



# Innovazioni in Angiografia – le soluzioni per migliorare flusso di lavoro e ridurre radiazioni e mezzo di contrasto

Le ultime evoluzioni tecnologiche per la Cardiologia interventistica e strutturale: Roadmapping cardiaco, Live Fusion Imaging e nuove soluzioni per ridurre la dose di radiazione per interventi più sicuri

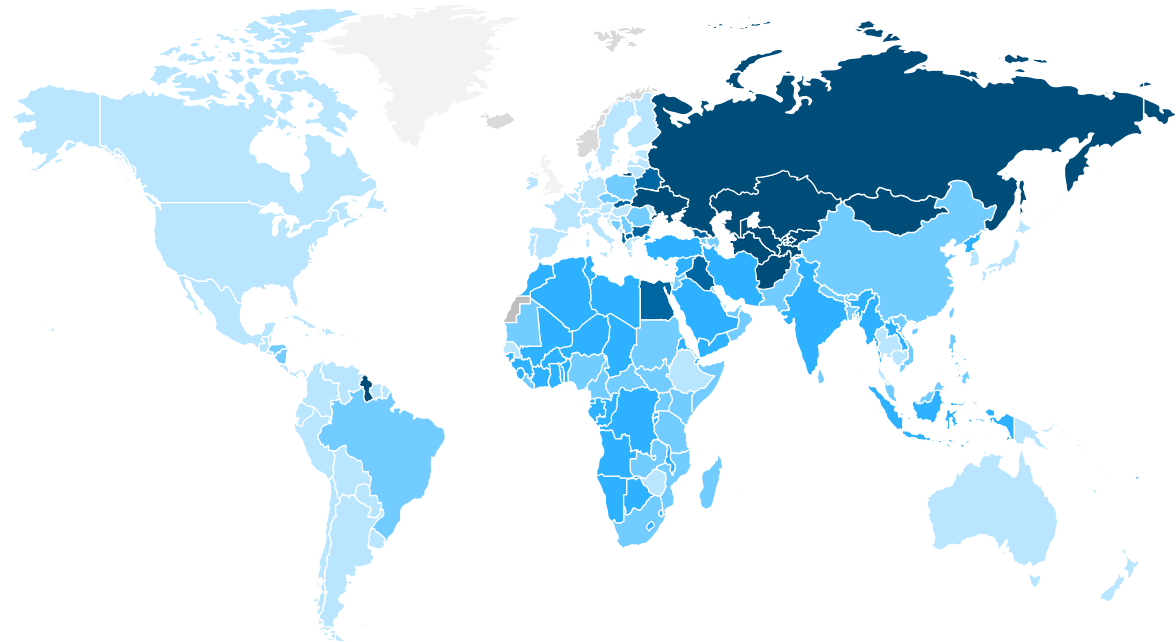
# Trends & challenges

Cardiovascular diseases (CVDs) are the number one cause of death worldwide\*

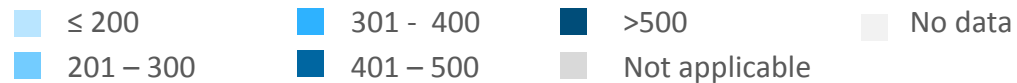


# Trends

## CVDs number 1 cause of death globally



Death rate (per 100 000 pop)



Cardiovascular diseases mortality:  
age-standardized death rate per 100.000 population, 2000-2012  
Both sexes: 2012

- CVDs are the number 1 cause of death globally: more people die annually from CVDs than from any other cause.
- An estimated 17.5 million people died from CVDs in 2012, representing 31% of all global deaths. Of these deaths, an estimated 7.4 million were due to coronary heart disease and 6.7 million were due to stroke.


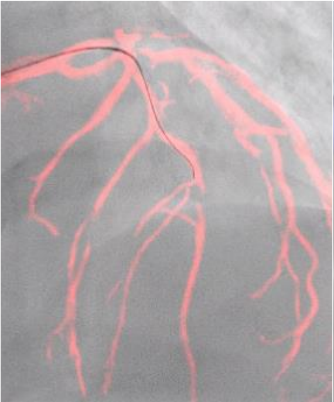

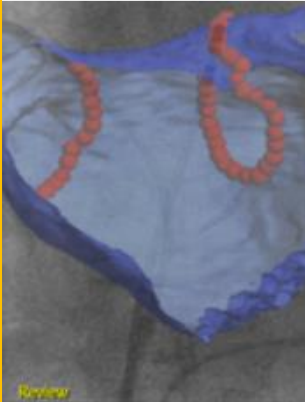

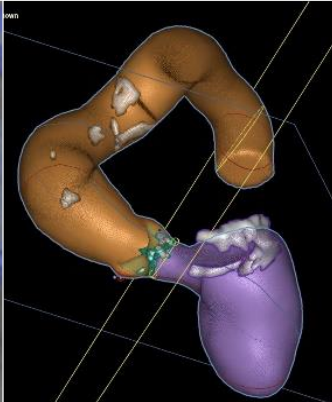

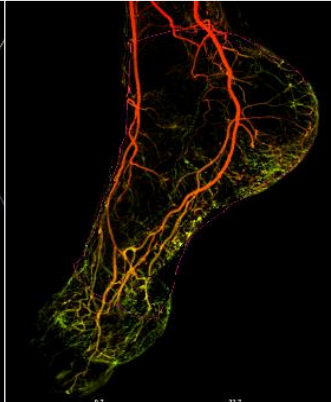

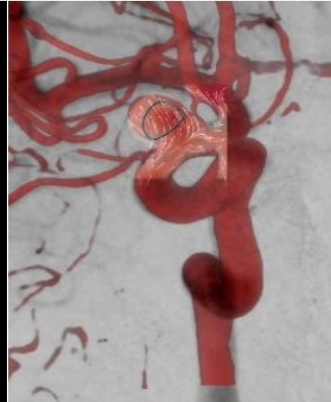

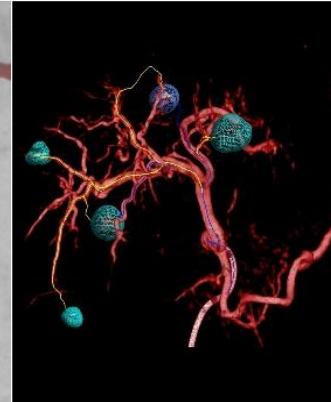


<http://www.who.int/mediacentre/factsheets/fs317/en/>



# Coronary Suite



# No matter what your need, we have the solution

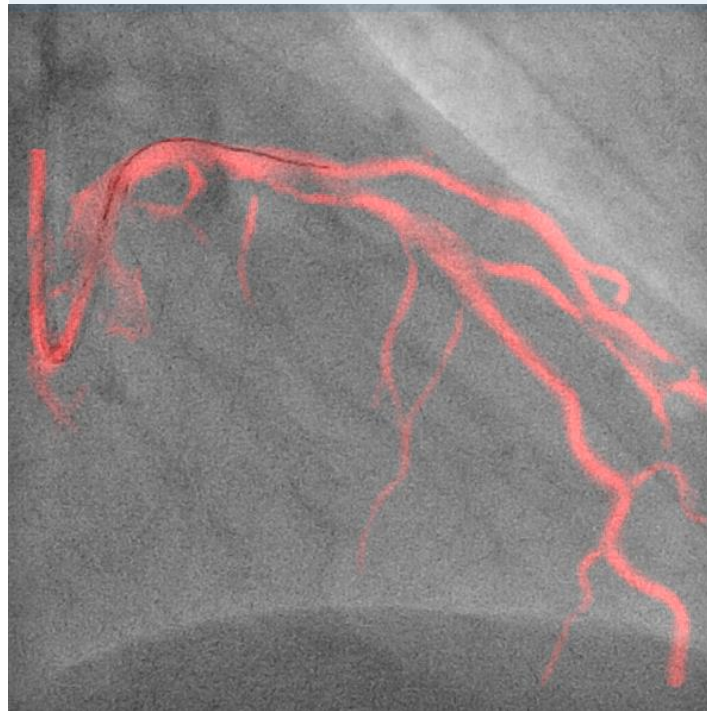
 <p><b>Coronary suite</b> Transforming complex PCI procedures into confident care</p> 	 <p><b>EP suite</b> Seamless integration drives EP excellence</p> 	 <p><b>SHD suite</b> Planning to live guidance for SHD procedures</p> 	 <p><b>Vascular suite</b> Redefine outcomes for vascular treatment</p> 	 <p><b>Neuro suite</b> Neuro decisions are based on what you see, so see more</p> 	 <p><b>Onco suite</b> Critical insights for superior care in Interventional Oncology</p> 	 <p><b>Spine suite</b> Perform spine surgery with confidence and precision</p> 
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# Coronary Suite



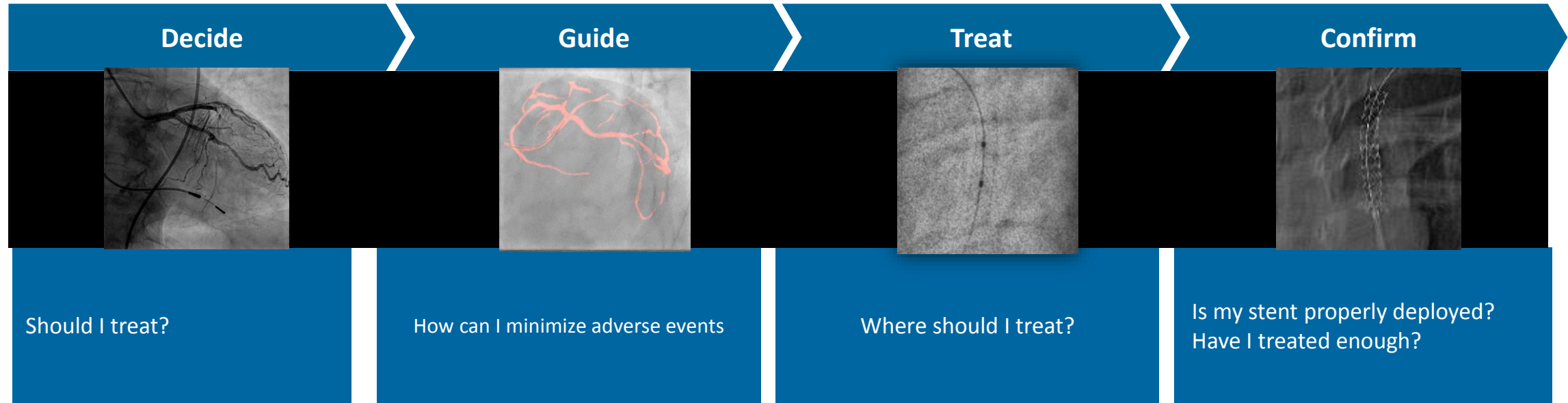
## **Coronary suite**

Transforming complex PCI procedures into confident care

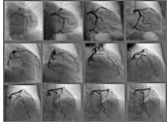
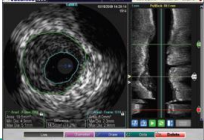
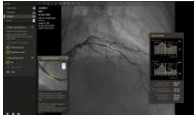
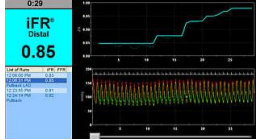

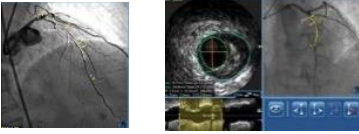
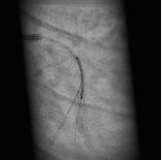

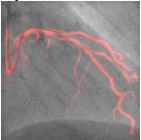

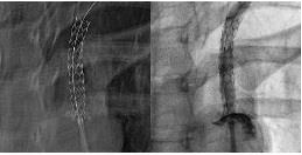
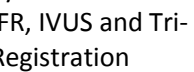
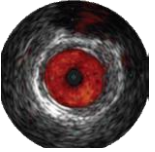




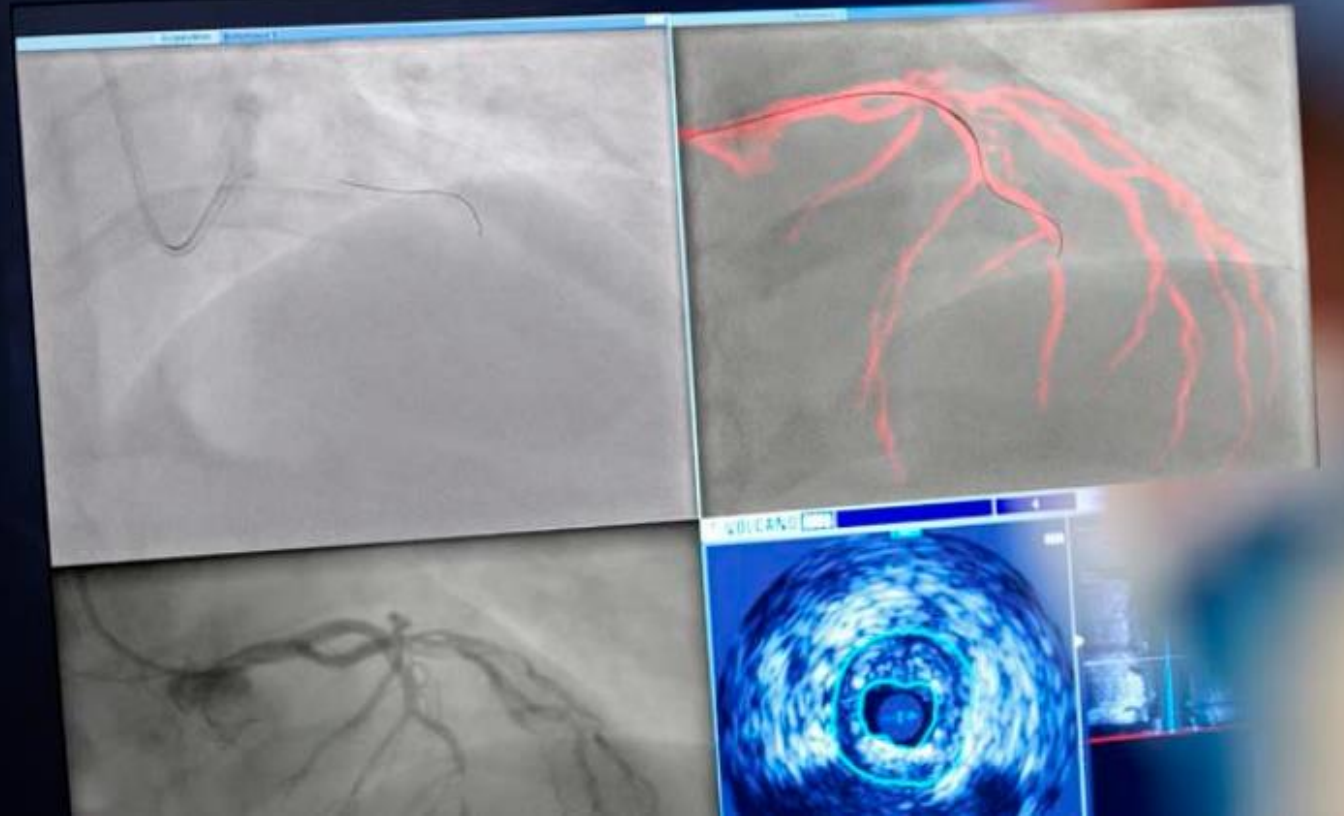
# Challenges in PCI procedures



## Tools supporting you in tackling your challenges

<p><b>Cardiac Swing</b></p>  <p><b>Eagle Eye® IVUS Catheter</b></p>  <p><b>2DQA</b></p>  <p><b>Verrata Pressure® Guide Wire, iFR Scout</b></p> 	<p><b>Dynamic Coronary Roadmap &amp; iFR Roadmap</b></p>  <p><b>Syncvision: iFR &amp; IVUS co-registration</b></p> 	<p><b>Stentboost Live</b></p>  <p><b>AngioSculpt</b></p>  <p><b>Dynamic Coronary Roadmap</b></p>  <p><b>ELCA</b></p> 	<p><b>Stentboost</b></p>  <p><b>SyncVision iFR, IVUS and Tri-Registration</b></p>  <p><b>ChromaFlo Imaging</b></p> 
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Dynamic Coronary  
Roadmap  
Real confident,  
Real-time navigation



# Dynamic Coronary Roadmap

Making the difference in Coronary Interventions



## Key benefits

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- Real-time, automatic, motion-compensated coronary imaging for easier image guidance
- Store and easily re-display previously acquired roadmaps and enhance procedure efficiency
- Integrates seamlessly into standard of care workflow and daily clinical practice



# Dynamic Coronary Roadmap

Integrated in a standard workflow

## 1 Select the standard protocol



## 2 Acquire an angiogram



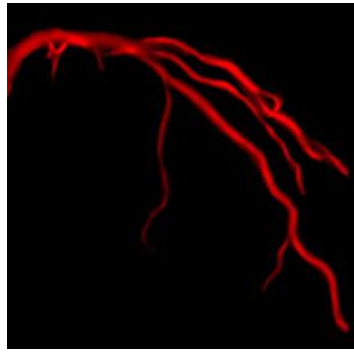
## 3 Roadmap automatically created, and ready for use with fluoro



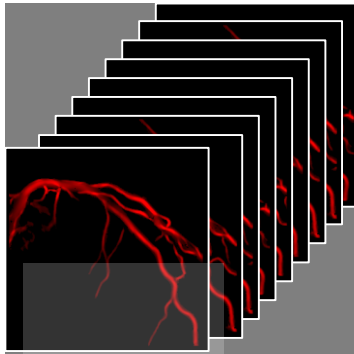
# Dynamic Coronary Roadmap – Technology



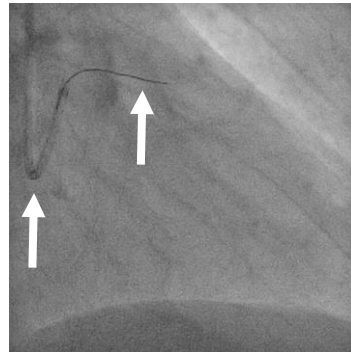
Angiograms are analyzed with contrast density



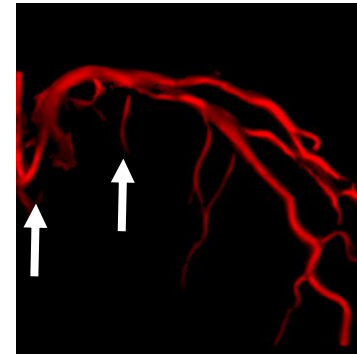
Angiograms are converted into masks



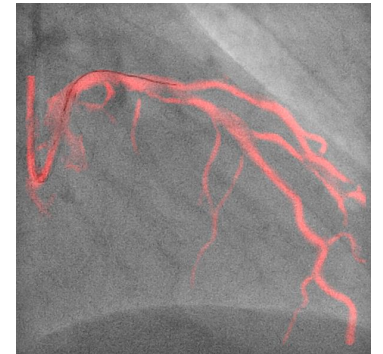
Masks for one heart cycle are stored in a library



Analysis of guide catheter and wire shape



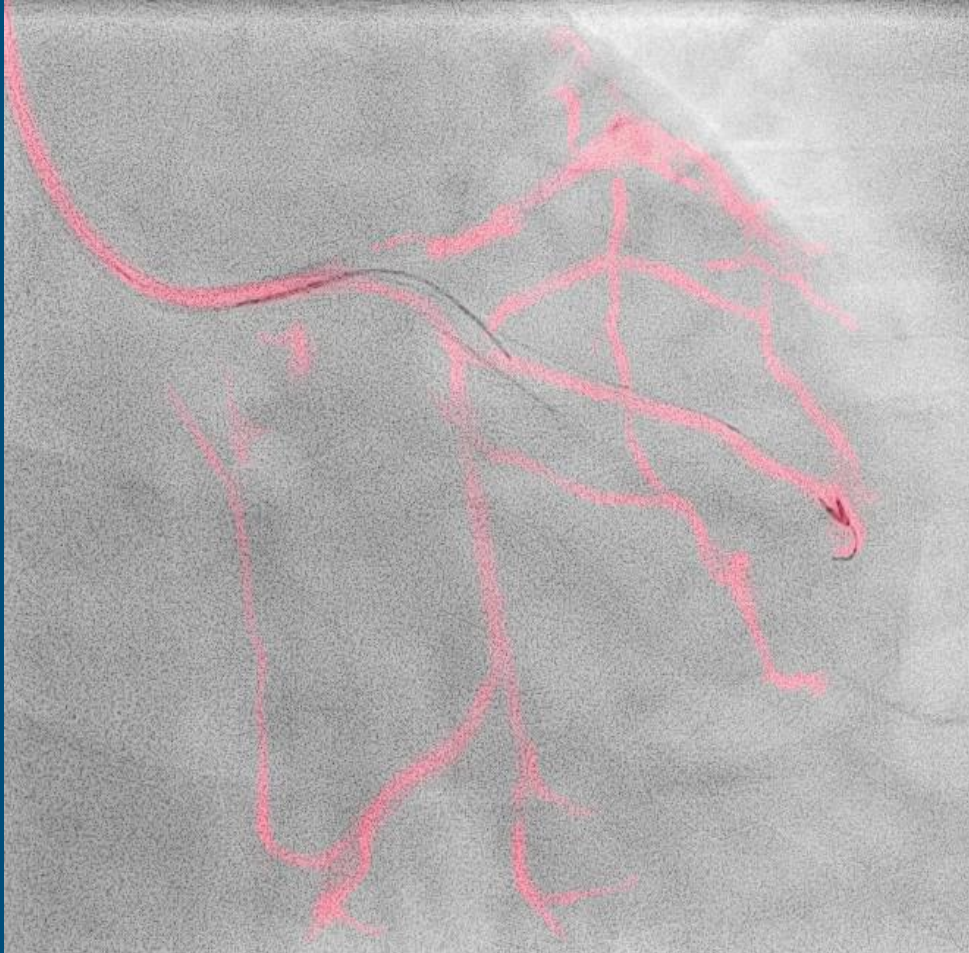
Search library for mask with similar shapes



Fuse mask with fluoroscopy image

# Dynamic Coronary Roadmap

Real-time, automatic, motion-compensated navigation



## Clinical Challenge: Wiring of both OM1 with tight ostial lesion and OM2

Dynamic Coronary Roadmap is used to quickly identify the specific location for the second wire, guiding its passage down the OM1. The interventional cardiologist can confidently rely on the seamlessly integrated workflow of Dynamic Coronary Roadmap, and without the need for additional contrast puffs, in this example, to visualize and navigate to the area of within the coronary anatomy

Courtesy of Aster Medical City, Kochi India  
Note: Results from case studies are not predictive of results and may vary in other cases.

# iFR Roadmap

## Co-Registration Technology





# DEFINE-FLAIR & iFR SWEDEHEART

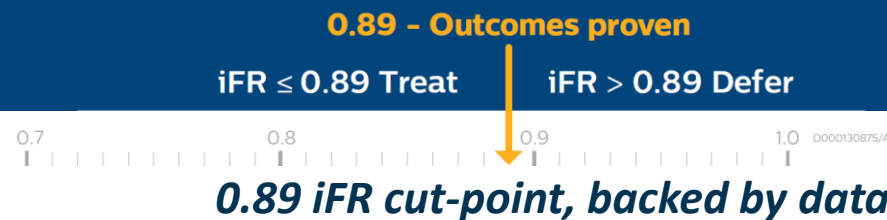
Latest largest randomized clinical trial of physiology-guided revascularization

Philips Volcano is dedicated to the advancement of physiology guided PCI. Since the introduction of hyperemia-free iFR modality in 2014, iFR has been studied in nearly 15,000 patients and used in over 4,000 cath labs around the world

**DEFINE-FLAIR first global study of physiology**  
Functional Lesion Assessment of Intermediate stenosis to guide Revascularisation<sup>1</sup>

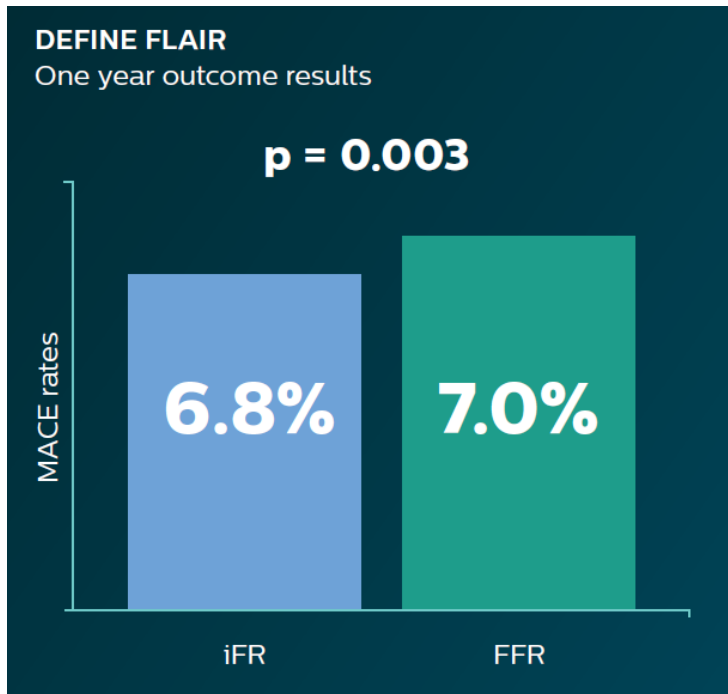


**iFR SWEDEHEART:**  
Evaluation of iFR vs FFR in Stable Angina or Acute Coronary Syndrome<sup>2</sup>



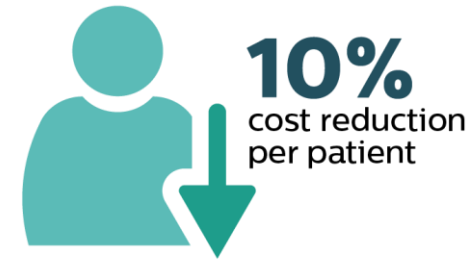
<sup>1</sup>Davies JE, et al., Define-Flair, new England journal of medicine epub March 18, 2017; <sup>2</sup>Gotberg m, et, al., iFR-swedeheart. New England journal of medicine, epub March 18, 2017

# Proven Outcomes. Superior Value.



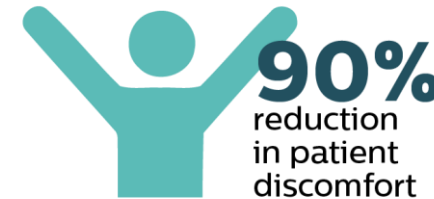
An iFR-guided strategy is statistically comparable to an FFR-guided strategy for patient outcomes\*

\* p-values are for non-inferiority of an iFR-guided strategy versus an FFR-guided strategy with respect to 1-year MACE rates; pre-specified non-inferiority margins were 3.4% and 3.2% in DEFINE FLAIR and iFR Swedeheart, respectively



## Reduced costs per patient

Cost effectiveness analysis of DEFINE FLAIR demonstrates a reduction in costs by \$896 for the US system when using iFR compared to FFR.



## Improved care

Define FLAIR demonstrates that you can achieve a 90% reduction in patient discomfort during procedures without hyperemia.



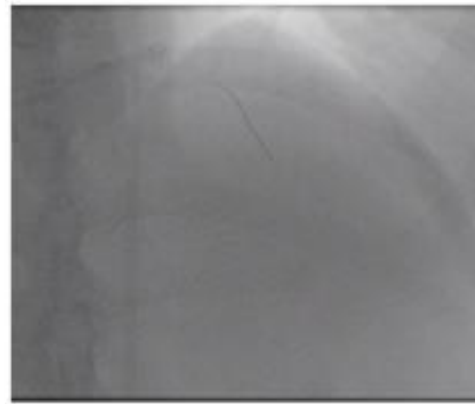
## Workflow Optimization

DEFINE FLAIR reported an average procedural time of 40.5 minutes in the iFR arm, vs. 45.0 minutes in the FFR arm.



# iFR Roadmap (with FFR, iFR & iFR Scout)

Express iFR co-registration guides you to the right decisions



Dynamic Coronary  
Roadmap

Live Fluoro

FFR / iFR /  
iFR Scout data

iFR Roadmap

# iFR Roadmap

Express iFR co-registration guides you to the right decisions



1. The initial distal iFR measurement indicated that it is significant lesion at 0.82

2. The pressure wire passed the mid LAD showing a first pressure drop due to the myocardial bridging and a measurement of 0.86 iFR

3. The final iFR measurement can be seen equalized to 1.0 once it crossed the lesion seen in the proximal LAD

PHILIPS

VOLCANO

0.89 - Outcomes proven

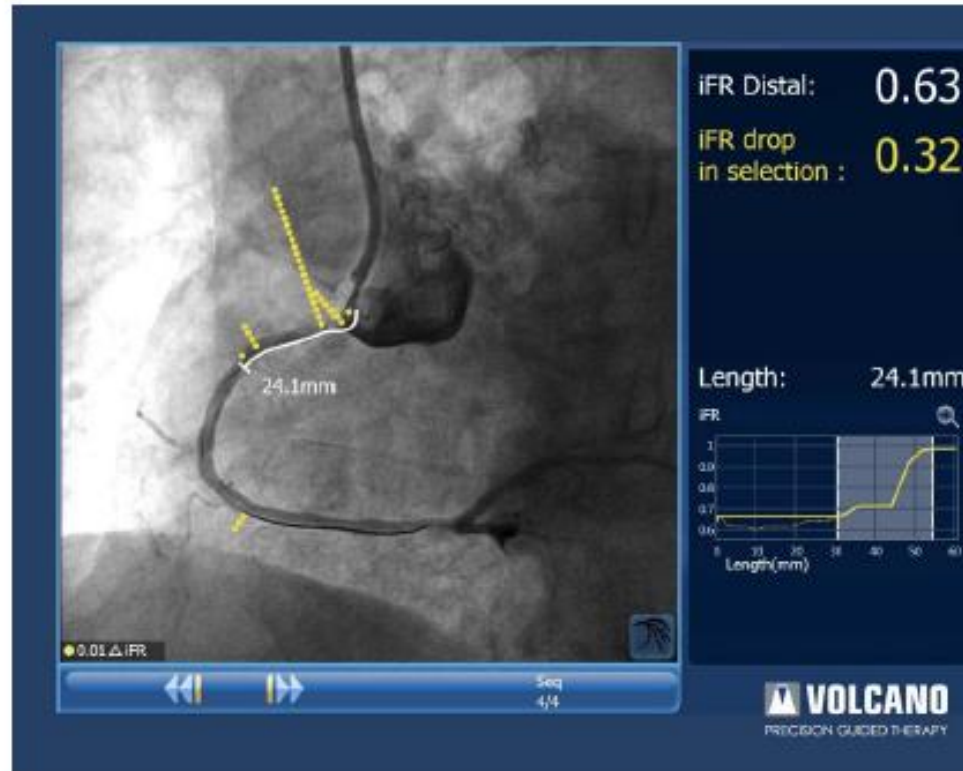
iFR  $\leq$  0.89 Treat

iFR  $>$  0.89 Defer

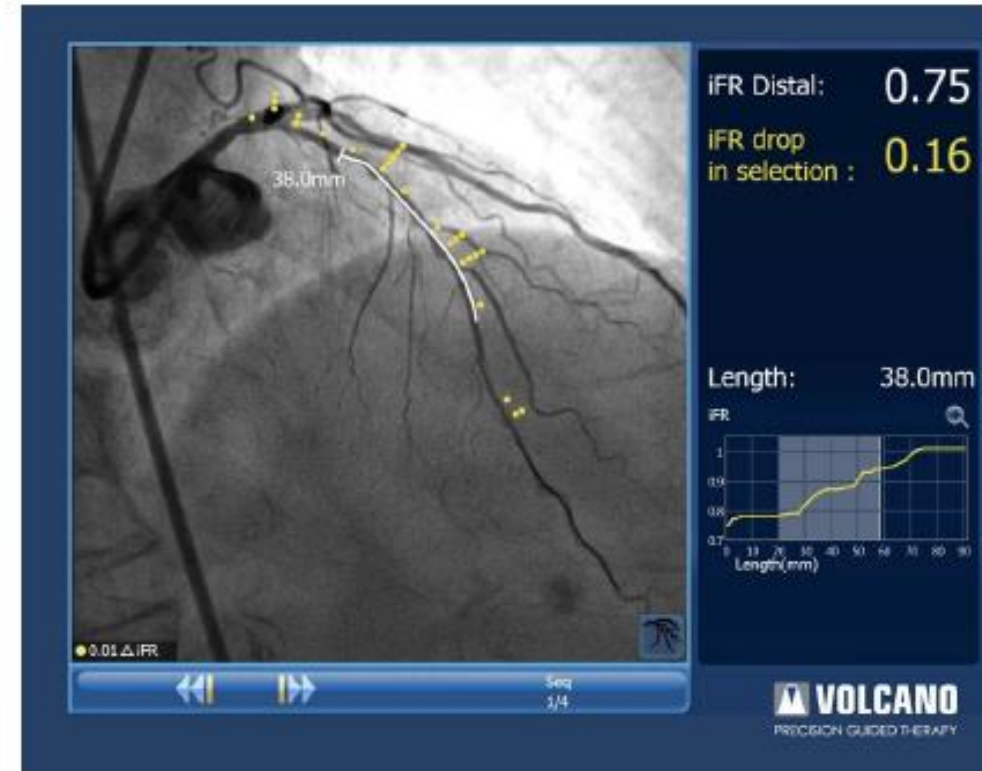


# Syncvision

iFR co-registration graphically displays the iFR drop along the angiogram, highlighting which portion of the vessel is ischemic.



Focal Disease



Diffuse Disease

# StentBoost Live

To help save lives,  
you have to see live



# StentBoost Live

Improves your current workflow

## 1 Select the StentBoost Live protocol



## 2 Acquire an angiogram



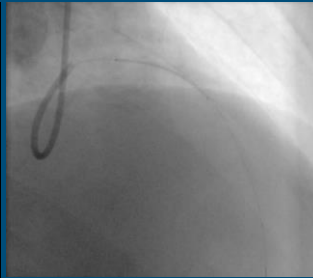
## 3 StentBoost Live instantly displayed





# StentBoost Live

Optimizing PCI for enhanced patient procedures



## Clinical challenge: Positioning overlapping stents

Using StentBoost Live, positioning of the overlapping stent in the proximal LAD is clearly visualized and performed in real-time. StentBoost Live can then instantly display placement and successful deployment of the stent.

Courtesy of Aster Medical City, Kochi India  
Note: Results from case studies are not predictive of results and may vary in other cases.



# Coronary suite



Transforming complex PCI procedures into confident care

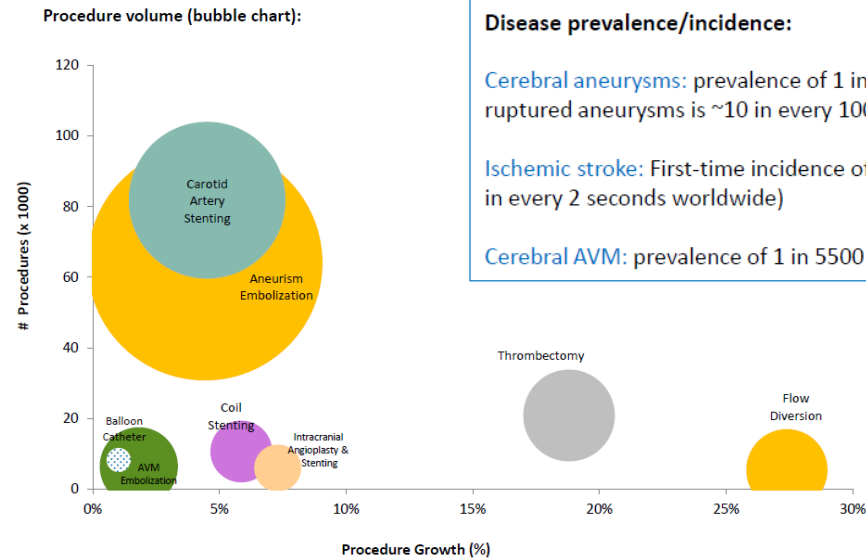
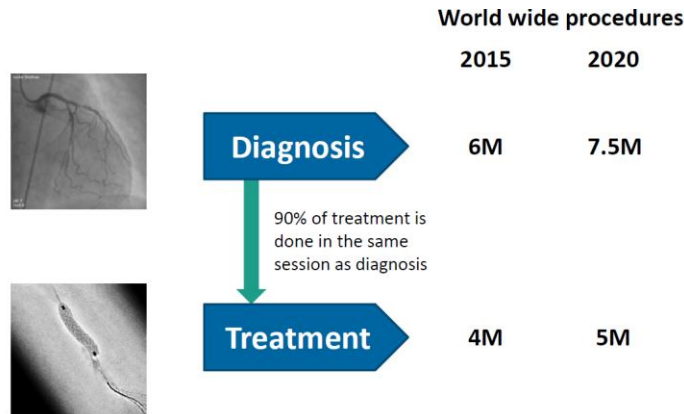
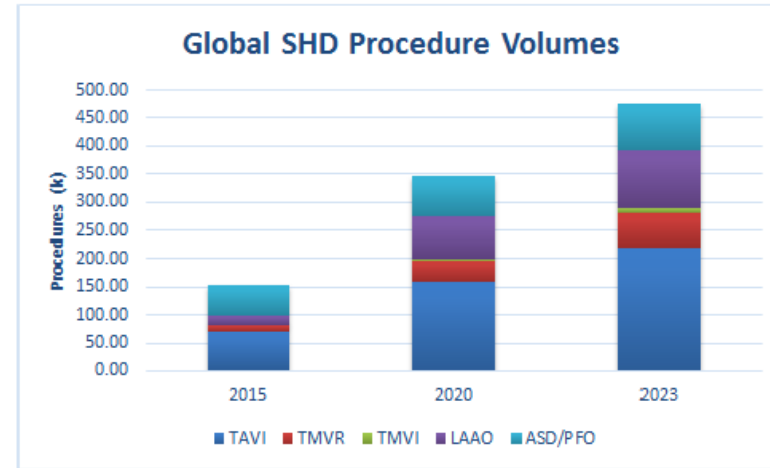
# Trends & challenges

# Trends & challenges:

## Growth in clinical areas and procedures

The growing number and complexity of interventional cardiology procedures have been significant in the past years.

Future trends show continuous growth in many clinical areas



**Disease prevalence/incidence:**

**Cerebral aneurysms:** prevalence of 1 in 50 people. Incidence of reported ruptured aneurysms is ~10 in every 100,000

**Ischemic stroke:** First-time incidence of 1 in 500 people annually (1 person in every 2 seconds worldwide)

**Cerebral AVM:** prevalence of 1 in 5500

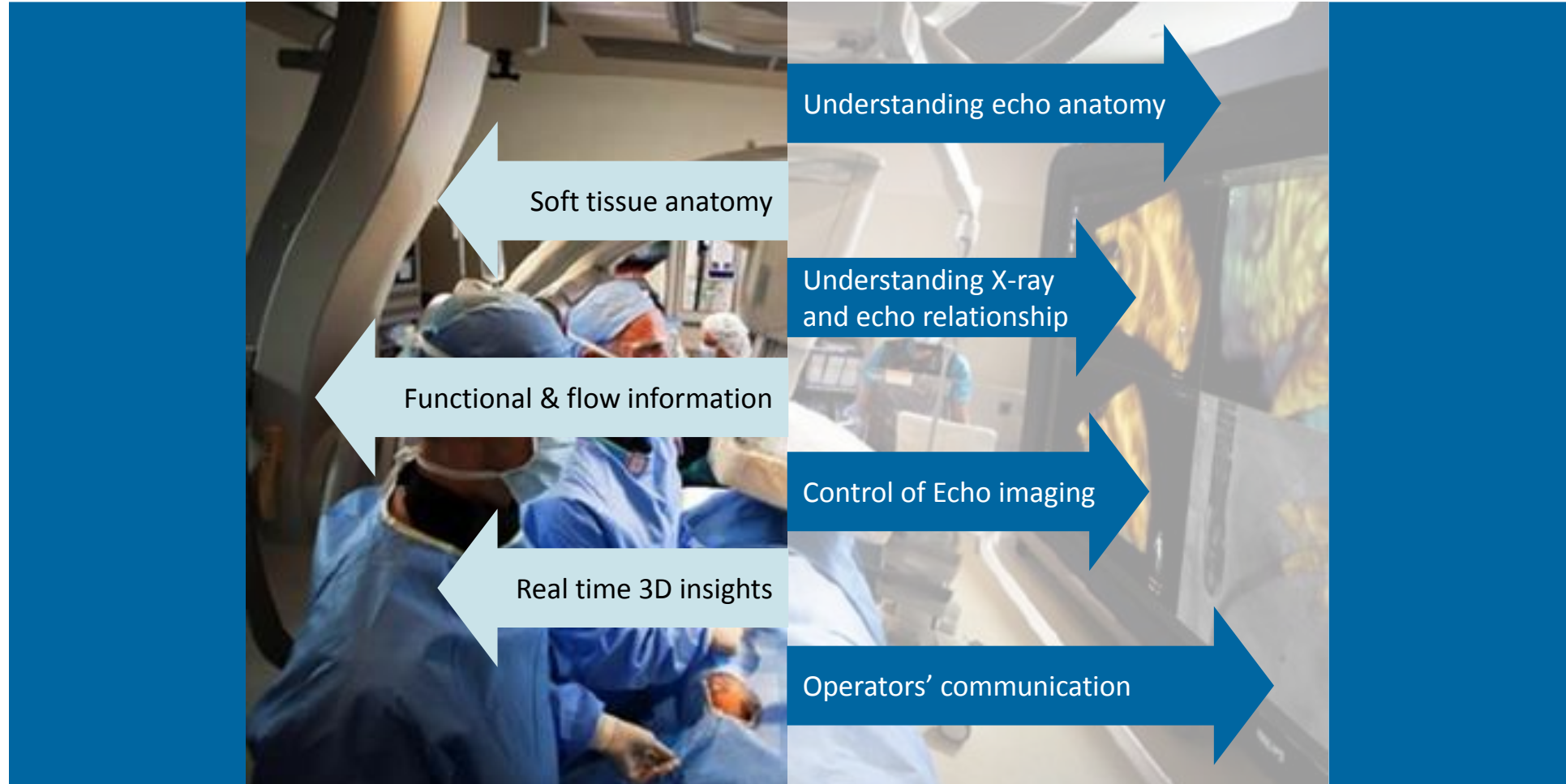
# Making the Difference with Philips Live Image Guidance

## EchoNavigator

Real-time fusion of live X-ray and live echo images for intuitive guidance during Structural Heart Disease procedures

# Today's Scenario for Structural Heart Disease

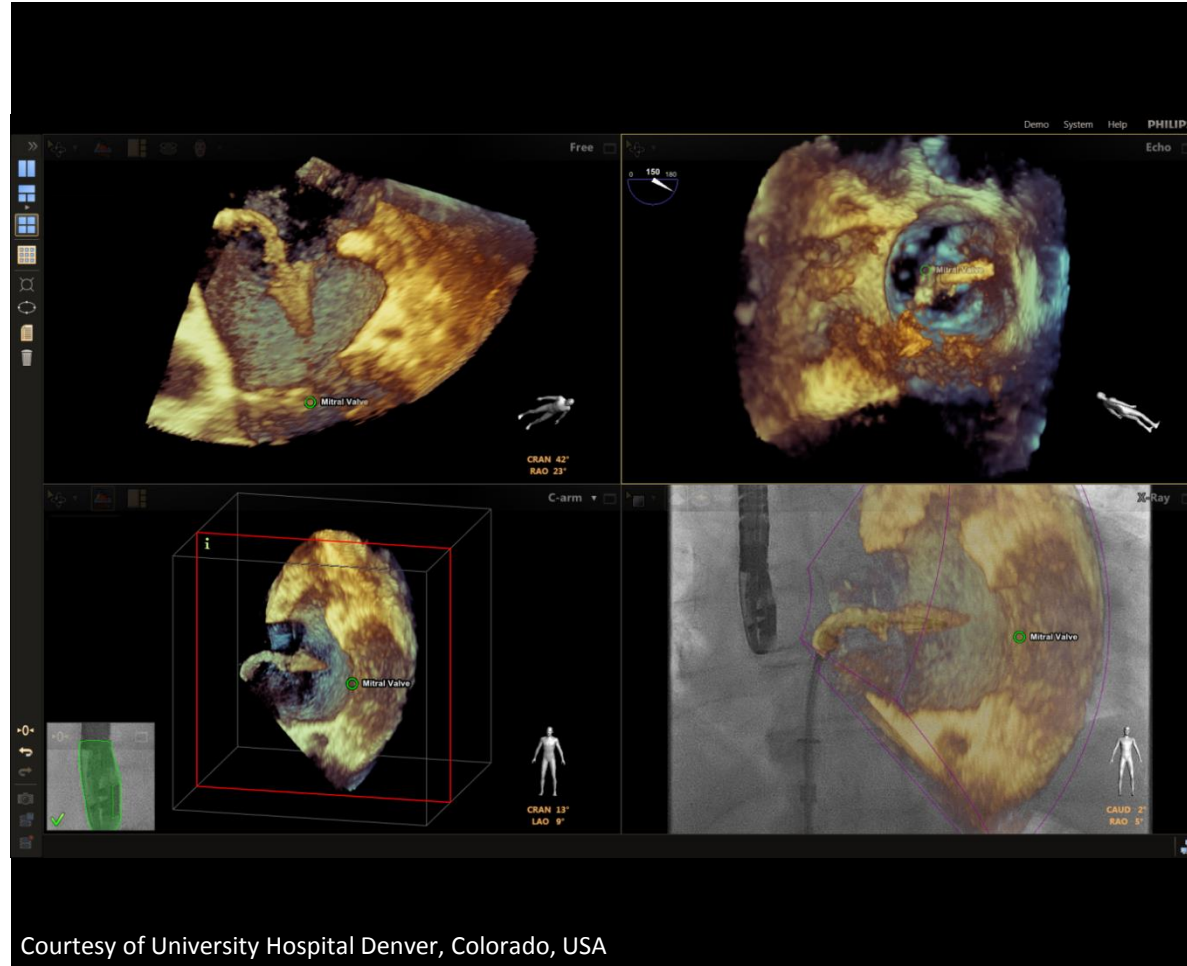
## Benefits and Challenges of Echo







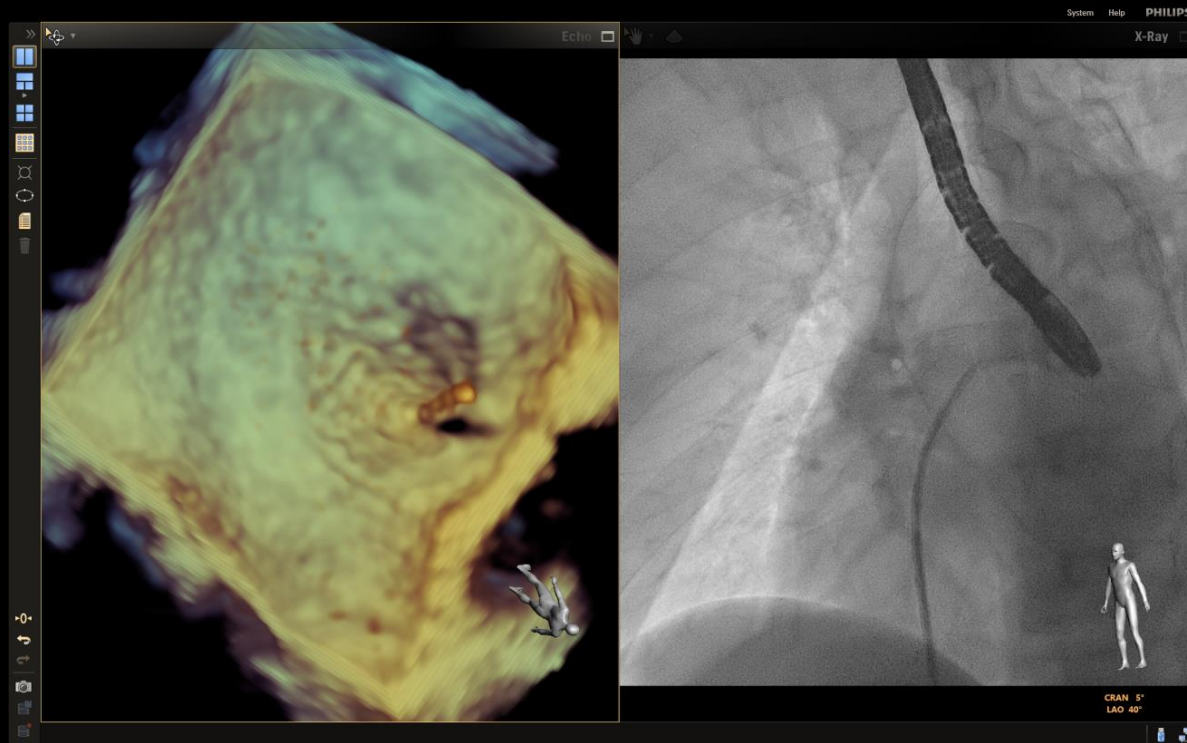
# EchoNavigator



- New real time imaging modality
- Fusion of live X-ray and live echo images
- Bringing operators and images together in interactive intuitive & procedurally relevant way

# EchoNavigator

## Key clinical functionality

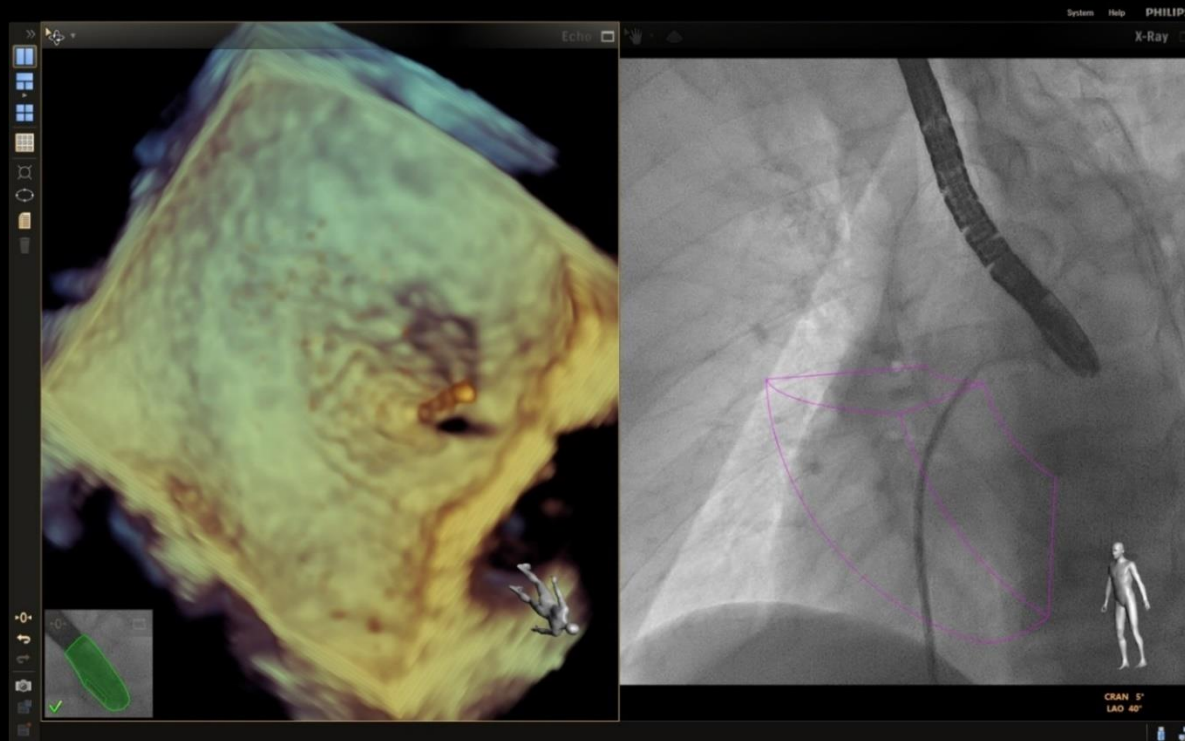


Courtesy of University Hospital Denver, Colorado, USA

- **Without EchoNavigator:** Two imaging modalities presented without any interaction or correlation

# EchoNavigator

## Key clinical functionality

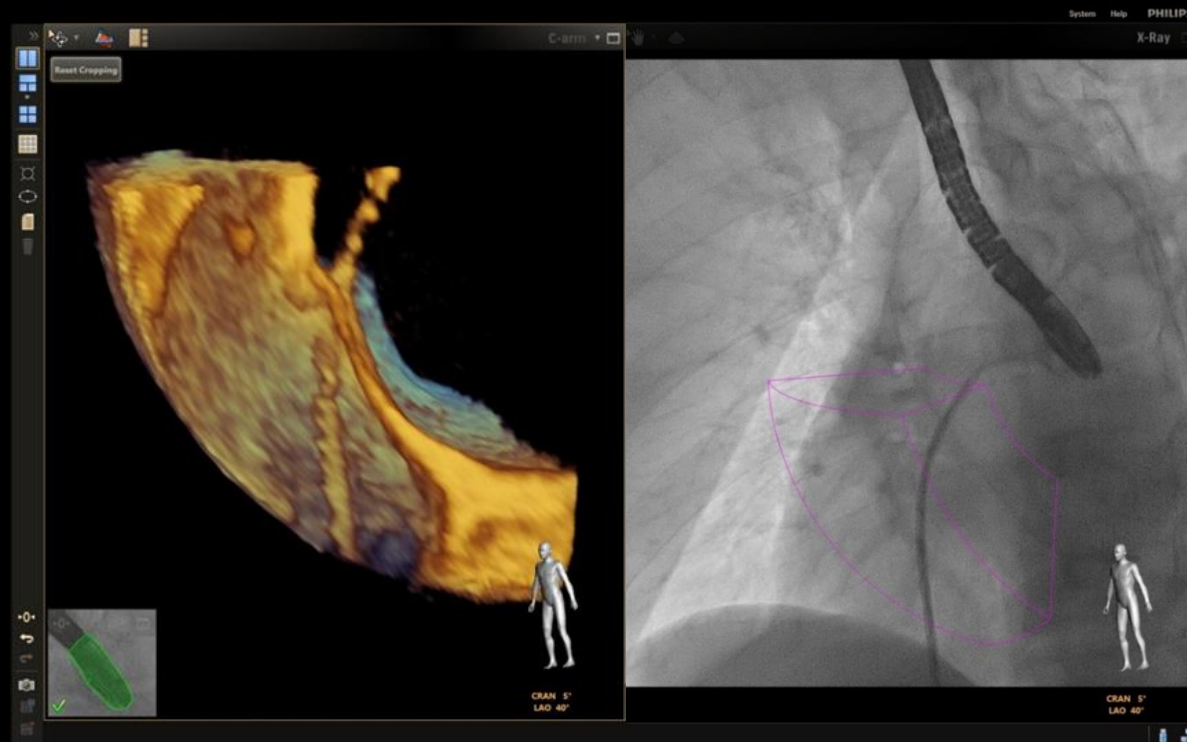


Courtesy of University Hospital Denver, Colorado, USA

- TEE field of view (Ultrasound cone) visible as an outline in the X-ray view

# EchoNavigator

## Key clinical functionality

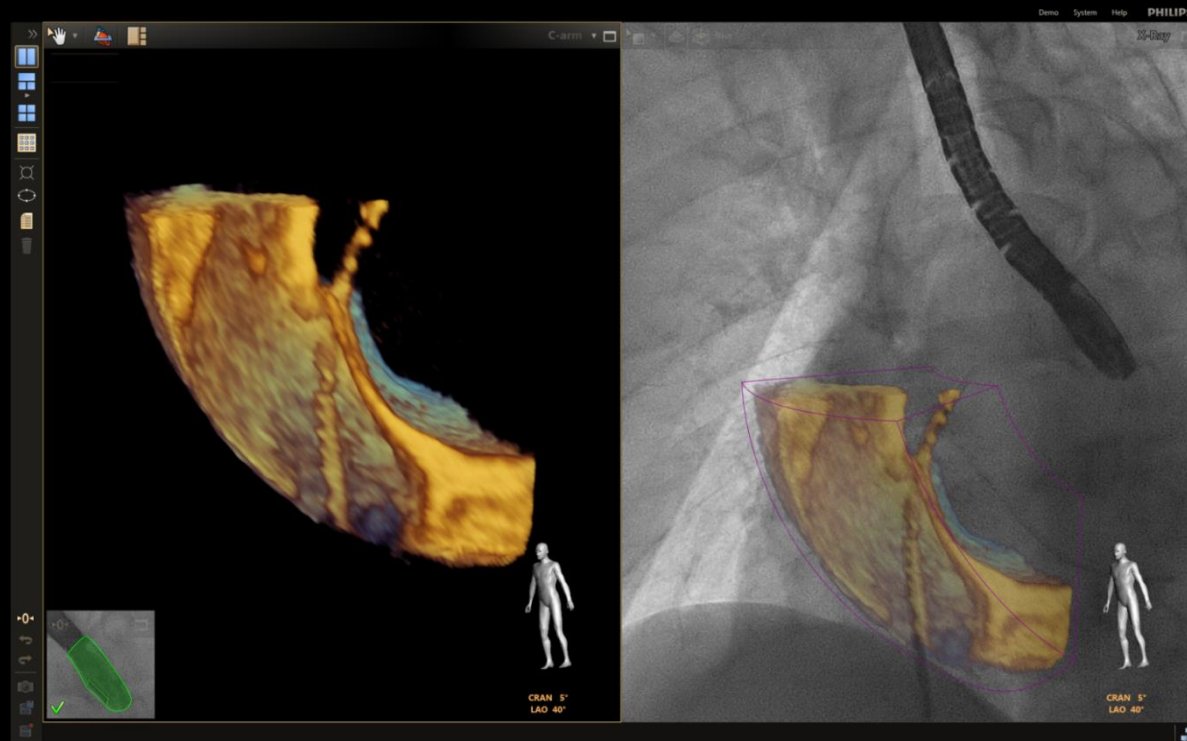


Courtesy of University Hospital Denver, Colorado, USA

- Automatic and intuitive link between X-ray and Echo image orientation

# EchoNavigator

## Key clinical functionality



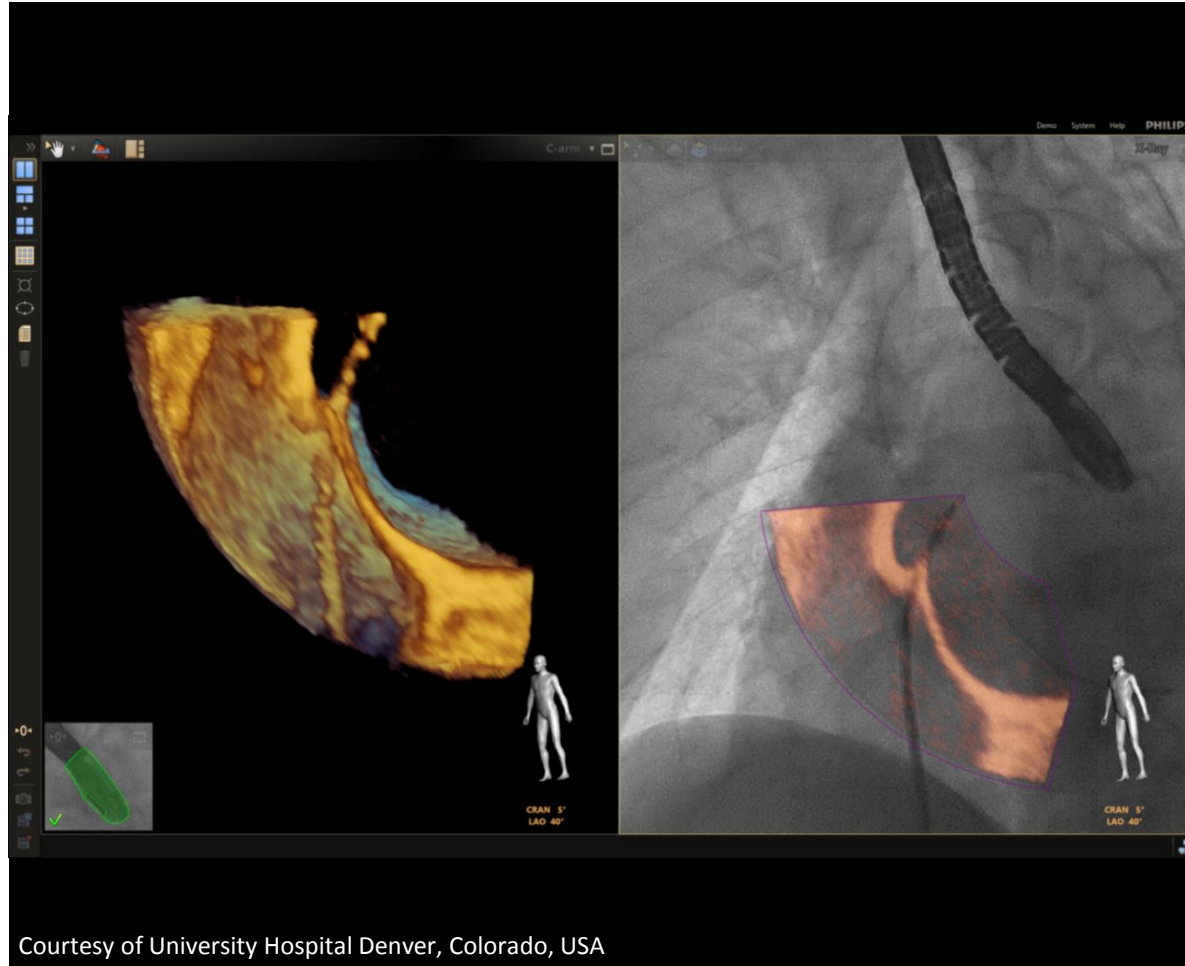
Courtesy of University Hospital Denver, Colorado, USA

- **Smart Fusion:** Real-time, automatic fusion of live X-ray and live echo images for intuitive guidance



# EchoNavigator

## Key clinical functionality



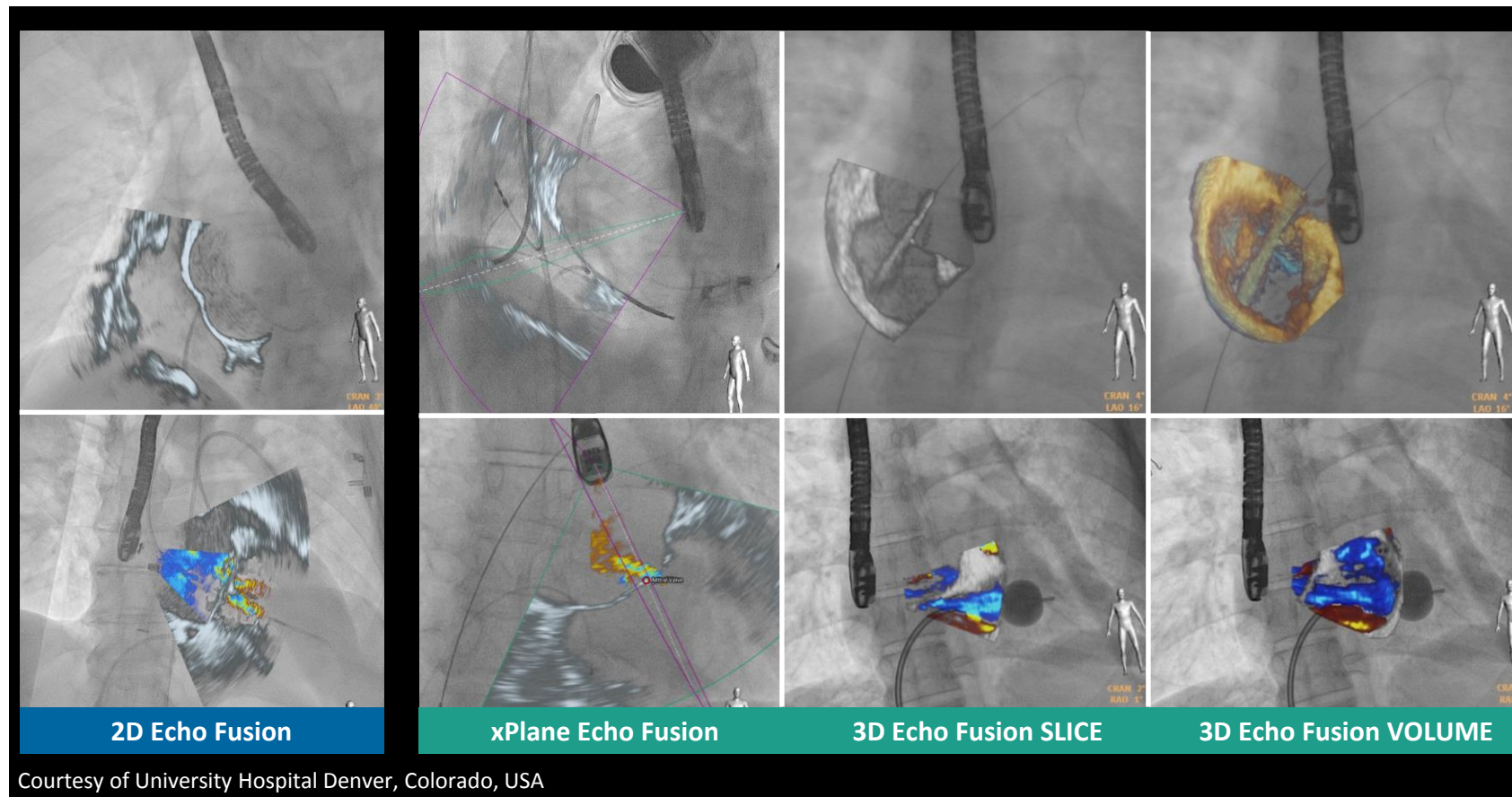
- **Smart Fusion:** Real-time, automatic fusion of live X-ray and live echo images for intuitive guidance (Echo slice fusion – out of Echo volume)



# EchoNavigator

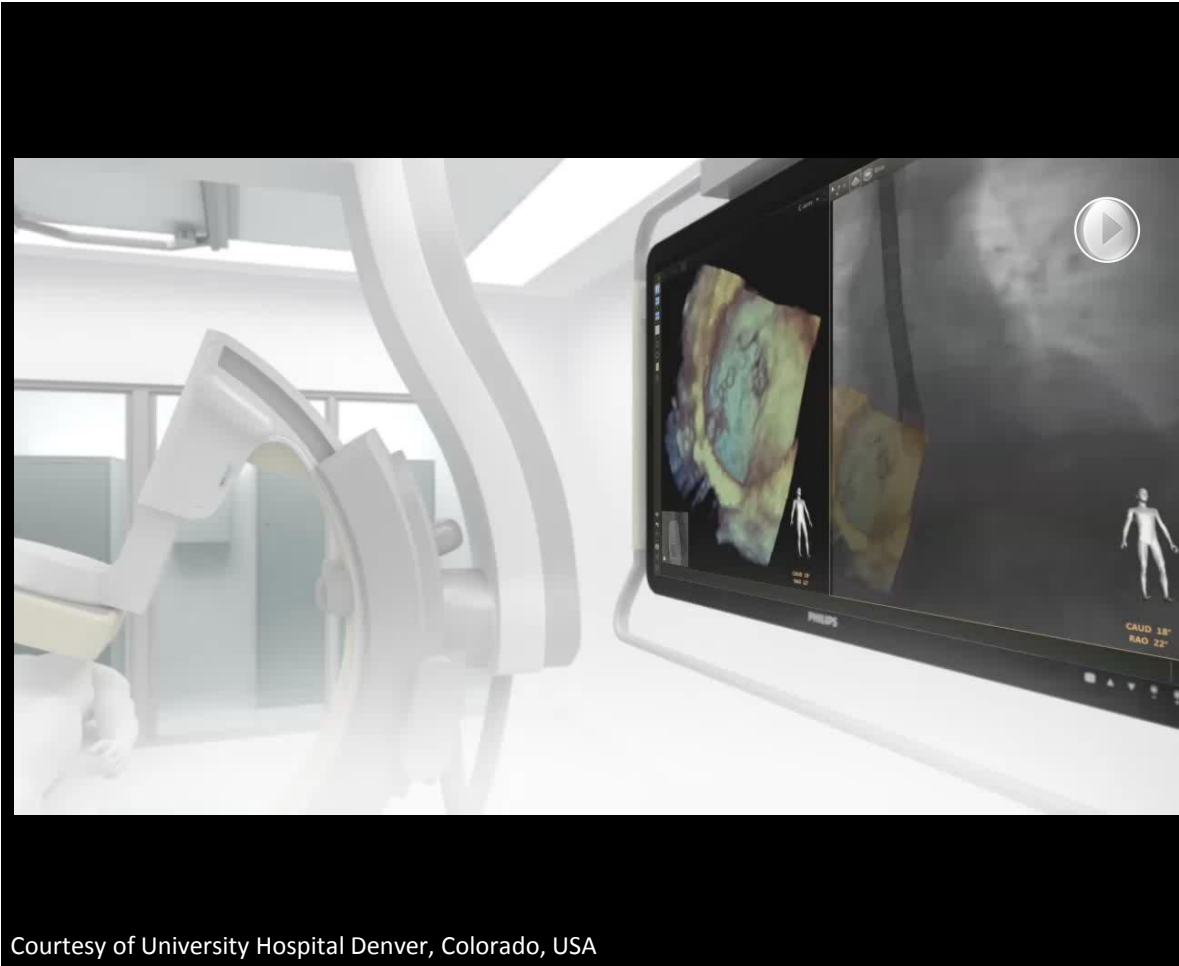
## Key clinical functionality

**SmartFusion** – Fusion of live X-ray and live Functional & Flow echo images



# EchoNavigator

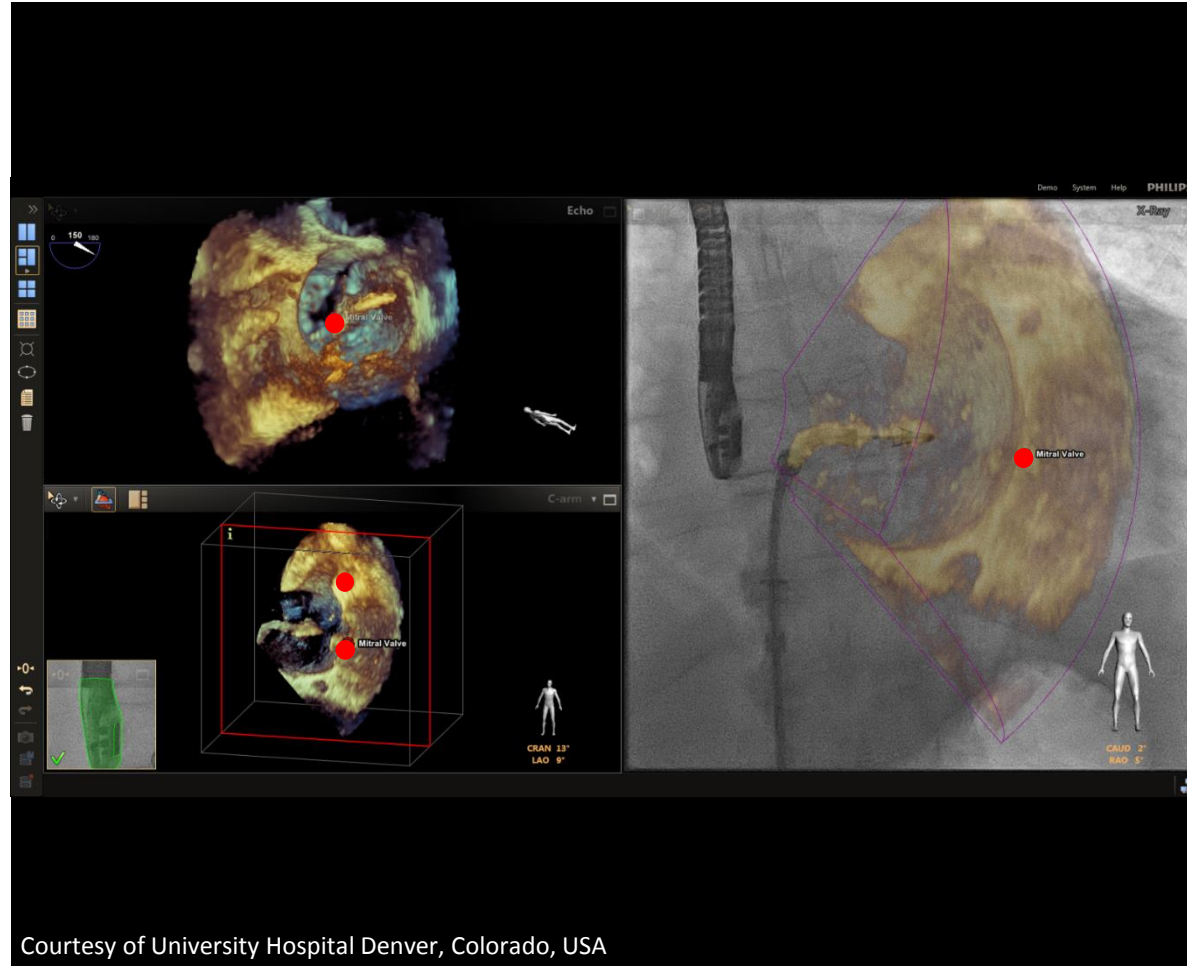
## Key clinical functionality



- Echo image orientation automatically follows as the C-arm gantry is repositioned

# EchoNavigator

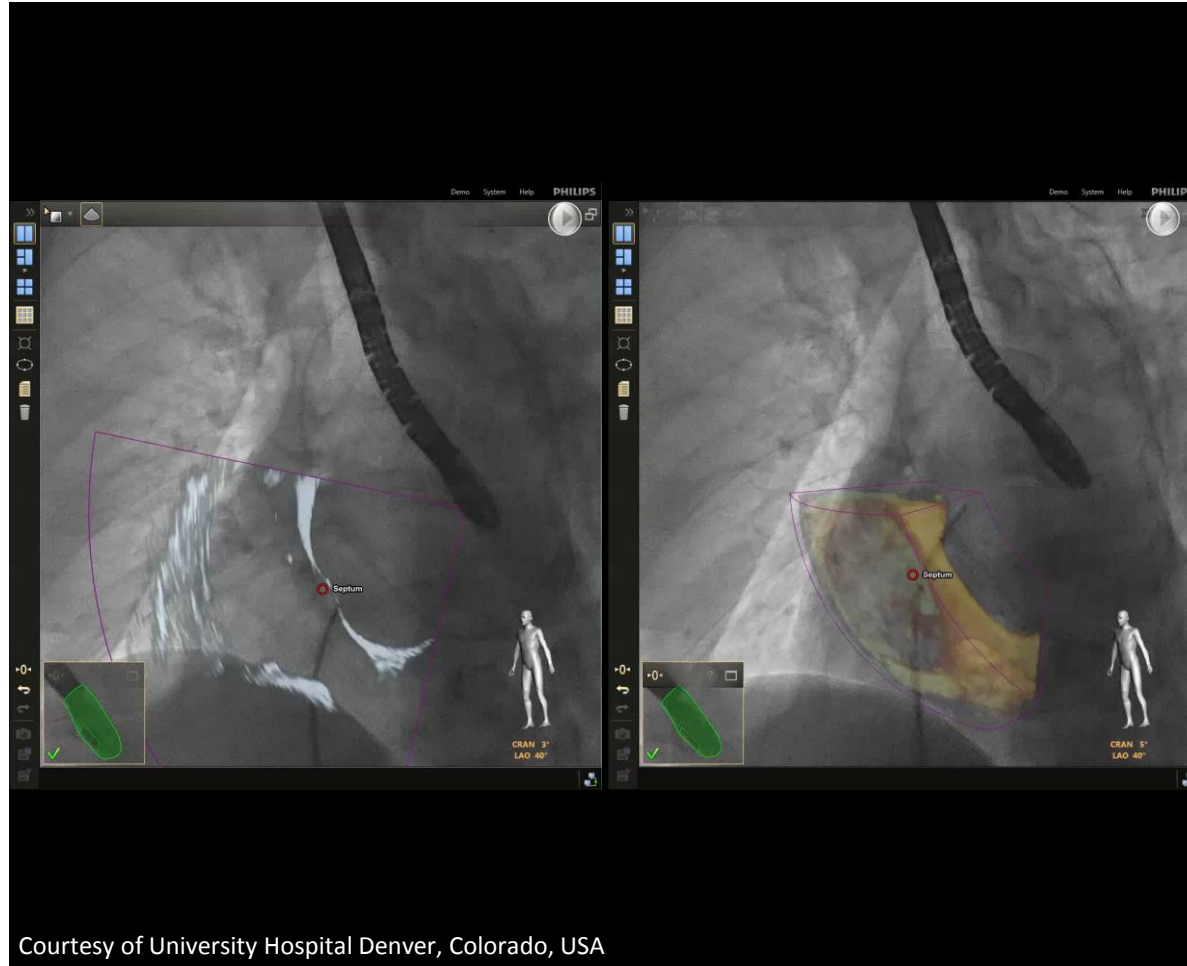
## Key clinical functionality



- Markings on soft tissue anatomical structures in Echo, appear in X-ray for context and guidance

# EchoNavigator

## Key clinical functionality

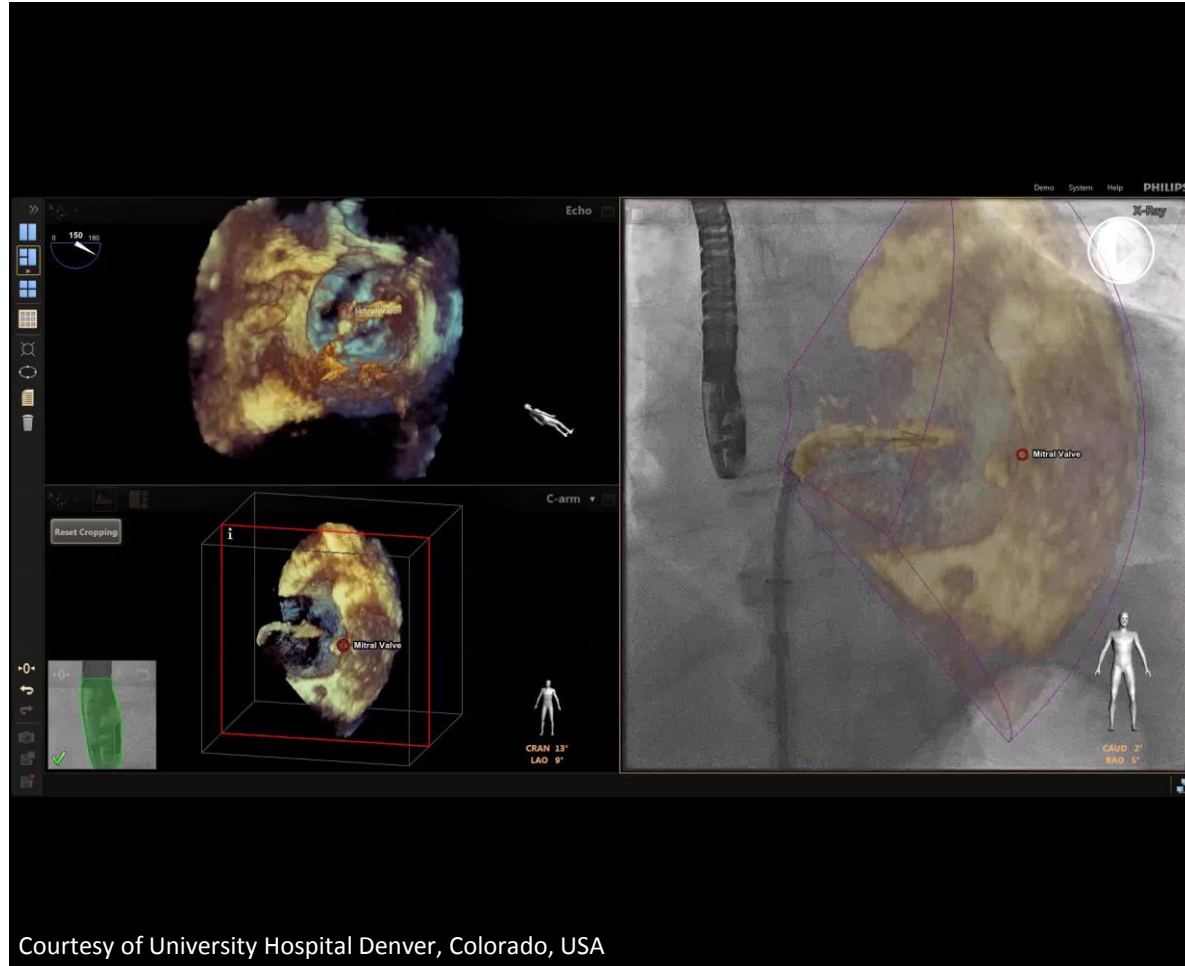


Courtesy of University Hospital Denver, Colorado, USA

- Trans-Septal puncture guidance
- Markings on soft tissue anatomical structures in Echo, appear in X-ray for context and guidance

# EchoNavigator

## Key clinical functionality

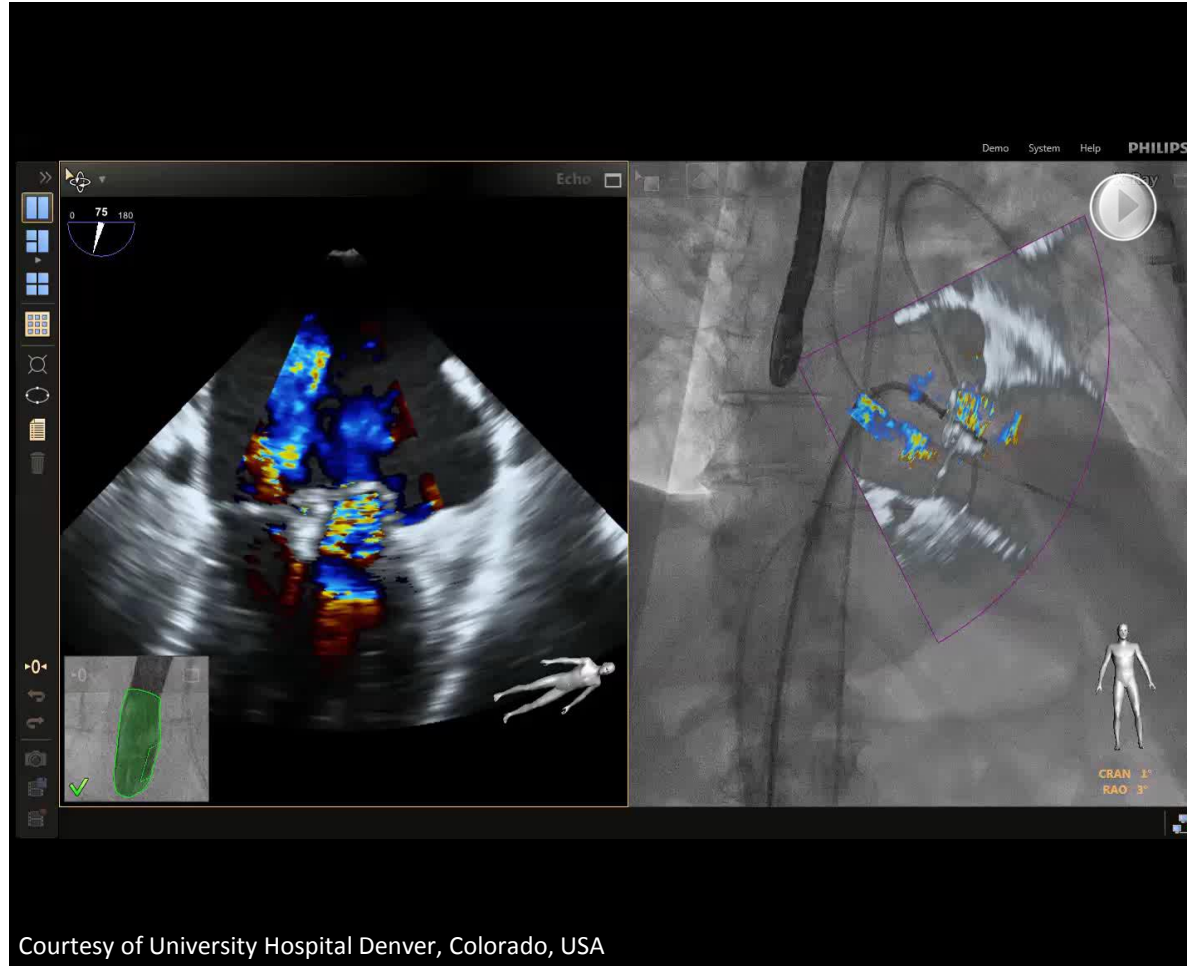


- Steering clip toward mitral valve
- Markings on soft tissue anatomical structures in Echo, appear in X-ray for context and guidance



# EchoNavigator

## Key clinical functionality

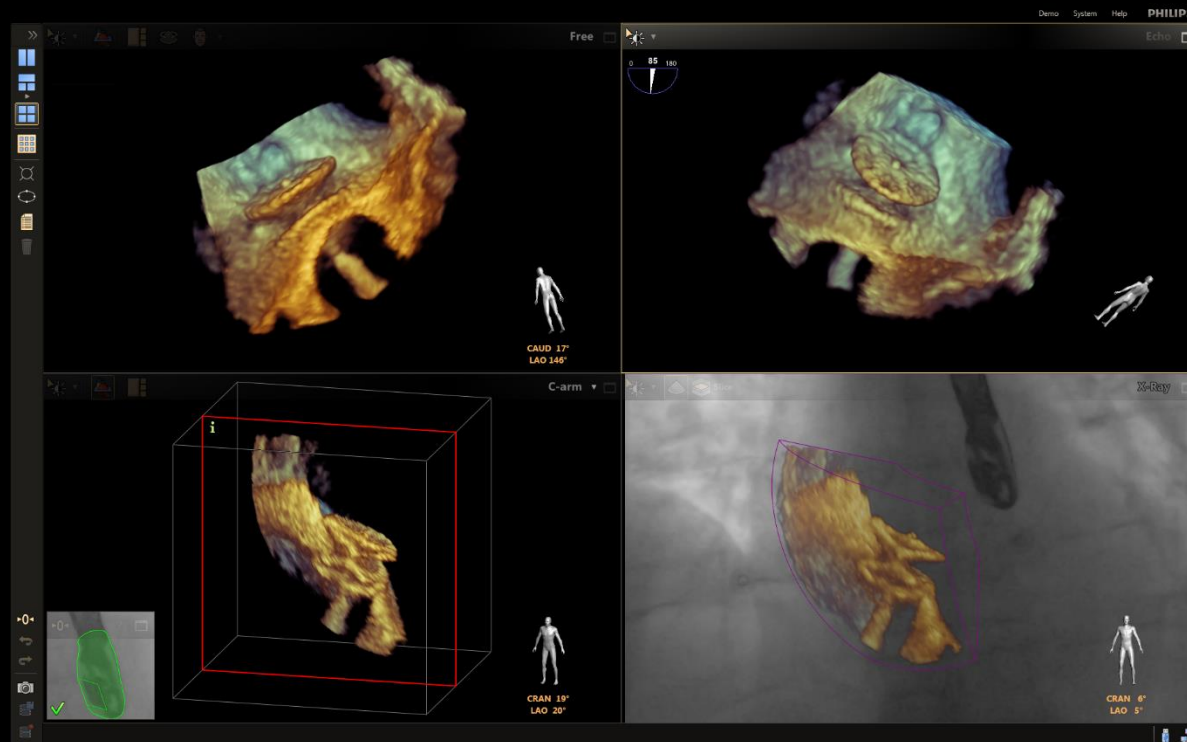


- Check effect of clip placement



# EchoNavigator

Key clinical functionality

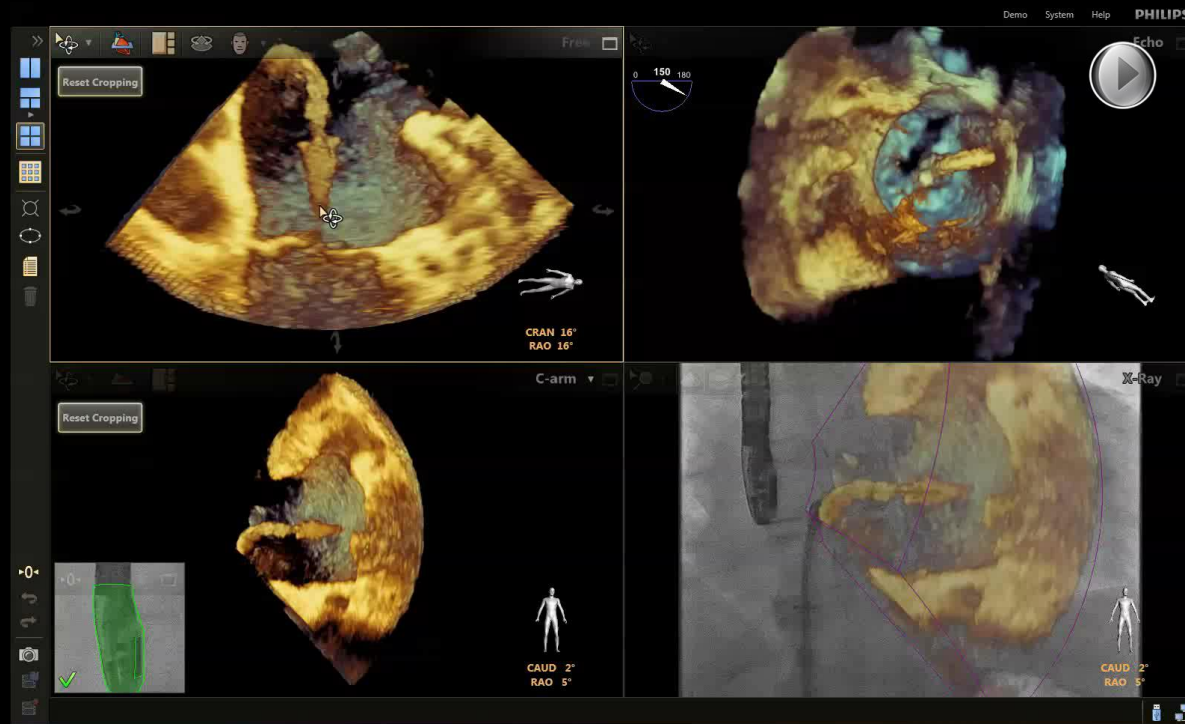


Courtesy of University Hospital Denver, Colorado, USA

- Showing anatomical structures in live Echo from different angles simultaneously in real time

# EchoNavigator

## Key clinical functionality



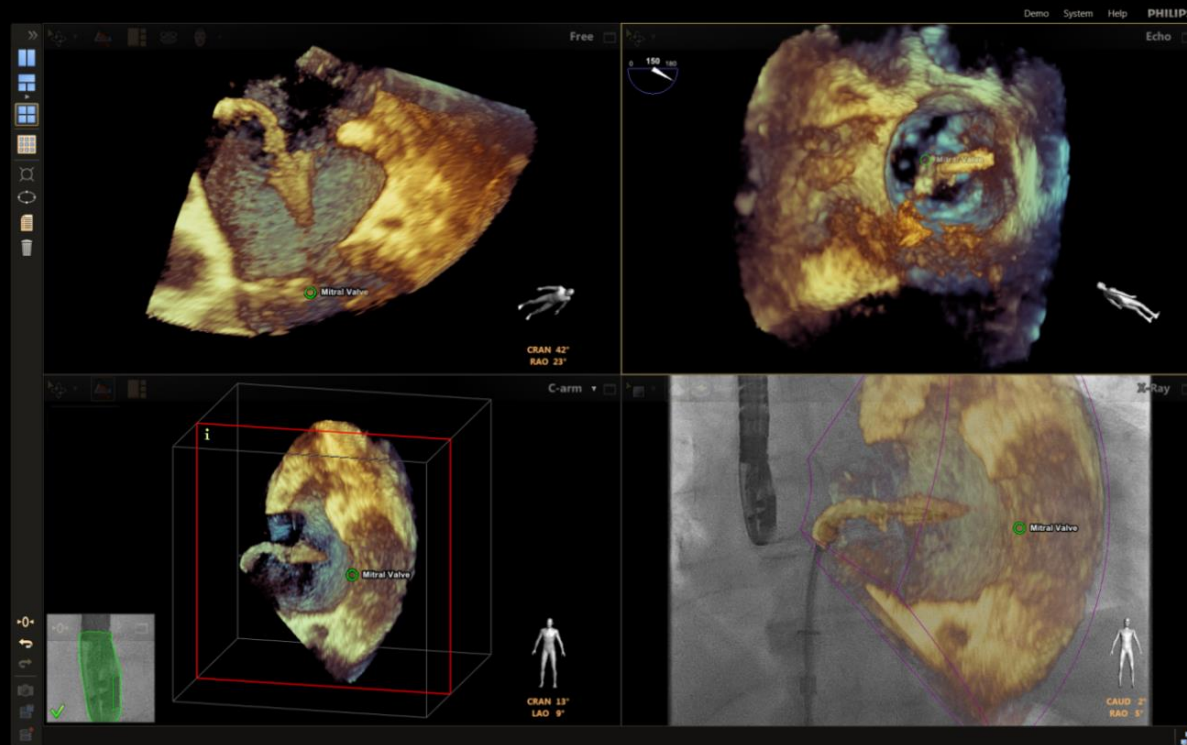
Courtesy of University Hospital Denver, Colorado, USA

- Quickly interrogate the anatomical structures (e.g. change views, zoom) in the Echo data from the table side



# EchoNavigator

Making Structural Heart Disease procedures more straightforward



Courtesy of University Hospital Denver, Colorado, USA

## Typical procedures:

- Trans Aortic Valve Replacement\*
- Mitral valve clipping
- Left Atrial Appendage (LAA) closure
- Paravalvular Leak (PVL)
- Pulmonary valve repair
- Septal closure (VSD, ASD)
- Patent Foramen Ovale (PFO) closure
- (Mitral) Valvuloplasty

\* When 3D TEE Echo is used for guidance

# EchoNavigator

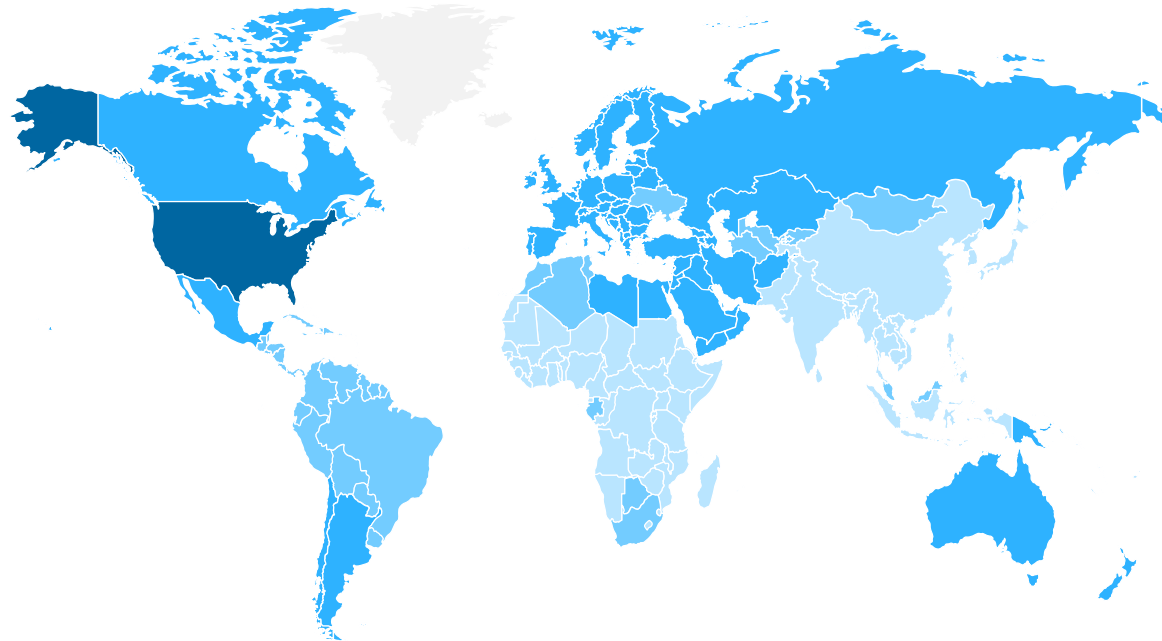
Making Structural Heart Disease procedures more straightforward



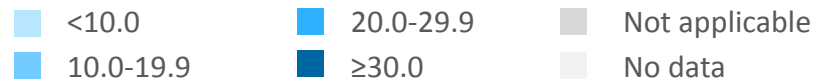
# Trends & challenges

# Trends & challenges

## Changing patient demographics



Prevalence (%)



Prevalence of obesity\*, ages 18+, 2010-2014  
(age standardized estimate)  
Male: 2014

- Between 2015 and 2050, the proportion of the world's population over 60 years will nearly double from 12% to 22%.

<http://www.who.int/mediacentre/factsheets/fs404/en/>

- Obesity is still a major concern and one major cause of cardiovascular diseases

<http://www.who.int/mediacentre/factsheets/fs311/en/>

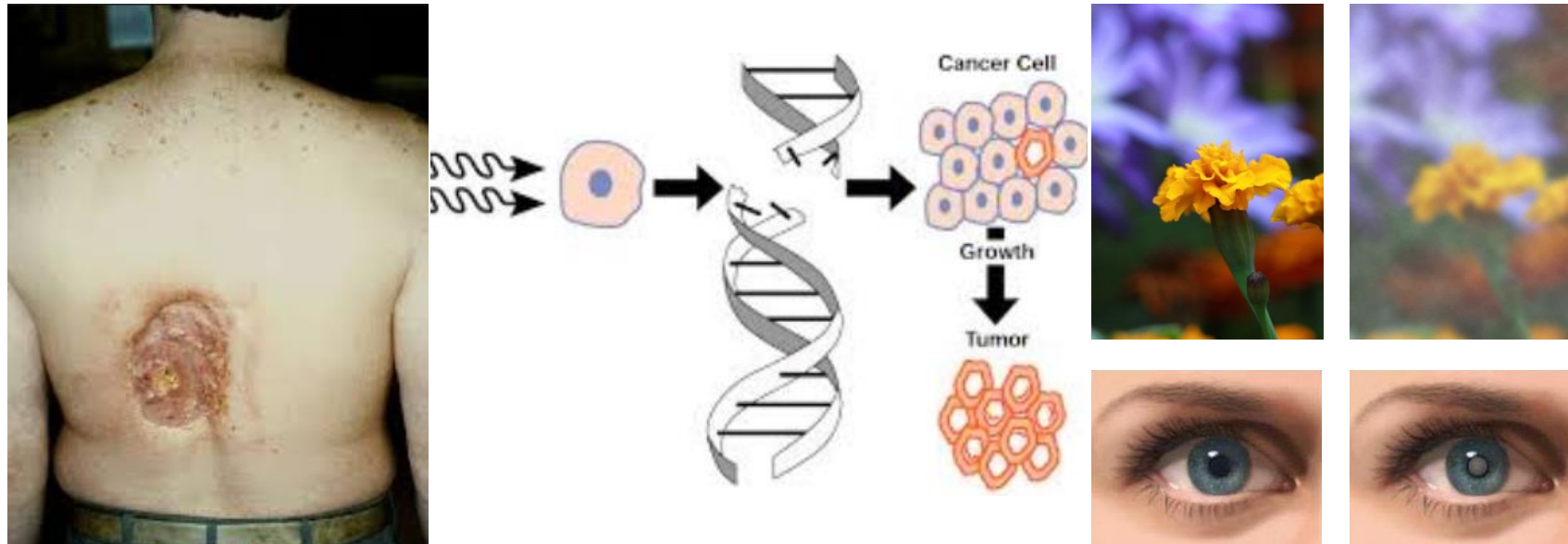




# Trends & challenges:

## Effects of radiation dose

While the benefits of CV procedures to the patients are undisputable, all these procedures contribute to high accumulated radiation doses to the patient population with consequent stochastic effects or skin burns.



Pioneer in dose savings  
Philips DoseWise

# Leading the way in dose management



## Breakthrough solutions

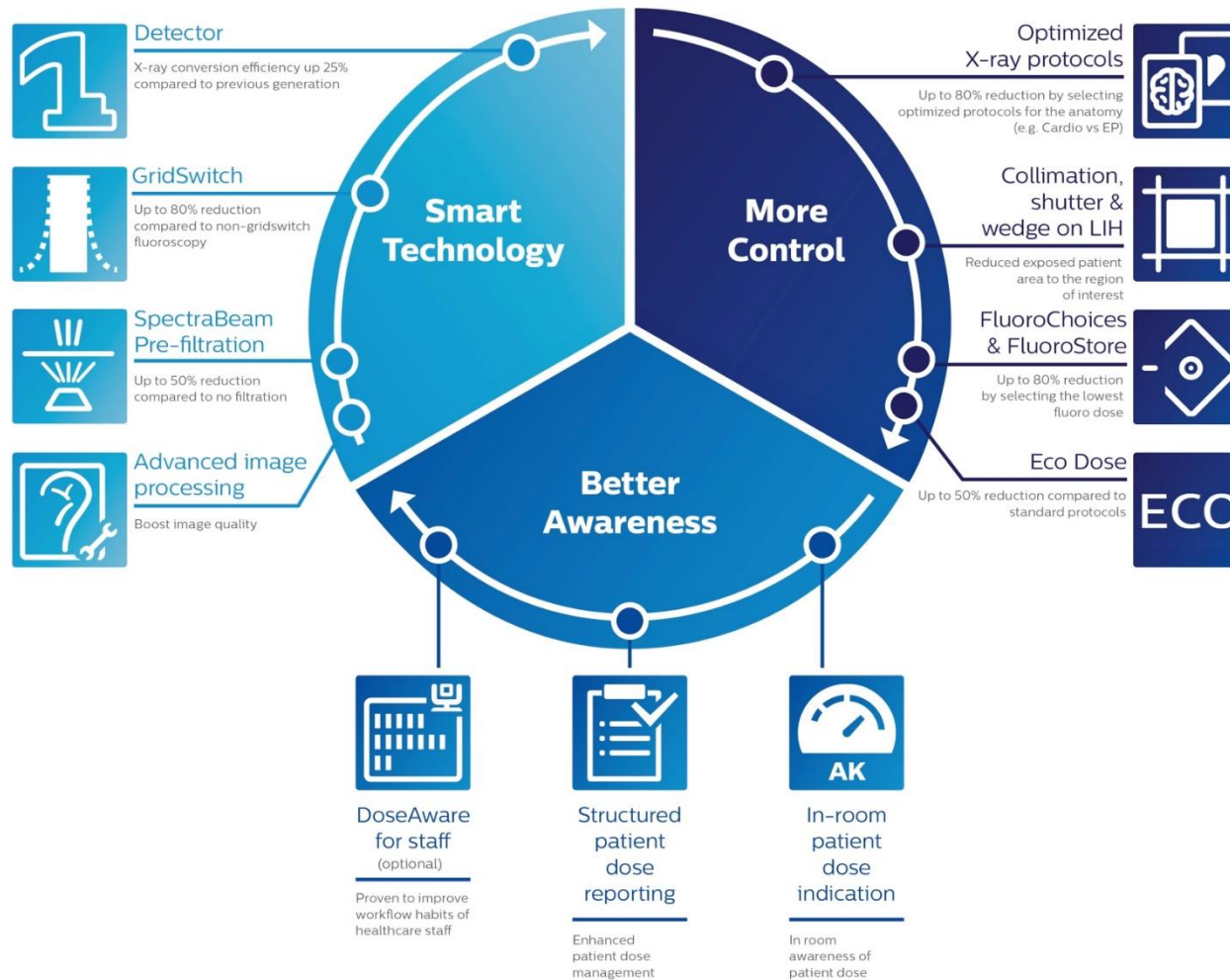
### Interventional X-ray

1896	1952	1979	1981	1988	1992	1995	1996
Introduction of the first medical X-ray tube by CHF Müller, Philips	First commercial X-ray image intensifier	Digital Video Image Processor	Digital Subtraction Angiography (DSA)	MRC X-ray tube and Spectra Beam copper filtration system	Rotational Angiography	Grid Switched Fluoroscopy	Introduction of collimation on Last Image Hold
1998	2001	2003	2005	2010	2012	2013	2014
Introduction 3D-RA	Introduction Flat panel detector with Xres3 imaging processing	Introduction of X-ray Personalized (Xper) & Dose display	Introduction XperCT and StentBoost	DoseAware - real time dose feedback for physicians	AlluraClarity X-ray system with ClarityIQ technology	Introduction DoseAware Xtend	Introduction DoseWise portal



# DoseWise ingredients

DoseWise standard in ALL fixed systems



# ClarityIQ

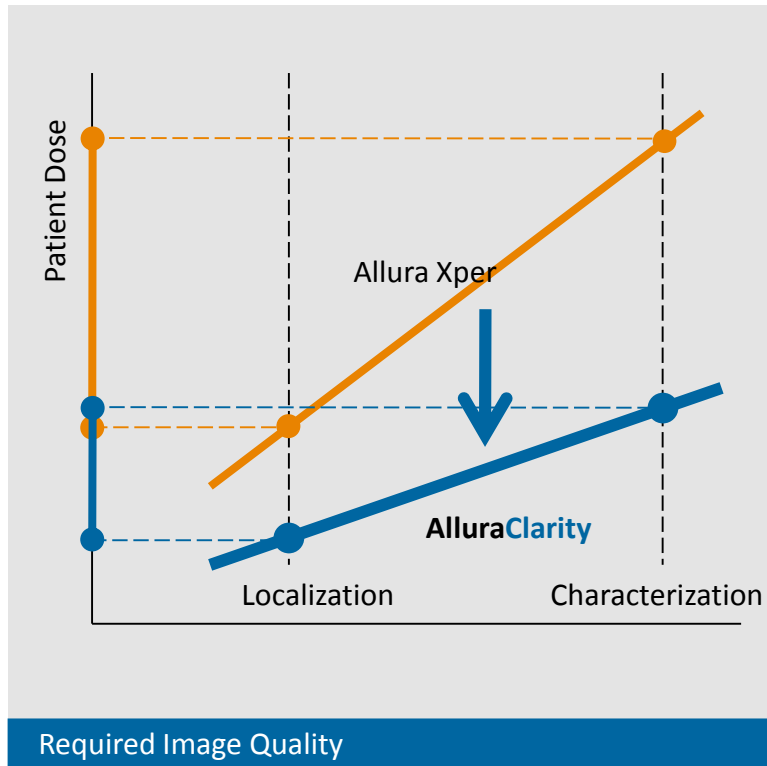
## Clinically proven

What is it?



# ClarityIQ technology

With Clarity we've changed the equation



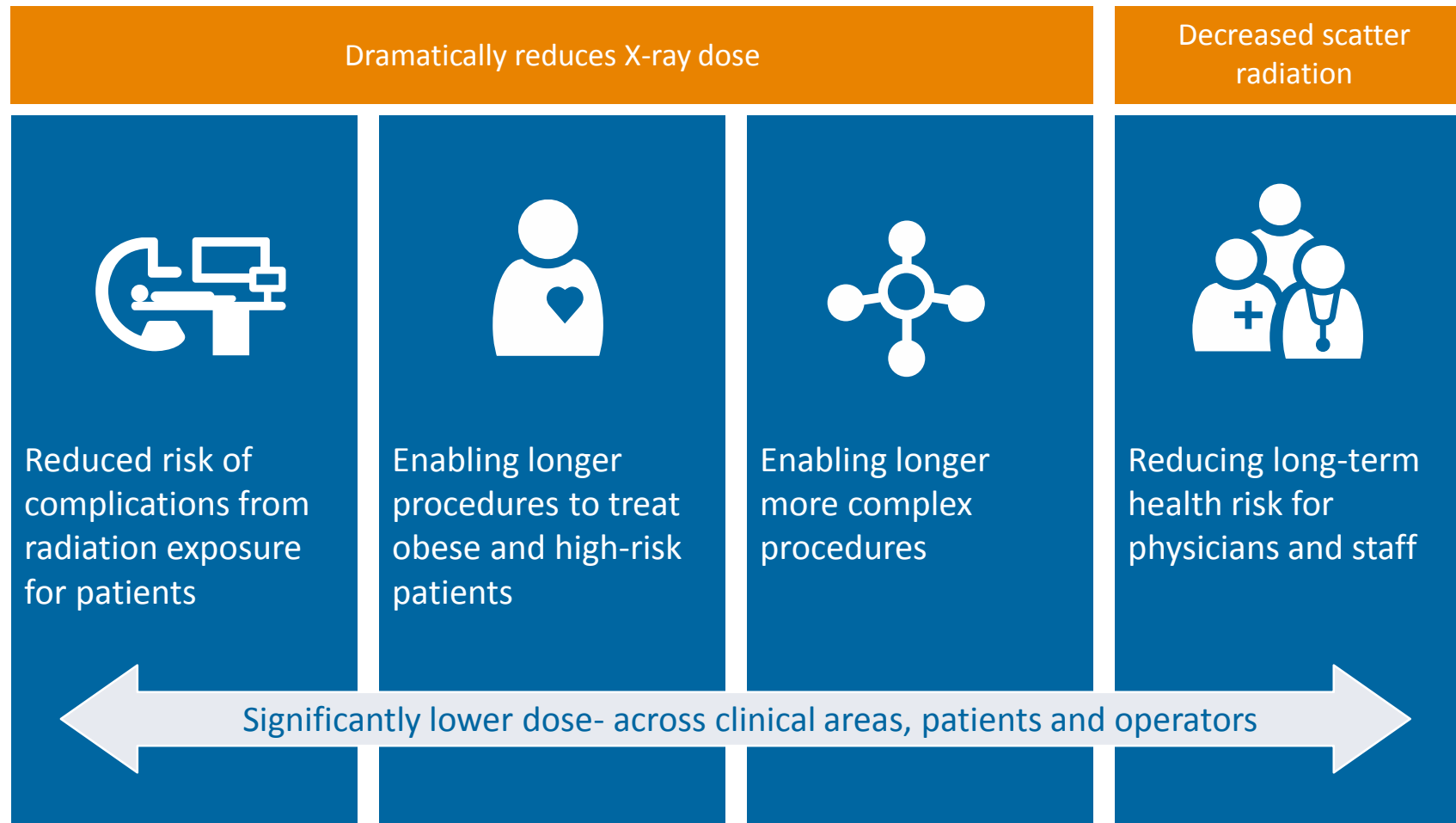
Required Image Quality

Allura Xper

AlluraClarity @ 50% dose setting



# Key Benefits of ClarityIQ



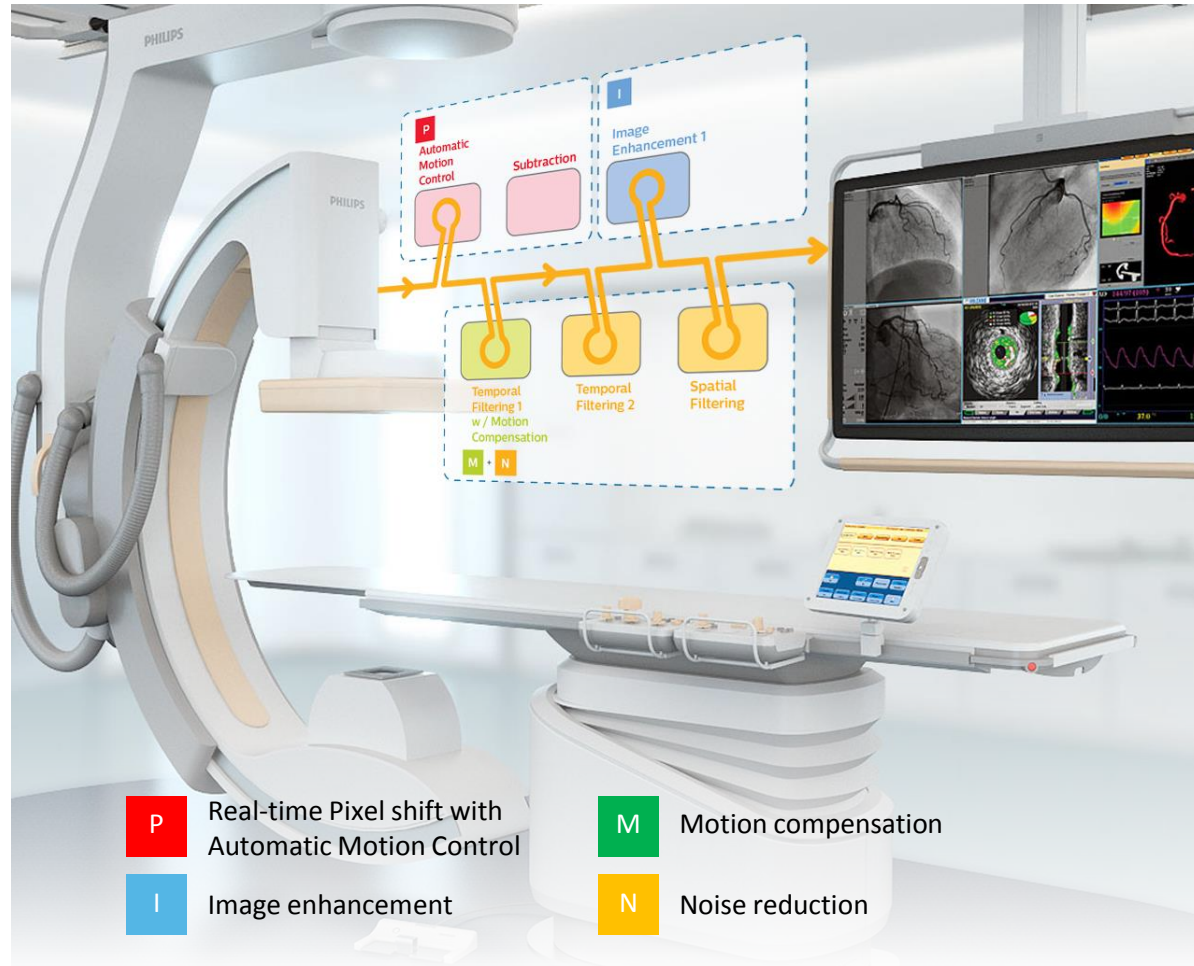
ClarityIQ

Clinically proven

How does it work?

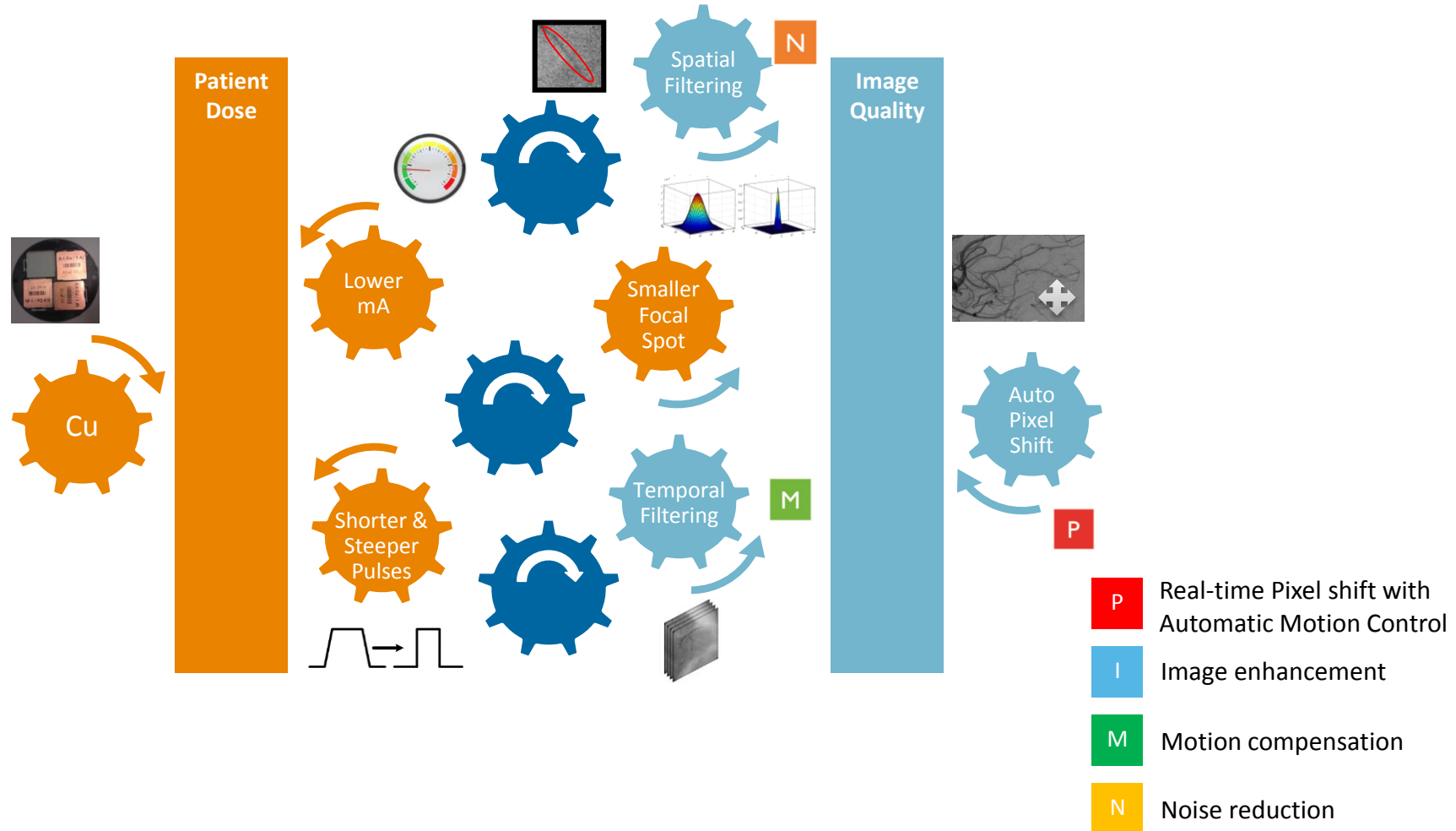
# ClarityIQ technology

Touches every part of the system, from tube to display



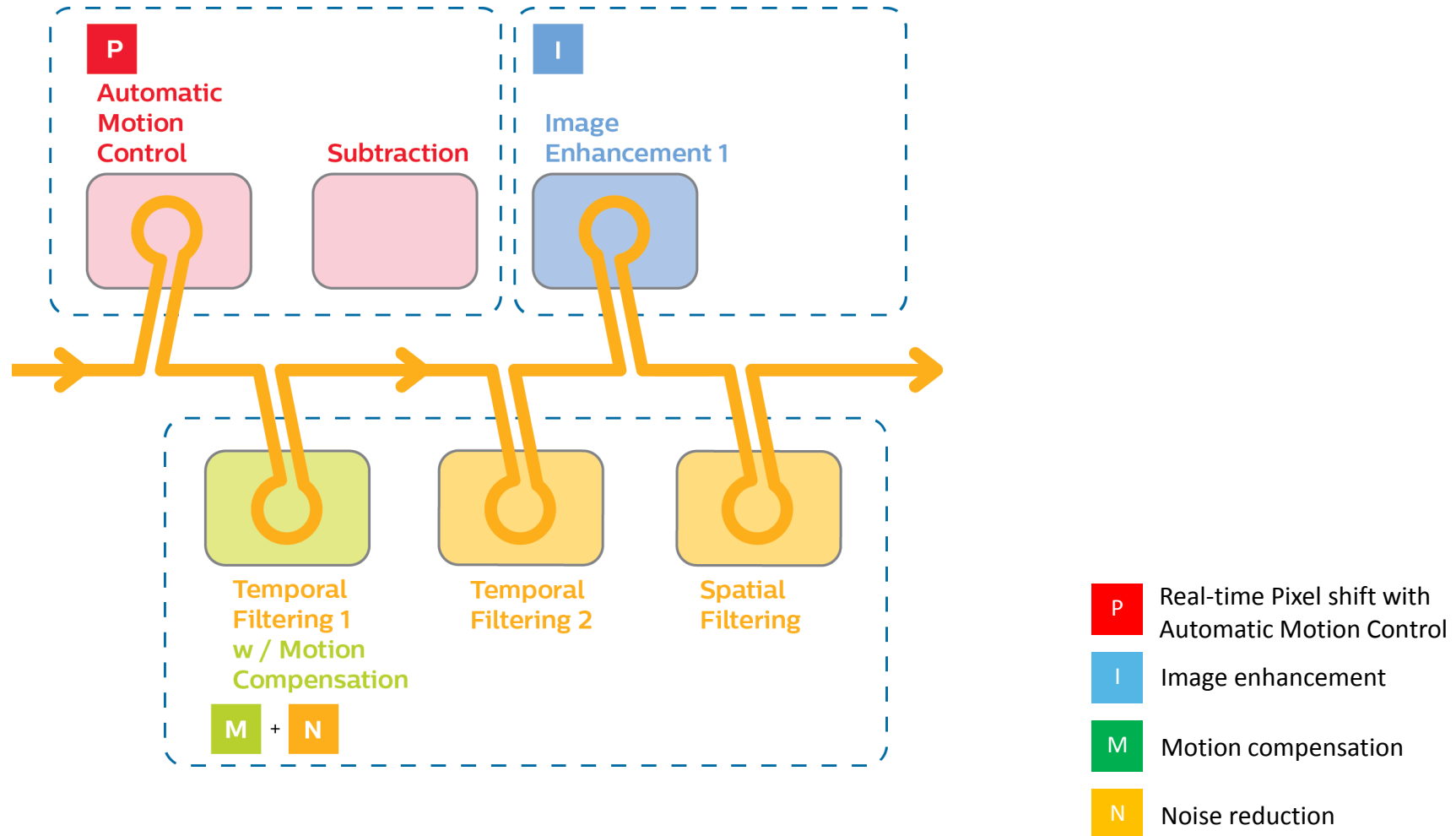
1. Powerful image processing technology
  - Pixel Shift, Motion Compensation, Noise Reduction, Image Enhancement implemented on real-time
2. Flexible image pipeline: Tailored processing and fine tuning for each and every application area.  
“Flexible asset”
3. Clinically fine-tuned parameters across the entire imaging chain over 500 system parameters  
(tube, detector, image processing) fine-tuned for each application area

# ClarityIQ: “Software and Hardware” connection

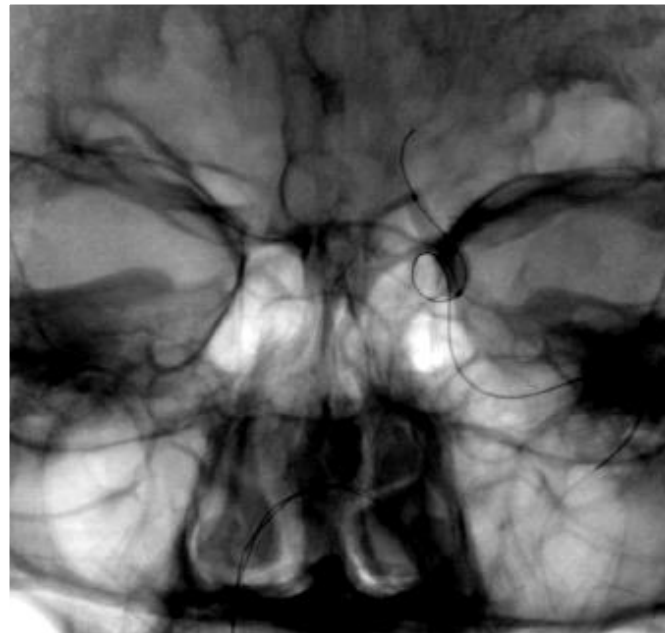
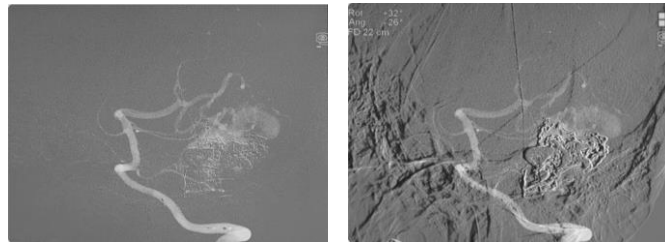




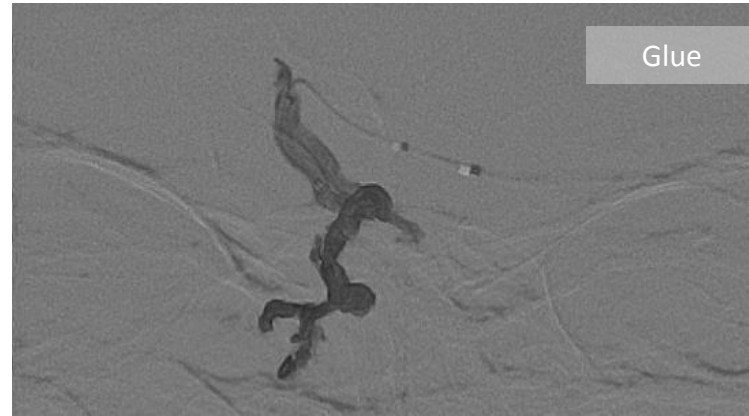
# 1. How does it really work?



# Pixel Shift – Neuro roadmap



Click to animate Automatic pixel shifting on live roadmap

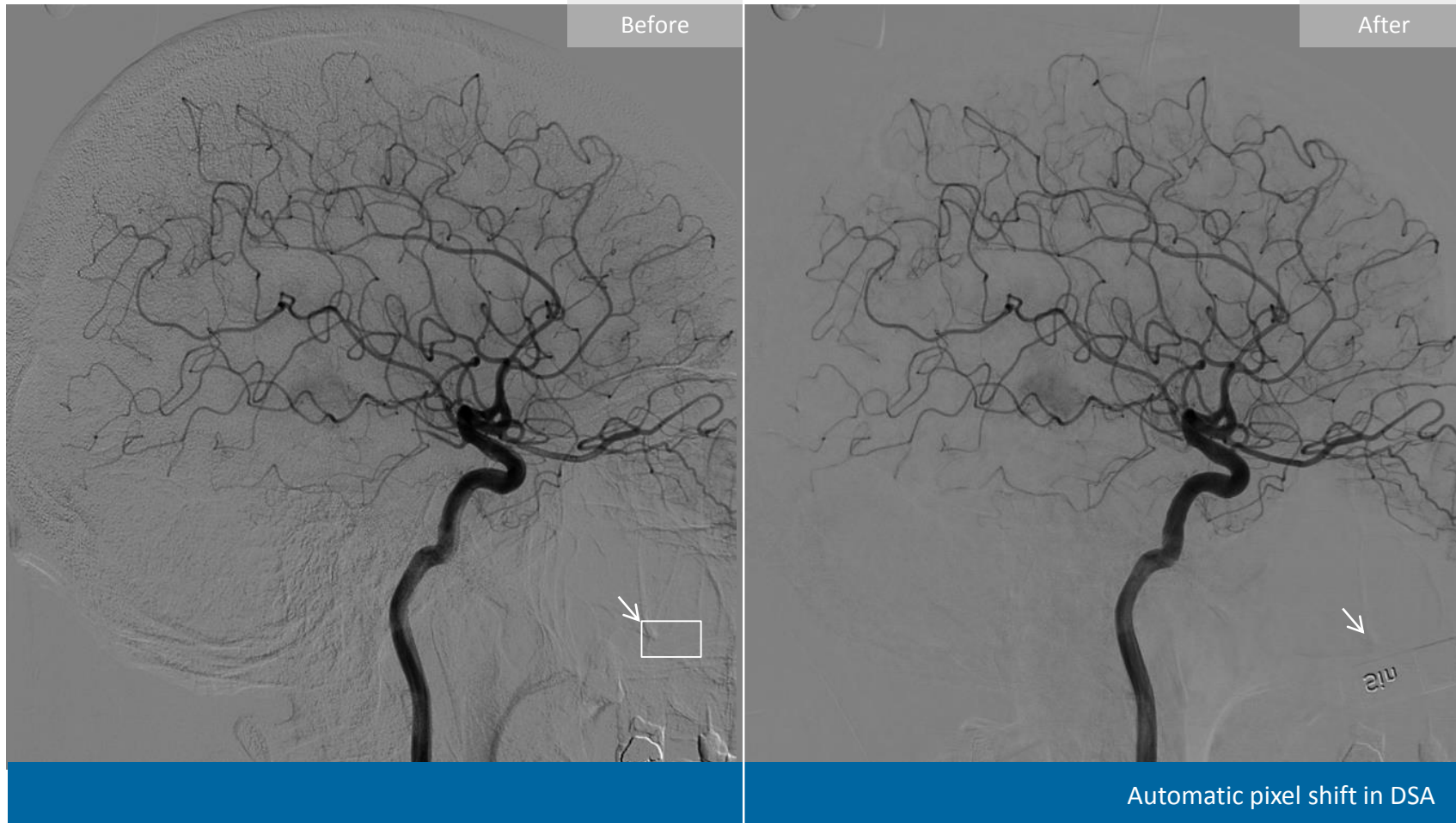


Without auto pixel shift



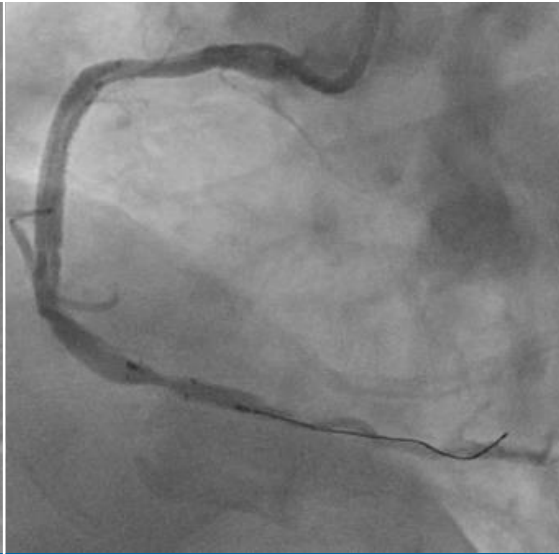
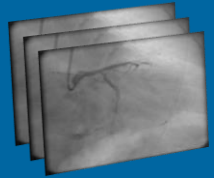


With auto pixel shift

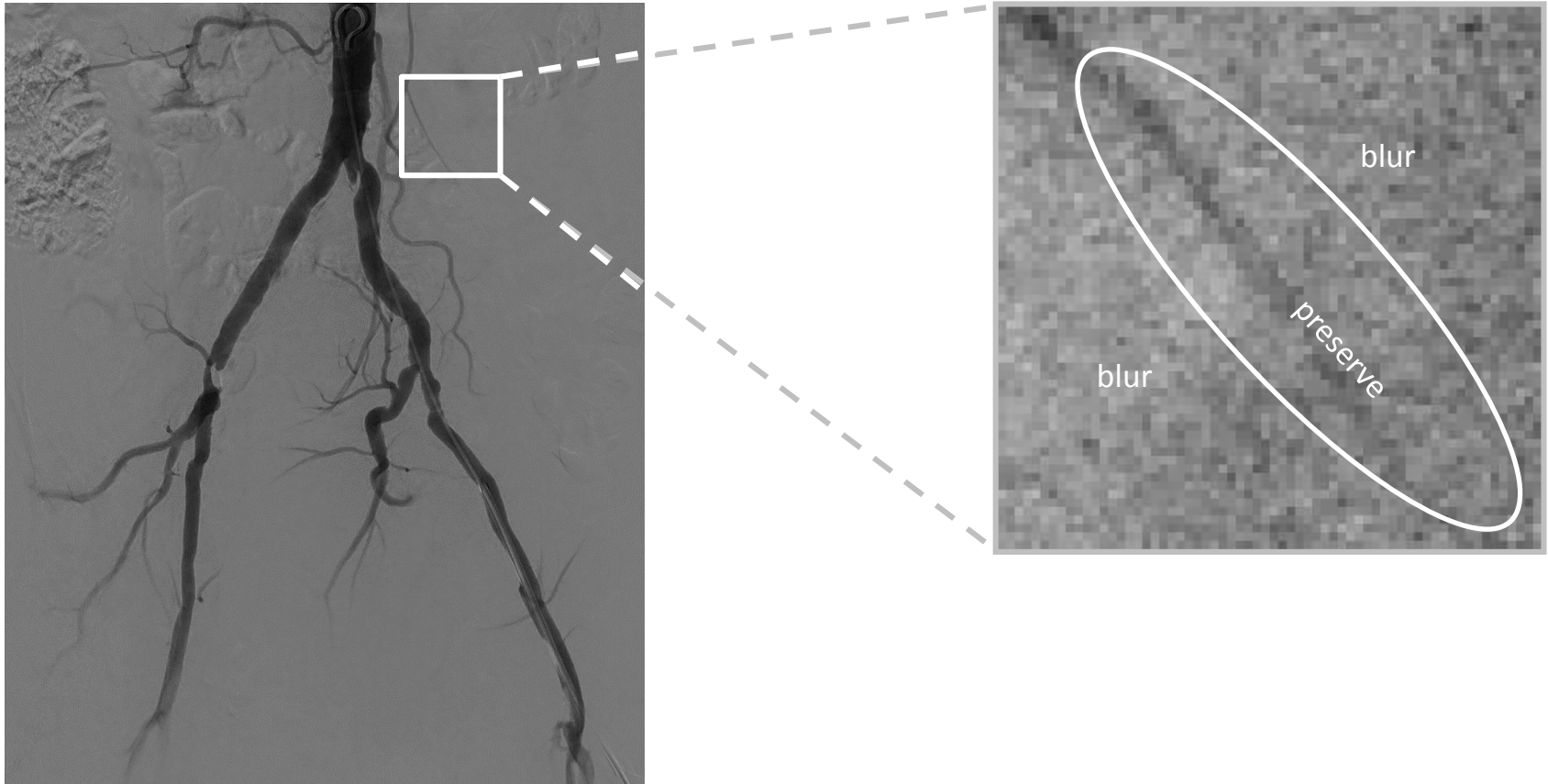
# Pixel Shift – DSA



# Motion Compensation

		
<p>Raw image</p>	<p>Basic Temporal Filtering</p> <p>More images = less noise But, motion between images = shadow</p> 	<p>ClarityIQ Temporal Filtering</p> <p>More images = less noise Motion-compensated temporal filtering = less shadow</p>

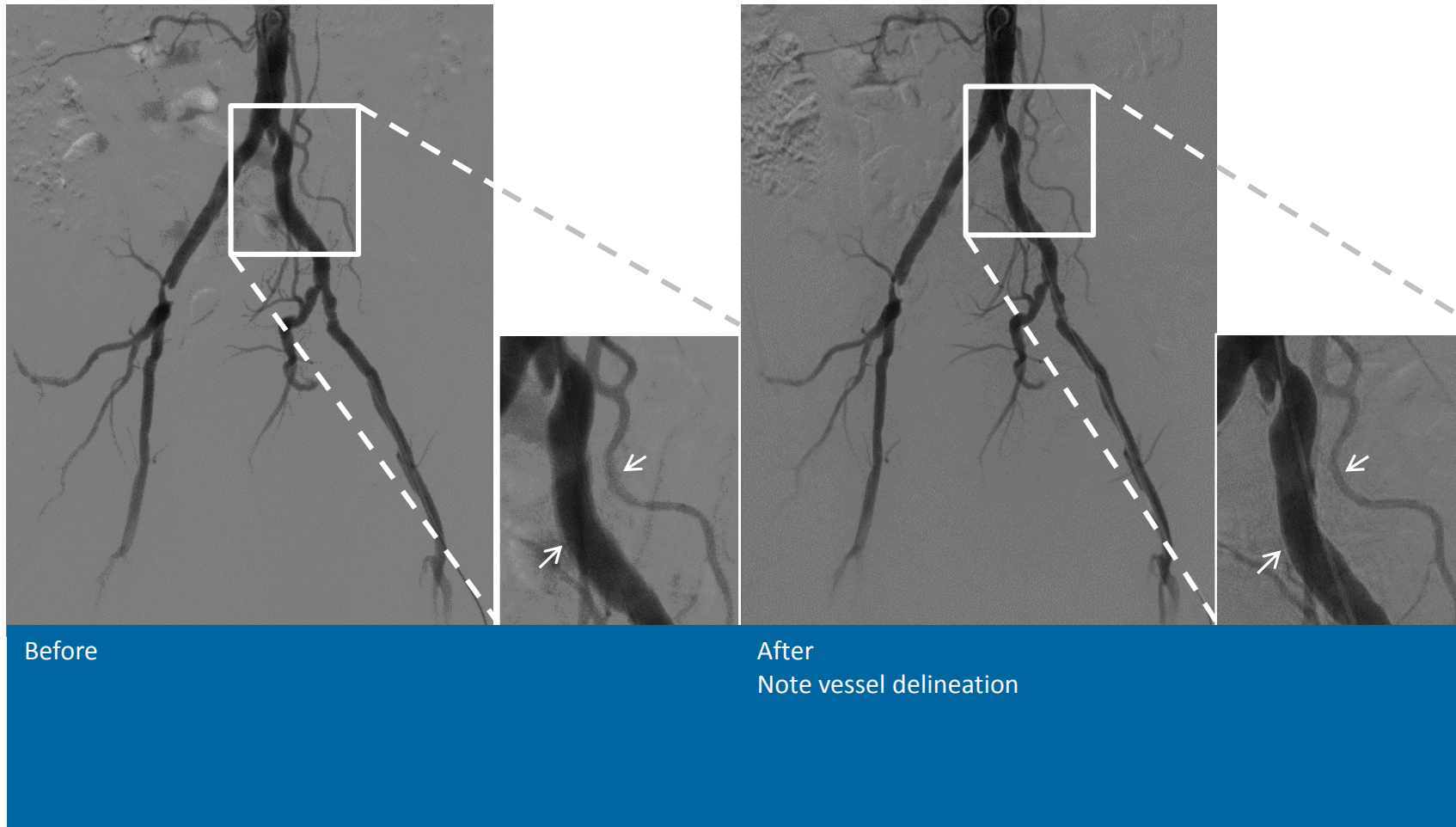
# Noise Reduction



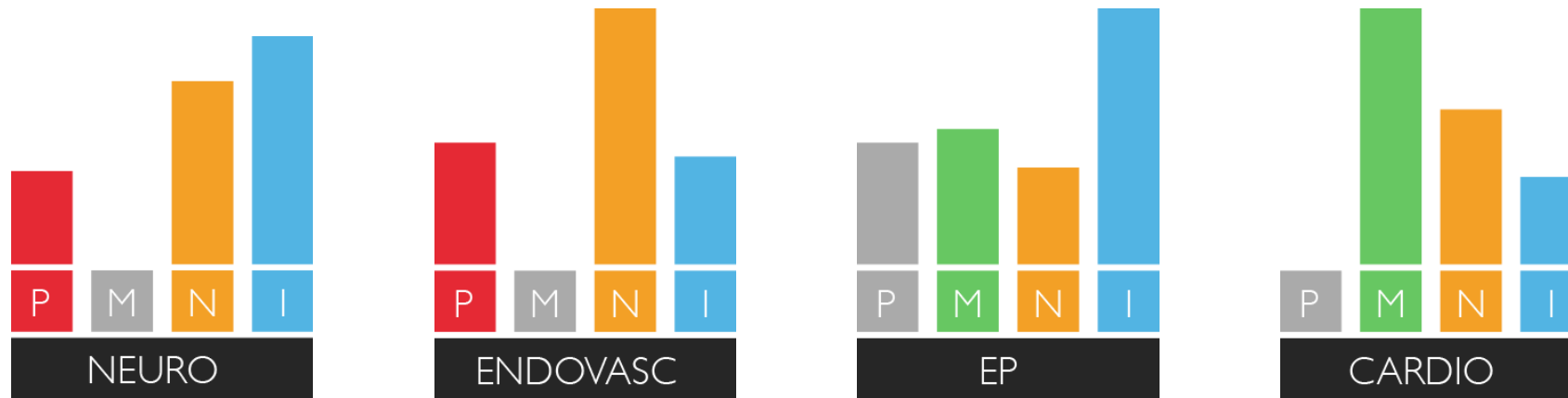
With Spatial Noise Reduction:  
Determine if pixel is noise by looking at the "neighborhood". (60 x 60 pixel sample, during subtraction process)



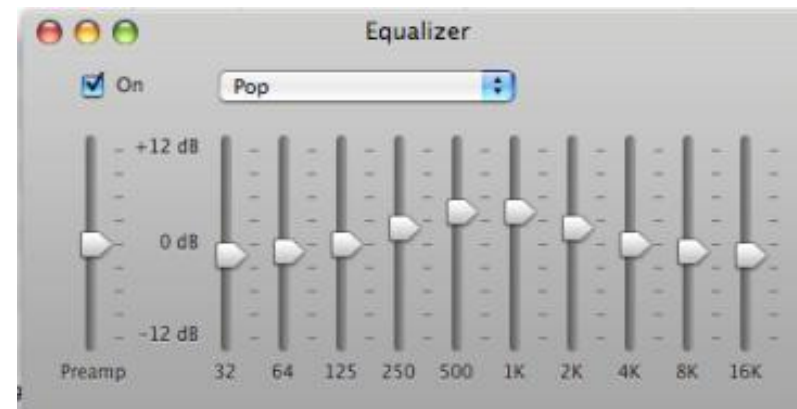
# Noise Reduction



# Image Enhancement



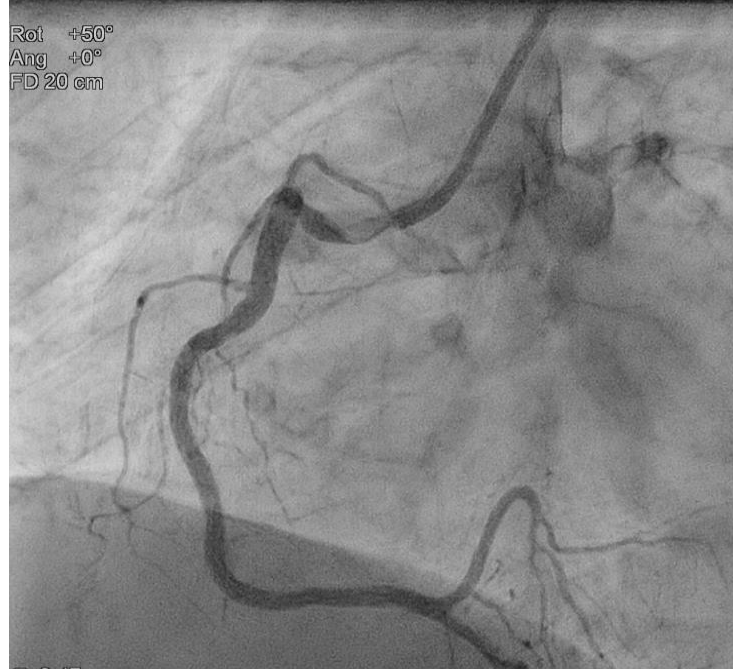
- Optimized presentation of the image, by clinical use, through extensive research
- Contrast, Brightness, Edge Enhancement, etc.
- Selectable to personal preference



# ClarityIQ technology

## Setting the next standard

- Every time you step on the x-ray pedal
- Industry leading image quality at a fraction of the dose



ClarityIQ at 50% dose setting

# Unique characteristics

1. Subjective image quality assessed in clinical trials performed worldwide
2. Copper filtration in almost all default settings, for all patient thicknesses, SID, steep angles (without decrease in image quality!)
3. All Medium and Low fluoroscopy settings now with 0.5 Cu eq.,  
All Normal fluoroscopy settings now with at least 0.2 Cu eq.,  
For all patient thicknesses, SID, steep angles (without decrease in image quality)
4. Always smallest focal spot for Neuro DSA (without decrease in image quality)
5. Cardio cine dose at 75% reduction is close to cardiac fluoro setting 3
6. The maximum dose levels for Fluoro Low are always 25% or less of the maximum legal level as set by the FDA (10R/min). For all patient thicknesses, SID, steep angles (without decrease in image quality)
7. Real time automatic pixel shift without the need for user interaction

Clinical proof



18 peer-reviewed studies  
3840 patients

One clear conclusion:  
Significantly lower dose- across clinical areas, patients and  
operators. With the superb image quality you expect from Philips.

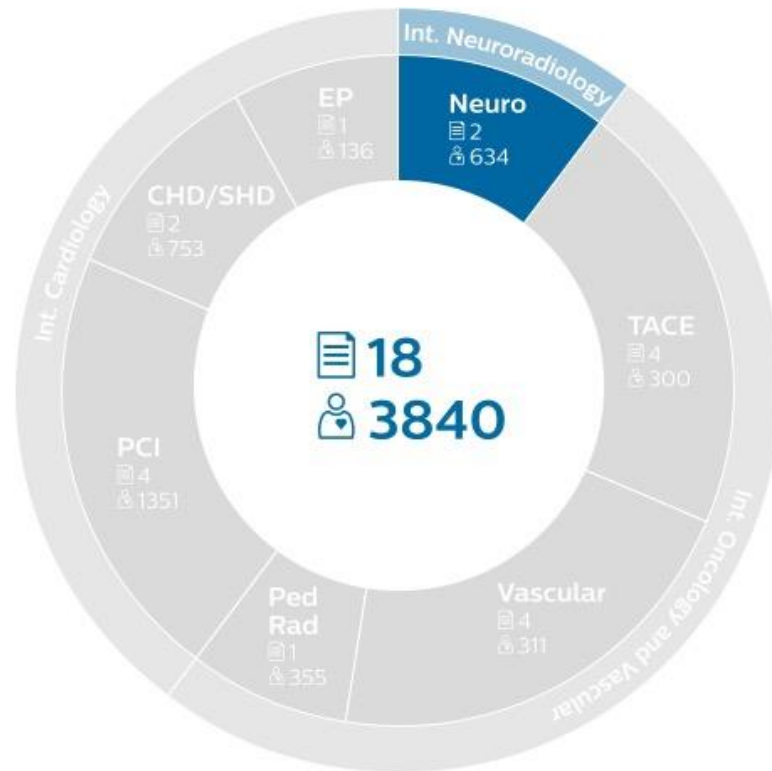


ClarityIQ

Clinically proven

Neuro interventions

# Overview Neuro studies



number of clinical studies / peer-reviewed papers published  
 patient data analyzed



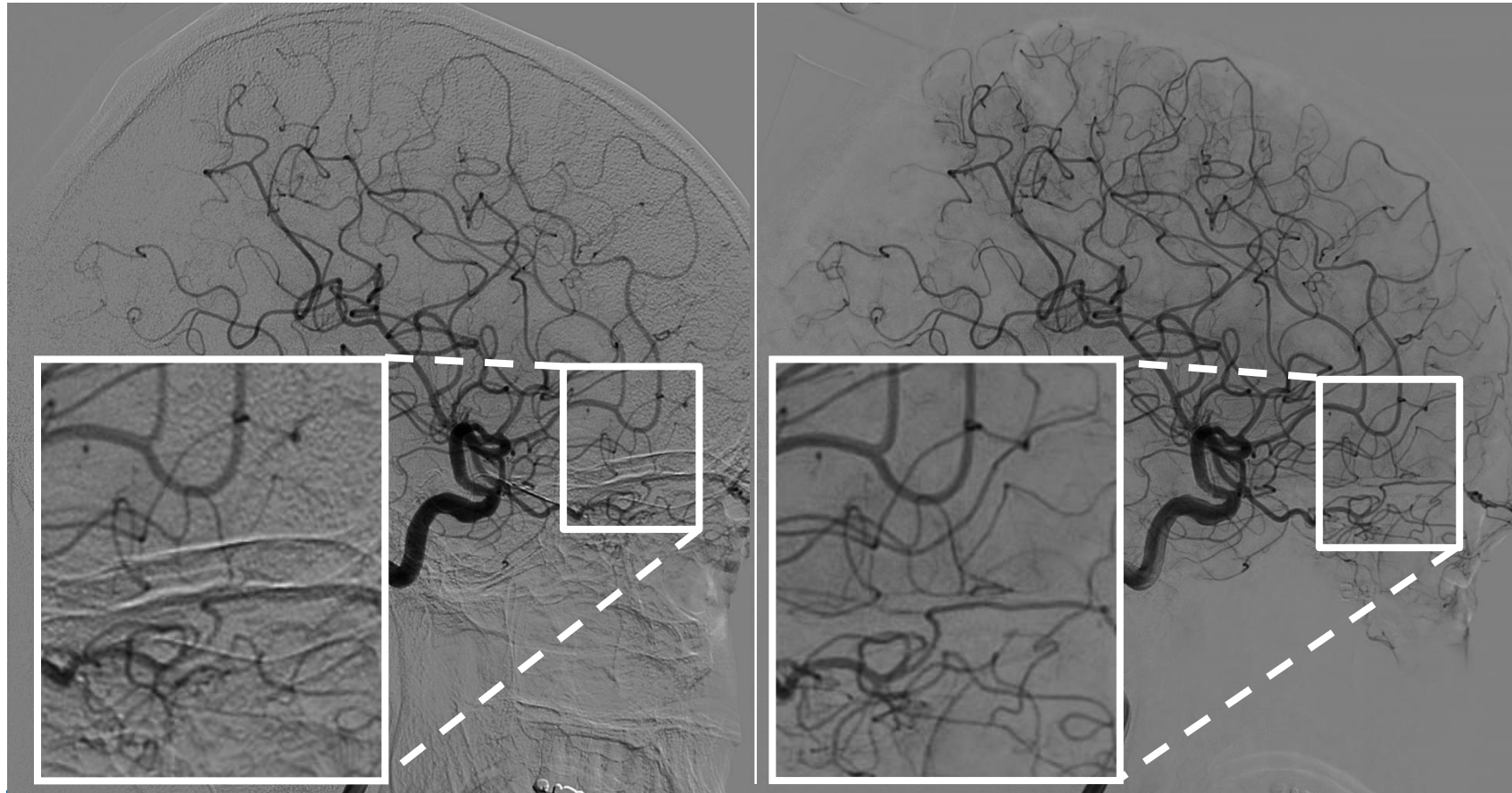
M. Söderman, et al.2 – in diagnostic and interventional neuro procedures, ClarityIQ technology reduces patient dose by 62% and 65%, respectively, compared to a system without ClarityIQ<sup>c,d</sup>



M. Söderman, et al.1 – in neuro DSA, ClarityIQ technology reduces patient dose by 75% while maintaining equivalent image quality, compared to a system without ClarityIQ<sup>c,h</sup>



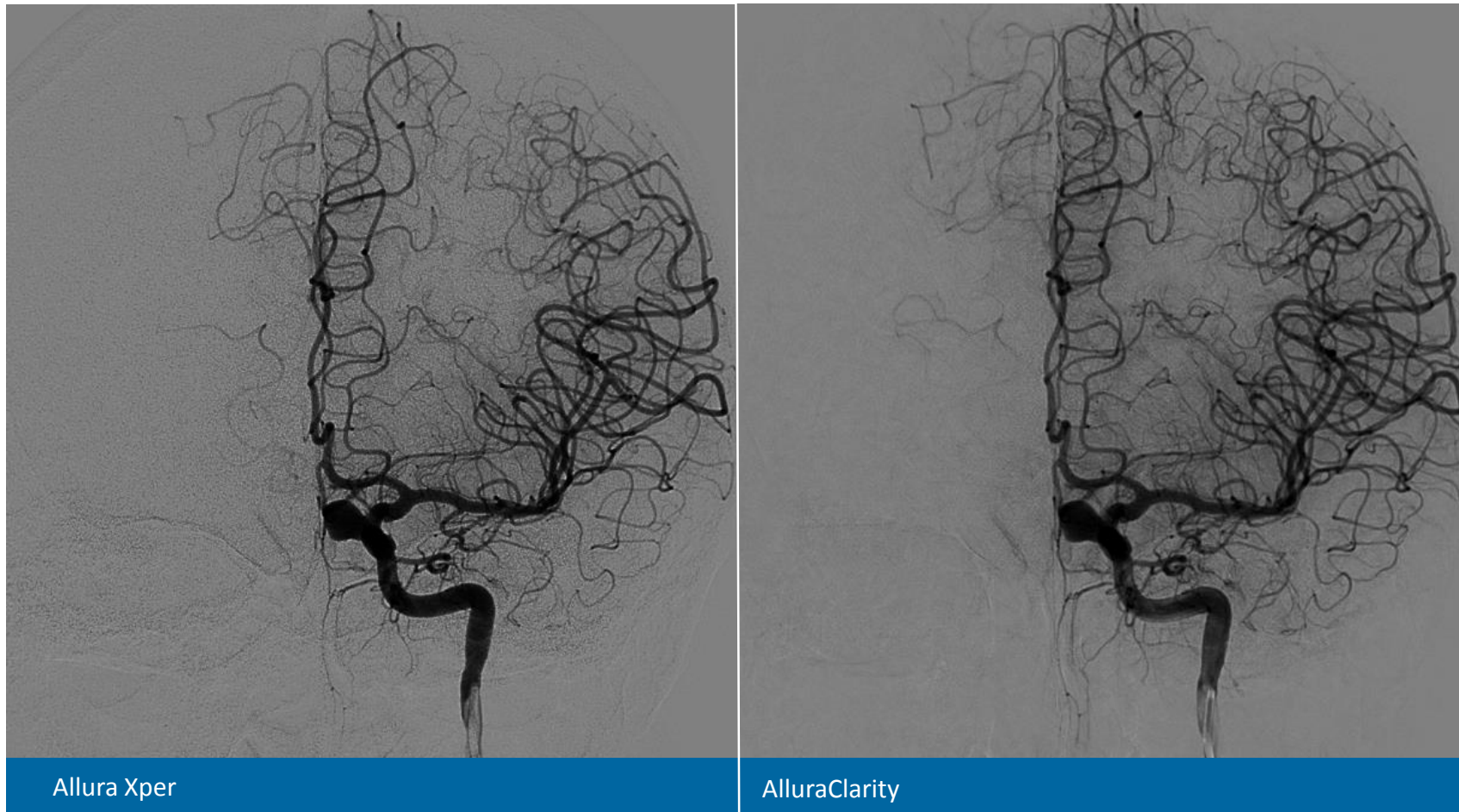
# ClarityIQ removes subtraction artifacts



Subtraction artifacts can disguise clinical information



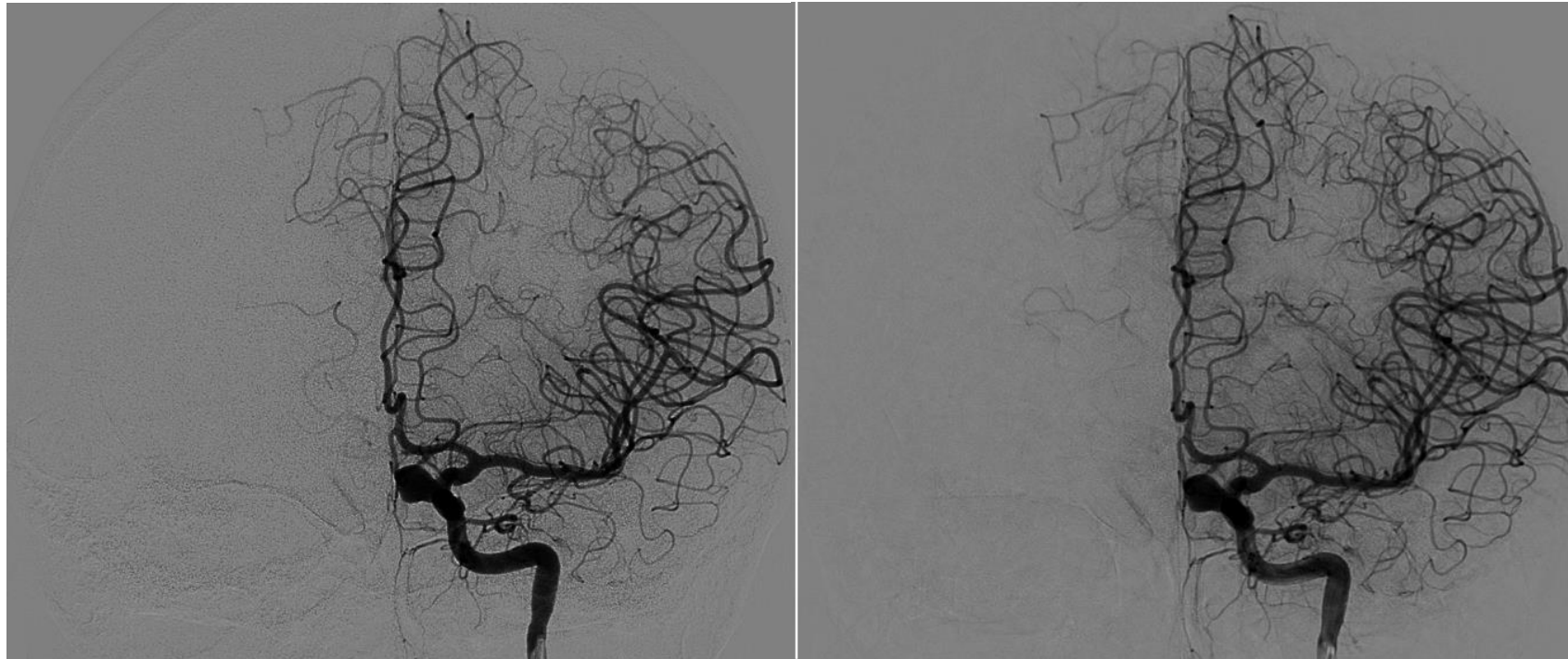
# Equivalent IQ at 73% less X-ray dose\*!



Images courtesy Karolinska University Hospital, Stockholm, Sweden. Two separate injections: iodine not fully comparable  
\* Soderman et al. Radiology 2013 doi: 10.1148/radiol.13121262 <http://www.clinicaltrials.gov/ct2/show/NCT01381952>



# Same IQ at 73% less X-ray dose\*!



Allura Xper

AlluraClarity with 73% less dose

In an interventional application, the AlluraClarity Series an equivalent similar diagnostic image quality in digital subtraction neuro-angiographic exams at an average of 73%\* lower X-ray dose compared to the previous default settings.

\* In a clinical study, the measured dose reduction ranged from 70%-75% at 2 frames per second.

NOTE: In clinical practice, the use of AlluraClarity Series , the X-ray dose reduction may vary, depending on the clinical task, patient size, anatomical location, and clinical practice. To determine the appropriate X-ray dose to obtain diagnostic image quality for the particular clinical task, please consult your physicist or radiologist.

Images courtesy Karolinska University Hospital, Stockholm, Sweden. Two separate injections: iodine not fully comparable

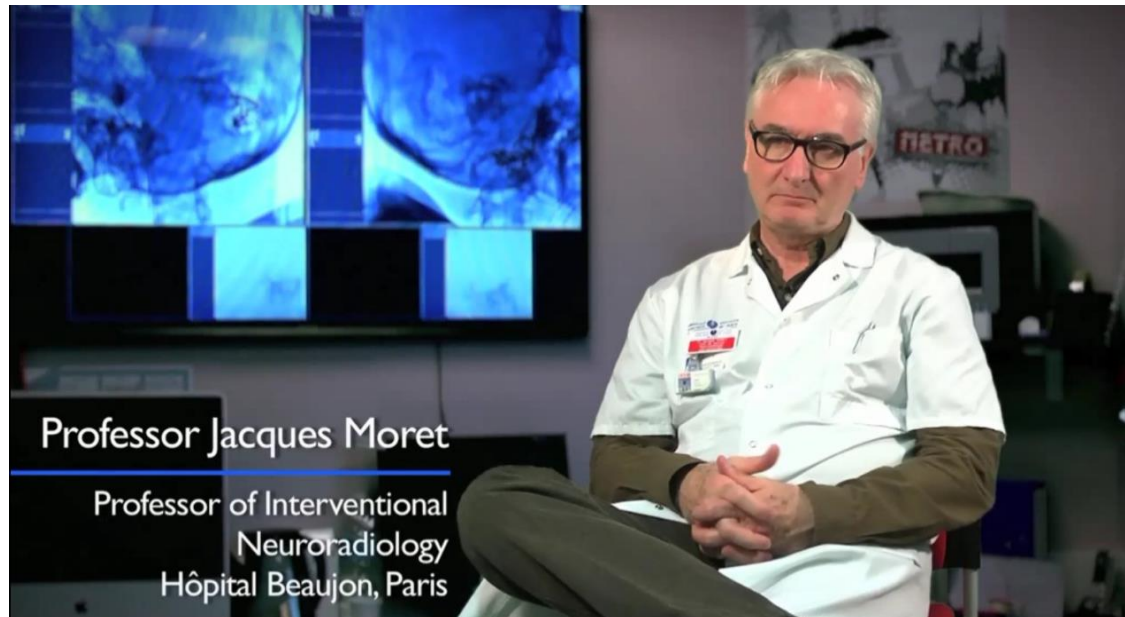


“We had three readers and it turned out that all three readers actually valued the image quality from the reduced dose better than the original images.”

Dr. M. Söderman, Interventional Neuroradiologist, Karolinska University Hospital, Stockholm, Sweden



# Real Time Motion compensation in AlluraClarity



Professor Jacques Moret

Professor of Interventional  
Neuroradiology  
Hôpital Beaujon, Paris

“This real time motion compensation – it is a big relief for us – it has changed our life, specifically when you are looking at the base of the skull”

Professor Jacques Moret

- Works with AlluraClarity for since 2012
- Effects of AlluraClarity:
  - Dose reduction for patients and staff
  - Reduction of complications caused by X-ray dose in case of long procedures
  - Improved IQ noise reduction and motion compensation

# Conclusions Neuro

[Click here for more background information about these studies](#)



ClarityIQ is a X-ray imaging technology that combines advanced real-time image noise reduction algorithms, with state-of-the-art hardware to reduce patient entrance dose significantly.

Clinical studies conducted with leading medical centers in the world proved patient dose reduction at equivalent IQ and procedural patient dose reduction for neuro:



- Dr. M. Soderman, et al.<sup>1</sup> – in neuro DSA, ClarityIQ technology reduces patient dose by 75% while maintaining equivalent image quality, compared to an Allura Xper system<sup>c,h</sup>
- Dr. M. Soderman, et al.<sup>2</sup> – in diagnostic and interventional neuro procedures, ClarityIQ technology reduces patient dose by 62% and 65%, respectively, compared to an Allura Xper system<sup>c,d</sup>

Image Guided Therapy - System, Philips Healthcare



# ClarityIQ

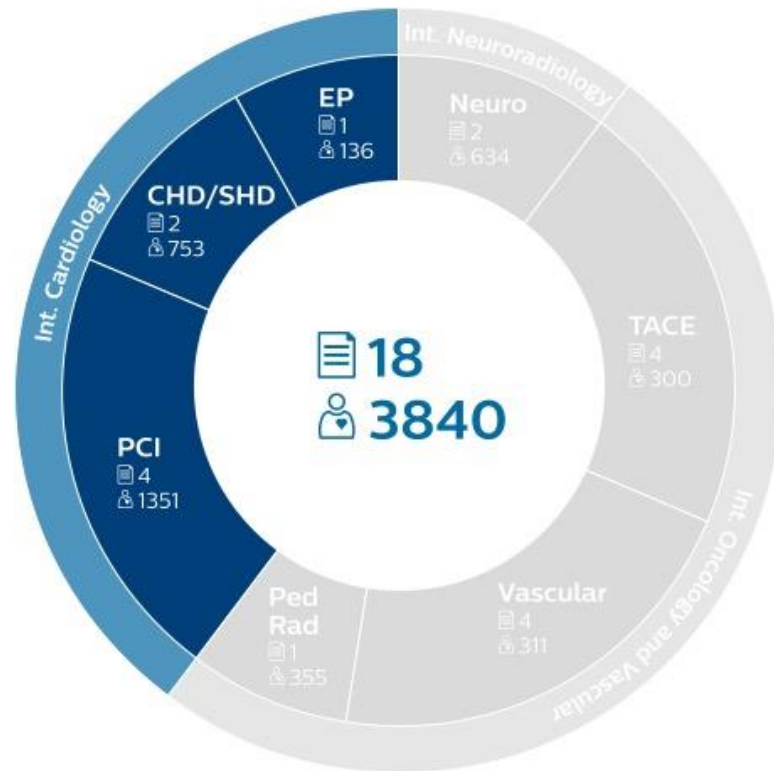
## Clinically proven



Cardiac interventions









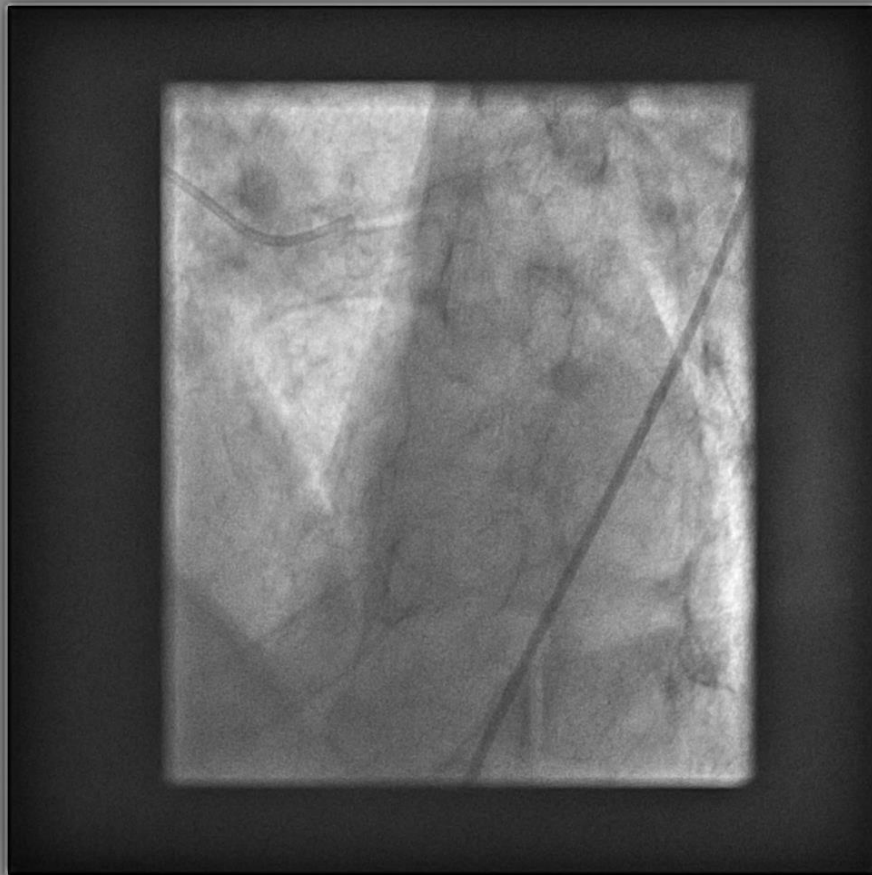
# Overview cardiac studies



 number of clinical studies / peer-reviewed papers published  
 patient data analyzed

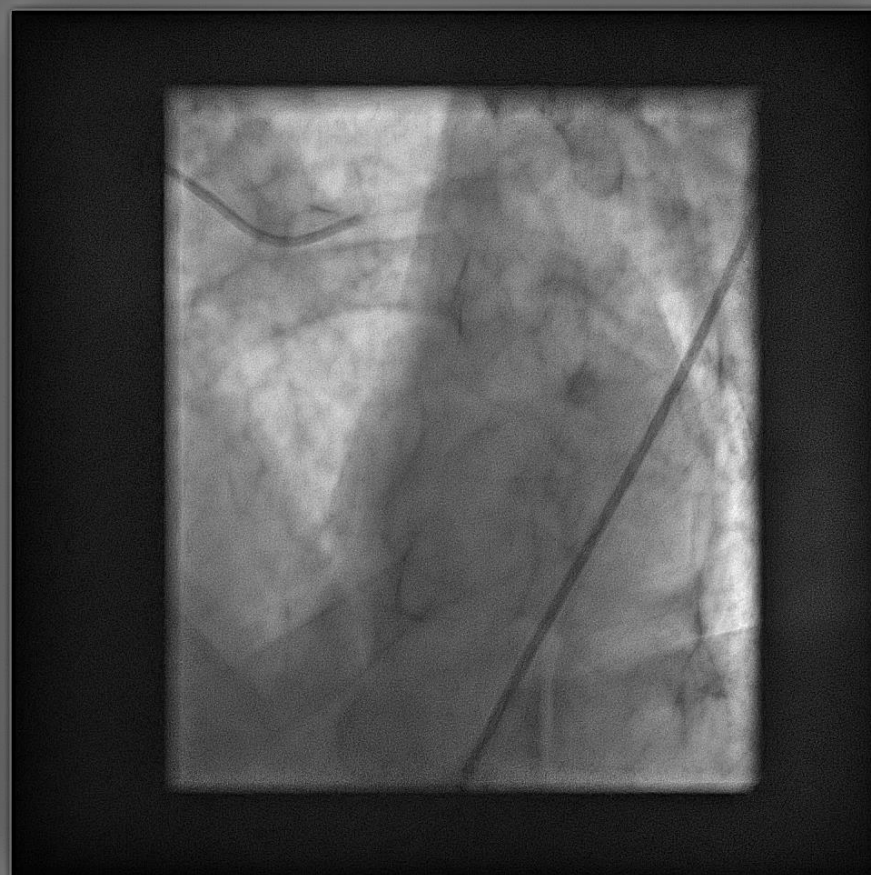
-  L. Eloit, et al.<sup>4</sup> – in diagnostic coronary angiography, ClarityIQ technology reduces patient dose by 75% while maintaining diagnostic image quality, compared to a system without ClarityIQ<sup>c,e</sup>
-  T. Ten Cate, et al.<sup>5</sup> – in cardiac cine, clarityIQ technology reduces patient dose by 53% while maintaining equivalent image quality, compared to a system without ClarityIQ<sup>c,f</sup>
-  L.R. Dekker, et al.<sup>13</sup> – in EP procedures, ClarityIQ technology reduced patient dose by 43%, compared to a system without ClarityIQ<sup>c,l</sup>
-  S. Nakamura, et al.<sup>6</sup> – reports significant patient dose reduction for PCI procedures<sup>c</sup>  
 N.A. Haas, et al.<sup>7</sup> – reports significant patient dose reduction for adult congenital heart disease interventions<sup>c</sup>

Proven to reduce X-ray dose by an average of 50% with equivalent image quality for diagnosis in cardiac angiography<sup>5</sup>



**Allura Xper**

LAO 40 CRA 20, 15 fps, 20 cm FOV  
DAP 5.396 Gy<sub>cm</sub><sup>2</sup> @ 0.0545 Gy<sub>cm</sub><sup>2</sup>/frame  
AK 91 mGy



**AlluraClarity**

LAO 40 CRA 20, 15 fps, 20 cm FOV  
DAP 2.156 Gy<sub>cm</sub><sup>2</sup> @ 0.0247 Gy<sub>cm</sub><sup>2</sup>/frame  
AK 36 mGy

**Patient info**

M, 67 yrs, BMI 25.6 kg/m<sup>2</sup>  
hyperlipidemia; previous MI and CABG  
admitted for angina and myocard ischemia

# ClarityIQ technology

Industry leading image quality at a fraction of the dose

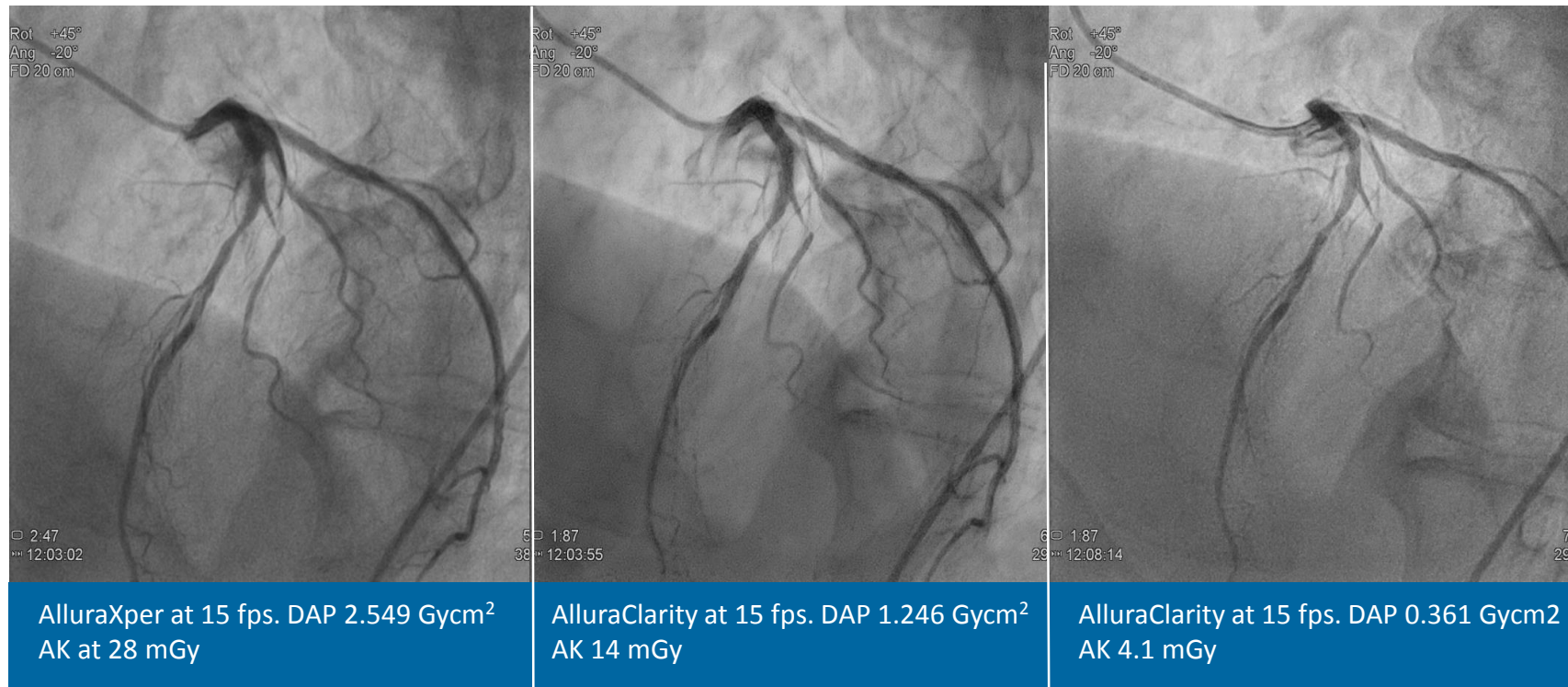


Image courtesy from Dr. Gehlmann, UMC St. Radboud, Nijmegen, Netherlands



# ClarityIQ technology

Industry leading image quality at a fraction of the dose 64 yo F with stenosis at proximal RCA

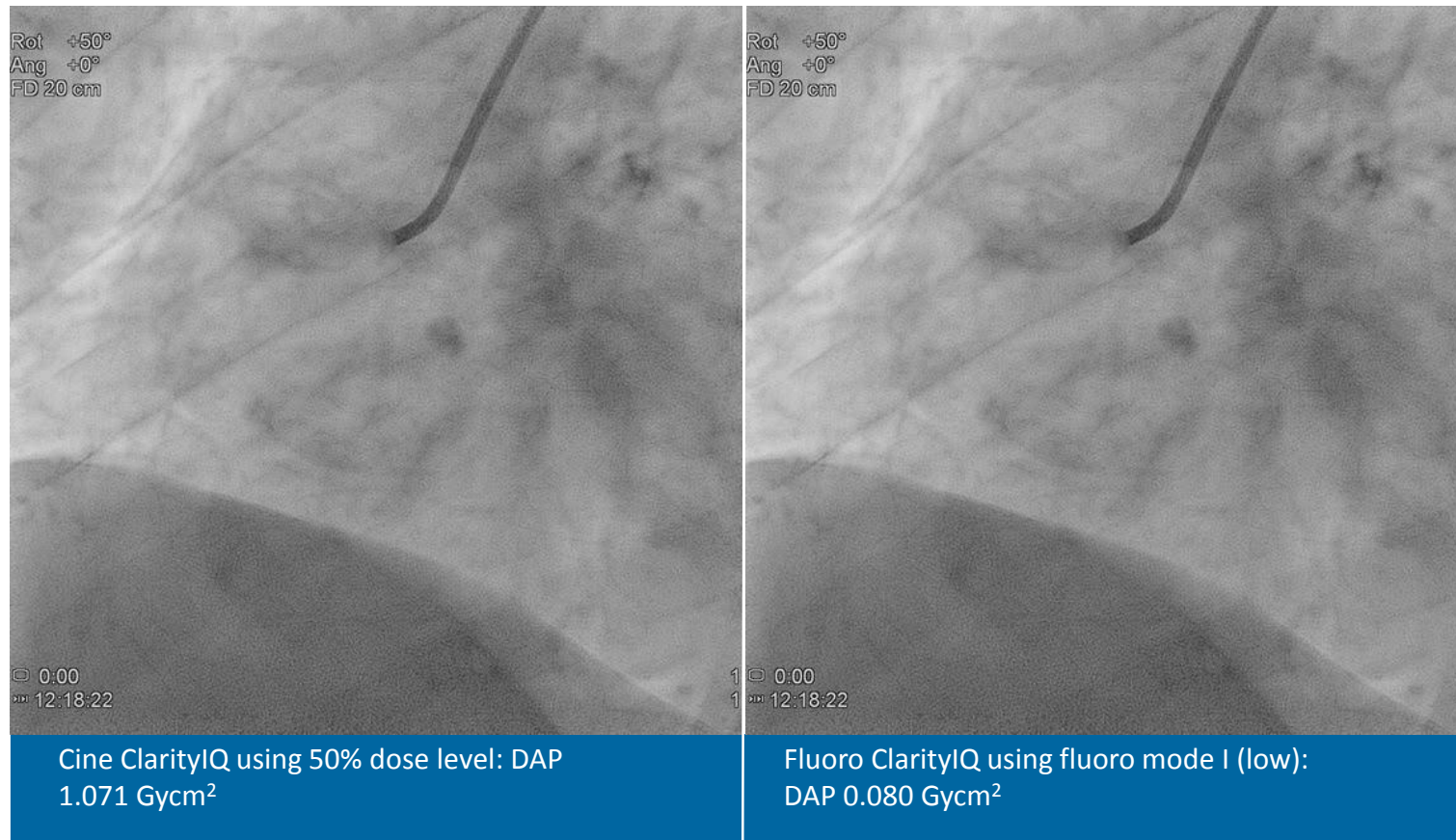


Image courtesy from Dr. Gehlmann, UMC St. Radboud, Nijmegen, Netherlands

# Expected to reduce the procedural X-ray dose

by an average of 50% with adequate image quality for all ablation procedures

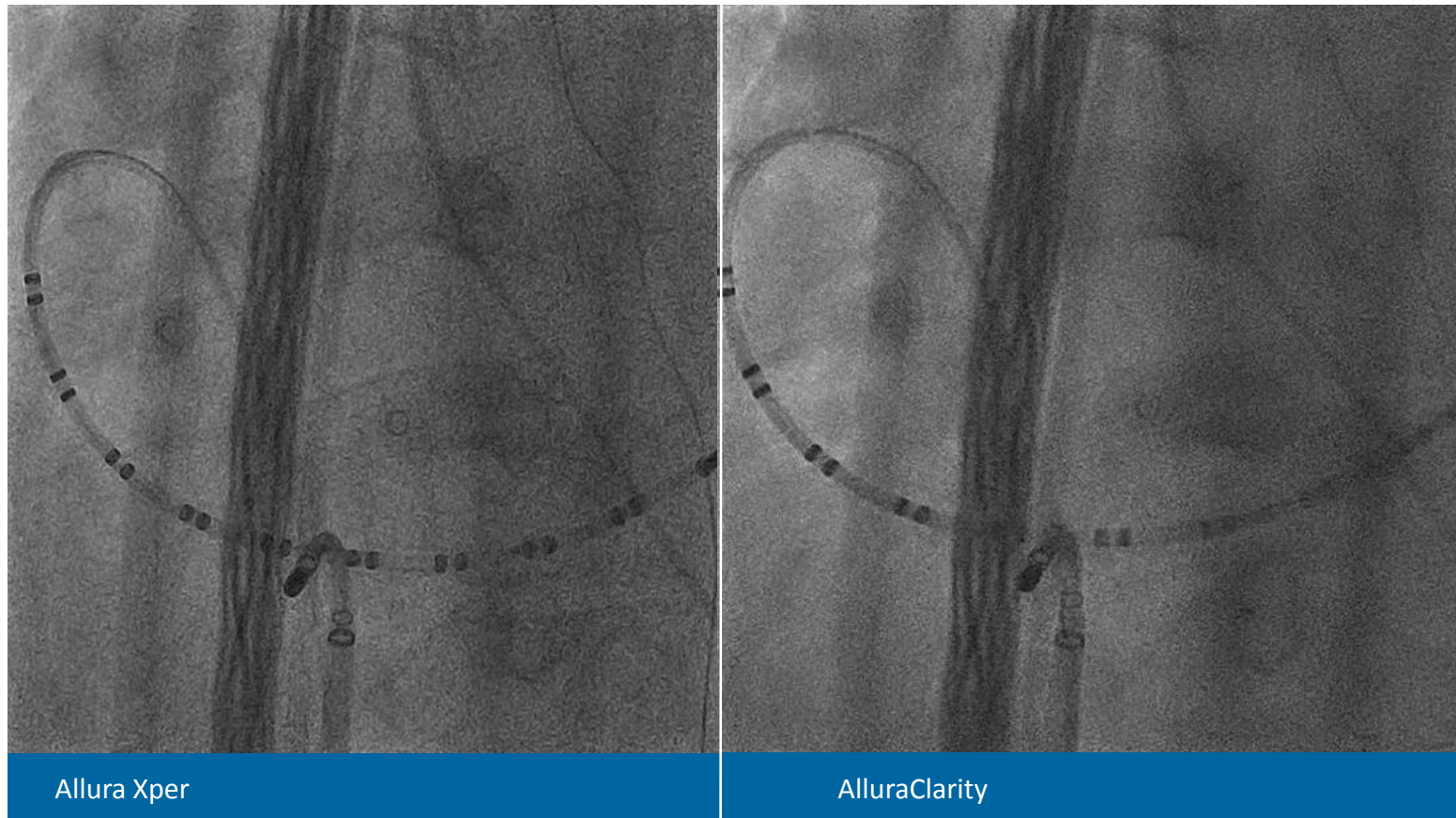


Image courtesy of dr. Dekker, Catharina Ziekenhuis, Eindhoven, the Netherlands





# AlluraClarity with ClarityIQ technology

Setting the next standard

“The typical DAP values that I normally used to achieve in PCI procedures was around 40 to 60 Gy $\text{cm}^2$  but now with ClarityIQ, my typical DAP values are around 12 to 25 Gy $\text{cm}^2$ .”

Dr. Helmut Gehlmann  
Head of Cardiac Catheterization Dept  
UMC St. Radboud, Nijmegen Netherlands

Based on combination of ClarityIQ technology and DoseWise  
with best practices

# Conclusions Cardio

[Click here for more background information about these studies](#)



ClarityIQ is a X-ray imaging technology that combines advanced real-time image noise reduction algorithms, with state-of-the-art hardware to reduce patient entrance dose significantly.

Clinical studies conducted with leading medical centers in the world proved patient dose reduction at equivalent IQ and procedural patient dose reduction in interventional cardiology



Dr. Y. Taeymans, et al: in diagnostic coronary angiography, ClarityIQ technology reduces patient dose by 75% while maintaining diagnostic image quality, compared to an Allura Xper system <sup>c, e</sup>

Dr. S. Nakamura, et al.<sup>6</sup> – reports significant patient dose reduction for PCI procedures<sup>c</sup>

Dr. T. Ten Cate, et al.<sup>5</sup>– in cardiac cine, clarityIQ technology reduces patient dose by 53% while maintaining equivalent image quality, compared to an Allura Xper system <sup>c, f</sup>

Dr. L.R. Dekker, et al.<sup>13</sup> – in EP procedures, ClarityIQ technology reduced patient dose by 43%, compared to an Allura Xper system<sup>c, i</sup>



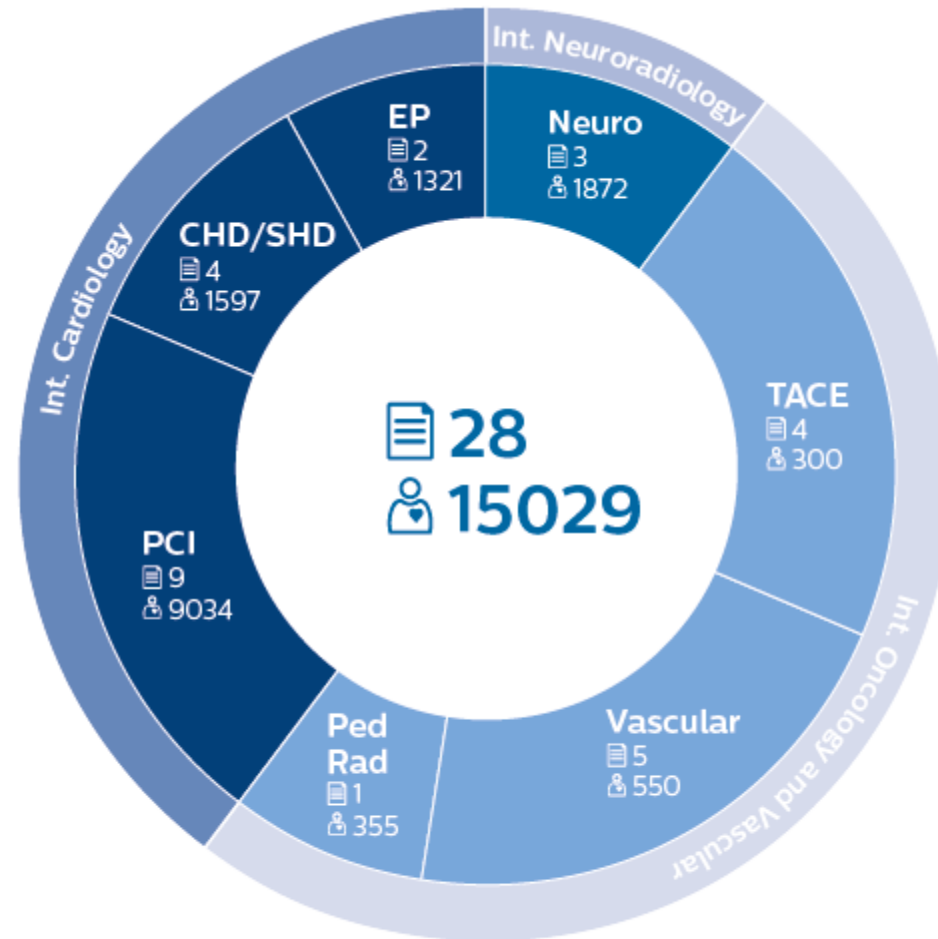
What do our users think about  
ClarityIQ?


# ClarityIQ – reviewed by Cardiology users



# ClarityIQ peer reviewed comparative studies per clinical area

# 2018



 number of peer-reviewed papers published  
 patient data analyzed



