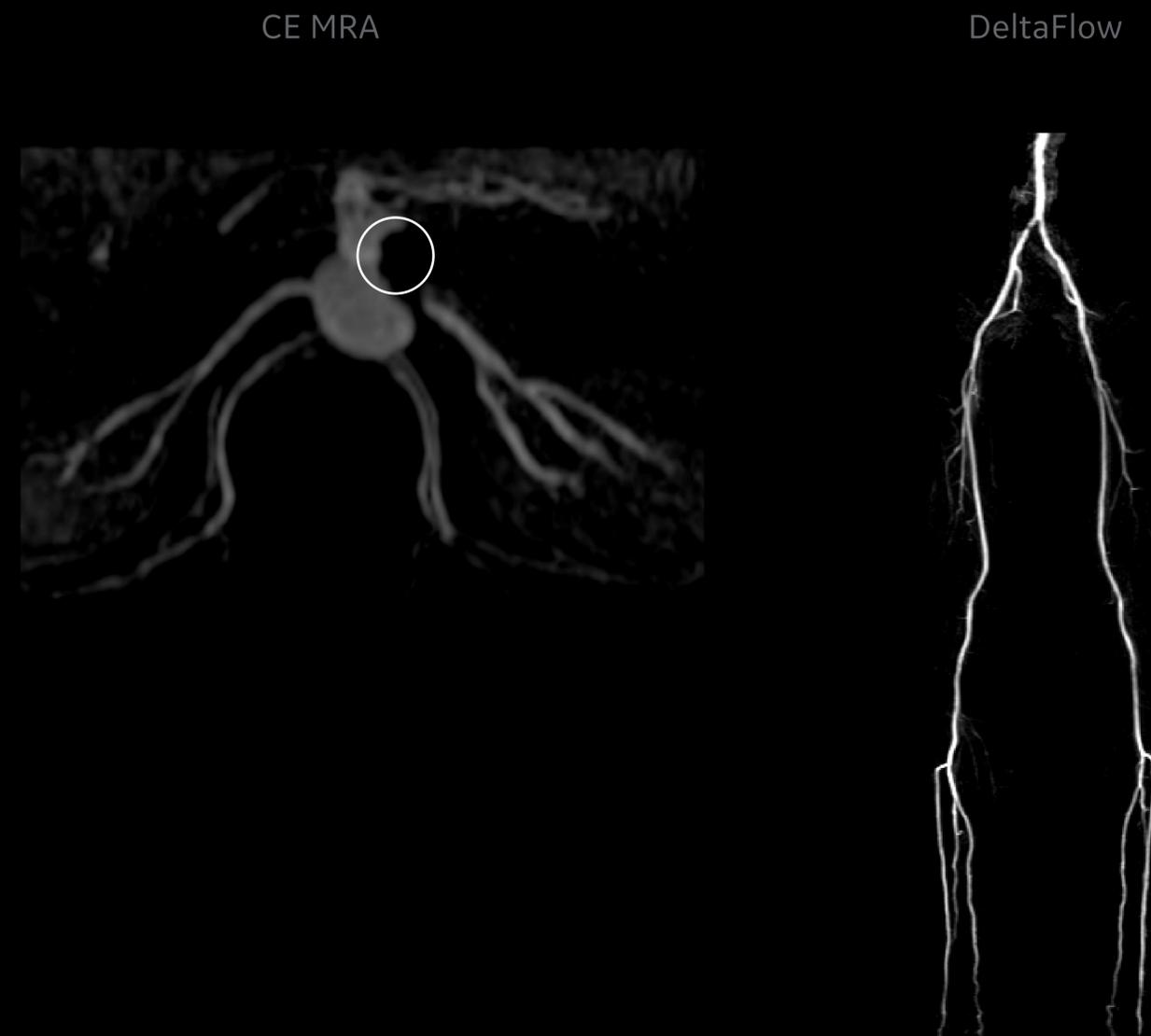
The Inhance Suite improves your workflow with easy setup by allowing visualization of blood flow in diverse anatomies with an advanced array of powerful pulse sequences – with no need for gadolinium.

The suite includes:

- 3D IFIR
- 3D Velocity
- 2D InFlow
- 3D DeltaFlow

Clinical benefits:

- Enhances evaluation of renal conditions and lower extremities
- Eliminates bolus timing
- Uses peripheral gating instead of full cardiac gating for easy setup
- No injection needed, which eliminates potential contrast reaction



CVWorks

Elective Applications

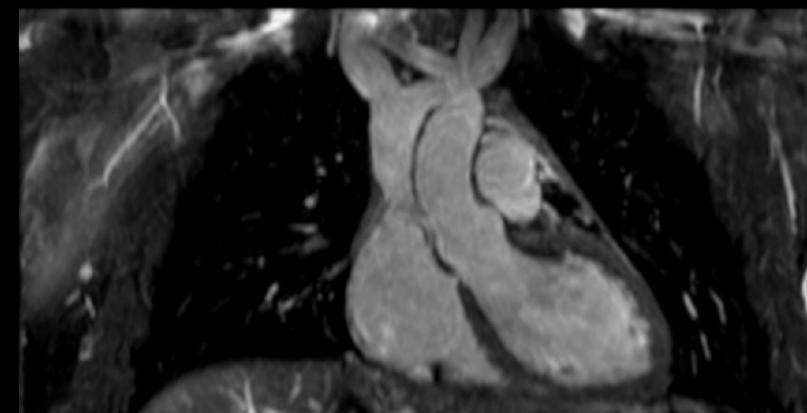
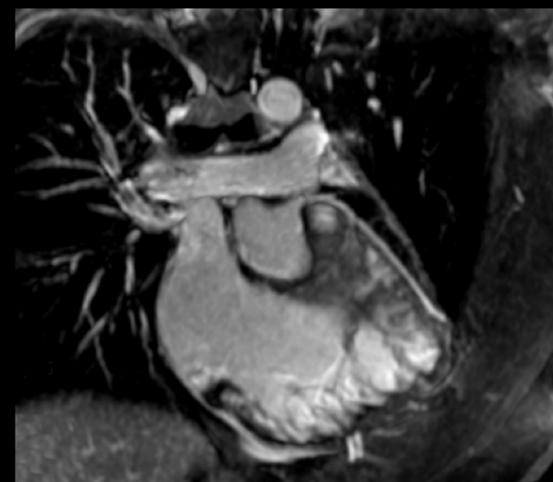
3D Heart

3D Heart is a 3D free-breathing, non-contrast assessment of the whole heart that can be used on both adults and children. Two different sequences are used per system type; 1.5T uses a 3D FIESTA-based sequence and 3.0T uses a 3D FGRE-based sequence. Cardiac gating, is required but uses a Navigator pulse to track respiratory motion.

Clinical benefits:

- Free breathing, non-contrast features help to increase patient tolerance
- Helps to evaluate congenital heart disease
- Aids in the assessment of coronary arteries and heart morphology

3D Heart reformatted into different imaging planes

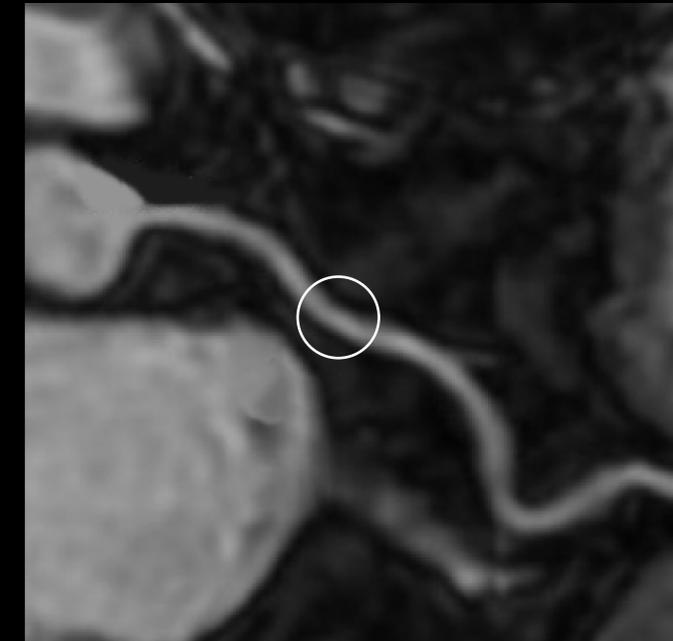
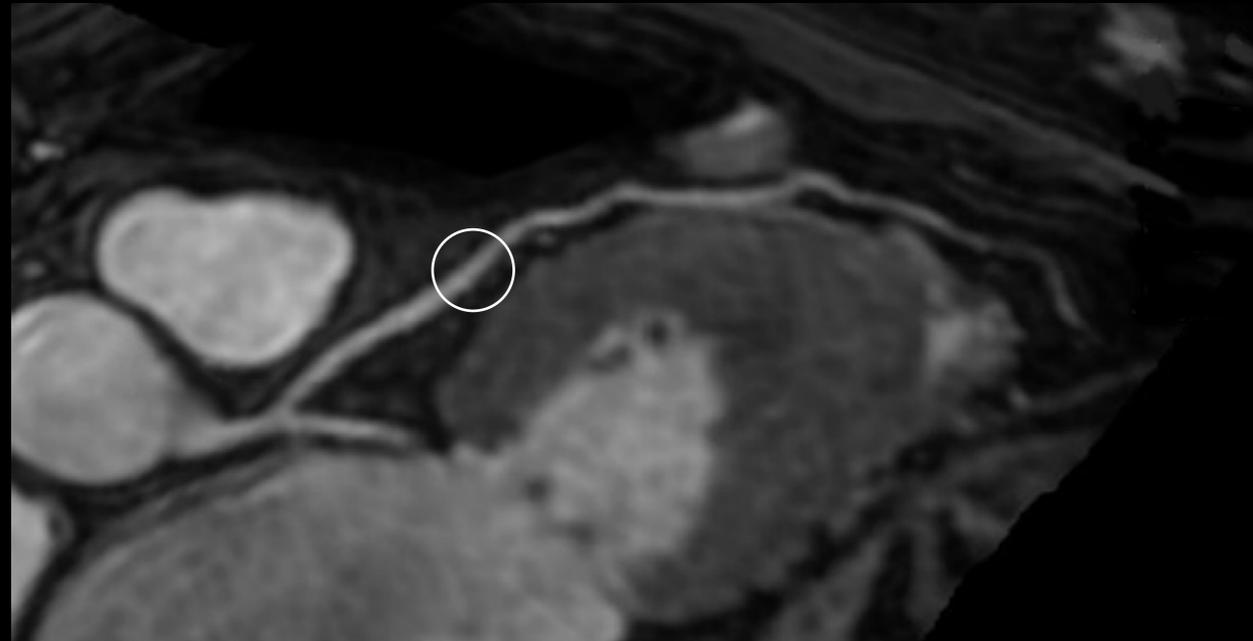


CVWorks

Elective Applications

3D Heart

3D Heart and non-contrast enhancement coronary arteries visualization



CVWorks

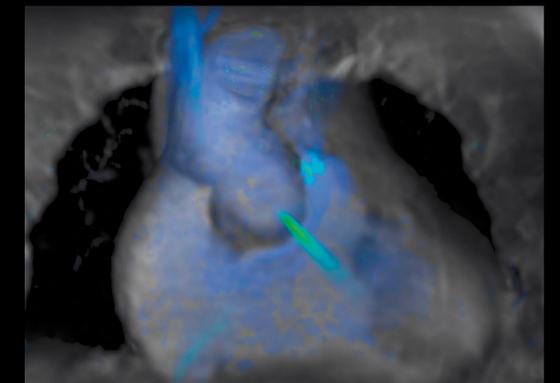
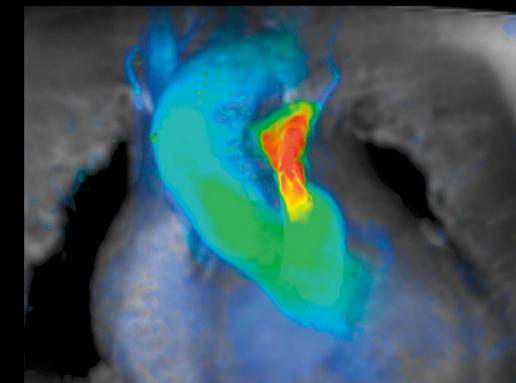
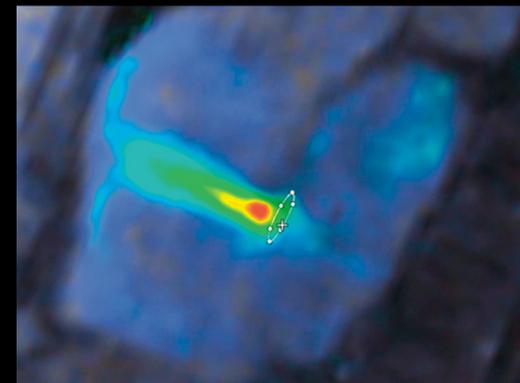
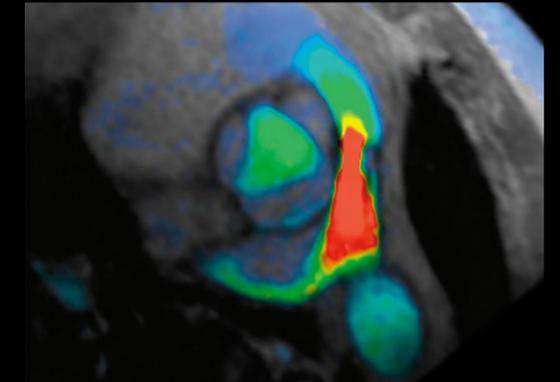
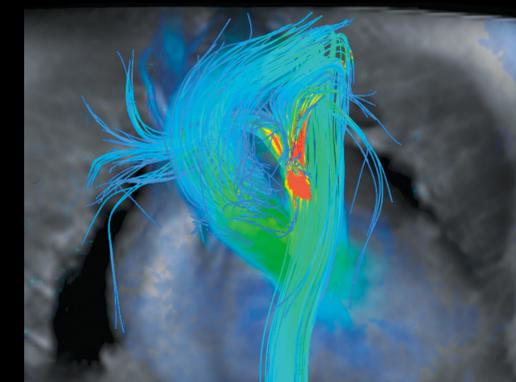
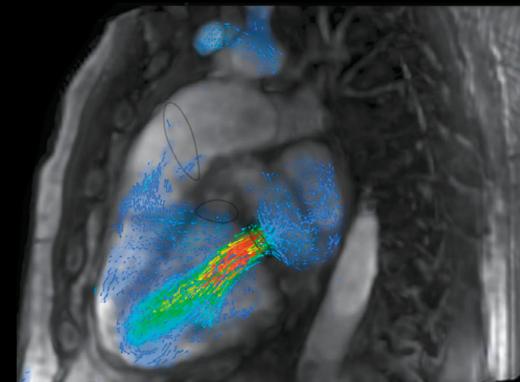
Innovative Applications

ViosWorks

ViosWorks is a comprehensive cardiovascular solution that captures visualization and quantification of 4D Flow with simplicity and speed in a free-breathing, 8-minute scan. ViosWorks 3D captures the entire ventricular volume during multiple cardiac phases in a single breath-hold.

Clinical benefits:

- Enables flow visualization in challenging areas, particularly helpful with pediatric patients
- Increases productivity and improves patient comfort
- Offers simplified workflow design with one 3D volume over the chest, enabling all users to be cardiac technologists
- Cloud-based post processing



CVWorks

Innovative Applications

Case Study: Post-Ross Procedure Assessment using ViosWorks

Clinical solutions

System: SIGNA™ Architect

Protocols used:

Axial T1 2IR, SA FIESTA Cine, LA FIESTA, 3D MRA, Axial 4D Flow (post contrast enhancement)

Patient history

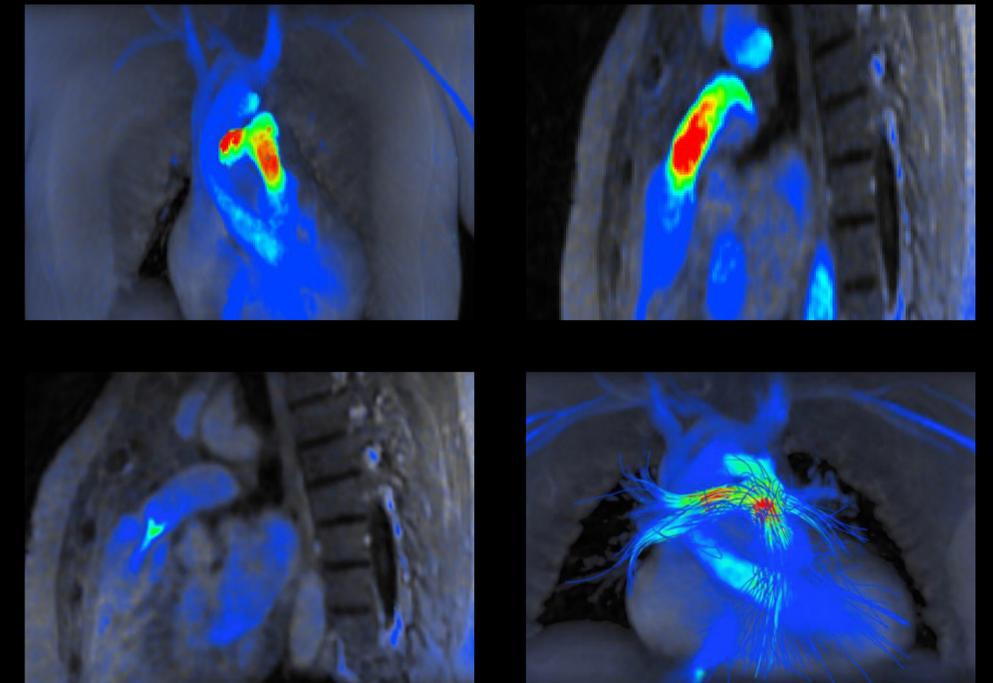
A pediatric patient presented with a previous aortic stenosis status post-Ross procedure. Exam was a two-year follow-up from a prior study. The initial exam was on a 1.5T scanner, the follow-up was on the SIGNA™ Architect 3.0T.

Procedure

The study took roughly 30 minutes to complete and involved 12 series. The majority were localizers. Exam was free breathing. 4D Flow replaced the setup and helped to minimize extra scans in hard-to-reach post-surgical areas.

MR findings

Final impressions found pulmonary insufficiency, pulmonary regurgitant fraction of 18% and pulmonary stenosis with a gradient of 27 mmHg. Clinician also noticed borderline enlarged Rt ventricular end-diastolic volume of 133ml.



back to app

CVWorks

Innovative Applications

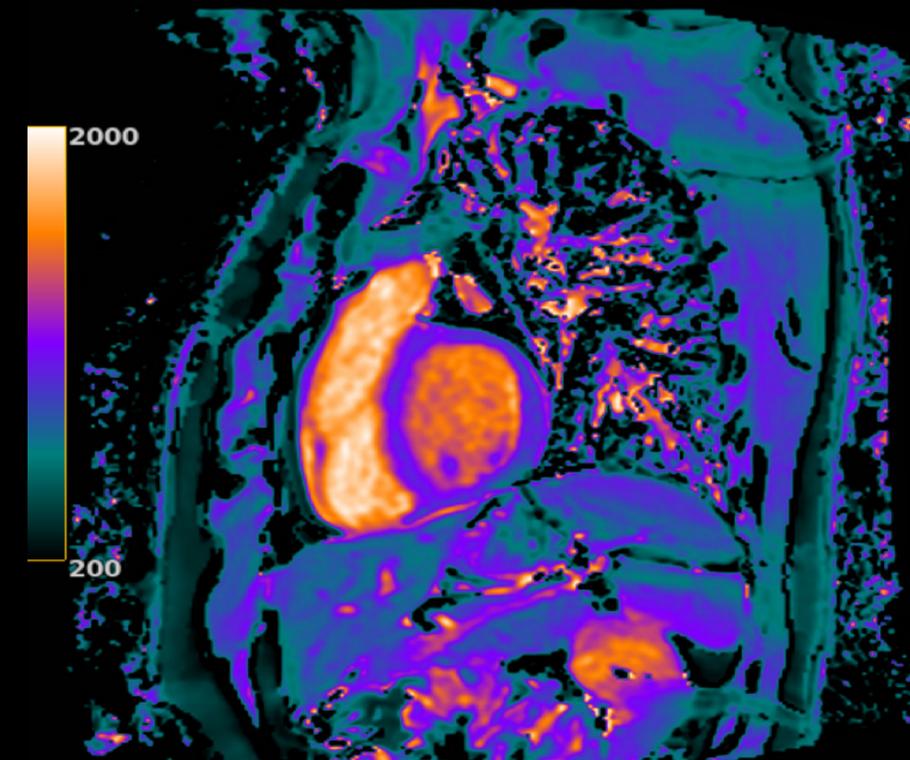
CardioMaps

CardioMaps consists of T1 and T2 mapping sequences. SMART1Map, as a GE-exclusive, is based on a saturation recovery sequence and is independent of heart rate and scan parameters. MOLLI is based on an inversion recovery sequence with apparent T1 values that can be affected by heart rate or imaging parameter variability. T2 mapping is a multi-echo FSE used for the quantitative assessment of myocardium and other tissues.

Clinical benefits:

- Primary application used in most cardiomyopathies
- SMART1Map offers in-line motion correction to compensate for cardiac and/or respiratory motion, providing reliable results
- Mapping can provide objective, quantitative measurement of T1 tissue characteristics

SMART1Map



CVWorks
Innovative Applications

CardioMaps

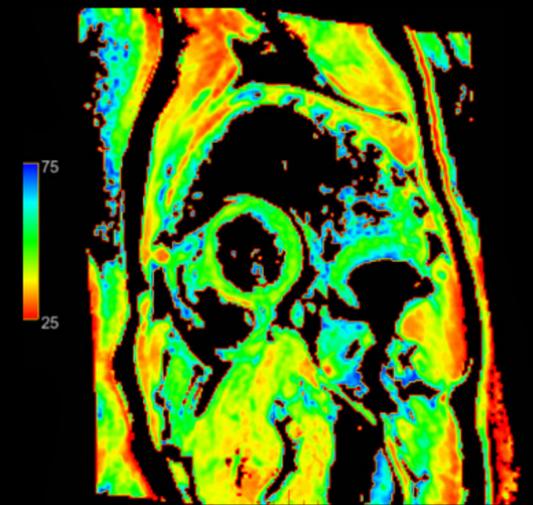
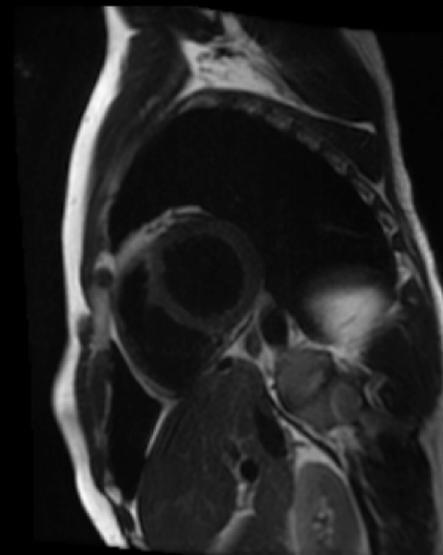
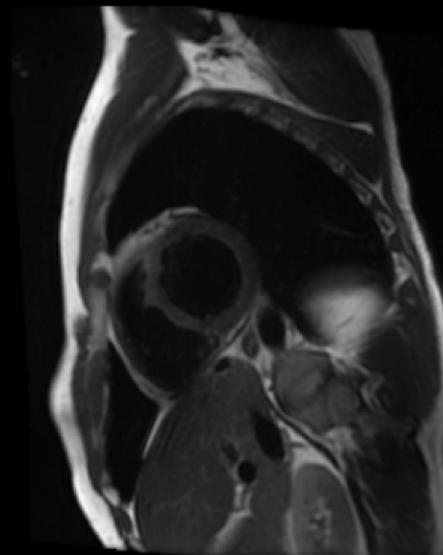
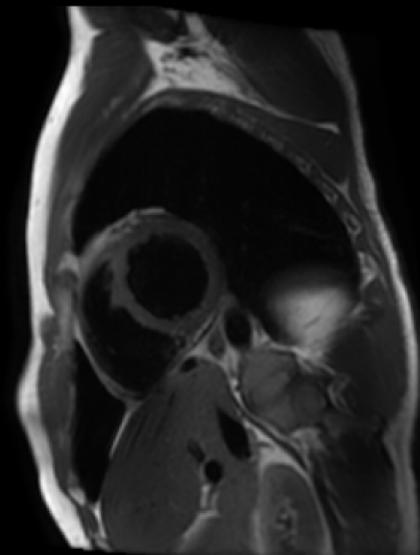
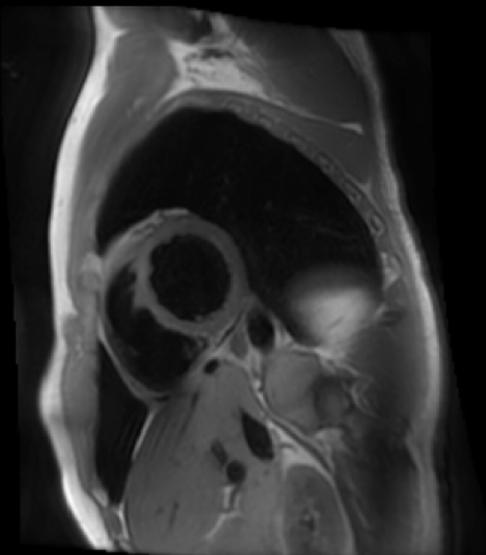
T2 Map FSE Black Blood

TE 1 = 10.9ms

TE 2 = 32.8ms

TE 3 = 54.7ms

TE 4 = 76.6ms



CVWorks

Innovative Applications

Case Study: Assessing Hypertrophic Cardiomyopathy with T1 mapping

Clinical solutions

System: SIGNA™ Architect

Coil used: Large AA coil

Protocols used:

Short Axis (SA) FIESTA Cine, SA MOLLI FIESTA, Cine IR 2RR, SS PS MDE SPGR

Patient history

A 51-year-old patient with a clinical history of hypertrophic cardiomyopathy was referred to MR based on echocardiography results.

Procedure

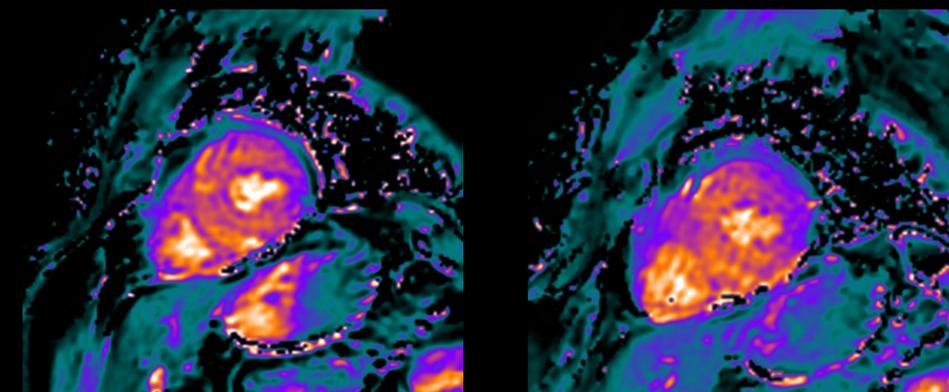
Patient positioned in the supine, feet-first position with vector gating leads applied in longitudinal and latitudinal directions. A large AA coil was positioned over the patient's chest and contrast was administered into the antecubital vein.

MR findings

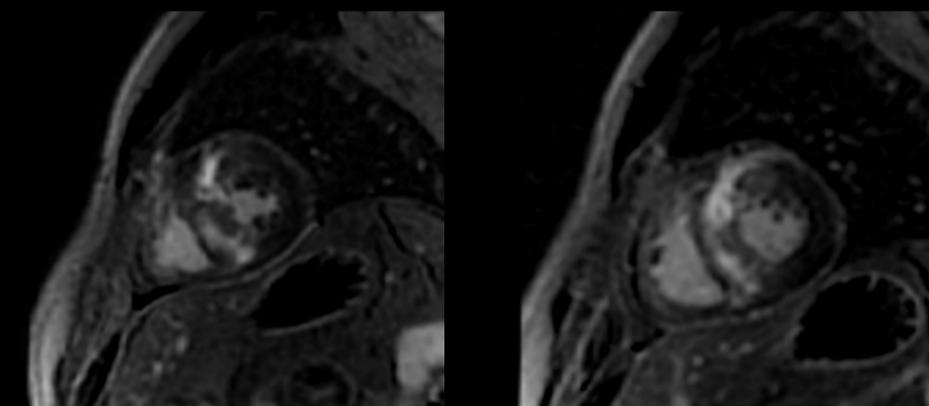
Exam concluded an asymmetric thickening of the interventricular septum measuring up to 24mm. No subaortic jet or anterior motion of the anterior mitral leaflet. There was extensive myocardial delay enhancement anteriorly at the base, and subendocardial delayed enhancement inferoseptally in the mid-myocardium.

T1 mapping correlates to delayed enhancement

Short Axis MOLLI FIESTA



SS PS MDE



CVWorks

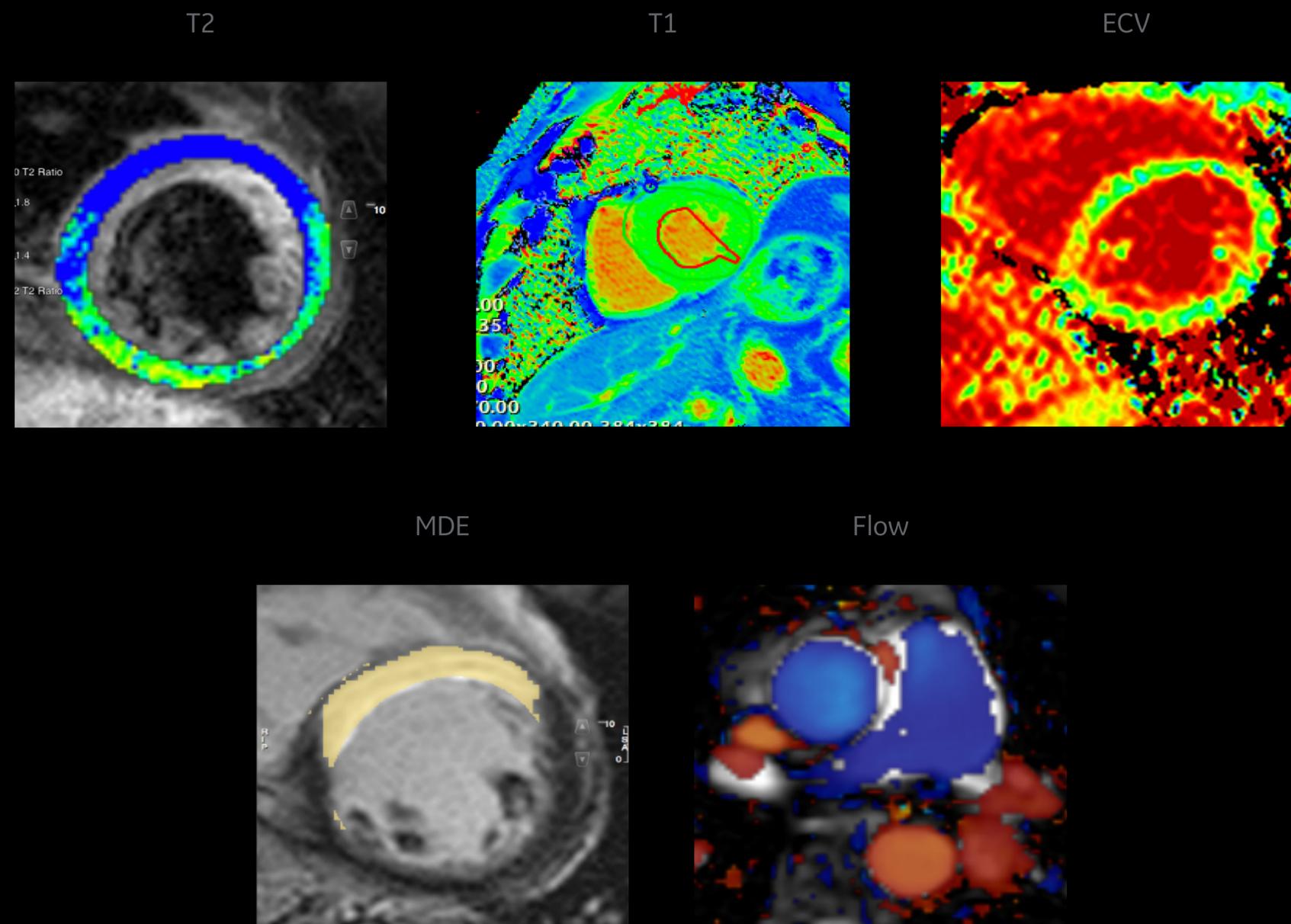
Innovative Applicationscmr⁴²

Now available on the AW and AW Server, cmr⁴² is a post processing and visualization solution that provides an easy and efficient analysis workflow of advanced function, flow, tissue characterization, perfusion and tissue mapping of the heart.

Clinical benefits:

- One-stop processing for cardiac imaging analysis
- Customizable to fit workflow needs, rapid quantified results and report generation
- Supports multi-vendor data

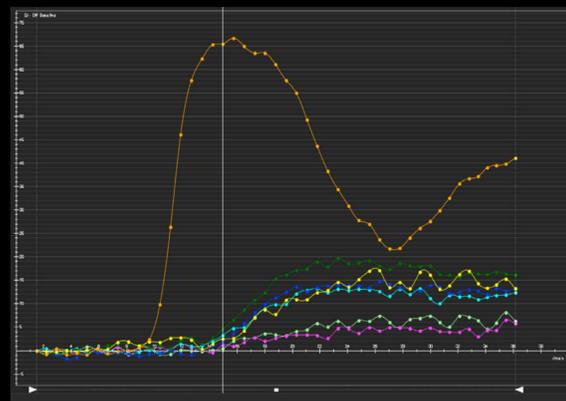
Cardiac post processing integrated on AW and AW Server



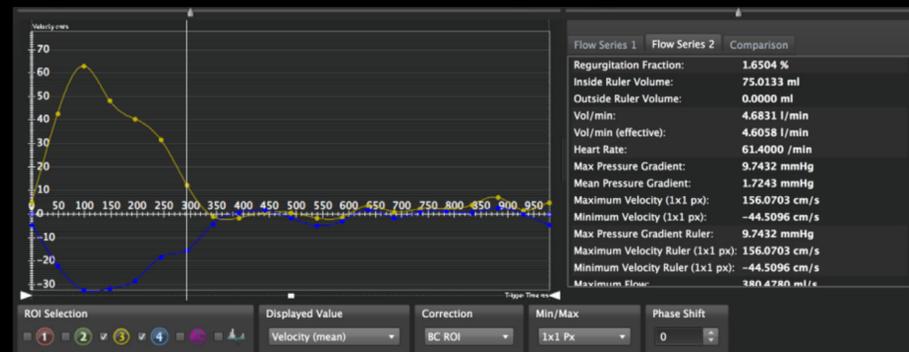
CVWorks Innovative Applications

cmr⁴²

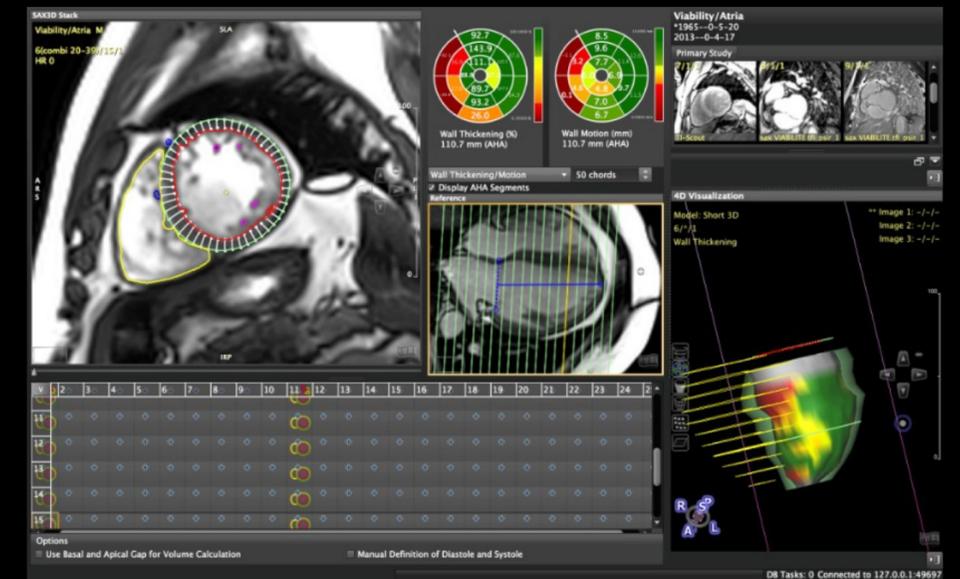
Perfusion



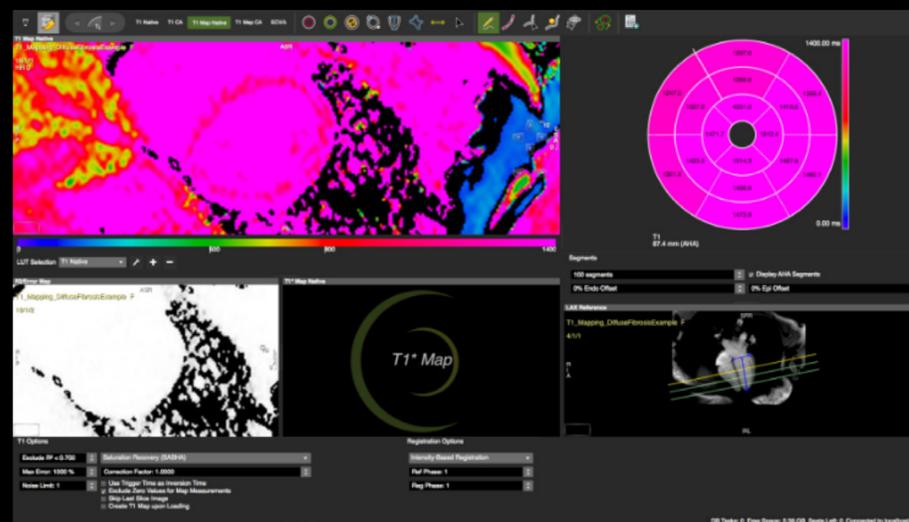
Flow



Mass, volume, function, tissue characterization



Tissue mapping



Images courtesy of: Fairfax MRI Center, Fairfax, VA, US; CHR Laennec Imaging Center, Creil, France; GIE IRM, Creil, France; Mansoura Advanced Medical Imaging Center, Mansoura, Egypt; Mayo Clinic, Rochester, MN, US; Hartford Hospital, Hartford, CT, US; Centro Cardiologico Monzino, Milano, Italy; OSF, Peoria, IL, US; Yokohama Sakae Hospital, Japan; Keio University, Japan



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