

# Smart solutions for arrhythmias



Diagnosis



Therapy



Follow-up

# Arrhythmias – a growing challenge

Atrial fibrillation (AFib) is the most common and fastest-growing diagnosed form of arrhythmia. One reason for this is increased longevity: AFib prevalence is 5.9 percent higher among those over-65 year of age.

With the increasing prevalence of AF, you need to be able to treat your patients quickly and effectively. Siemens Healthineers provides you with a comprehensive portfolio that can help improve outcomes all along the clinical pathway.

We've asked ourselves three key questions:

**How can we help you treat this growing population of patients:**

- more effectively and efficiently
- in a way that is safer for the patient and the clinician
- and lastly optimizes the power of multimodality imaging?

**How can we help you to improve throughput and outcomes?**

**How can we maximize the potential of multimodality integration?**

**33.5 million:**

Number of people around  
the world who have AFib.

That's **0.5%** of the  
world's population.



A 2013 study published in *Circulation* revealed that 33.5 million people around the world have AFib. That's about 0.5 percent of the world's population. In 2005, AFib affected about three million Americans, according to the Cleveland Clinic. That figure is projected to rise to eight million by the year 2050.

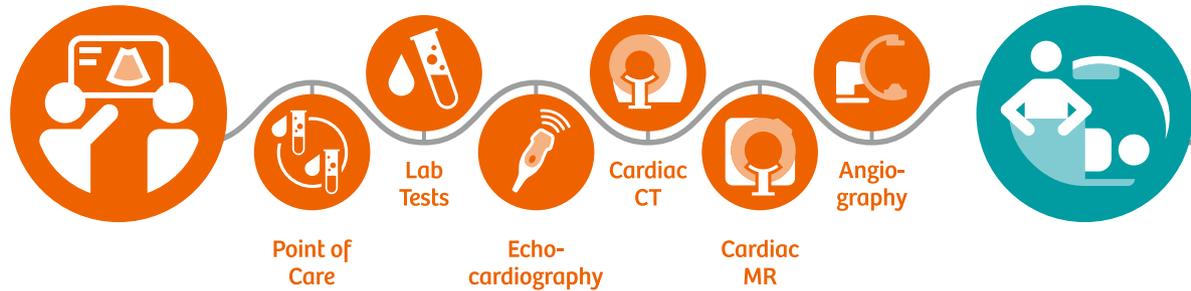
<sup>1</sup> *JAMA Internal Medicine*

**With hearts so  
strongly connected,  
shouldn't arrhythmia  
solutions be, too?**

# A perfect match: Our solutions for arrhythmia

## Diagnosis

## Therapy



Effective treatment starts at the point of care (POC). So to help you plan the best course of action with confidence, our cardiac biomarker assays and blood gas testing solutions deliver consistent lab quality results fast – wherever you happen to be.

With powerful scanner technology and smooth, AI-powered, intelligent workflows, our CT and MR imaging solutions extend your cardiovascular imaging workflow to include

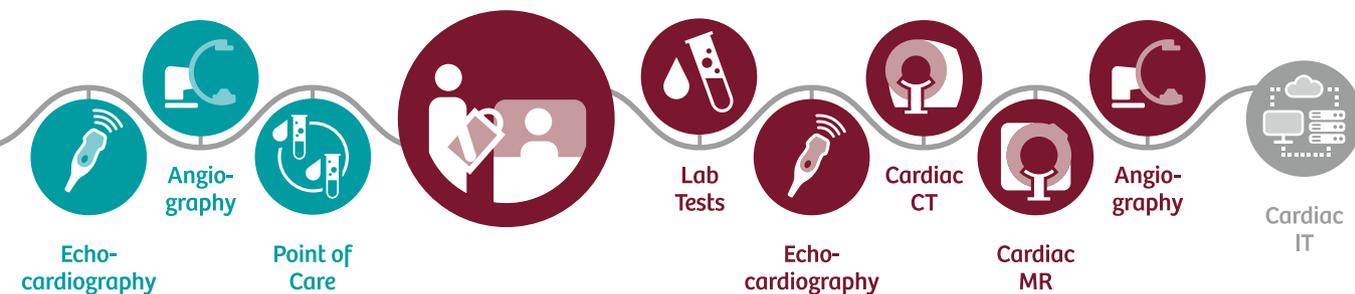
patients with arrhythmias. When it comes to echocardiography, our ACUSON SC2000 PRIME is the only ultrasound system that can image in 2D & 4D TTE (transthoracic), TEE (transthoracic echocardiography), and ICE (intracardiac echocardiography) to handle all your diagnostic exams and your echo-guided procedures for your arrhythmia patients. You can even combine TEE and angiography live imaging during interventions with TrueFusion.\*

TEE imaging is ideal for identifying possible thrombi before AFib interventions, while ACUSON ultrasound catheters deliver anatomical details in real time for better guidance during ablation procedures. And when you need to perform transeptal punctures or LAA (left atrial appendage) closures, the ACUSON SC2000 PRIME system provides superior visualization of anatomies and devices – in 2D and real-time 4D imaging without stitching or gating artifacts.

All our systems are carefully designed to standardize, automate, and integrate different imaging modalities and third-party systems. So even when you're running multiple applications concurrently, your AFib workflows never miss a beat.

With synergies that extend all along the patient's clinical journey, our portfolio is designed to help you to set new standards in delivering quality and efficiency.

## Follow-up



With their new ultra-low dose programs, Artis Card angiography systems reduce dose exposure significantly in the EP lab. By delivering consistent, high quality images at the lowest reasonable dose, they lighten the load on everyone: your AFib patient, your team, and yourself.

For optimal guidance during interventions, you can even overlay a segmented 3D model of the left atrium onto live fluoroscopy in real time. Particularly when using cryoablation and mapping systems to treat atrial fibrillation, this can make a real difference to workflows and outcomes.

Our Sensis Vibe documentation solution is designed to blend smoothly into your hospital IT ecosystem. In addition to hemodynamics and electrophysiology, it also takes care of reporting and standardization.



# Keep your POC testing consistent

## POC Immunoassay Systems

When every second counts, our Stratus® CS 200 Acute Care™ Analyzer delivers lab-quality results swiftly at the point of care. The broad menu of tests enables rapid decision-making for better patient care.

## POC Blood Gas Systems

With on-demand blood gas testing becoming standard, consistent measurements and centralized management are key to workflow efficiency and improved health outcomes.

From patient-side to on-board solutions, our POC Blood Gas Systems deliver the fast, accurate laboratory results you need for prompt diagnosis and therapeutic intervention. You can adapt the broad range of test menus to support your hospital's specific testing needs, and have confidence in providing consistent results from the laboratory to the point of care. This improves your outcomes and workflow while transforming care delivery across clinical pathways.

## Point of Care Ecosystem™ Enabled



Consistent blood gas results wherever and whenever you need them



Have confidence in patient results with a customized configuration of analyzers, from handheld to benchtop systems, with results that correlate no matter where the testing takes place.



# No need to exclude AFib patients

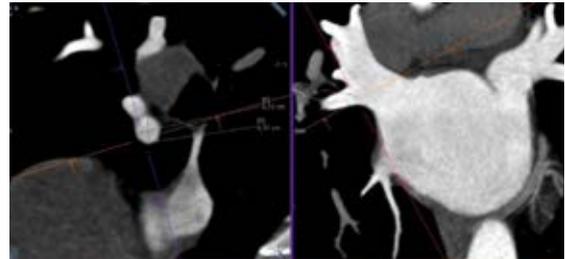
## Be prepared – with Dual Source CT

With its 3D imaging capability, Dual Source CT delivers robust, reproducible data for your preprocedural AFib assessments. After excluding contraindications such as coronary artery disease, you can familiarize yourself in advance with the unique anatomy of your patient's heart – particularly the size of the left atrium as well as the number, locations, and diameters of the pulmonary veins.

Frail patients in particular benefit from the ultra-fast acquisition speed and low kV imaging. Dual Source CT can provide all relevant information in a single scan with a single injection of contrast agent as low as 38 ml<sup>1</sup>, thereby reducing the risk of impaired renal function.

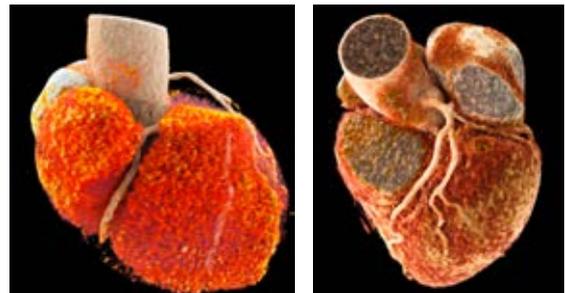
CT imaging is the only way to simultaneously assess femoral access and decide on the optimal angiographic procedural angle. This additional information could enhance the success and efficiency of your procedures. During procedures, you can then overlay a 3D model of the left atrium on live fluoroscopy in real time – for confident, image-based guidance.

## Get ready for tomorrow today – with Siemens Healthineers Dual Source CT



Dual Source CT angiography for precise anatomical assessment and planning with SOMATOM Definition Flash.

*Courtesy of F. Hintringer / M. Stuehlinger, Medical University of Innsbruck, Austria*



Ejection fraction study: Low-dose CT (less than 2 mSv) scan with SOMATOM Drive of a 70-year-old male weighing 94 kg with an unstable heartbeat

*Courtesy of Medical University of Vienna, General Hospital AKH, Vienna, Austria*

<sup>1</sup> Bittner et al. *Eur Radiol.* 2016 Dec;26(12):4497-4504.

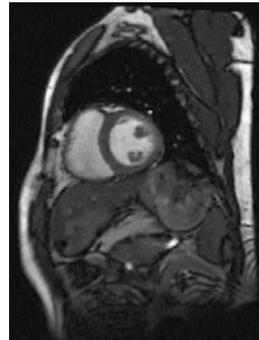


# High-res cardiac MRI for arrhythmic patients

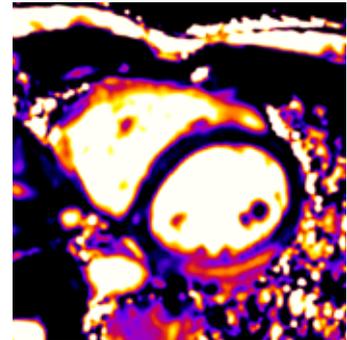
## High quality cardiac MRI up to ten times faster

With Compressed Sensing Cardiac Cine (CSCC), even your most challenging arrhythmic patients can now benefit from MRI. Rather than almost six minutes, you can now perform a high-resolution scan in just 25 seconds – without compromising on image quality.

MRI is ideal for accurate, preprocedural diagnoses of complicated arrhythmias such as ventricular arrhythmia. You can also input 3D cardiac MRI volumes from pre-procedural scans to electro-anatomic mapping systems or fuse them with live fluoro to guide your interventions at a later stage.



CSCC of a 50-year-old male with AFib acquired in a single heartbeat



MyoMaps with HeartFreeze for pixel-based quantification of myocardial damage

Courtesy of Peking Union Medical College Hospital, Peking, China

## Tissue characterization

To help you assess the nature and scope of myocardial tissue damage in AFib patients, MyoMaps with HeartFreeze provides pixel-based quantification. This extra clarity increases the chances that ablation procedures will be successful and helps you to create individual treatment strategies that minimize the risk of sudden cardiac death.

## Consistent results, fast

Reproducible results are particularly important when monitoring the results of ablation and CRT (cardiac resynchronization therapy) in arrhythmia patients. Our BioMatrix Sensors and AI-powered Cardiac Dot Engine provide automatization and step-by-step guidance for standardized cardiac MRI exams in as little as 30 minutes.



Cardiac Dot Engine with AI-powered technology for step-by-step guidance and standardized CMR exams

Courtesy of J. Garot, Cardiovascular Institute Paris-Sud, France



# Precision imaging and AI-powered measurements

## One system for 2D & 4D real-time TTE, TEE, and ICE imaging

Accurate, real-time assessments of anatomy and function can help you monitor and treat your arrhythmia patients even more accurately and efficiently. Our ACUSON SC2000 Prime Ultrasound system is the hub for all your echocardiography needs. With AI-powered 2D and 4D quantification tools, automated protocols, and powerful navigation tools it provides reproducible measurements over multiple heart beats in 1-click as well as volume imaging with no stitching artifact to efficiently support at all stages of care – from diagnosis to intervention.

### Comprehensive, precise information in real time

2D and real-time 4D TEE imaging without stitched artifact are ideal when you need to assess valvular condition and ventricular function, measure left atrium (LA) size, or detect thrombi in the LA. This is particularly important for patients with irregular heartbeats as in AFib cases.

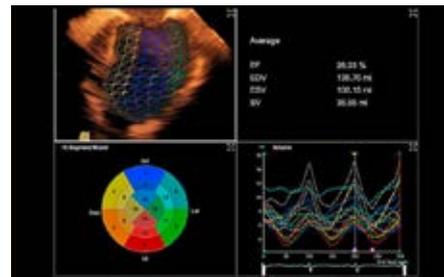
### AI-powered measurements acquired by TTE or TEE

Provide ejection fraction measurements and cardiac mechanics to help you assess and monitor ARR and Heart Failure patients during routine echo exams. Choose from eSie Left (left heart measurement package) or eSie LVA (left ventricular analysis).

### ACUSON ICE catheters – 2D/3D/4D Volume real-time ICE monitoring of complex anatomies

ACUSON AcuNav ultrasound catheters are ideal when you need to identify anatomical structures, facilitate transseptal access, guide intracardial tools, or spot potential complications during procedures.

### Clear, real-time visualization of anatomy, devices, and catheters



eSie LVA Volume LV Analysis

### One-click TTE and TEE Quantification

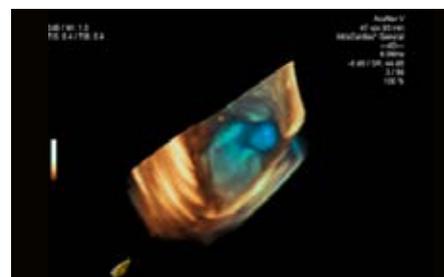
Improve EF reproducibility and accuracy with automated one-click quantification of 3D transthoracic or transesophageal echocardiograms.



eSie Left Heart Measurement Package

### eSie Left: Fast and reproducible

Achieve one-click fast and reproducible ejection fraction (EF) measurements for both the left ventricle (LV) and left atrium (LA) without simultaneous manual tracing for systole and diastole.



Volume ICE imaging of LAA



ACUSON AcuNav catheter provides anatomical details



# Tailored to your needs – Artis in arrhythmias

To help you diagnose and treat arrhythmias more effectively, you need an imaging solution that delivers images of the moving heart in any angulation, yet blends smoothly into your workflow. To add to the challenge, dose has to be kept to a minimum – even during complex procedures.

Artis systems are our answer to these three demands. From floor, ceiling mounted, or biplane systems to highly flexible multi-axis configurations, all these systems have one thing in common: They deliver excellent image quality at the lowest reasonable dose – smoothly and efficiently.

## A PURE® experience

At Siemens Healthineers, we believe complex angiography systems should be smooth and intuitive to operate. That's why every Artis zee, Artis Q, and Artis Q.zen system comes with our PURE® platform pre-installed.

As with the 3D Wizard, you simply select which image you want, then let the system guide you through acquisition. All the parameters you need for a 3D scan – including a rotational angiography protocol recommendation – are provided automatically. That's a big help when you need to define clinical and departmental standards for clinical studies or quality assurance.

For higher process efficiency, better diagnostic information, and enhanced patient treatment outcomes, it pays to experience PURE®.



Heads-up display: Stay focused with context-sensitive onscreen menu

# Reducing radiation exposure during therapy

## CARE – Combined Applications to Reduce Exposure

Minimizing radiation dose during interventional procedures is important for clinical staff and patients alike. Our applications help you provide superior medical care at the lowest reasonable dose – without compromising on image quality or clinical outcomes.

### Dose saving



**CAREvision** provides variable fluoroscopy frame rates ; pulse frequencies can be adapted to clinical needs.



**CAREfilter** is a specially designed copper prefiltration system that automatically adjusts the filter to the patient's anatomy.



**CAREprofile** allows radiation-free collimator and semitransparent filter adjustment using the last image hold (LIH) position as reference.



**CAREposition** enables radiation-free object positioning, i.e., allows the table or C-arm position to pan without using fluoroscopy.



**Low-Dose Acquisition**, a dedicated acquisition protocol that helps to achieve dose reductions.

### Dose reporting



**CAREreport** is a DICOM-structured radiation report containing all patient demographic, procedure, and dose information.



**CARE Analytics** is a standalone tool for installation on any PC in the hospital network, allowing evaluation of DICOM-structured reports.

### Dose monitoring



**CAREguard** allows three threshold values to be defined for the accumulated skin dose and signals when a skin dose level is exceeded.



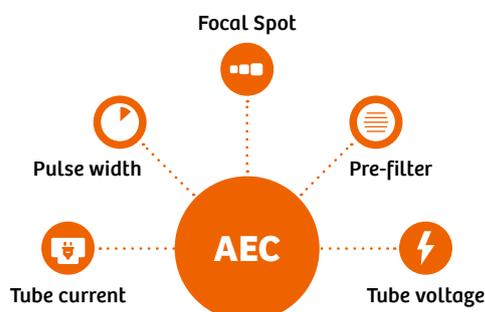
**CAREwatch** displays the dose area product and dose rate at the interventional reference point on the live display in the examination and control rooms.



**CAREmonitor** shows in real time the accumulated peak skin dose according to the current projection in the form of a fill indicator on the live monitor.

## Automatic Exposure Control (AEC)

During interventions, this Siemens Healthineers feature monitors and adjusts five parameters – including copper prefiltration – on the fly, taking factors such as patient size and C-arm angulation into account. This is the key to achieving the lowest reasonable dose while maintaining the image quality you desire.



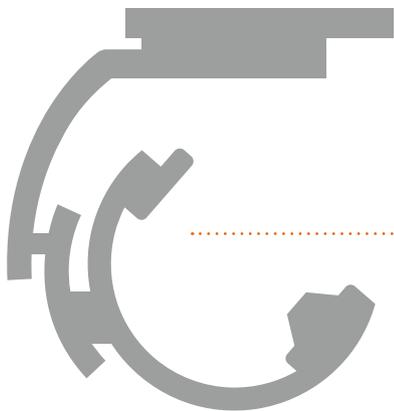


# Setting the gold standard for dose in ARR therapy

We understand the importance of doing everything possible to minimize dose exposure during interventions. In routine electrophysiology interventions, our Artis zee angiography systems can help you to reduce dose levels by more than 70 percent.<sup>1</sup>

## Significant dose savings with ultra-low dose protocol of Artis systems

"In routine electrophysiology interventions\*, Artis zee angiography systems equipped with (ultra-) low dose settings may reduce patient dose (as dose-area product) by as much as 76% (in standard procedures) and by as much as 77% (in complex EP procedures)\*\* as compared to equivalent procedures on Artis zee systems equipped with standard low dose settings as demonstrated in one single-center study\*\*\*."



## 90 $\mu\text{Gym}^2$

Total DAP per procedure

Other vendor:  
DAP: 880  $\mu\text{Gym}^2$ \*\*\*\*



77%  
dose savings



<sup>1</sup>Bourier et al. *Europace* 2016; 18(9):1406-10.

\*Routine electrophysiology interventions comprise of cine-loop and fluoroscopy imaging sequences.

\*\*90.7  $\pm$  62.3  $\mu\text{Gym}^2$  vs. 387.7  $\pm$  367.0  $\mu\text{Gym}^2$  for standard procedures; 199.7  $\pm$  159.6  $\mu\text{Gym}^2$  vs. 877.9  $\pm$  624.7  $\mu\text{Gym}^2$  for complex procedures. The results of the application of (ultra-) low dose settings vary depending on clinical task, patient size, angulation of the angiography system and collimation.

\*\*\*Results based on total dose-area product from a single center, retrospective, historically controlled study (German Heart Center Munich, Germany) on 140 patients undergoing electrophysiology procedures, including 100 left atrial, and 40 standard procedures, and 237 cine-loops.

\*\*\*\*Comparable procedures.

*“The new ultra-low dose settings support us in electrophysiology with the result of a 80% dose saving on the same Artis system!”*



Dr. Osman Tutdibi, Verbund Katholischer Kliniken, Düsseldorf, Germany



*“We are using the new settings for ultra-low doses for all procedures, and are really pleased.”*

Dr. Peter Schuster, Haukeland University Hospital, Bergen, Norway

*The outcomes achieved by the Siemens Healthineers customers described herein were achieved in their customer's unique setting. Since there is no “typical” hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption) there can be no guarantee that others will achieve the same results.*

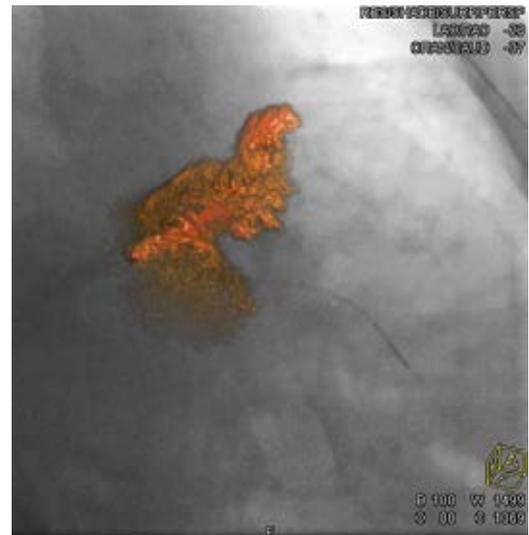


# One rotation to the LAA

Left atrial appendage closures (LAACs) are now an established method of reducing stroke risk in patients with non-valvular atrial fibrillation (nvAF) as an alternative to long-term anticoagulation drug therapy. Since no two LAAs or surrounding structures are the same, our advanced imaging tools can help you plan and effectively perform occlusions with reduced risk of complications. In addition to echo-based 4D Volume imaging support such as ICE, TEE, and the fusion of TEE with live fluoroscopy, we also offer guidance solutions based purely on angiography.

**syngo DynaCT Cardiac** creates 3D CT-like images of the LAA with its current blood-fill status during the procedure. With rotational angiography, you can obtain high quality CT-like images in just 5 seconds.

## CT-like imaging in the cath lab



syngo DynaCT Cardiac 3D volume overlaid on live fluoroscopy

Courtesy of University Hospital Erlangen, Erlangen, Germany

**20 million**  
people worldwide suffer from atrial fibrillation. They have a **5-fold risk** of developing ischemic stroke.<sup>1</sup>



## syngo DynaCT Cardiac

- Improve access to care through intra-procedural CT-like imaging in your cath Lab
- High-quality 3D volumes for cardiac anatomy assessment even at virtually impossible angulations
- Optimize clinical operations with 3D Wizard guidance for fast, easy, and intuitive acquisition

<sup>1</sup> Guidelines for the management of atrial fibrillation. The task force for the management of AFib of the ESC Euro Heart J 2010; 31:2369-2449.

# Strong collaborations with industry partners in EP

At Siemens Healthineers, we believe in integrating expertise through collaboration. In the field of arrhythmias, we work with strategic partners to make sure you can integrate third-party mapping and navigation technologies seamlessly and reliably. Our aim is to help you square the circle by increasing therapy effectiveness, while decreasing radiation exposure.

## Mapping system integration

This is why our systems offer fully automatic segmentation algorithms for the left atrium. Why they automatically overlay 3D anatomical data to live fluoroscopy. And why you can also transfer results to your preferred mapping systems for fusion with anatomical data.

## Fluoro image integration with navigation systems



Fluoro images seamlessly integrated into CARTO®3 System\*



Integration of prerecorded fluoro scenes on Abbott's MediGuide System\*

\*Product must be ordered from manufacturer



# Your real-time guide in AFib therapy

For interventionists, atrial fibrillation poses not one, but two challenges: How do we improve success rates? And how do we deal with the growing number of patients?

Together with the established therapy – RF (radio frequency) ablation guided by electro-anatomical mapping systems – cryo-balloon ablation is now becoming an alternative. Image guidance can provide real-time support by superimposing 3D data on live fluoroscopy during interventions. This is particularly valuable when maneuvering the cryoballoon to the pulmonary vein ostia.

## Versatile ICE imaging

During the procedure, precise anatomical and physiological details guide you in real time.

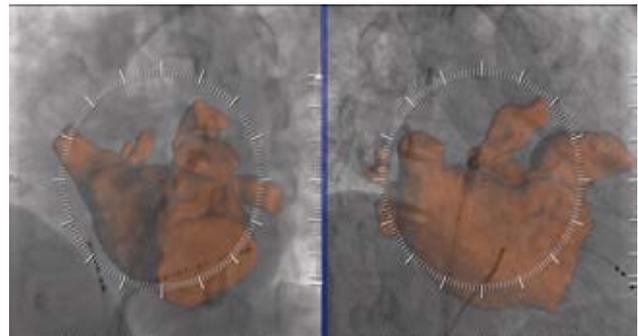


### ACUSON AcuNav ultrasound

- Visualize anatomical details
- Facilitate image-guided transseptal access
- Real-time navigation of intracardiac tools

## From CT assessment to fusion

Use data easily from your patient's preprocedural CT scan for real-time guidance.



### syngo 2D/3D Fusion

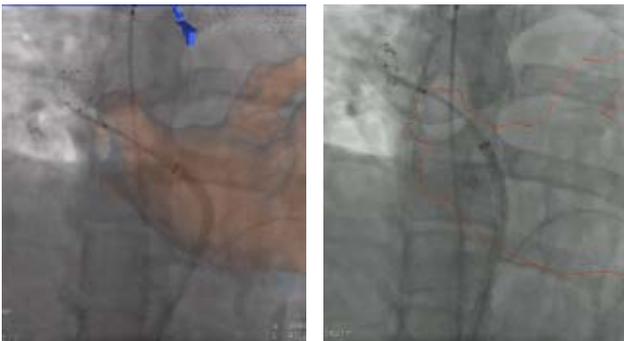
- Enhance therapy outcomes by fusing preoperative CT or MR data with angiography for live image guidance
- Co-registration requires just two 2D fluoro images

# Multimodality imaging for precision in AFib therapy

Multimodality imaging has the potential to support AFib treatment in several ways. For example, real-time image guidance during cryoballoon ablation interventions can make navigating complex anatomies clearer for confidence in accurate balloon positioning before inflation. The ultra-low dose settings on our Artis angiography systems can make workflows more accessible and logical. And our recording system Sensis Vibe, reduces administrative effort and delivers the excellent signal quality you need for any EP procedure.

## Image-guided intervention

An image-guided cryoballoon ablation procedure



### syngo 3D Roadmap

- Overlay of segmented LA is automatically updated to fit corresponding C-arm angulation, including zoom factor or table movement
- 3D object transparency can be adjusted or the contour of the LA overlaid to live fluoro for real-time catheter guidance

## Pristine signal quality

Analyses based on ICEG and ECG are essential in EP



### Sensis Vibe integration

- Benchmark in signal processing
- Integrated vital signs measurements
- Automatically generated reports
- Seamlessly integrated in Artis systems



# Sensis Vibe Combo for seamless interaction

Sensis Vibe® is the intuitive recording hub that captures all events, decisions, measurements, and data from your procedures without interrupting your workflow. By blending in with the rhythm of your interventional team, Sensis Vibe enhances efficiency, reduces administrative effort, and standardizes documentation and reporting across interventional entities.

## Pristine signal quality

During complex EP procedures, Sensis Vibe serves as the interface for key therapeutic equipment such as the angiography system, stimulators, ablaters, and mapping system. Using a single system for hemodynamics and EP has many benefits: It saves space and hardware, combines all your data in one database, and requires less training than multiple interfaces.

As a scalable solution, Sensis Vibe is designed to grow with your EP lab. When you need more clinical capabilities, you simply add an extra ICEG board.

22-bit A/D converter for sharp and clear signal even during ablation

64 channels acquired at 2000 Hz regardless of number of channels used



Compact amplifier, smartly integrated in the Artis table base

Integrated vital signs measurement

# Ready for reporting

## Sensis Vibe – recording and reporting

Cath labs and hybrid ORs are busy places where many things happen at once. Even in a routine procedure, every move needs to be synchronized and the entire team has to be on the same wavelength. Documenting the procedure must blend into the overall workflow.

Sensis Vibe® is the vital core where all events, decisions, measurements, and data from your procedures are captured. It reduces administrative effort by standardizing documentation and reporting across interventional entities. Sensis Vibe intuitively blends into the rhythm of the interventional floor and tunes up your workflow efficiency.

Sensis Vibe's core principle is ease of use at every step of the procedure. From the one-stop patient registration between Sensis and Artis to adaptable workflow support programs, Sensis Vibe helps you keep the focus where it truly belongs – on the patient.



### Automated report generation

Microsoft® Word-based reports are generated online during ongoing examination. Reports are customizable and can be forwarded automatically via email or send to your PACS.



### Artis systems

Sensis Vibe is fully integrated into all Artis interventional angiography systems via a bidirectional interface.

# Our portfolio for cardiovascular care



Cios Alpha



Mobile C-Arms



Artis Q.zen



Artis one



Artis zee



Angiography



Biograph mCT



Biograph Vision



Biograph Horizon



Nuclear Cardiology



Cardiac IT



Sensis Vibe Combo Recording System



Digital Ecosystem



syngo Dynamics



syngo.via



Xprecia Stride™  
Coagulation Analyzer



Stratus CS 200 Acute  
Care Diagnostic System\*



Point of Care



Lab Test



Echocardiography



Cardiac CT



Cardiac MR



Atellica Solution



Atellica COAG 360 System\*



ACUSON Freestyle



ACUSON P500



ACUSON SC2000 PRIME



SOMATOM Edge Plus



SOMATOM Drive



SOMATOM Force



MAGNETOM Sola  
Cardiovascular Edition



MAGNETOM Vida



MAGNETOM Aera

\* Not available for sale in the U.S. Product availability varies by country.



# Why Siemens Healthineers?

**At Siemens Healthineers, our purpose is to enable healthcare providers to increase value by empowering them on their journey toward expanding precision medicine, transforming care delivery, and improving patient experience, all supported by digitalizing healthcare.**

**An estimated 5 million patients globally benefit from our innovative technologies and services every day in the areas of diagnostic and therapeutic imaging, laboratory diagnostics and molecular medicine, as well as digital health and enterprise services.**

**We are a leading medical technology company with over 170 years of experience and 18,000 patents globally. With more than 48,000 dedicated colleagues in 75 countries, we will continue to innovate and shape the future of healthcare.**

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**Siemens Healthineers Headquarters**

Siemens Healthcare GmbH  
Henkestr. 127  
91052 Erlangen, Germany  
Phone: +49 913184-0  
siemens-healthineers.com