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

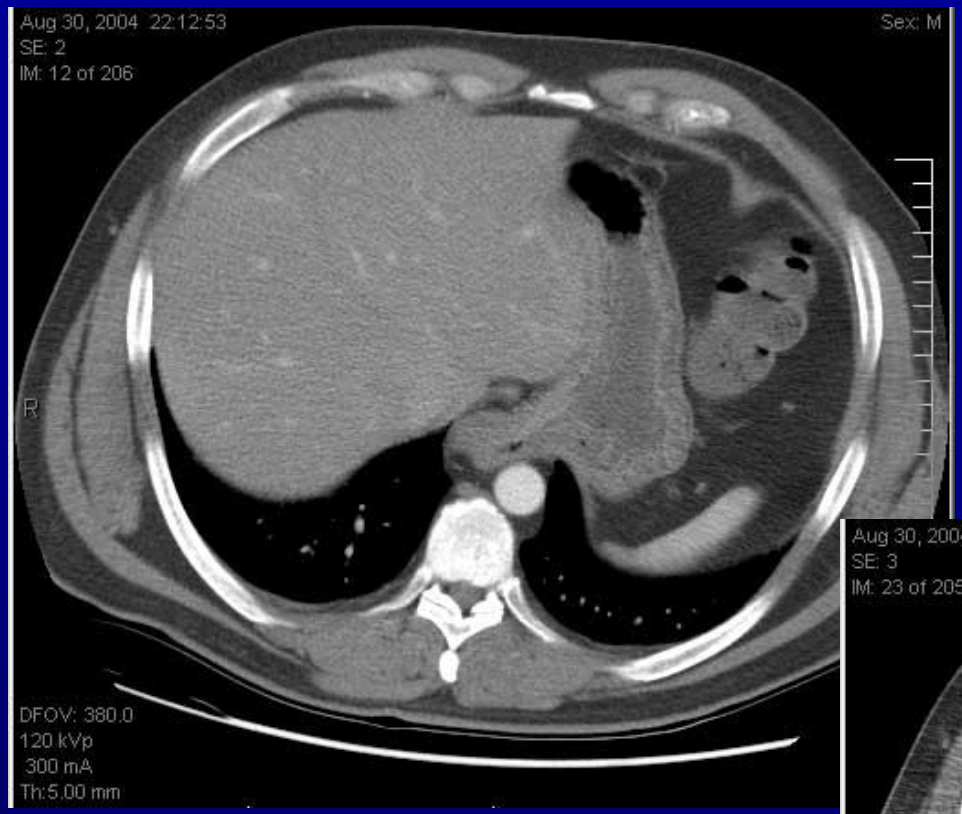
THE AMERICAN EXPERIENCE

- 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"

Courtesy of Robert Zeman, MD

Another example of "not-optimal"

- Selecting the optimal detector configuration

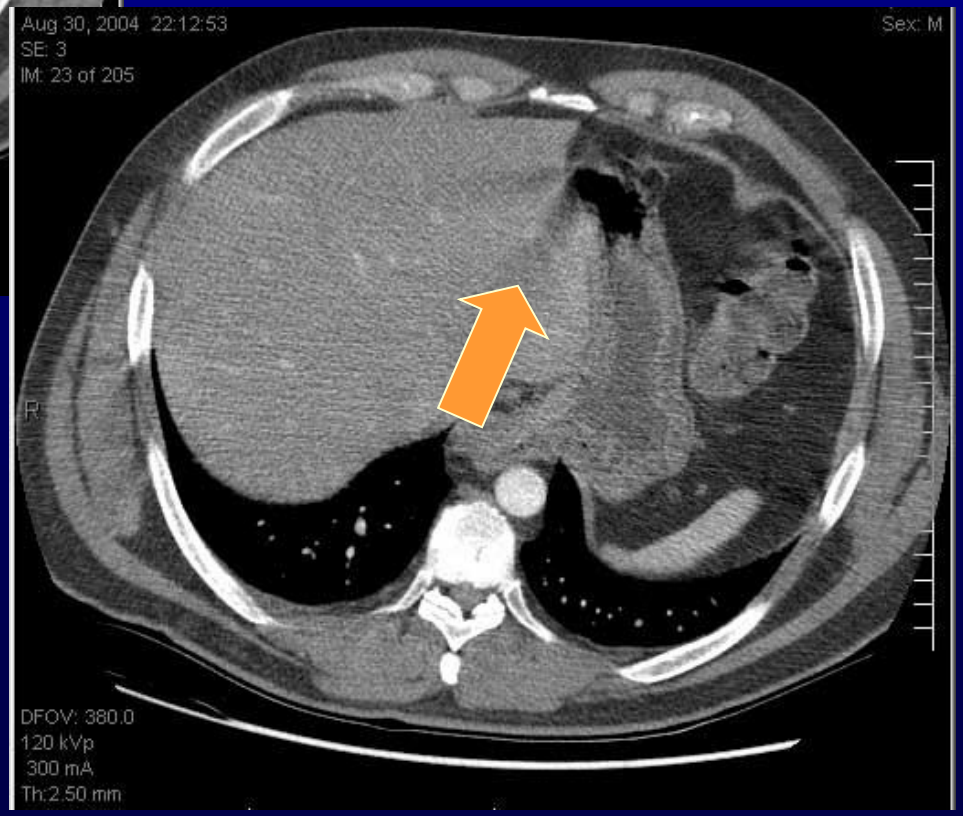


Prospective images at 5mm

Scanner: 16-channel

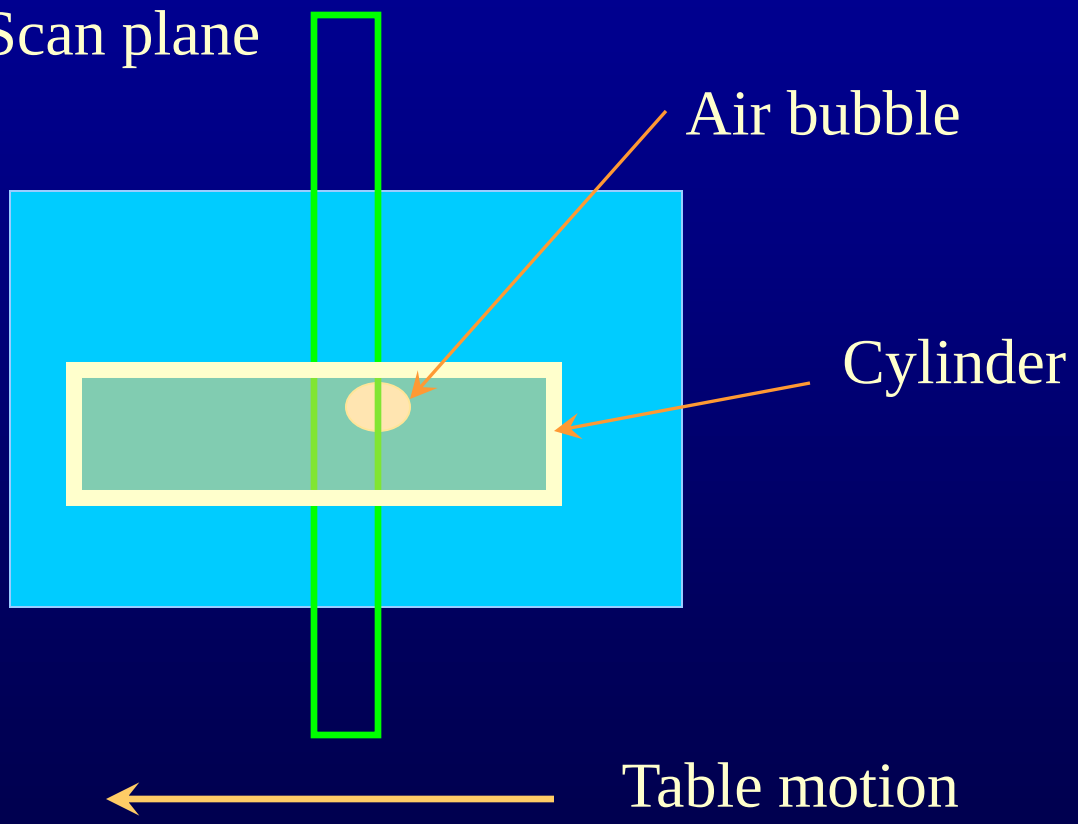
Detector: 8 x 2.5

Pitch = 0.875



Retrospective images at 2.5mm

Bubble Phantom
(side view)

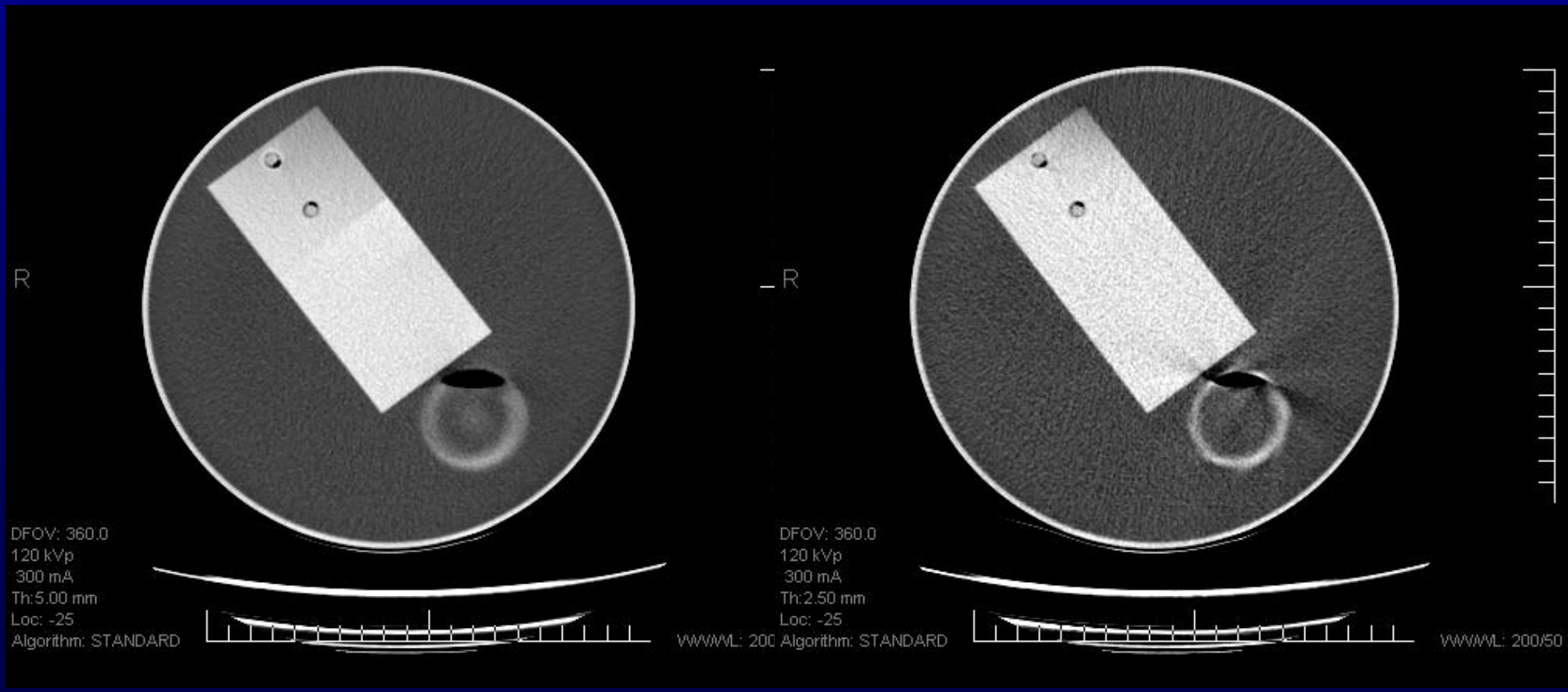


Same as patient study

Pitch: 0.875, Detector: 8×**2.5mm**, Beam: **20**mm

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**

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**

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 CTDIvol = 45 mGy
  - Multi-slice scanner default CTDIvol = 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

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

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