

초청 강연 II

Reconstructed 3D Angiogram & Endo-view Angiogram

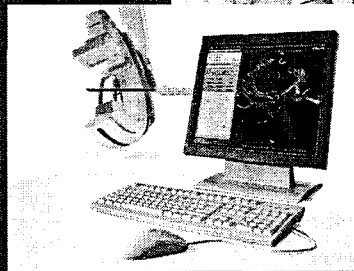
- 좌장 | KAIST 장근식

- 필립스(주) 윤종민

PHILIPS

Volumetric imaging

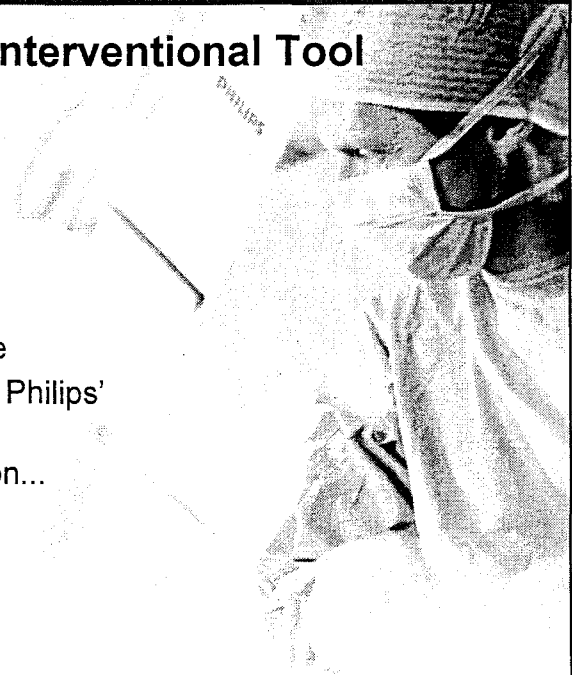
Integris 3D-RA Interventional Tool
Release 4.2



Integris 3D-RA Interventional Tool

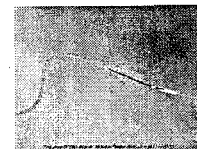
Agenda

- Introduction
- Clinical environment
- 3D angio evolution
- Philips' 3D Technique
- Unique Advantages - Philips' 3D system
- Product demonstration...

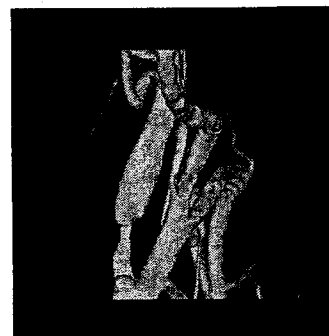
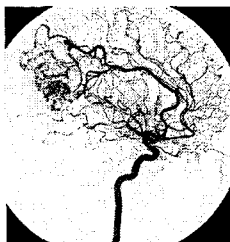


Clinical Environment

- Expansion of minimally invasive “tool kit”
 - Neuro and Body: catheter-based devices
 - Reduced procedural risk, hospital stay
 - Better outcomes
- Impact on imaging
 - Resolution:
 - Small devices requiring excellent resolution without increased dose
 - Workflow:
 - Minimize procedure time – fast positioning, fast image acquisition and processing



3D Angio Evolution



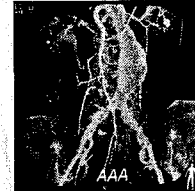
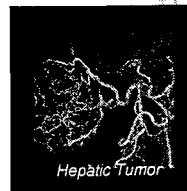
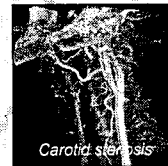
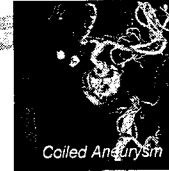
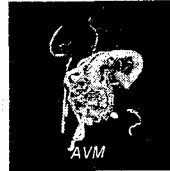
“On several occasions we have faced situations where conventional digital angiography indicated that the aneurysm could not be treated, while Integris 3D-RA indicated that it could, and vice versa. Each time, the Integris 3D-RA information proved to be correct.”

Prof. J. Moret, Fondation A. De Rothschild, Paris, France

3D Angio Evolution

- Clinical Applications

- Neuro:
 - Initial area of clinical use – small, motionless, complex structures
 - Aneurysm, AVM treatment
- Neck and body:
 - Utility expanding to include carotids and structures of the abdominal and pelvic region



- “Interventional Tool” approach

- Designed for use during intervention; intuitive, fast

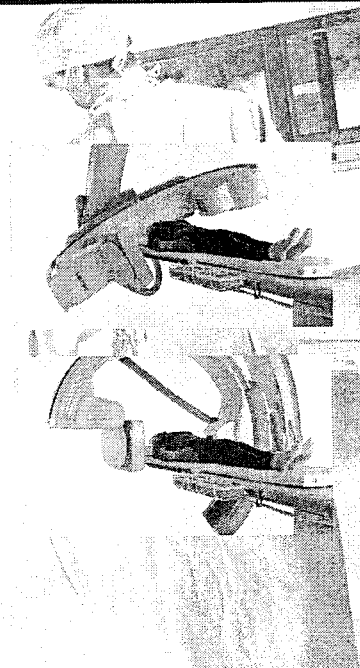
Philips' 3D Technique

- “System”

- Integris Allura monoplane (9", 12" or 15")
- Integris Allura bi-plane system
- Allura Xper systems (FD10 & FD20)
- Integris 3D-RA Interventional Tool

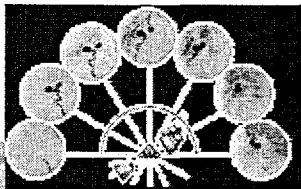
- Description

- Images acquired via Rotational Angio
 - 60 or 120 images
 - 240° arc @ 55° per second
- 3D image reconstruction
 - 75 seconds @ 120 images
 - 2nd /3rd reconstructions: <10 seconds



Philips' 3D Technique

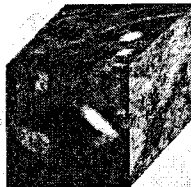
Rotational Angio



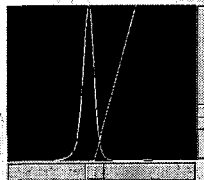
Display



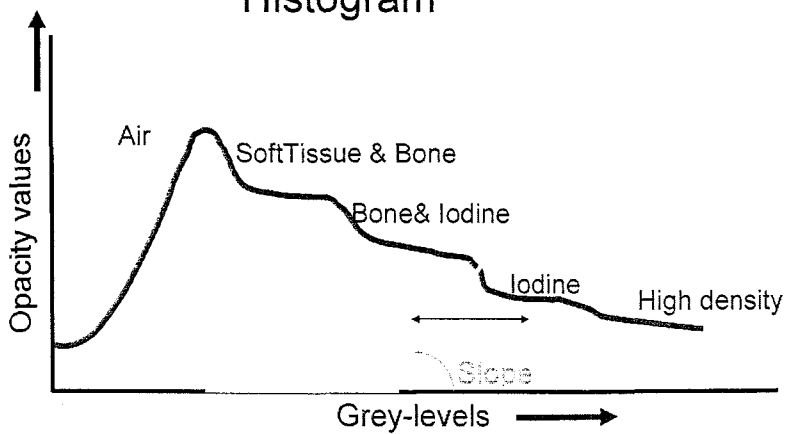
Reconstruction



Window/Level



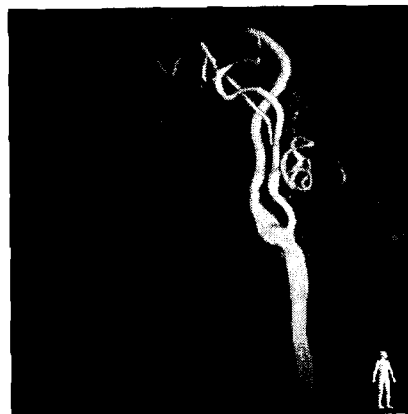
3DRA Viewing, Histogram



Windowing of clinically relevant information

3DRA Viewing, Rendering modes

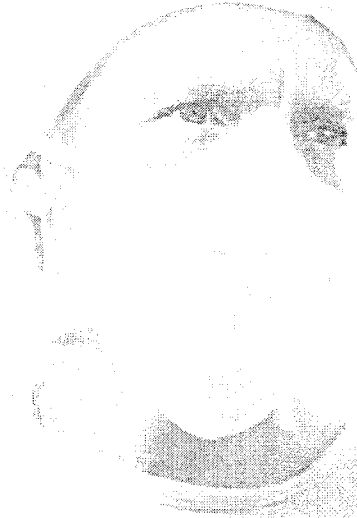
- Volume Rendered
- Shaded Surface Display
- Sum
- MIP
- Gradient Rendered
- Volume Colored Rendered.



Strengths and unique features of Philips Integris 3D-RA

Strengths and unique features of Philips Integris 3D-RA

- Speed
- Workflow / Ease of use
- Image Quality
- Unique (clinical) features



Speed

- Acquisition
 - 4 second "spin" = less contrast media, less artifact
- Reconstruction
 - from "send to see" in 75 seconds (120 image data set) at a 256³ voxel resolution
 - from "send to see" in 45 seconds (60 image data set)
 - Within 10 seconds a 2nd or 3rd reconstruction
 - Better workflow, better clinical utility
- Image manipulation
 - Smooth, responsive renderings



Workflow / Ease of use (Allura Xper FD20 only)

- Fully automated 3D process via Xper driven “continuous Autopush” functionality; no user interaction needed
- 3D functionality at Xper module; all 3D functionality at tableside



Workflow / Ease of use (Allura Xper FD20 only)

- Fully automated 3D process via Xper driven “continuous Autopush” functionality; no user interaction needed
- 3D functionality at Xper module; all 3D functionality at tableside
- 3D Automatic Position Control; C-arc steers automatic to 3D position
- 3D Follow C-arc; 3D volume follows the projection of C-arc.
2D and 3D projection always aligned

Workflow / Ease of use

CD recording functionality

- write all patient data incl volumes, stills and video files
- one or multiple patient storage (one or multiple CD)
- backwards compatible with 3DRA rel 3 (no HW upgrade, only SW)

Workflow / Ease of use

Communications

- Share photofile images via network/web
 - Stills: .jpg
 - Movies: .avi
 - Volumes: .vrml
- Instantly available for lectures and presentations
- Email images to colleagues, referring physicians
- Personal archive via CD-Rom storage of volumes

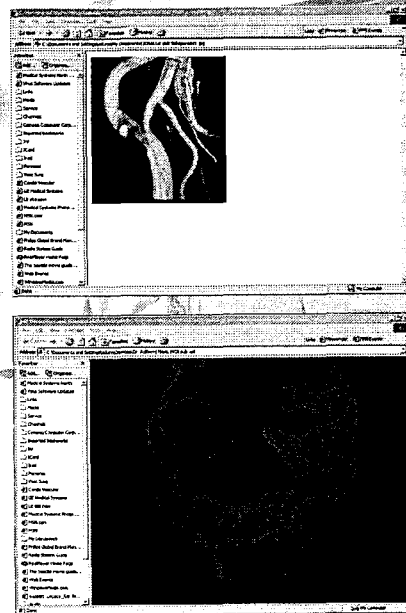
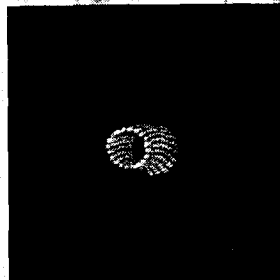
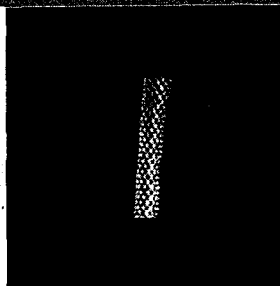


Image Quality

System Approach

- Exam room: Allura Xper
 - Superior x-ray generation and beam filtering
 - Latest I.I. / FD technology
 - Stable, fast movements
 - Full body coverage
- Control room: Integris 3D-RA interventional tool
 - Highly specialized reconstruction methodology
 - 120 image data set
 - 32 micron minimum voxel size with Reconstructive Zoom Technique



Stent wire: 100 microns

Image Quality

- **Stability** Integris Allura: Designed for 3D
 - Fully motorized, quiet, smooth, FAST movements to reduce artifact
 - High reproducibility
 - No extra Calibration needed
 - Flexibility:
 - Ceiling or Floor mount with full body access

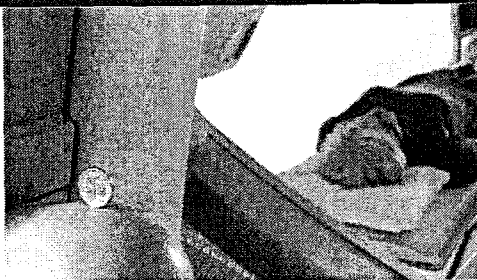


Image Quality

PHILIPS

Enhancers of Image Quality

- CRM technology
- Unique 512³ VR reconstruction
- Automatic Voxelshift for subtraction and superimposition of different volumes

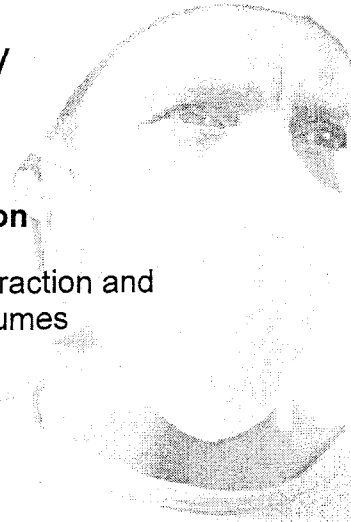


Image Quality; CRM technology



Normal 256³



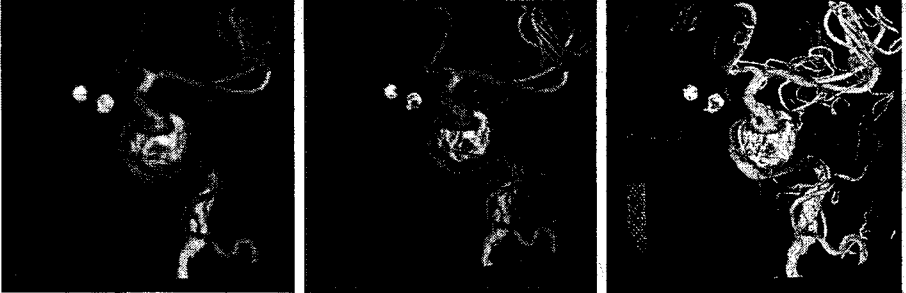
CRM technology

256³

PHILIPS

Image Quality; Unique 512³ VR reconstruction

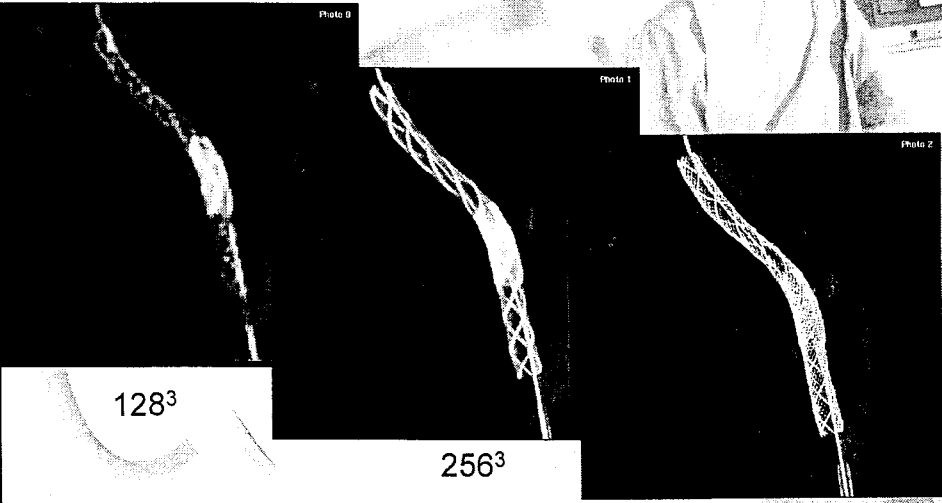
Allows reconstruction of a real volume rendered volume in a higher resolution matrix



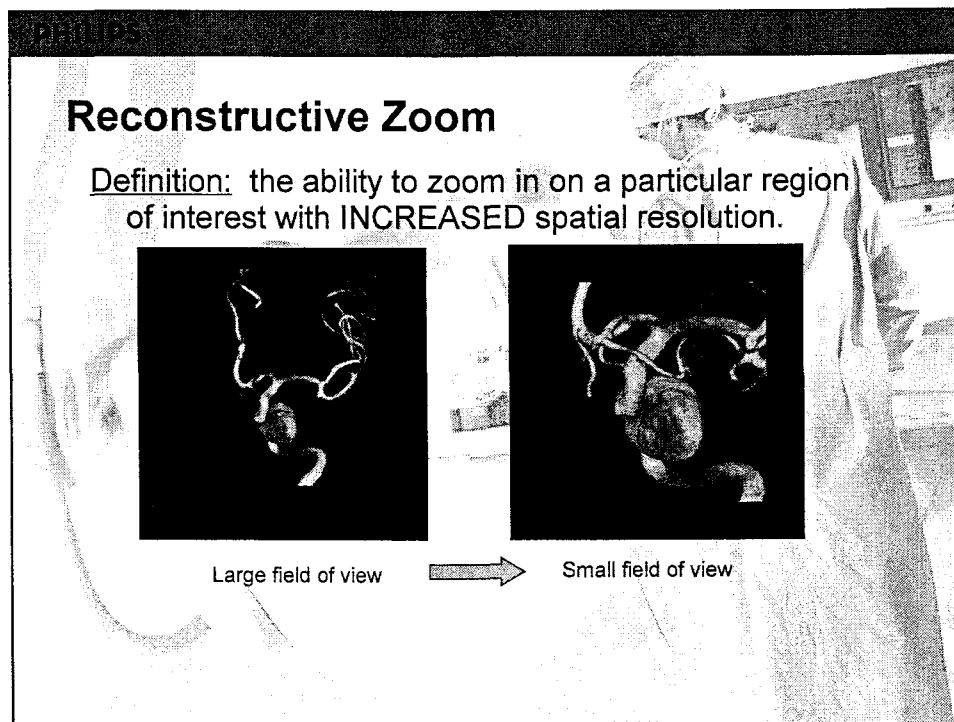
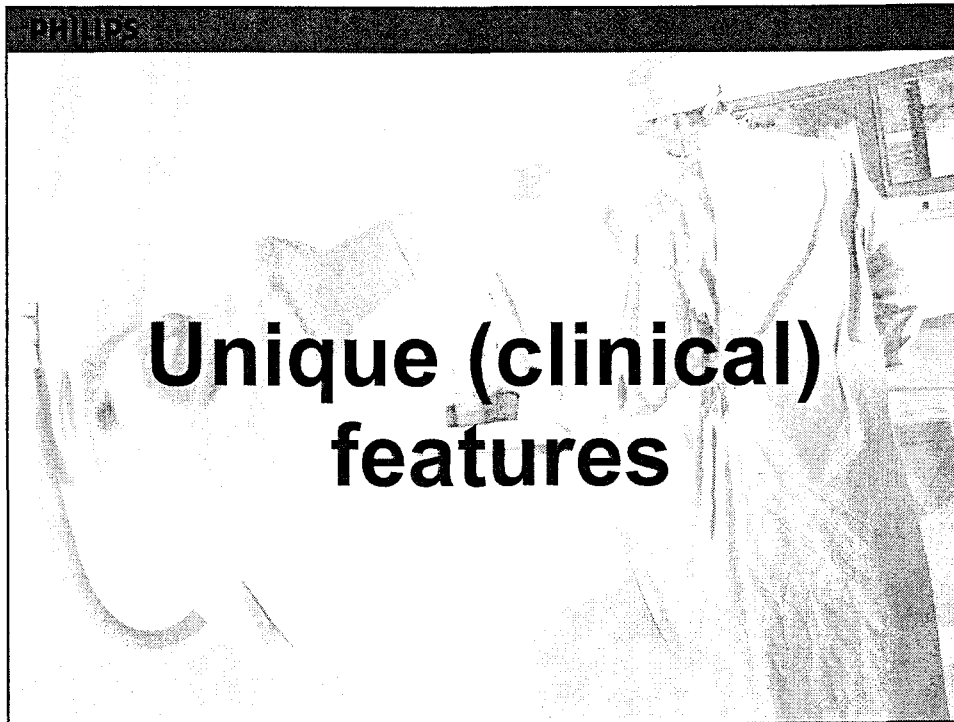
128³ 256³ 512³

PHILIPS

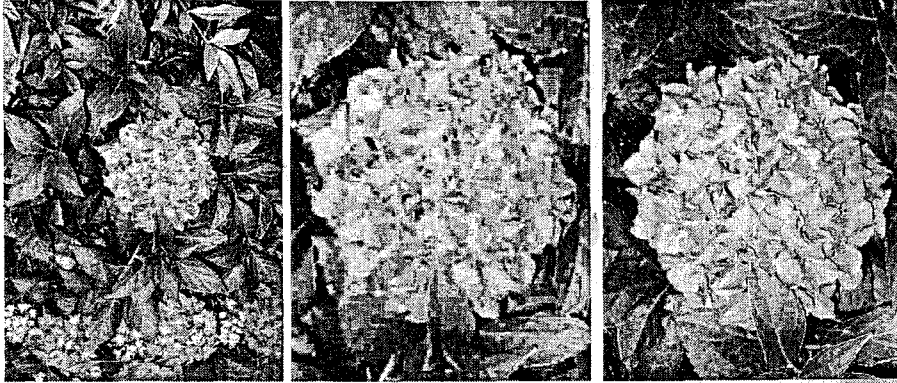
Image Quality; Unique 512³ VR reconstruction



128³ 256³ 512³



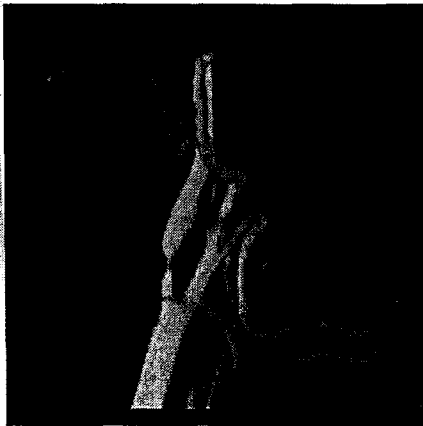
Reconstructive Zoom



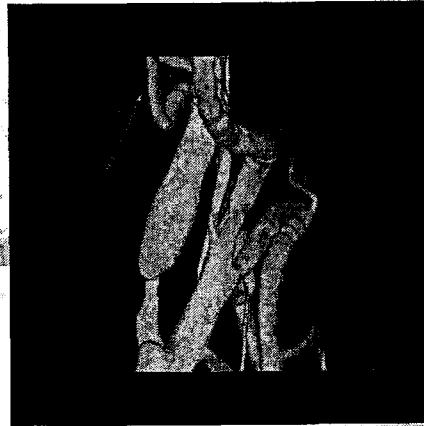
Pixel (voxel) enlargement...

Same number of voxels in smaller volume = Higher Resolution

Reconstructive Zoom



Initial Reconstruction

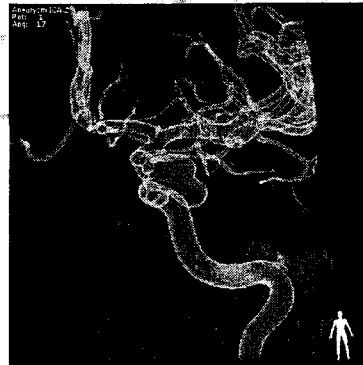


Reconstructive Zoom

Gradient Rendering

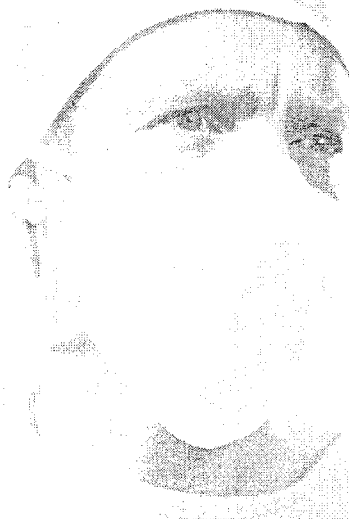
A “see through” visualization of the vessels

Helps the physician in understanding the complexity from the vasculature better



Complete measurement package

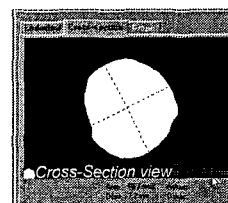
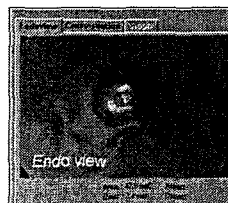
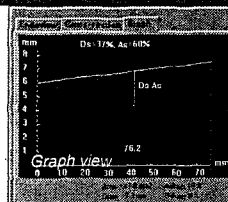
- Quick measurement
- 3D length measurement
- 3D volume measurement
- Automated Vessel Analysis (AVA)
- Aneurysm analysis
- Virtual stenting



Automated Vessel Analysis



Intellispace 3D-RA Automated Vessel Analysis provides in-depth information on vessel segments with just 3 mouse clicks. Fast, accurate information for better decisions.



Automated Vessel Analysis

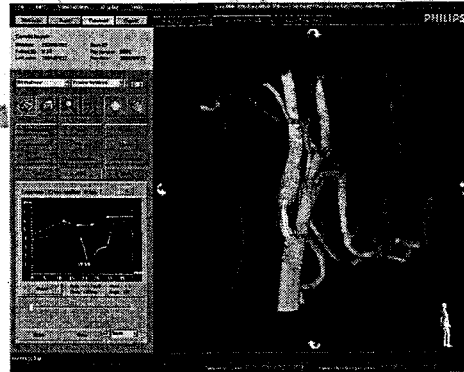


Virtual Stenting

Being able to simulate a stent placement in a selected vessel segment for proper stent sizing.

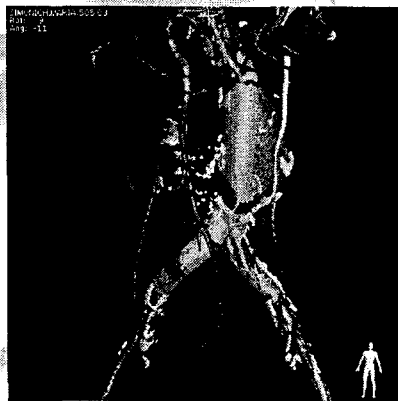
Application areas:

- AAA
- Cerebral aneurysms
- Iliac, carotid stenosis
- Etc.....



Virtual Stenting

- First clinical case from Trieste



Dr. Fabio Mucelli was delighted with the software. His colleague – a vascular surgeon asserted that from now on all the new AAA cases will definitely be sent to the Allura room for the planning/treatment purposes.

Aneurysm Analysis

Advanced software which will support the physician in analysing the aneurysm

SW that automatically calculates all quantitative data needed, like volume and neck size

and..

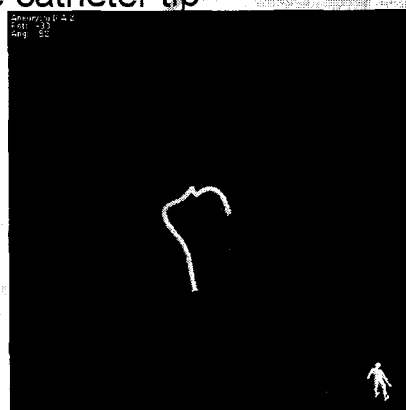
is able to simulate the reconstruction of the parent vessel



Catheter Tip Shaping

Advanced software which will support the physician in shaping the catheter tip

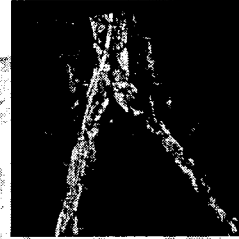
Simulation of the catheter tip in 3D to help the physician how to shape the catheter tip for optimal aneurysm approach



CalciView

visualizes the hyperdense plaque accumulation in the arteries allowing:

- estimation of the plaque burden and distribution
- enhances accurate determination of the stent(graft) location with respect to the plaque position
- accurate definition of the vessel portions suitable for arterial clamping during vascular surgery



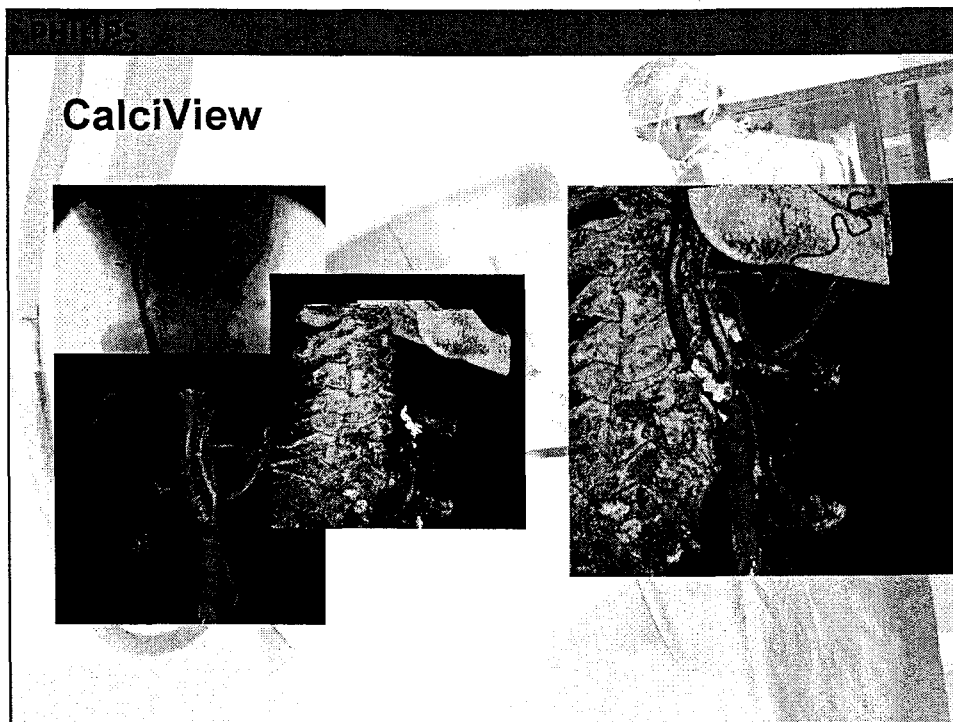
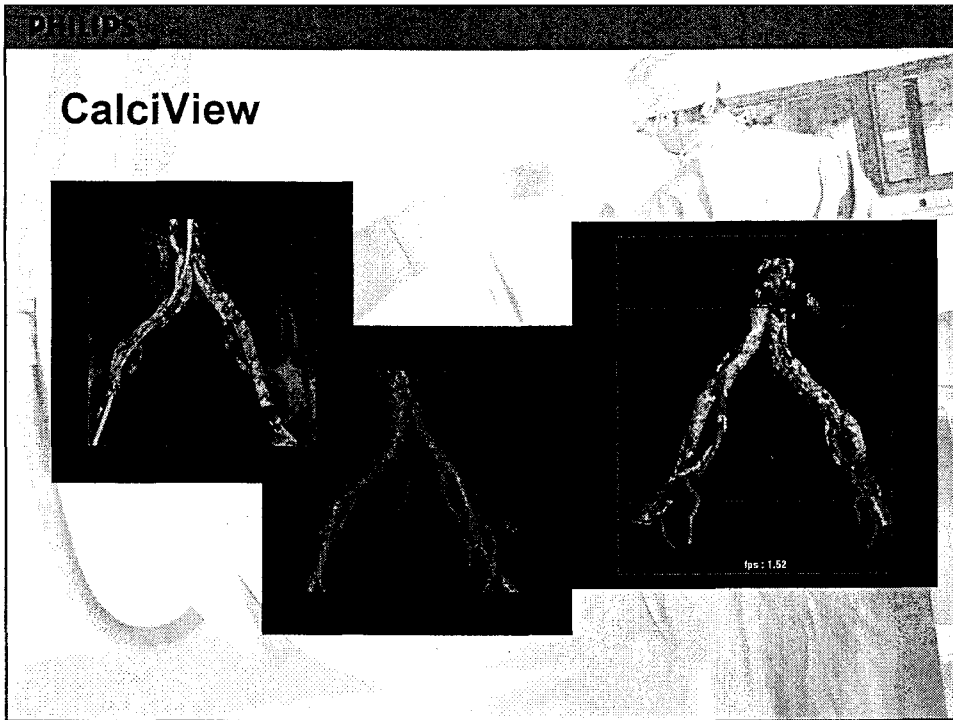
CalciView

plaque detection is made with for this purpose specially designed protocol (lowered X-ray penetration rate)

superimposition of contrast and plaque run is performed

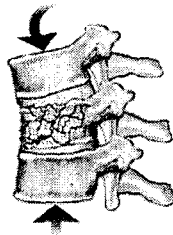
so far used for abdominal aorta and carotid applications





SpineView

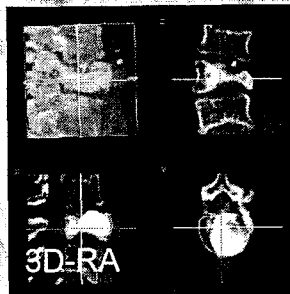
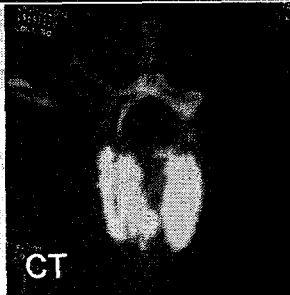
- Vertebroplasty is a strong growing interventional procedure area
- immediate check on cement distribution
- expected workflow improvement by making a CT check superfluous



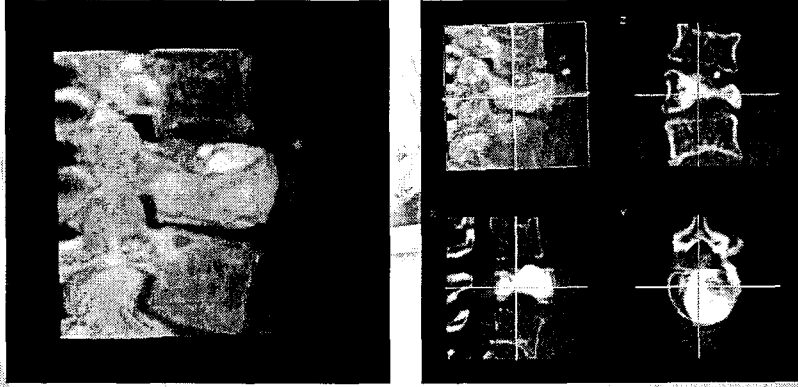
SpineView

Imaging of the vertebrae is made with for this purpose specially designed protocol

- lowered X-ray penetration rate
- more acquired images

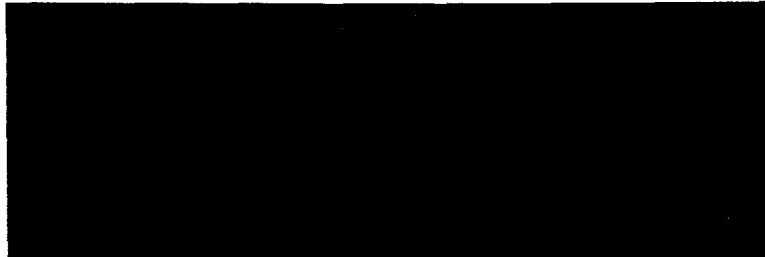
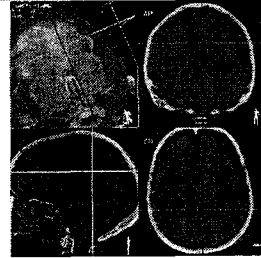


SpineView



Research

- Soft tissue imaging
 - 750 images acquired
 - Visualization of fresh haemorrhage with/without contrast
 - Visualization of intracranial stents
 - Visualization of soft plaque (?)



Research

- 3D roadmapping (2D/3D mapping)
 - 3D Roadmapping is based on real-time integration of 2D fluoroscopic and 3D
 - 3D data set is superimposed on 2D data sets all the time/on request and provides better morphological understanding of 2D anatomy
 - Transparency levels can vary upon user taste
 - Will result in decreased contrast load and total patient dose

3D Roadmapping Philips Patented

