


THE UNIVERSITY OF TEXAS
MD Anderson
 Cancer Center
 Making Cancer History®



Choosing the Right Scan Parameters:
 Basic Scans – Neuro, MSK, Body

Dianna Cody, Ph.D.
 Professor
 UT MD Anderson Cancer Center
 Houston, TX

THE UNIVERSITY OF TEXAS
 MD Anderson
 Cancer Center
 Making Cancer History®

Choosing scan parameters...

- Basic CT physics principles still matter...
 - Consider lower kV when using IV contrast to boost enhancement
 - Consider more technique, iterative reconstruction, thicker images for "grainy" image complaints
 - Use faster rotation speeds to decrease patient motion
 - Lower pitch may improve IQ, but watch scan time
- Mostly recent, all real life examples of scan parameter choices
- How CT scan parameter adjustments made a noticeable improvement (and sometimes surprise problems)
- New CT protocols designed for specific purpose

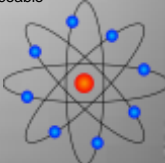


Image interpretation

Radiology dictation

IQ report

List – physicists & Tech supervisors



Log file...

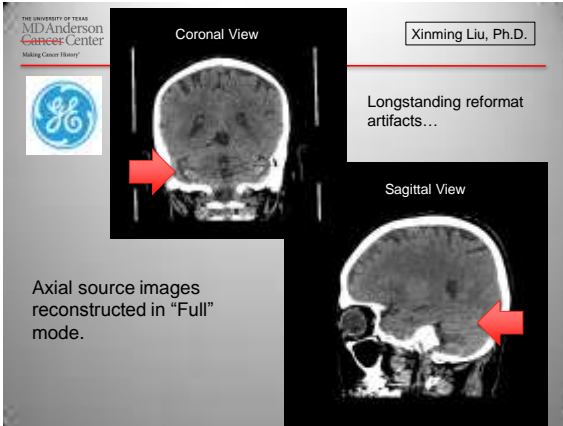
Missing images, etc.

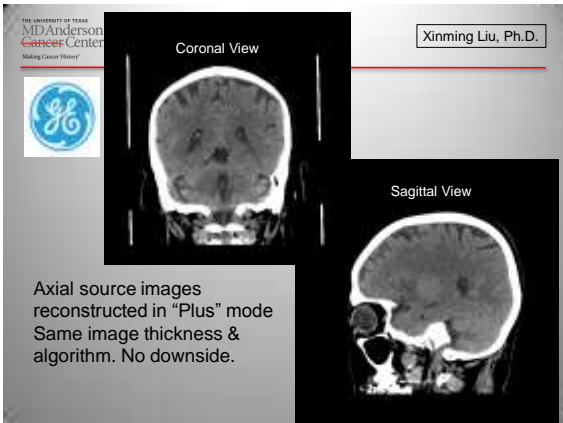
IQ issue?
Radiologist response

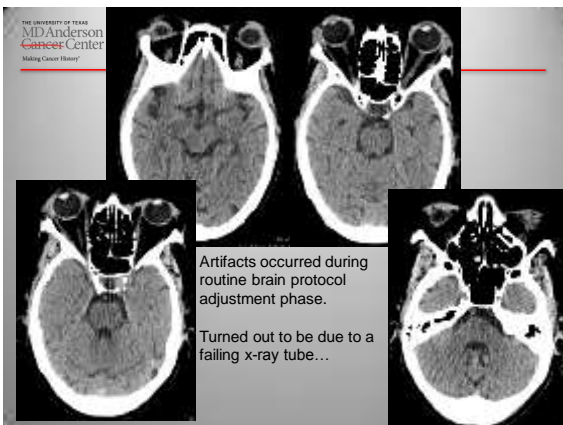
Proposed protocol change

Radiologist report during read...







THE UNIVERSITY OF TEXAS
MDAnderson
Cancer Center
Making Cancer History

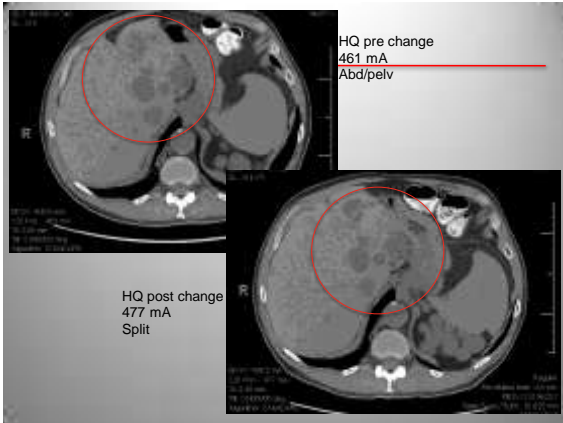
How to get high quality Abd/Pelvis CT images w/o IV Contrast?

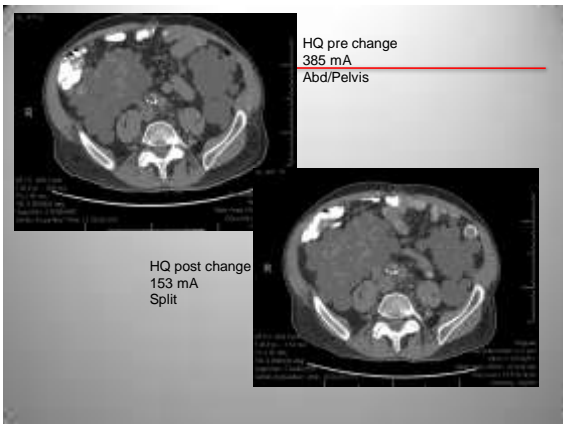
Corey Jensen, MD

- We use a specific protocol
- Labeled 'HQ' for high quality
- Used for patients who cannot tolerate iodine contrast
- Needed improvement for abdominal portion

Split Abd/Pelvis scan, adjusted TCM:

- Increased dose to abdominal region
- Spared dose to pelvis region





Dose Reports – Before & After Change

Series	Type	Scan Range (mm)	CT DIAP (mGy)	ERP (mGy-cm)	Phantom
Chst	Scout	-	-	-	001
A	Medical	115.000-1185.000	11.21	457.87	Body 32
P	Medical	023.000-073.000	76.42	1302.39	Body 32
Total Exam DLP				1760.26	

Series	Type	Scan Range (mm)	CT DIAP (mGy)	ERP (mGy-cm)	Phantom
Chst	Scout	-	-	-	001
A	Medical	110.250-1166.250	10.28	398.95	Body 32
P	Medical	054.250-0474.250	39.77	1026.71	Body 32
P	Medical	1673.250-1704.250	18.07	371.21	Body 32
Total Exam DLP				1796.87	

+2%
dose overall

Splitting acquisitions – impact reformatted views???



Patient Care/Convenience Issue

- LARGE Lymphoma clinic
- Most frequently ordered exams (@ ~ 3 month intervals)
- Chest-Abd-Pelvis AND Head/Neck CT exams
- Previously performed on separate dates

To improve patient satisfaction...

Xinming Liu, Ph.D. & Rick Layman Ph.D.

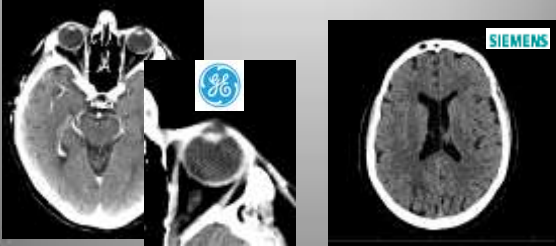
- Combined into single CAP+H/N CT exam
- Use single bolus of IV contrast
- Localizer with Arms down (for H/N)
- Localizer with Arms up (for CAP)
- Scan CAP first
- 20 sec intermission – Tech dashes into room, pt lowers arms
- Head/Neck scan performed

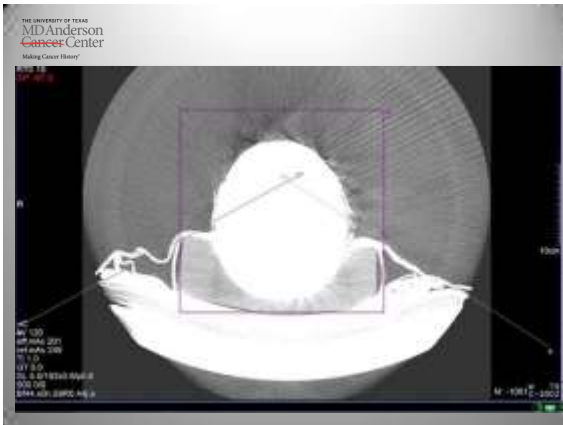
THE UNIVERSITY OF TEXAS
MDAnderson
Cancer Center
Making Cancer History

Biggest Challenge???

Xinming Liu, Ph.D. &
Rick Layman Ph.D.

- No place for arms/hands to rest if using head-holder
- Forced to scan patient on table-top
- Causes artifacts on both GE & Siemens head images!






THE UNIVERSITY OF TEXAS
MDAnderson
Cancer Center
Making Cancer History

Decrease cardiac motion, please...

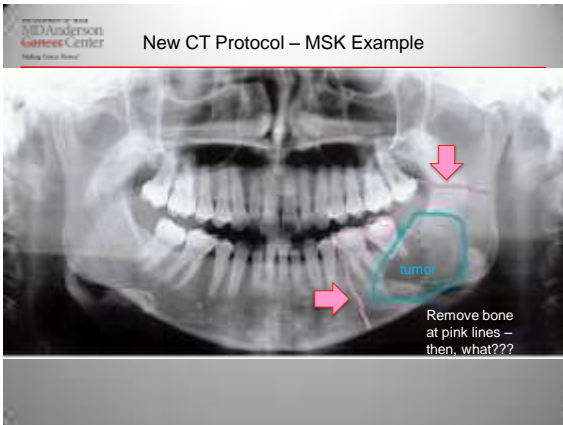
Rick Layman, Ph.D.



0.5 sec rot time
Siemens Force

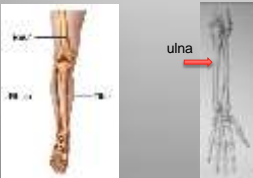
0.285 rot time
Siemens Flash





Bone filler necessary Rick Layman, Ph.D.

- Patient's own bone tissue is best option (no rejection issues)
- Which bones would be reasonable to harvest?
 - Fibula (lower leg)
 - Ulna (lower arm)
- Critical to success – maintaining blood supply to bone tissue



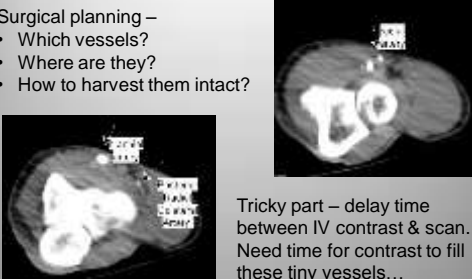
SmartPrep Descending Aorta:
Reached 100 HU
20 sec Arterial (5 sec scan)
24 sec Venous (5 sec scan)
31 sec Delay (5 sec scan)

THE UNIVERSITY OF TEXAS MD Anderson Cancer Center Making Cancer History

Ulnar 'Flap' – bone plus vasculature Rick Layman, Ph.D.

Surgical planning –

- Which vessels?
- Where are they?
- How to harvest them intact?



Tricky part – delay time between IV contrast & scan. Need time for contrast to fill these tiny vessels...

THE UNIVERSITY OF TEXAS MD Anderson Cancer Center Making Cancer History

Artifacts...

AAPM website –


- Basic exam scan parameter sets
- Multiple vendors & scanner models

Don't expect 100% perfection

- Some patients have specific challenges
- Some protocols run opposite to scanner design
- There will always be less than pretty CT exams
 - Diagnostic?

Struggle – Radiologists' "confidence"

- Fear missing subtle finding
- Increasing interpretation speed pressure



THE UNIVERSITY OF TEXAS MD Anderson Cancer Center Making Cancer History

Open Faculty Position – Assistant Professor
University of Texas MD Anderson Cancer Center

- Houston, TX
- ENORMOUS equipment base
- Competitive salary
- Excellent benefits
- Ph.D. (D.M.P.)
- Some flexibility –
 - Focus area of interest
 - Keep broad expertise
- X-ray based modalities
- Academic environment
- Imaging Physics Dept. (>100)

Contact: dcody@mdanderson.org
