LEIDEN UNIVERSITY MEDICAL CENTER

Jornada sobre Protección Radiológica en Radiología Pediátrica. Criterio ALARA

Experiencias con equipos de Toshiba

LUMC Toshiba Bi-Plane Infinix

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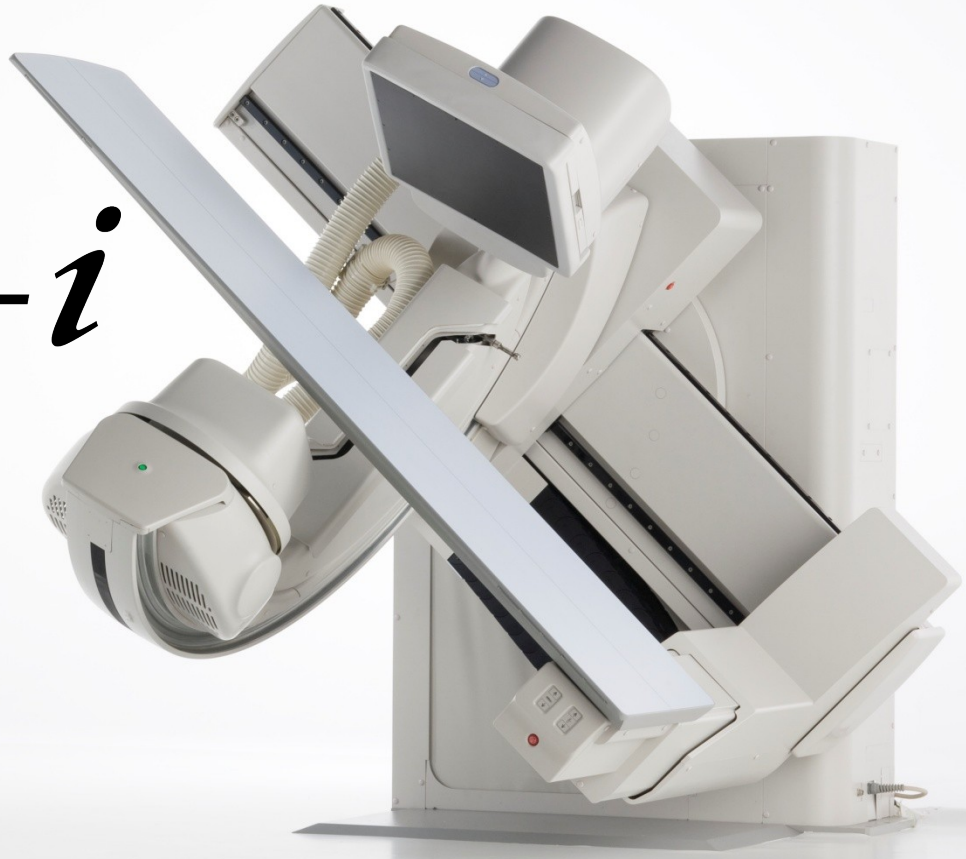
Toshiba Ultimax-i Multipurpose Digital RF System

Ultimax-i

Multipurpose Digital RF System

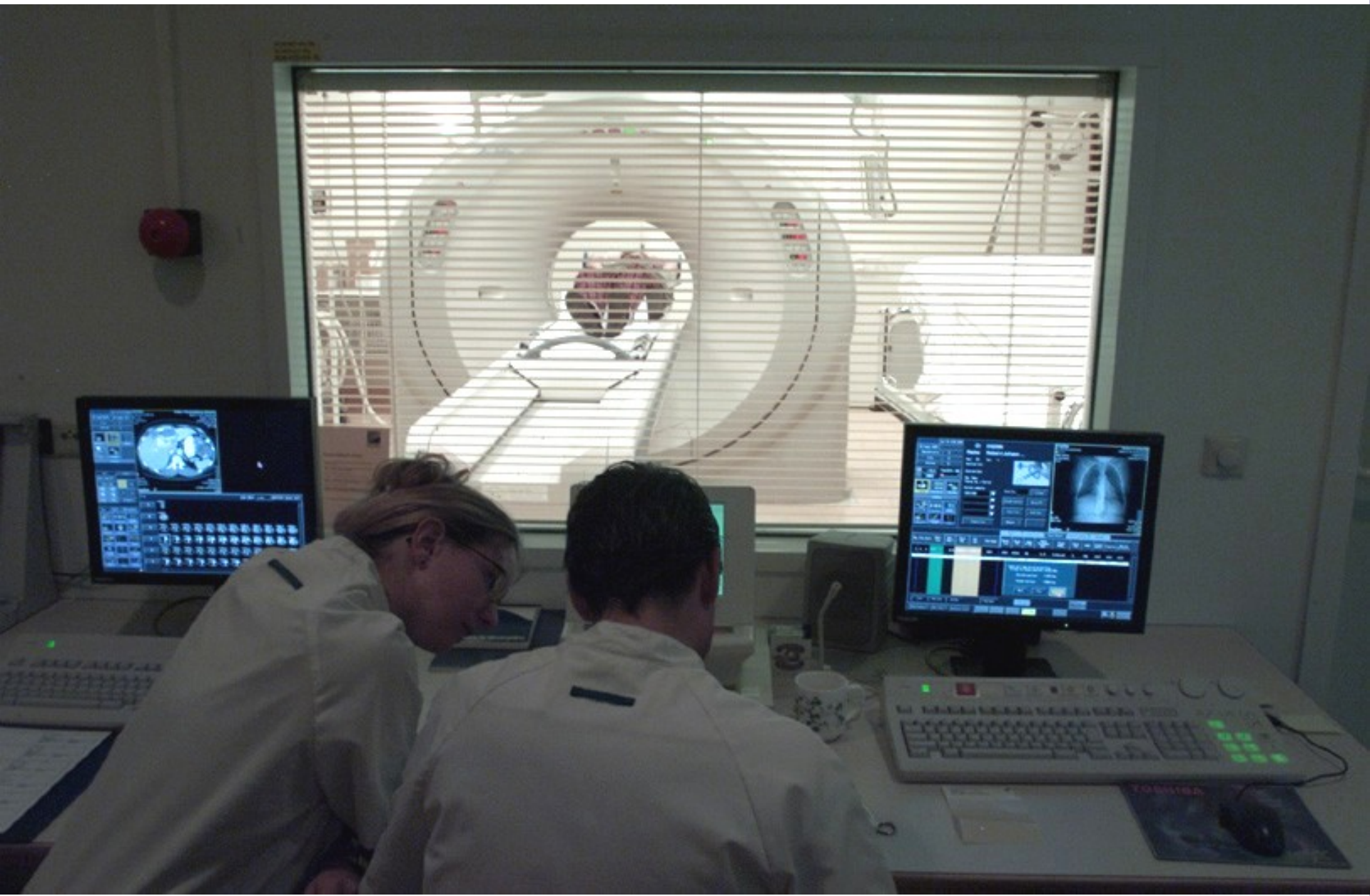


Toshiba Ultimax-i Multipurpose Digital RF System

Dose & Safety

OptiBeam Tantalum Filter
Digital Grid Controlled Pulsed Fluoroscopy
Light Beam Collimator
Laser Positioners
Removable anti-scatter Grid
Virtual Collimation
Variable Dose Mode Selection
Digital Zoom
Retrospective and Prospective Fluoroscopy Store
Single Frame Fluoroscopy Store
Acquisition w/o Test Exposure

LUMC Toshiba Aquilion CT scanners (4, 16, 64, ONE)



Pediatric imaging: current and emerging techniques

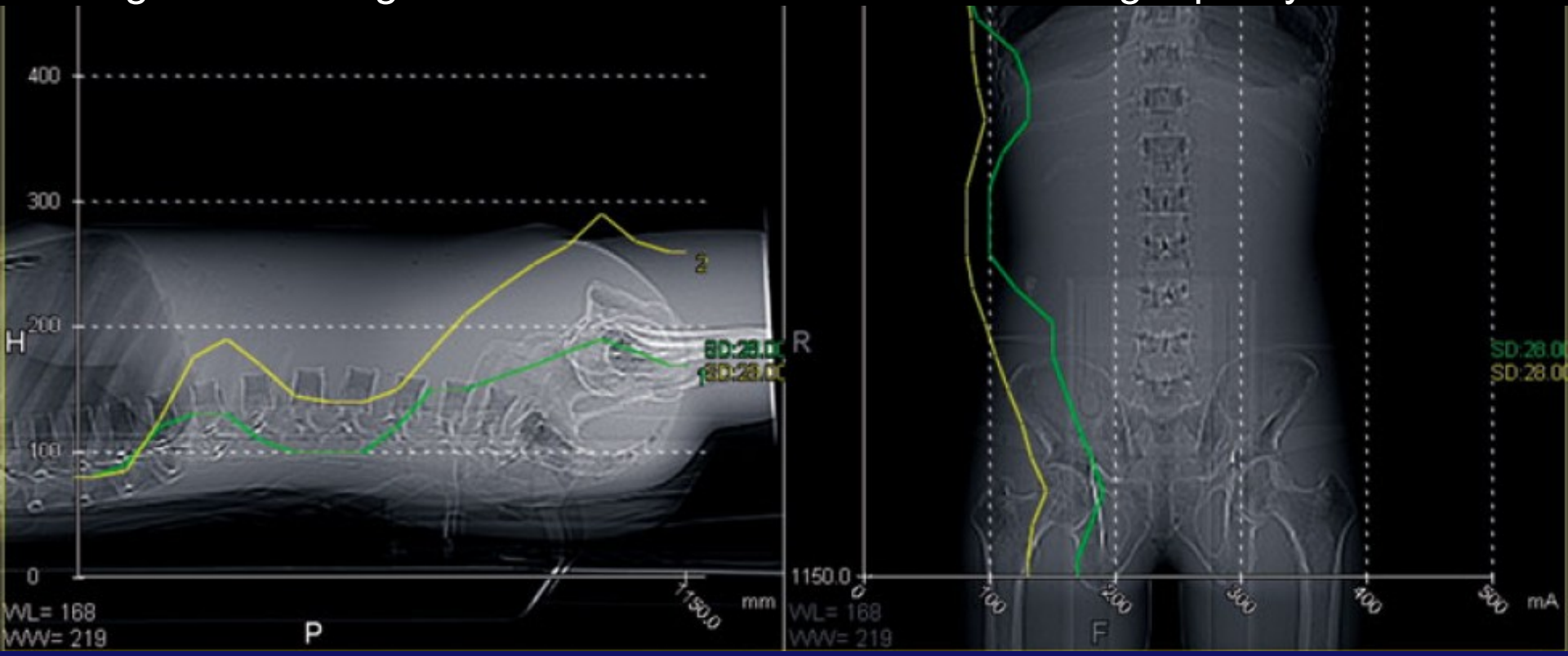
Computed tomography (CT) remains the imaging modality with the highest increase in utilization in children due to its widespread availability and rapid image acquisition.

A variety of hardware and software technical innovations have led to a significant reduction in CT radiation exposure.

A Shenoy-Bhangle, K Nimkin, MS Gee, JPGM, Vol 56, 98-102, 2010.

Optimized tube current modulation and selection

SUREExposure 3D from Toshiba: tube current modulation leads to more homogeneous image with dose reduction at constant image quality.

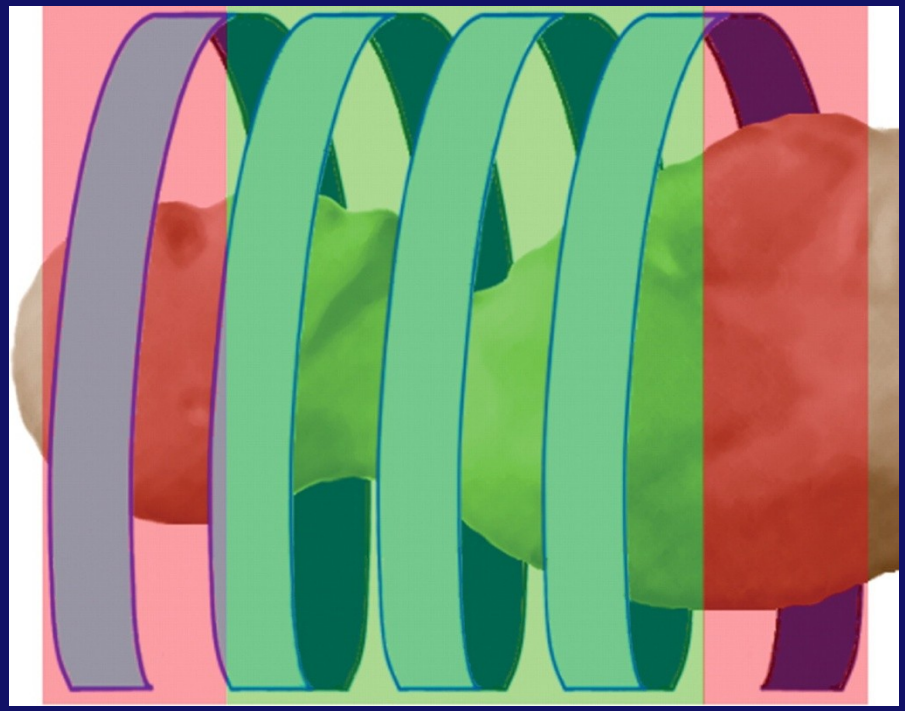


Pediatr Radiol (2010) 40:1324–1344, Multidetector CT in children: current concepts and dose reduction strategies. Nievelstein RA, van Dam IM, **van der Molen AJ**.
Submitted: Performance Evaluation of Longitudinal and Volumetric Tube Current Modulation in a 64-slice Multidetector Row CT. **van der Molen AJ, Joemai R, Geleijns J.**

Problem: overranging

The effect of overranging is larger in children than in adults.

The effect is also larger the more slices are being used.



Overranging: at least an extra half rotation (red) is scanned before the start and beyond the end of the imaged volume (green).

Radiographics, A. Schilham, **A. van der Molen**, et al., Vol 30, 1057-1067, 2010.

Sliding collimator

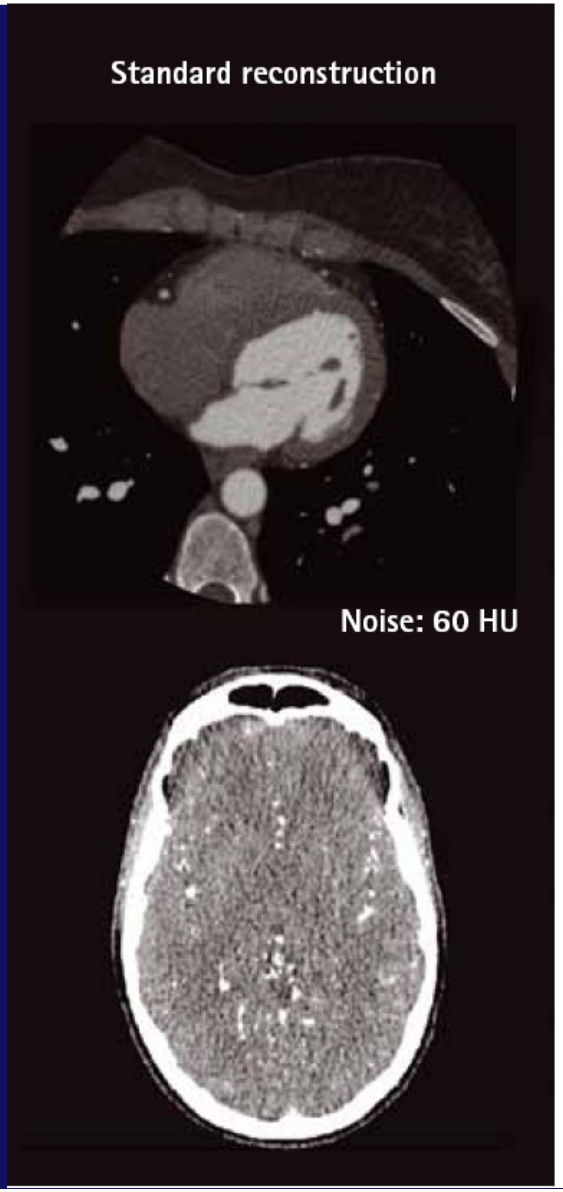
- Toshiba offers Ultra Helical CT scanning, 160x0.5mm
- For Ultrahelical acquisitions the effect of overranging would become excessive
- Solution the active collimator: slowly opens during the start of the scan, and slowly closes during the end of the scan, thus avoiding overranging.
- With the active collimator, overranging is for helical CT scanning not a limiting factor anymore.

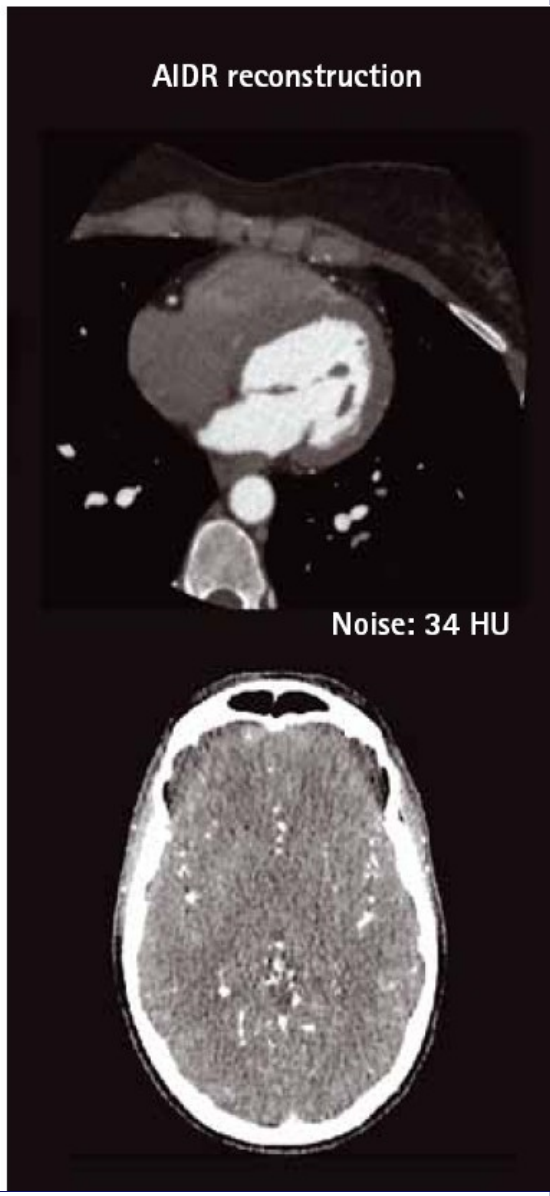
Visions (Toshiba's Journal): Ultra Helical scanning - Fast acquisition of CT images, **R.M.S. Joemai**

Adaptive Iterative Dose Reduction (AIDR)

Visual comparison of two reconstruction methods show a decrease of noise for AIDR reconstruction.

Reconstructions with AIDR showed no negative influences on image quality and showed a significant decrease of image noise.





Visions (Toshiba's Journal): Improved image quality in clinical CT by AIDR, **R.M.S. Joemai**

Volumetric scanning: low dose and fast cardiac CT in small children, no sedation required

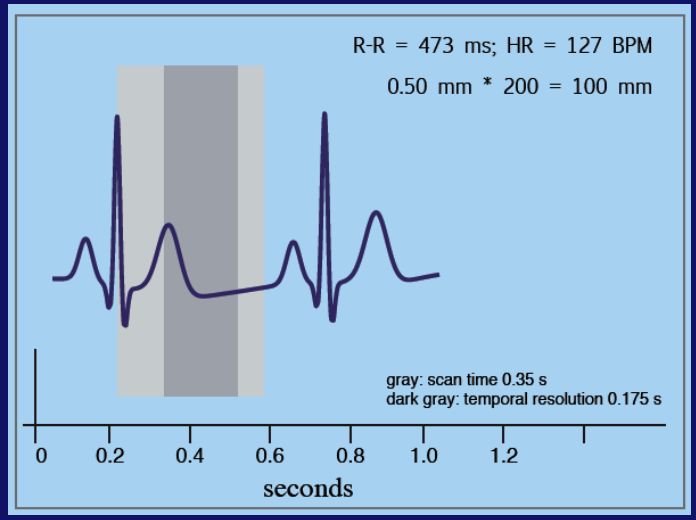
Aquilion ONE (320x0.5 mm)

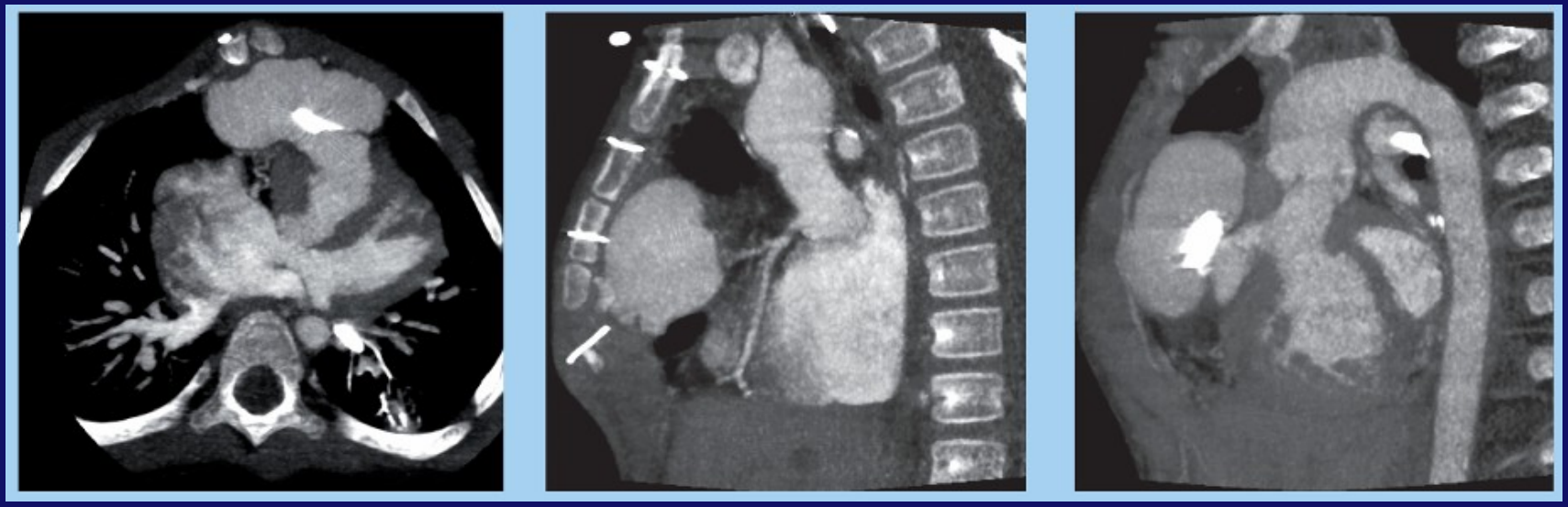
160mm coverage in 0.35s

Only one rotation (axial acquisition)

Chest CTA of a 2 year old girl (10kg)

Effective dose 1.2 mSv





RSNA2009 Abstract: Low Dose Cardiac CT Imaging in Pediatrics; **Roelofs, Ruygrok, Kroft,**

Causes of respiratory distress in neonates and infants can be visualized with dynamic axial volumetric CT scanning

Indication:

- 35w + 5 neonate (2500gr) with respiratory distress (stridor)
- Suspect for median neck cyst, laryngeal cyst, tracheal malacia or chord paralysis.
- Both the bronchoscopy and US of the large vessels (and heart) provides no clarity.

Report:

- Tracheal deviation to the right with stenosis due to compression by mass / cyst.
- DD: parathyroid cyst, persistent thymo-laryngeal duct cyst…
- Tracheal deviation with locally a strong stenosis.
- No evidence for a primary tracheal malacia.

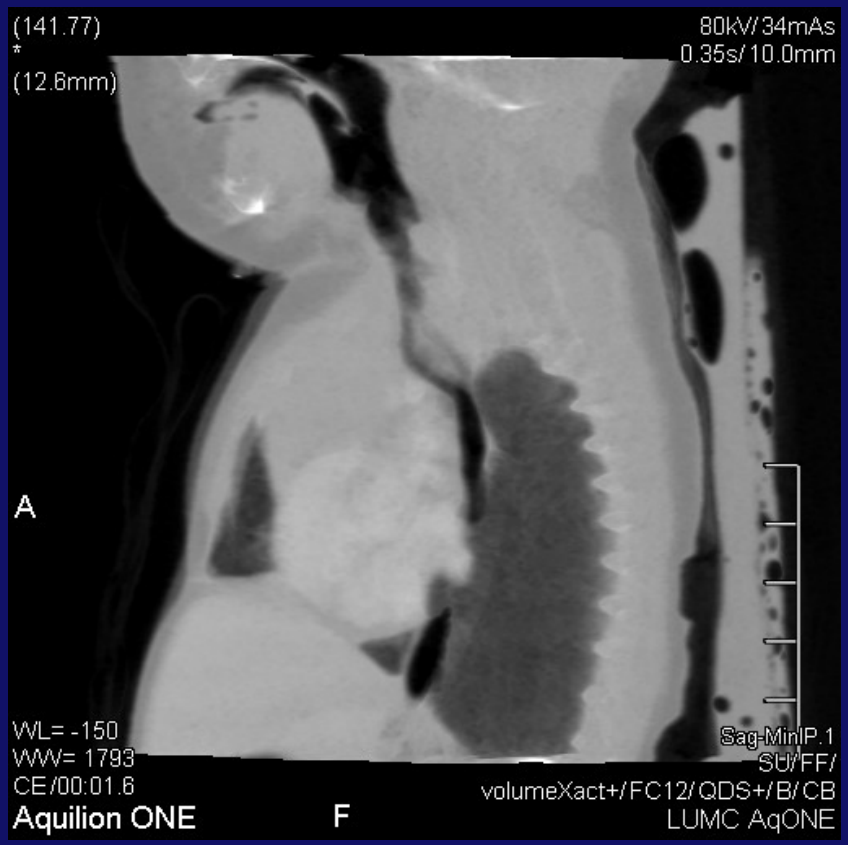
Time resolved dynamic volumetric CT scanning can be performed at low radiation doses (E = 1.9 mSv).

RSNA2010 Abstract: Dynamic CT of the Respiratory System in Neonates; **Roelofs, Smit, Kroft, Geleijns**

Causes of respiratory distress in neonates and infants can be visualized with dynamic axial volumetric CT scanning

Coronal 10mm Min-IP

Sagital 10mm Min-IP



RSNA2010 Abstract: Dynamic CT of the Respiratory System in Neonates; **Roelofs, Smit, Kroft, Geleijns**