

How our company contributes to radiation protection
SIEMENS

Right Dose – Innovation leadership in dose management

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Siemens follows the Right Dose approach and demonstrates innovation leadership in dose management

- » Reasonable balance between image quality and applied dose
- » Valid quantification of dose values
- » Value orientation for tangible outcomes

As a leader in medical imaging innovation, Siemens has a strong legacy in dose-managing and dose-reducing technologies. For many years we have been focused on reducing dose without compromising image quality and clinical outcomes. A recent addition to these efforts are solutions that help staff **reasonably balance** image quality and applied dose, solutions that provide a **valid quantification** of results and dose values and, to offer a sound **value orientation** within this context for tangible patient outcomes. With the Siemens **Right Dose** approach, we intend not only to lead in dose reduction technology in medical imaging, but also in approaches in how to best manage dose for patients, caregivers and healthcare businesses.

Siemens computed tomography and CARE Right – taking low dose to the next level

With the **CARE Right** approach, Siemens affirms its commitment to the Right Dose in CT. This holistic approach is based on the belief that after the recent innovations in radiation reduction, a singular focus on low dose is no longer sufficient. Consequently, efforts must now be targeted towards a comprehensive understanding of the right dose. Thus, **CARE Right** encompasses three key areas:

- » Right Dose Technology
- » Right Dose Levels
- » Right Dose Management

Technology

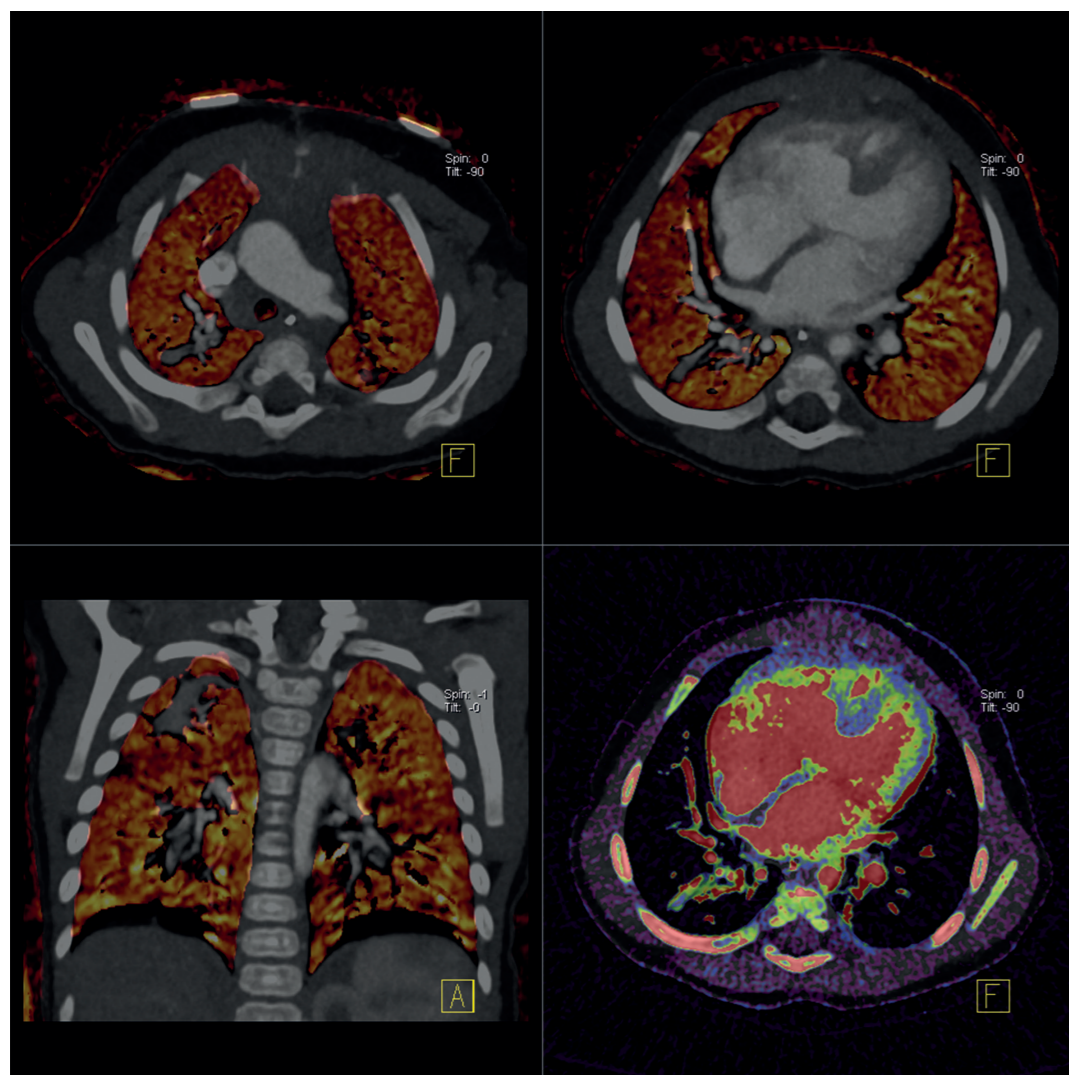
ADMIRE (Advanced Modelled Iterative Reconstruction) – the next generation in iterative reconstruction

SAFIRE (Sinogram Affirmed Iterative Reconstruction) – iterative reconstruction with a substantial dose reduction potential in the clinical routine

CARE Dose4D – real-time anatomic exposure control

CARE kV – first automated voltage setting resulting in substantial reduction without compromise in image quality

Paediatric case – SOMATOM Definition Flash with Stellar Detector



Diagnosis:
Septum defect with impact on lung perfusion

Scan method:
Thorax dual-energy scan and flash spiral scan

Image:
Erasmus MC – University Medical Center Rotterdam/Rotterdam, the Netherlands

Thorax dual energy scan:	Flash spiral scan:
Collimation: 64 x 0.6 mm	Collimation: 128 x 0.6 mm
Spatial resolution: 0.30 mm	Spatial resolution: 0.30 mm
Scan time: 2 s	Scan time: 0.29 s
Scan length: 118 mm	Scan length: 118 mm
TI: 0.28 s	TI: 0.28 s
80/140 Sn kV, 26/16 mAs	70 kV, 14 mAs
DLP: 18 mGycm	DLP: 3 mGycm
CTDIvol: 1.28 mGy	CTDIvol: 0.15 mGy
Eff. dose: 1.58 mSv	Eff. dose: 0.26 mSv

Siemens angiography and CARE+CLEAR - Improving image quality and optimising dose in angiography

The Siemens **CARE+CLEAR** concept dedicated to angiography systems provides surgeons and interventional radiologists with true added value at no extra cost – an excellent foundation for maintaining optimum clinical outcomes and safety in patient care.

The optimal image quality at the lowest reasonable dose with **CARE+CLEAR**:

- » Reduces dose to a minimum
- » Provides dose monitoring during the procedure
- » Makes dose reporting easy and structured
- » Achieves optimised image acquisition with all patients
- » Applies comprehensive image processing for excellent sharpness and contrast
- » Allows image quality customisation

Technology

CAREposition – Radiation-free patient positioning

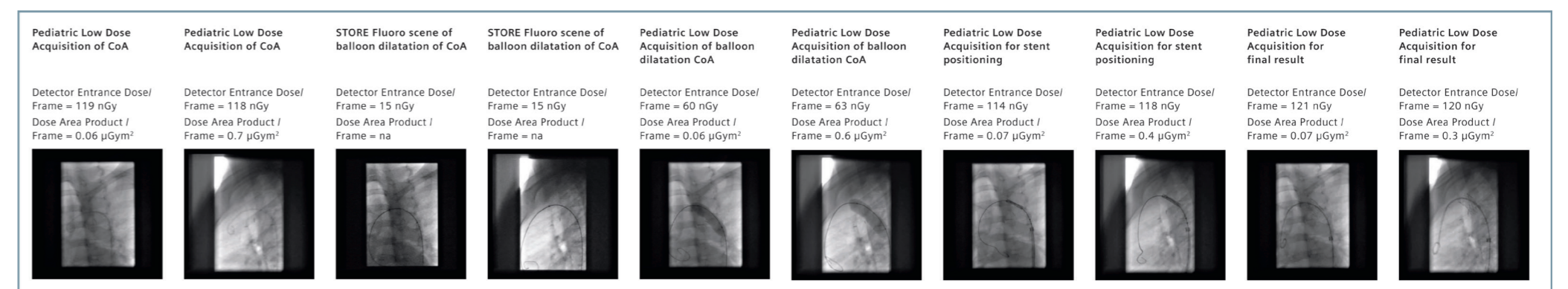
CAREfilter – Minimised patient entrance dose

CAREguard – Effective patient entrance dose control¹

CAREmonitor – Real-time patient entrance dose monitoring¹

Paediatric Case

- » Treatment of coarctation of the aorta in a 10-year-old child
- » Artis zee biplane angiography system in structural heart disease in paediatrics
- » Total of eight scenes in low-dose acquisition
- » Two Store Fluoro scenes
- » Ten-year-old male patient, BMI of 15



All sequences courtesy of University Hospital Erlangen

Siemens molecular imaging - minimum dose. Maximum speed.

Siemens Molecular Imaging offers innovative imaging solutions where the lowest dose can be used while still scanning patients faster than ever before. By reducing dose and increasing speed, costs are dramatically reduced, while increased utilisation can also be achieved. For example, Symbia™ IQ•SPECT technology enables routine cardiac SPECT scans using half dose and double speed. And with Symbia's spiral CT, scans are up to 28 times faster² than the competition, saving both time and dose. Moreover, TrueV and HD technologies on the Biograph™ mCT family enable PET scans with half dose and double speed. And IRIS achieves up to 60% CT dose reduction while maintaining excellent image quality.

Technology

IQ•SPECT – Ultra-fast cardiac imaging with a general purpose camera

TrueV – Capturing more information in each PET bed position

ultraHD•PET – Eliminating the need to choose between a fast scan or a low-dose scan

FlowMotion – Eliminating over-scanning

Abdomen case – Biograph mCT

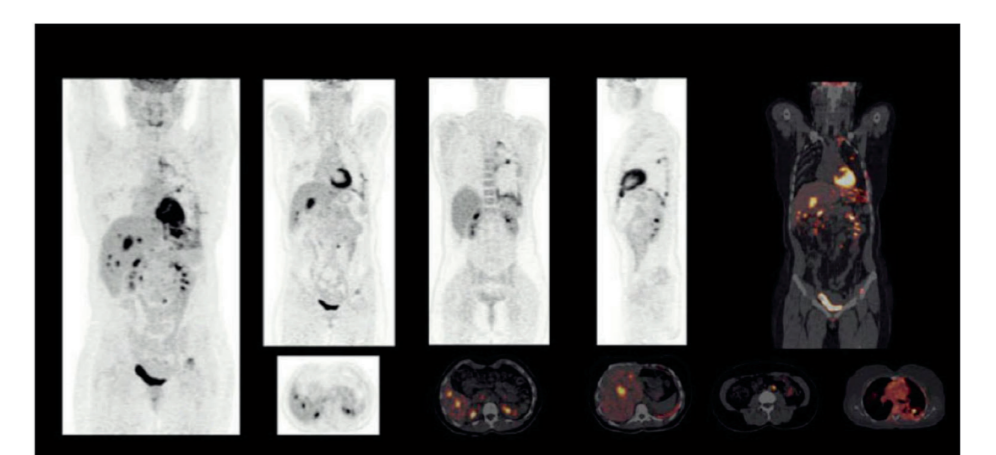
Molecular Imaging – Cases

Abdomen case – Biograph mCT

Minimum Dose: 5 mCi

Maximum Speed: 10 minutes

Diagnosis: The exam shows a cystic lesion in the posterior aspect of the left lower lobe of the lung with a focal hypermetabolic area in the margin suggestive of residual tumor. An intensively hypermetabolic (SUV 10.9) soft tissue density is visualized adjacent to the cardiac apex suggesting pleural metastases. Multiple small hypermetabolic pleural nodules in the lateral and posterior aspect of the lung are related to previous pleurodesis. The multiple nodular areas of the liver with increased FDG uptake suggest hepatic metastases. An 8mm paraortic nodal metastasis, as well as a hypermetabolic sclerotic acetabular lesion are visualized. Note the high image quality and improved contrast with ultraHD•PET, even with a low dose of 5 mCi and a standard acquisition time of two minutes per bed.



- 5.0 mCi (185 MBq) (3.1 MBq/kg) 18F-FDG
- 90 minute uptake
- 2 minutes per bed
- TrueV
- ultraHD•PET

Image: University of Tennessee, Knoxville, Tennessee, USA

Dose reduction advances in mammography – Siemens X-Ray products

X-ray mammography is the gold standard of investigational procedures. Digital mammography has improved diagnostics, especially in younger women and in women with dense breasts. In most countries, screening programmes have been established in order to support early breast cancer detection. The right balance between low dose and high image quality for diagnostic confidence is of the utmost importance.

Up until now, a lower dose meant lower image quality. The continuous low-dose discussion challenged us to rethink technology and do what seemed impossible: develop a mammography machine with considerable dose reduction without compromising on image quality. This is possible with the MAMMOMAT Inspiration PRIME-Technology.

Technology

PRIME-Technology³ – Progressive Reconstruction, Intelligently Minimising Exposure

Time-tested Tungsten Tube – saves up to 50% dose and is especially good at capturing dense breast tissue

Fast direct-to-digital aSe detector – higher Detectable Quantum Efficiency (DQE) and reduced time between exposures

¹air kerma = patient entrance dose; air kerma rate = patient entrance dose rate.

²Data on file.

³PRIME Technology is available on MAMMOMAT Inspiration PRIME Edition only.

⁴PRIME Technology is not commercially available in all countries. Due to regulatory reasons its future availability cannot be guaranteed. Please contact your local Siemens organization for further details.