



*Vetting Default Protocols:
How can Industry & Academia
Work Together?*

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Questions

- How are vendor default scanner protocols determined?
- Are they always optimal?
- Are they ever wrong?
- How can academia and professional societies have an impact on default protocols?



Example of “not-optimal”

- Protocols sometimes tend to be European-centric
 - “First thing we do with their scanner is increase all the default dose levels and choose a sharper kernel”



Some general observations

- U.S.
 - Highly litigious
 - Diagnostic accuracy is top priority
 - High obesity rates
- reference mAs
 - Chest – 170-180 mAs
 - Abd – 200-240 mAs
 - B40 kernel
- Europe/Asia
 - Litigation less common
 - Dose limitations are top priority
 - Lower obesity rates
- reference mAs
 - Chest – 130 mAs
 - Abd – 160 mAs
 - B30 kernel



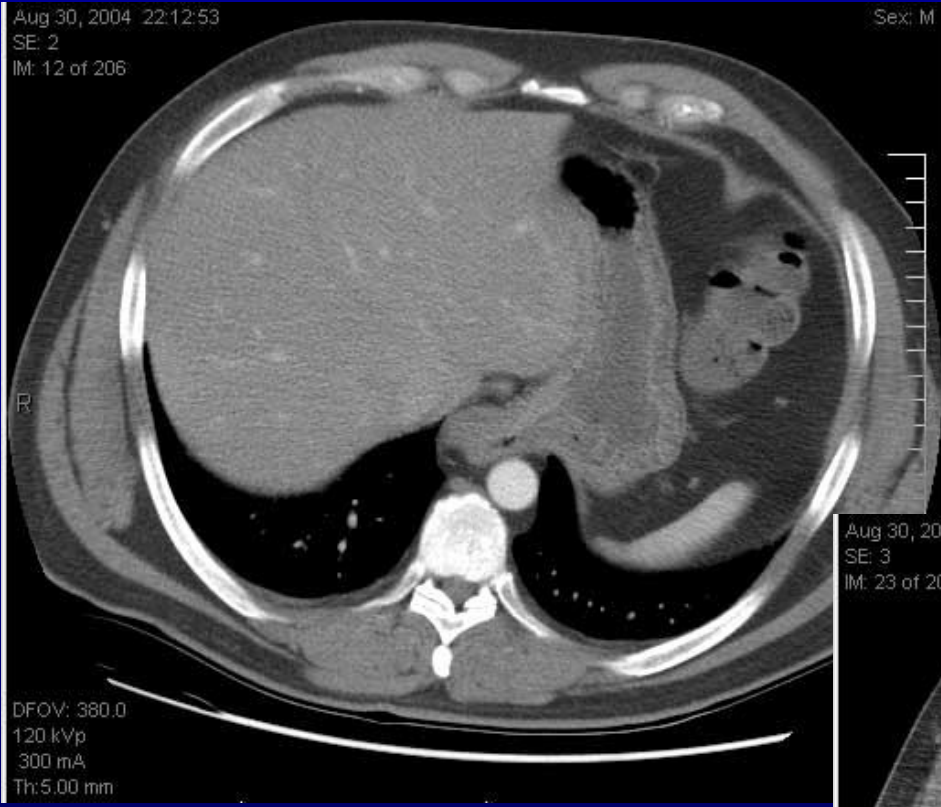
THE AMERICAN EXPERIENCE

- A number of years ago, a colleague said to me
 - “I’ve gotten sued for missing findings on suboptimal images, but never for using too much mA”



Another example of “not-optimal”

- Selecting the optimal detector configuration

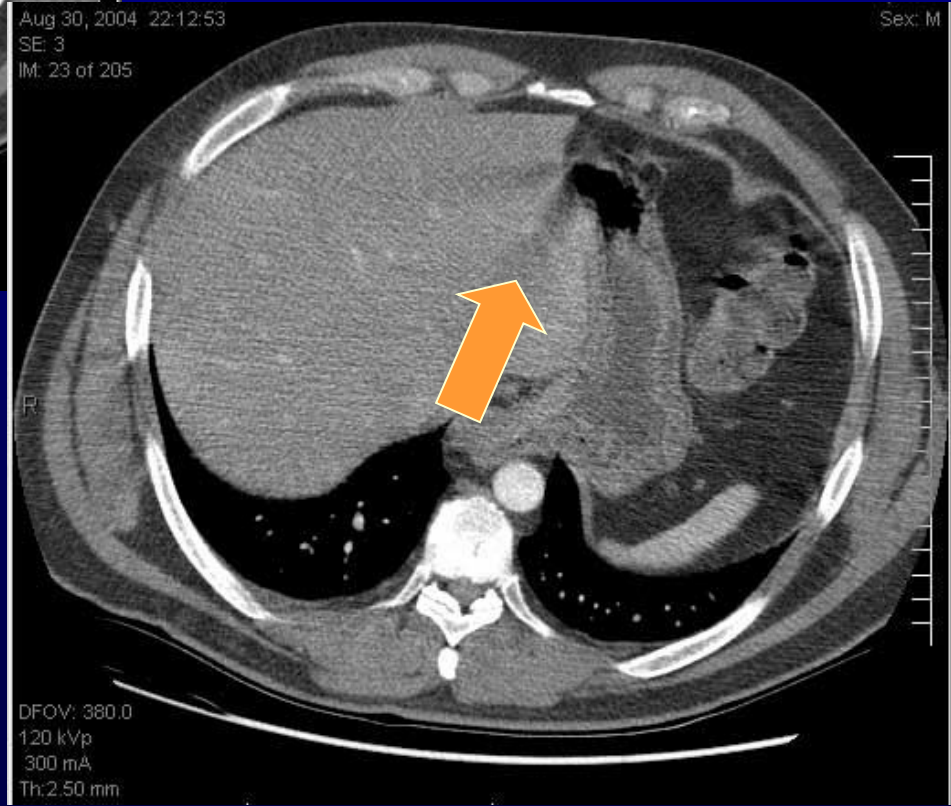


Prospective images at 5mm

Scanner: 16-channel

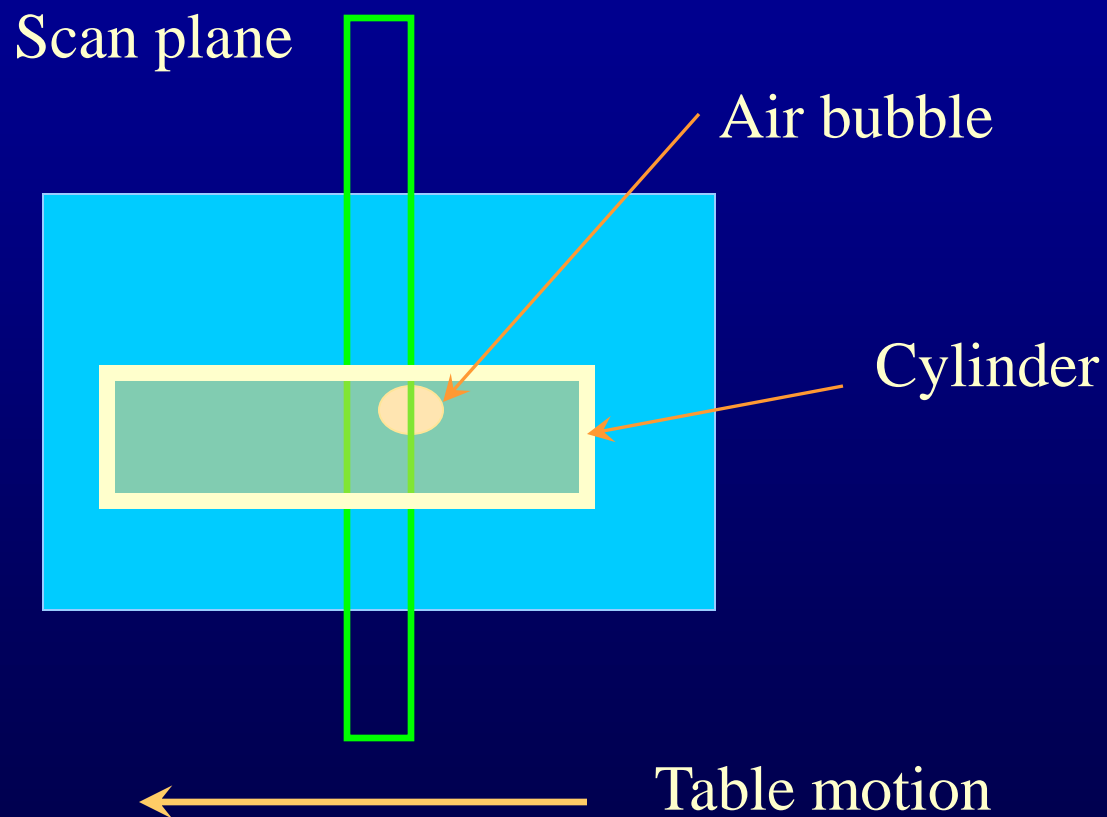
Detector: 8 x 2.5

Pitch = 0.875



Retrospective images at 2.5mm

Bubble Phantom (side view)





Same as patient study

Pitch: 0.875, Detector: $8 \times 2.5\text{mm}$, Beam: 20mm

SE 2, IM 2, 5mm

SE 3, IM 3, 2.5mm





Change detector (incr. Z sampling), retain beam width

Pitch: 1.375, Detector: 16×**1.25mm**, Beam: **20mm**

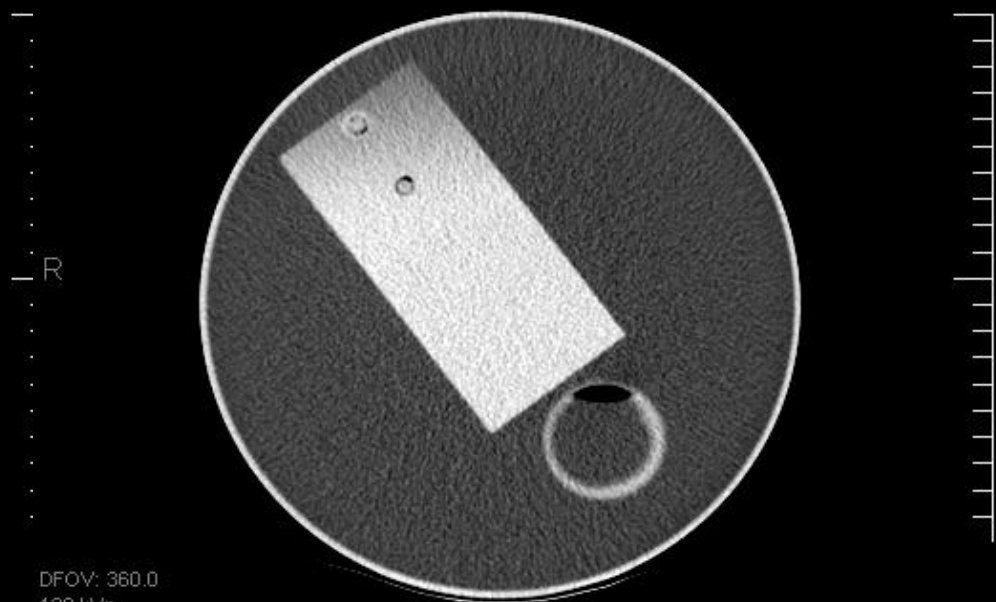
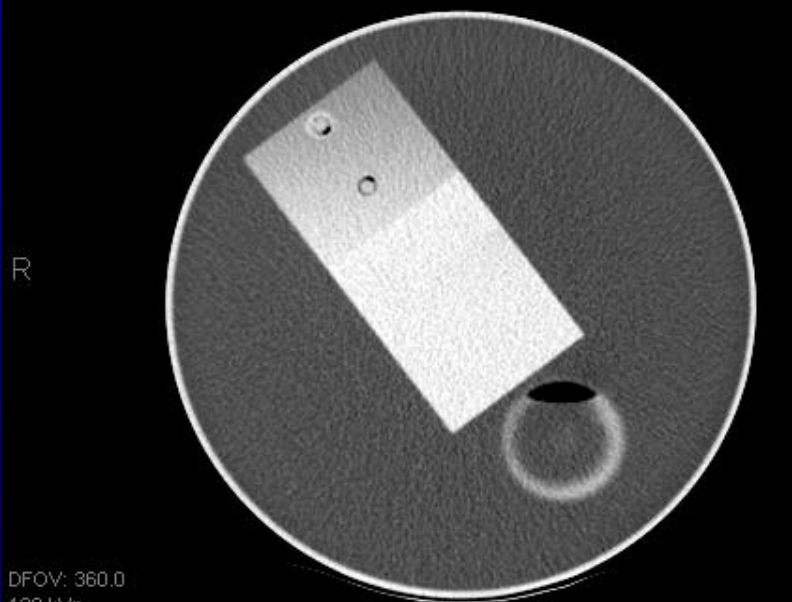
Effective mAs = 109 (decreased from 171)

SE 10, IM 2, 5mm

SE 11, IM 3, **2.5mm**

IM: 2 of 2

IM: 3 of 1



WWWWL: 200, Algorithm: STANDARD

WWWWL: 200/50



Change detector (incr. Z sampling), retain beam width

Pitch: 1.375, Detector: 16×1.25mm, Beam: 20mm

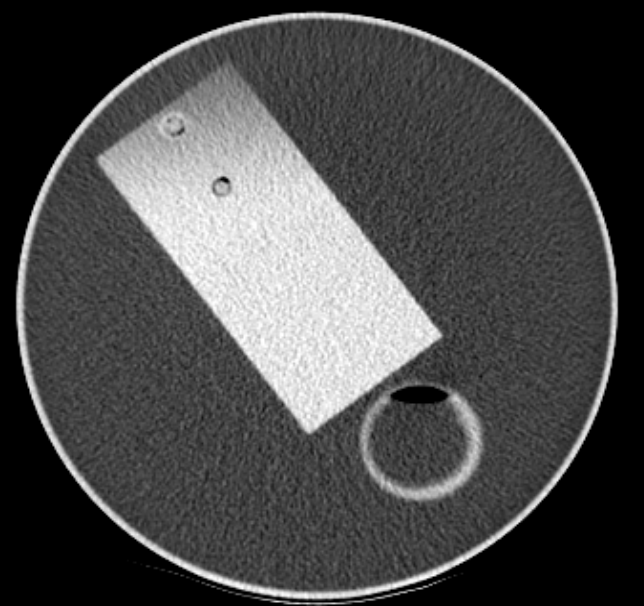
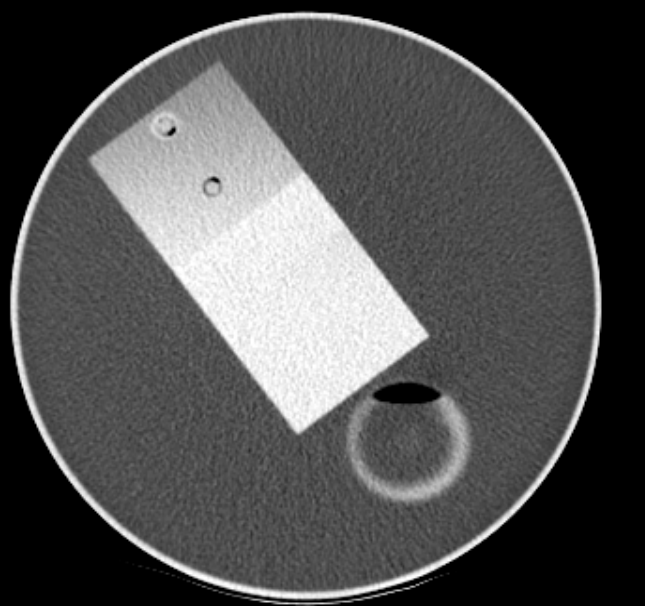
Effective mAs = 109 (decreased from 171)

SE 10, IM 2, 5mm

SE 11, IM 3, 2.5mm

IM: 2 of 2

IM: 3 of 1



DFOV: 360.0
120 kVp
300 mA
Th: 5.00 mm
Loc: -25
Algorithm: STANDARD

DFOV: 360.0
120 kVp
300 mA
Th: 2.50 mm
Loc: -25
WWWWL: 200. Algorithm: STANDARD



Z-axis Sampling Summary

- In general, use smallest detector spacing possible!
- More powerful than decreasing pitch to reduce helical artifacts
- Beam width may change with detector configuration
- Changes in beam width and/or pitch will affect total scan acquisition time and may affect dose



Example of “wrong”

- Initial multi-slice scanner (4-slice)
 - Shorter tube to isocenter distance than same vendor’s single-slice scanner
 - Required 20% less mAs at given kVp and slice width to achieve the same noise vs. single slice scanner



Routine Head Exam for ACR Accreditation

- Scanner default protocol:
 - Used thinnest collimation setting
 - Factor of 2 dose penalty on early 4-slice systems compared to single slice 5-mm scan
 - Meant to use same mAs as single-slice protocol (170 mA, 2 sec)
 - Used factor of 2 higher mAs by mistake (340 mA, 2 sec)
- Result:
 - Single-slice scanner default $CTDI_{vol} = 45$ mGy
 - Multi-slice scanner default $CTDI_{vol} = 190$ mGy
 - Several sites submitted to ACR using these settings/doses



Vendor Supplied Protocols

- Methods
 - Physicists & Engineers
 - Partners
 - Follow-up



Vender Supplied Protocols (con't)

- Options
 - STOP
 - BAU
 - Generic Groups
 - National Consensus



Vendor Supplied Protocols (con't)

- Tradeoffs
 - Partners feedback
 - Regulations
 - Innovation
 - Scientific Community
 - Sales



Literature

- Timelines
- Evidence Based
- Vender Proprieties
- Cottage Industry
- Culture

Single CT Perfusion - Message (Plain Text)

File Edit View Insert Format Tools Actions Help

Reply Reply to All Forward Print Reply All Reply Forward X Up Down A Search

From: DL Rad Trac

Sent: Wed 4/21/2010 11:37 AM

To: DL Rad Trac

Cc:

Subject: Single CT Perfusion

Exam 542148895-1 has perfusion time 39 seconds, KVP (0018, 0060) 80 kV and Exposure (0018, 1152) 270 mAs

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Future

Things Will Get Better



Future

- Protocol Review Committee
- Team Decisions
- Image Quality & Dose Discussions
- Public Workshops & Forums
- AAPM protocol web site
- Widespread transparent vetting of details
- Vendor & Imaging Community Solutions



Future

