

Manufacturers' role in medical radiation protection

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December 2012

Dose Measures and Standardization

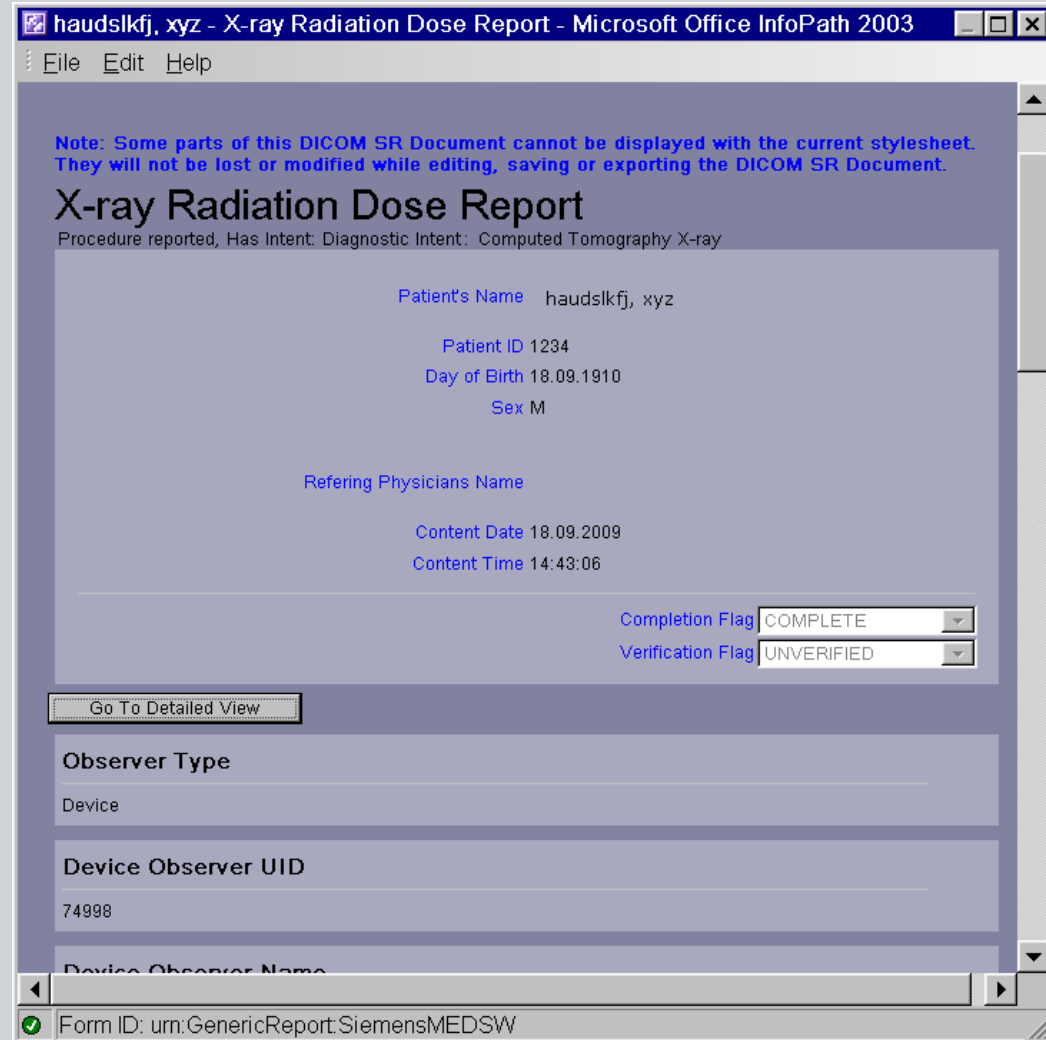
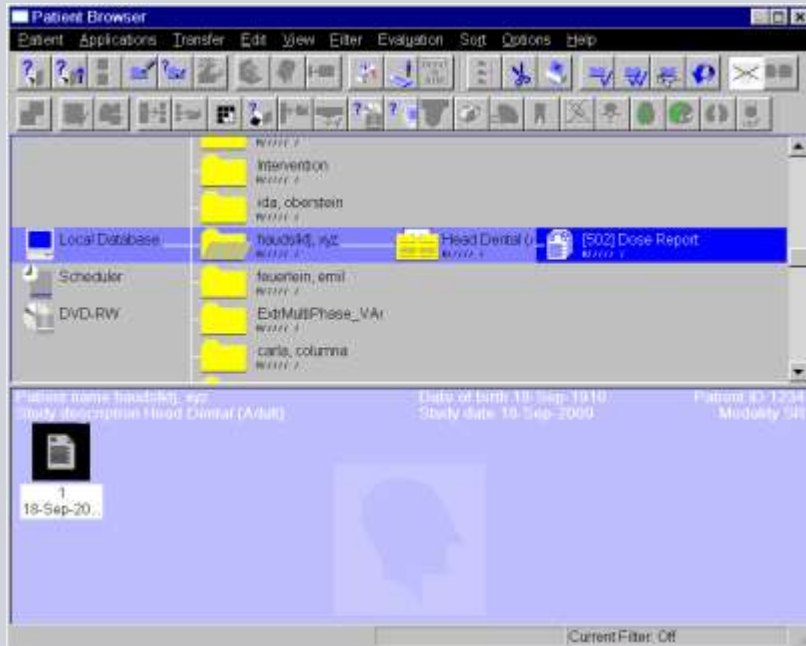
General



- Dose related measures and standards (e.g. $CTDI_{vol}$ and DLP, DICOM SR) are typically defined by IEC, FDA and/or other country specific governing bodies. Further standard/recommendations are given by organizations such as ACR or AAPM
- Vendors contribute constructively to dose awareness efforts via their organizations MITA, COCIR and others (e.g. MITA CT DOSE CHECK INITIATIVE)
- Vendors comply with standards

Dose Measures and Standardization

Example I: DICOMSR (Dose Report)



Dose Measures and Standardization

Example IIa: Dose Check MITA XR-25

01_AbdMultiPhase (Adult) 10.10.19-15:18:21-DST-Specials PolyTraum 10.10.19-15:18:21-DST- Total mAs: 184

Topogram
Non Contrast RT 1
Pause
PreMonitoring 2
Contrast
Monitoring 3
Arterial Phase RT 4
Venous Phase RT 5

Load Hold Recon Recon

Eff. mAs 197 CARE Dose4D
kV 140 CTDIvol (32cm): 19.43 mGy DLP: 459.3 mGy*cm
Scan time 5.62 s configured ref. value: 10.00 mGy
Delay 2 s
Slice 5.0 mm Acq. 128 x 0.6 mm
No. of images 45
Comments

Dose Notification

Arterial Phase: DLP (38.8 mGy*cm) exceeds the notification value (12.0 mGy*cm).
Venous Phase: CTDIvol (17.79 mGy) exceeds the notification value (10.00 mGy).
Venous Phase: DLP (420.6 mGy*cm) exceeds the notification value (12.0 mGy*cm).

Diagnostic reason

Load Cancel

Dose Measures and Standardization

Example IIb: Dose Check MITA XR-25

Examination Configuration

Patient | **Dose** | Workflow | Topogram | Processing | Contrast

Display Options

Dose Notification Dose profile Exposed range

Dose Report

Activate Dose Report Auto transfer Additional transfer: None

Dose Alert

Adult mGy Child mGy

DLP mGy*cm mGy*cm

OK Apply Default Settings

CARE Dose4D configuration: mAs adaptation to patient size

<input type="checkbox"/> Organ characteristics	Child	Adult slim	Adult obese
<input type="checkbox"/> Brain	Average	Average	Average
<input type="checkbox"/> Neck	Very weak	Average	Average
<input type="checkbox"/> Shoulder	Very weak	Average	Average
<input type="checkbox"/> Thorax	Very weak	Average	Average
<input type="checkbox"/> Abdomen	Very weak	Average	Average
<input type="checkbox"/> Pelvis	Very weak	Average	Average

Dose Alert

A dose value will be exceeded!

The accumulated CTDIvol (767.47 mGy) will locally exceed the alert value (700 mGy for Adult). Please reconsider the current examination procedure.

Hint: The currently used scan protocol can not be saved!

User name (mandatory) |

Diagnostic reason

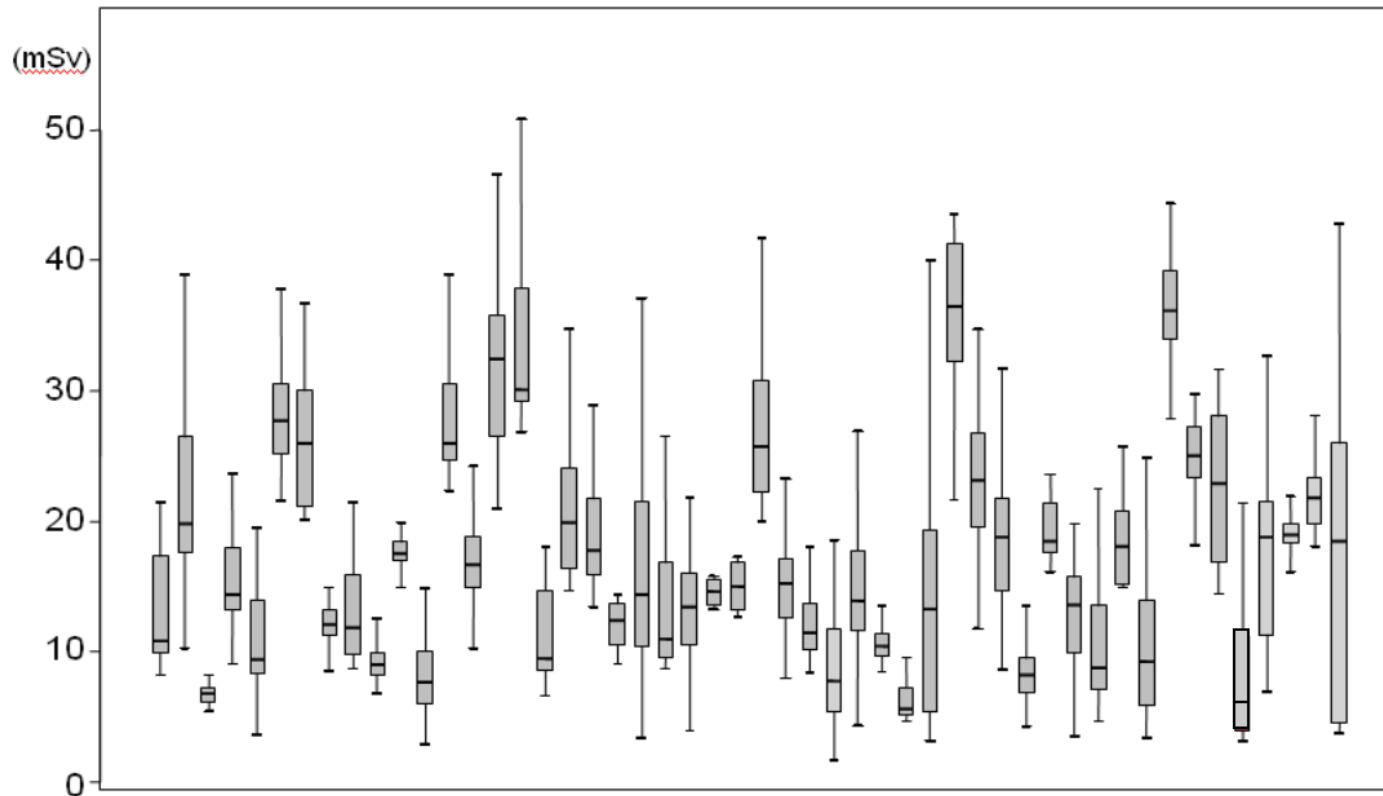
Load Cancel

Variations in Reported Dose for Same Exam

Example: Cardiac CTA

The Protection I Study*

- Multi-center multi-vendor trial, 50 sites, 1965 coronary CTAs
- Mean radiation dose: 5.7 mSv – 36.5 mSv



Training for Users

General



▪ **Scanner Specific Training:**

- 48h On-site Applications Training
- Application-specific default protocols using dose reduction feature (e.g. SAFIRE, CAREkV, 70kV)
- Workflow assistant: Practical tips, default protocols incl. dose values for the different body parts

▪ **Additional Material:**

- Education PPT's that describe dose reduction features
- CARE Dose 4D Training CD's for customers
- Siemens Medical Academy – e-learning 5 dose presentations
- 4 class room courses at Siemens Training Center (dose is one of the major focus of each of the courses)
- Training presentation developed for Image Gently
- Siemens Innovation Meeting – Dose main focus of meeting (90%)

Training for Users

“How to...” Flyers for optimizing dose reduction



How to scan children with FAST CARE

For all SOMATOM Scanners equipped with FAST CARE syngo CT 2011
By C. Leidecker and T. Flohr


www.siemens.com/healthcare



How to scan with CARE kV

For all SOMATOM Scanners equipped with FAST CARE syngo CT 2011
By B. Schmidt, R. Raupach and T. Flohr

www.siemens.com/healthcare



How to scan with CARE Dose4D

For all SOMATOM Scanners equipped with FAST CARE syngo CT 2011
By T. Allmendinger, R. Raupach and T. Flohr

www.siemens.com/healthcare



Training for Users

Web-based Training



Life Training Guideline - Data Selection

Scanner
 Workplace

SOMATOM Definition Flash

Update Training
 System Training

syngo CT 2010A

Select The Engines:

Acute CARE CT
 Adaptive Interventional Suite
 Cardiac CT
 Neuro CT
 Oncology CT
 syngo Dual Energy Advanced

Select The Options:

4D Adaptive Spiral
 Adaptive 3D Intervention

Life Training Guideline - SOMATOM Definition Flash		
	Initial	Follow Up
Introduction to Siemens MSCT Technology	1	0
CT Basics		
MSCT Technology		
Sure View Concept		
Introduction to Dual Source CT	1	0
Two Detectors and Two Tubes		
Size of the Two Detectors		
Up to 75 mSec Temporal Resolution Through Dual Source CT		
Double Tube Output Through Dual Source CT for Obese Patient Scanning		
Introduction to Dual Energy Technique		
Advantages over Single Source CT		
System Hardware	0.2	0
Scan Unit		

Training for Users

Teaching Website about Dose and Dose Reduction

SIEMENS

Dose saving in Computed Tomography - Dedication to Low Dose - Siemens Healthcare

http://www.medical.siemens.com/webapp/wcs/stores/servlet/LandingPage?storeId=10001&langId=-11&catalogId=-11&catTree=100010,1007660,12752&page

File Edit View Favorites Tools Help

Siemens Search

Siemens

Dose saving in Computed Tomography

Discover more

Siemens Global Website Site Explorer Contact

Home > Healthcare > Diagnostic Imaging & Therapy > Detection & Diagnosis > Computed Tomography


Dose saving in Computed Tomography

Dedication to Low Dose Example: Dose Shield Example: SAFIRE Example: IRIS Example: SIERRA


Text Size

Related Links


- > Expert tips on low dose CT techniques on DSCT.com
- > Download Clinical Low Dose Protocols




Easy Guide to Low dose
The Guide brings you up-to-date on what is new and developing in the field of diagnostic imaging.
[Read Now](#) [1.47 MB]




SOMATOM Definition Flash
Flash speed. Lowest dose.
[> more](#)



CT Image Contest
International CT Image Contest – highest image quality at lowest dose
[> more](#)



Worldwide Dose Counter
SOMATOM Definition Flash
[> View LIVE Statistics](#)



Reduce radiation dose with CARE.

General Information on low dose
Read more about Siemens' CARE standard to reduce radiation
[> more](#)

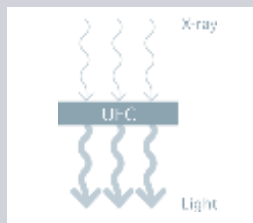
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Internet 100%

Equipment Features to Reduce Exposures

Overview

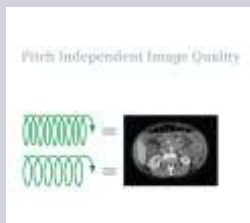
SIEMENS



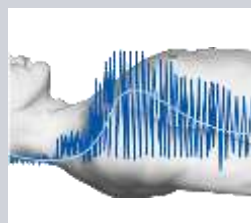
UFC



DICOM SR



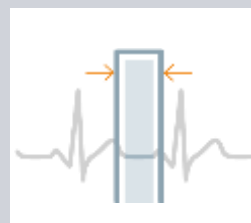
SureView



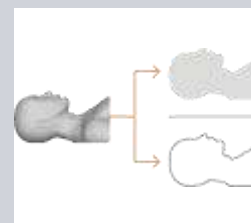
CARE Dose4D



Real-time Imaging



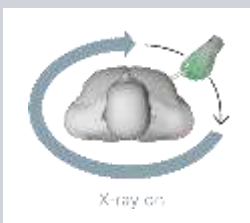
Adaptive ECG-Pulsing



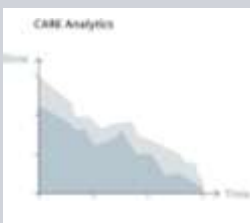
4D Noise Reduction



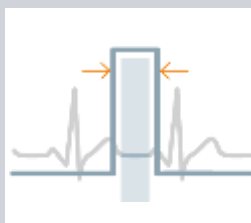
Dose Alert & Notification



Hand CARE



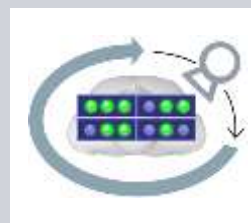
CARE Analytics



Adaptive Cardio Sequence



Selective Photon Shield



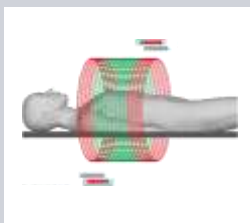
CARE Dashboard



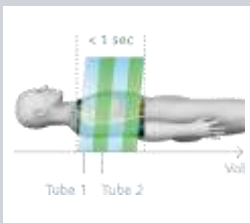
IRIS



X-CARE



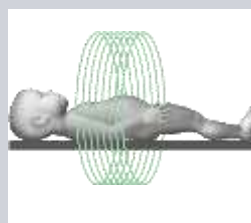
Adaptive Dose Shield



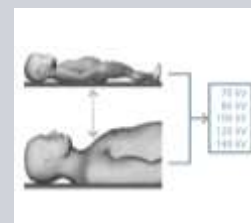
Flash Spiral



Sub-mSv heart



Pediatric 70 kV Protocols



CARE kV



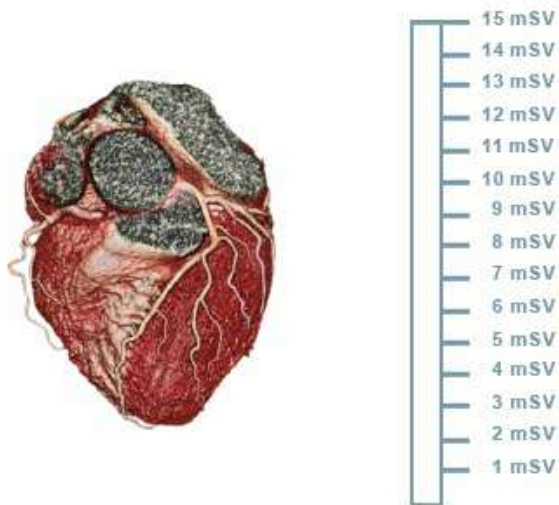
SAFIRE*

Equipment Features to Reduce Exposures

SIEMENS

High-Pitch Spiral on DSCT Systems for Cardiac Scanning

Conventional CTA



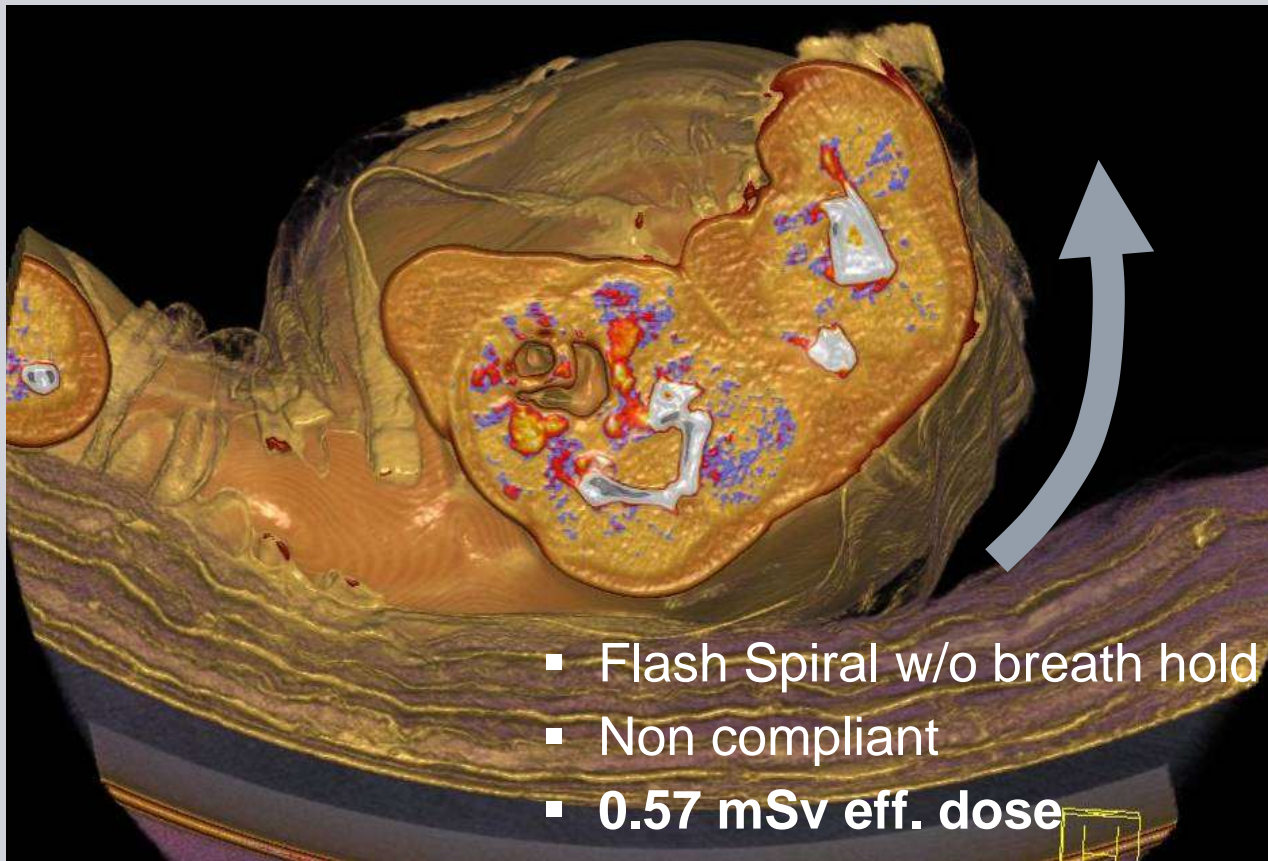
- 135 - 175 ms temporal resolution
- 2-10 s scan time
- Low Pitch + Overlap = Robustness
- Up to 30 mSv dose¹

Equipment Features to Reduce Exposures

SIEMENS

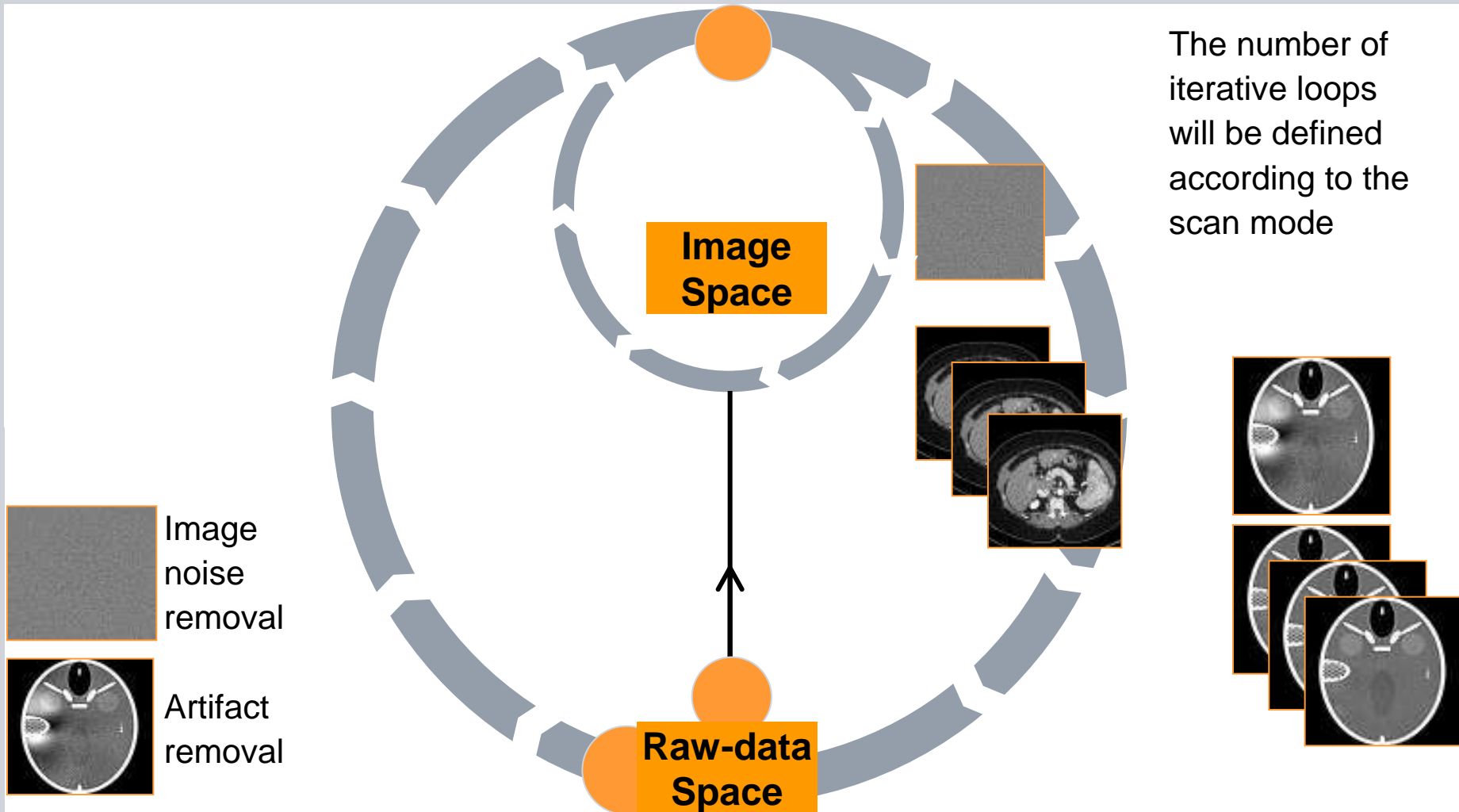
High-Pitch Spiral on DSCT Systems for Pediatric Scanning

- 13 month old boy, NO SEDATION
- Suspected congenital heart defect
- Tried to get up during scan



Equipment Features to Reduce Exposures

SAFIRE: Up to 60% Dose Reduction*



* In clinical practice, the use of SAFIRE may reduce CT patient dose depending on the clinical task, patient size, anatomical location, and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task. The following test method was used to determine a 54 to 60% dose reduction when using the SAFIRE reconstruction software. Noise, CT numbers, homogeneity, low-contrast resolution and high contrast resolution were assessed in a Gammex 438 phantom. Low dose data reconstructed with SAFIRE showed the same image quality compared to full dose data based on this test. Data on file.

Equipment Features to Reduce Exposures

SAFIRE: Up to 60% Dose Reduction*

SIEMENS



Without SAFIRE
CTDI_{vol} = 12.30 mGy



With SAFIRE
CTDI_{vol} = 4.07 mGy

* In clinical practice, the use of SAFIRE may reduce CT patient dose depending on the clinical task, patient size, anatomical location, and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task. The following test method was used to determine a 54 to 60% dose reduction when using the SAFIRE reconstruction software. Noise, CT numbers, homogeneity, low-contrast resolution and high contrast resolution were assessed in a Gammex 438 phantom. Low dose data reconstructed with SAFIRE showed the same image quality compared to full dose data based on this test. Data on file.

Thanks for
your attention!!!