CT EDUCATION AND COLLABORATION CENTER

Welcome to the 1st annual CT Protocol Optimization Workshop

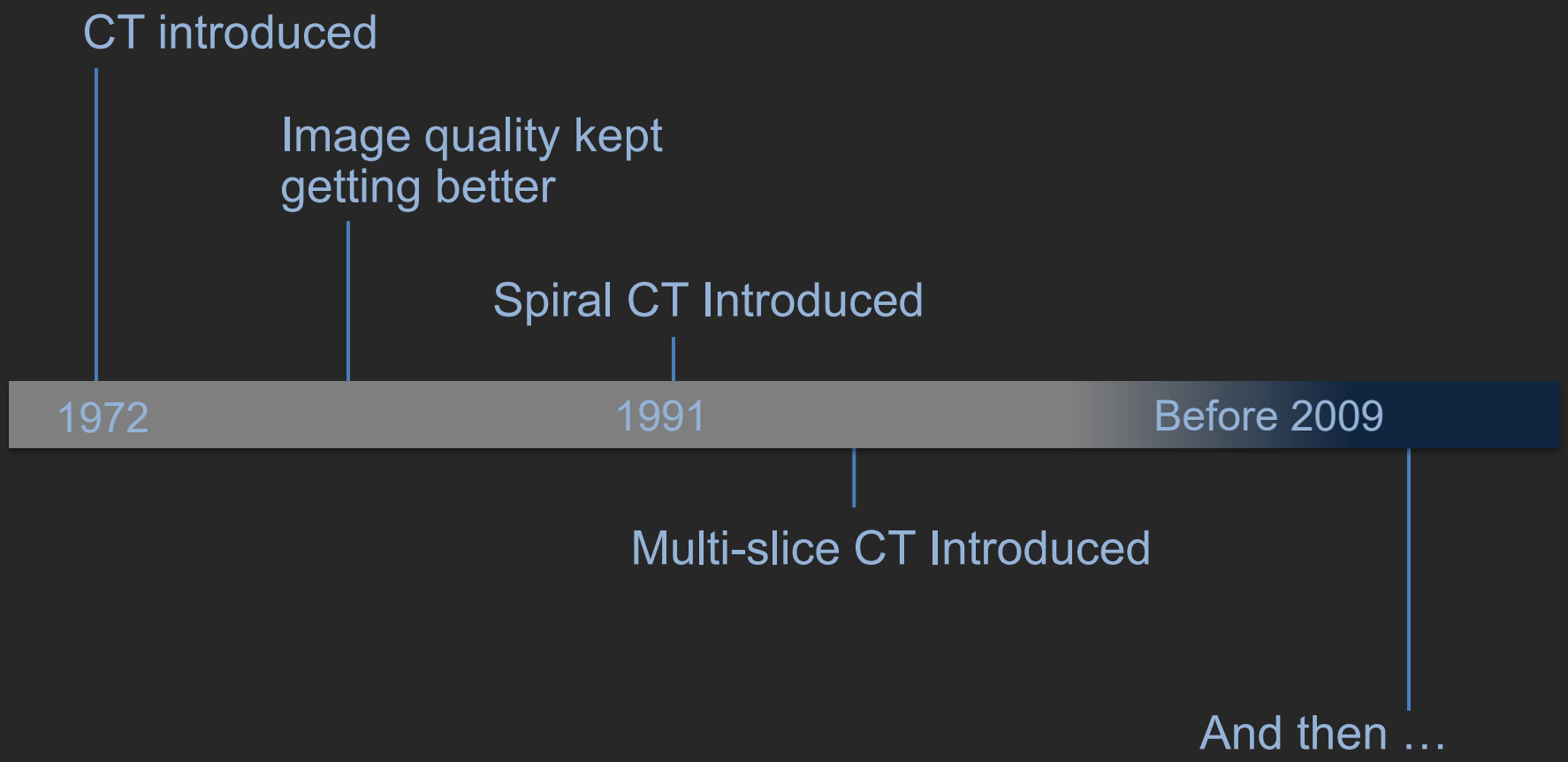
CT - POW!

We recognize the land our buildings and campus occupy is the ancestral home of the Ho-Chunk Nation, who have called this land Teejop (day-JOPE) since time immemorial.

In the first treaty following the Indian Removal Act in 1830, the state government forcibly removed the Ho-Chunk from their home in 1832. In the decades that followed, the federal and state government sought to completely remove the Ho-Chunk from Wisconsin. Despite these attempts, many Ho-Chunk people continued to return to their home in present-day Wisconsin.

We acknowledge the circumstances that led to the forced removal of the Ho-Chunk people and honor their history of resistance and resilience. The Ho-Chunk Nation and the other 11 First Nations residing in the boundaries of present-day Wisconsin remain vibrant and strong. We recognize and respect the inherent sovereignty of the 12 First Nations that reside in the boundaries of the state of Wisconsin. This history of colonization informs our work and vision for a collaborative future.

CT Timeline


CT introduced
Image quality kept getting better
Spiral CT Introduced
1972
1991
Before 2009
Multi-slice CT Introduced
And then …

CT Timeline

Jacoby Roth, 151 CT scans over 58 minutes!

2009

- Incidents reported in California and Alabama
- *NY Times* publishes first article

2010

- MITA announces dose check
- California passes SB 1237

2011

- Incidents reported in West Virginia
- *NY Times* publishes again
- The Joint Commission (TJC) issues alert
- IAEA, FDA, CRCPD et al issue call for exposure tracking

2012

- Texas amends TAC to include new rules for CT
- MITA endorses Smart Dose standard

2013

- AAPM issues CT practice guidelines
- TJC proposes new imaging standards

2015

- **TJC issues revised standards**

NEMA XR 29-2013 / MITA Smart Dose standard requires that a CT system include four key features:

DICOM Radiation Dose Structured Reporting

- Enables recording of post-exam dose information in a standardized electronic format.

CT Dose Check

- Incorporates two features—dose notifications and dose alerts—that warn operators and physicians when dose will exceed established thresholds.

Automatic exposure controls (AEC)

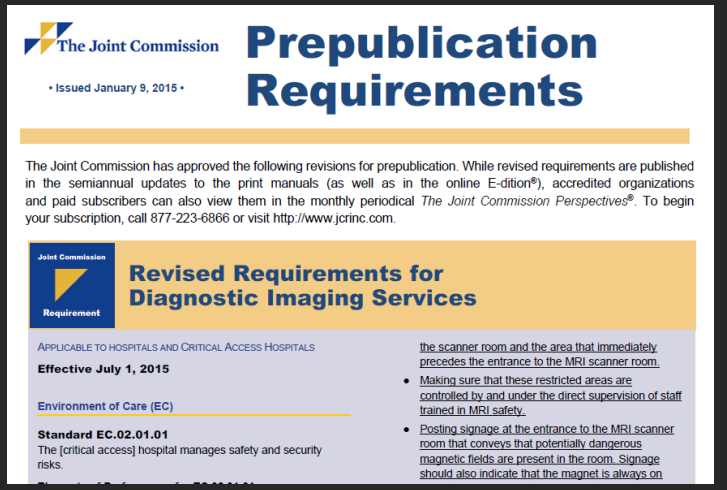
- Automatically adjust the amount of radiation within prescribed bounds as needed to achieve the desired image quality. Studies of AEC procedures have demonstrated dose reductions when used properly.

Pediatric and adult reference protocols

- A set of pre-loaded parameters on a CT system that can be selected by the operator to complete a particular clinical task, such as capturing an image of the abdomen.

Joint Commission standards

- Hospitals and critical access hospitals
- July, 2015
- MR, CT, PET/CT, NM


The Joint Commission

• Issued January 9, 2015 •

Prepublication Requirements

The Joint Commission has approved the following revisions for prepublication. While revised requirements are published in the semiannual updates to the print manuals (as well as in the online E-dition®), accredited organizations and paid subscribers can also view them in the monthly periodical *The Joint Commission Perspectives®*. To begin your subscription, call 877-223-6866 or visit http://www.jcrinc.com.

Joint Commission Requirement

Revised Requirements for Diagnostic Imaging Services

APPLICABLE TO HOSPITALS AND CRITICAL ACCESS HOSPITALS

Effective July 1, 2015

Environment of Care (EC)

Standard EC.02.01.01

The [critical access] hospital manages safety and security risks.

the scanner room and the area that immediately precedes the entrance to the MRI scanner room.

- Making sure that these restricted areas are controlled by and under the direct supervision of staff trained in MRI safety.
- Posting signage at the entrance to the MRI scanner room that conveys that potentially dangerous magnetic fields are present in the room. Signage should also indicate that the magnet is always on

- Changes to:
  - Environment of care (EC)
  - Human resources (HR)
  - Medication management (MM)
  - Provision of care, treatment, & services (PC)
  - Performance improvement (PI)

CT JCAHO Standards

Environment of care

- Quarterly occupational dose review by RSO
- Activities to maintain quality of diagnostic images
- Annual measurement and verification of displayed CTDIvol
- Annual equipment quality check
- Annual testing of image acquisition display monitors
- Shielding design assessment pre-installation
- Shielding survey post-installation

Human resources

- Qualifications for physicists
- Annual training for technologists

Provision of care

- Documentation of radiation dose index for every study in a retrievable format
- Pre-scan verification of patient info and protocol
- Consider patient's age when deciding on exam type
- Adoption of protocols based on current standards of care
- Periodic review of protocols

Performance improvement

- Identify incidents where radiation dose index exceeds expectations
- Review and analyze
- Compare to external benchmarks


McDonald's
RESTAURANT

A UW / GE CT protocol

Abd/Pelvis 6.1/6.2/6.3

Clinical Instructions

Indication

Evaluate for abdominal pathology other than hypervascular tumors.

Video for this protocol

Oral Contrast

Target dose: 1 liter of positive oral contrast.

- Give 4 200 mL doses at a concentration of 2% (5mL Iohexol 300 (Omnipaque) in 200 mL of water at 15-minute intervals.
- Give the final 200 mL on the scan table at a concentration of 4% (10 mL Iohexol 300 (Omnipaque) in 200 mL of water.

- If the patient is a bariatric post-op patient the patient will not drink up on the floor. Rather they will get between 100-150 mL oral contrast when they get to CT right before getting on the table. This should be in the order itself. If you have questions please ask the protocolling radiologist.

Pre-Scan Instructions

Clamp Foley catheter prior to scanning. Make sure to place Foley below the level of the bladder.

IV Contrast Parameters

Use the Medrad P3T Abdomen protocol. 3 ml per second. (Iohexol 300)

For sites without the Medrad P3T or P3T PA option, refer to the weight based contrast tables we provide in the protocol booklet.

Field of View

Same as previous study or as small as appropriate

Scan Description

- Series 1 - AP & lateral scout: from diaphragm through iliac crest or pubic symphysis
- Series 2 – Helical Scan
  - Smart Prep- Monitor Phase: Center over the liver. Put ROI (3) in the liver. Threshold 50 Hounsfield units. No more than 80 seconds delay.
  - Scan Phase: Start scan at the top of the diaphragm, for Abdomen Only end at the iliac crests or for Abdomen/Pelvis end at pubic symphysis.

Reformat Instructions

Use DMPR on THIN ST.

Reformats

Name	Source Recon	DMPR or Manual	Type (MIP, Average, etc.)	WW/WL	Slice Thickness (mm)	Interval (mm)	Orientation
SA BODY	THIN ST	DMPR	Average	325/15	5	2.5	sagittal
CO BODY	THIN ST	DMPR	Average	325/15	5	2.5	coronal

Networking

All images are networked to ALI_Store, except the thins send to ALI_Source.

Miscellaneous

None

Acquisition Parameters

Series 1, Scout

	Small	Medium	Large
Scout 1 kV	100	120	140
Scout 1 mA	10	10	10
Scout 1 Angle	180	180	180
Scout 2 kV	100	120	140
Scout 2 mA	40	40	80
Scout 2 Angle	90	90	90
WW/WL for Scout	600/50	500/50	500/50

Series 2, Smart Prep

	Small	Medium	Large
mA	40	40	40
Monitoring Delay (sec)	40	40	40
Monitoring ISD (sec)	3	3	3
Enhancement Threshold (HU)	50	50	50
Diagnostic Delay	Auto Minimum	Auto Minimum	Auto Minimum

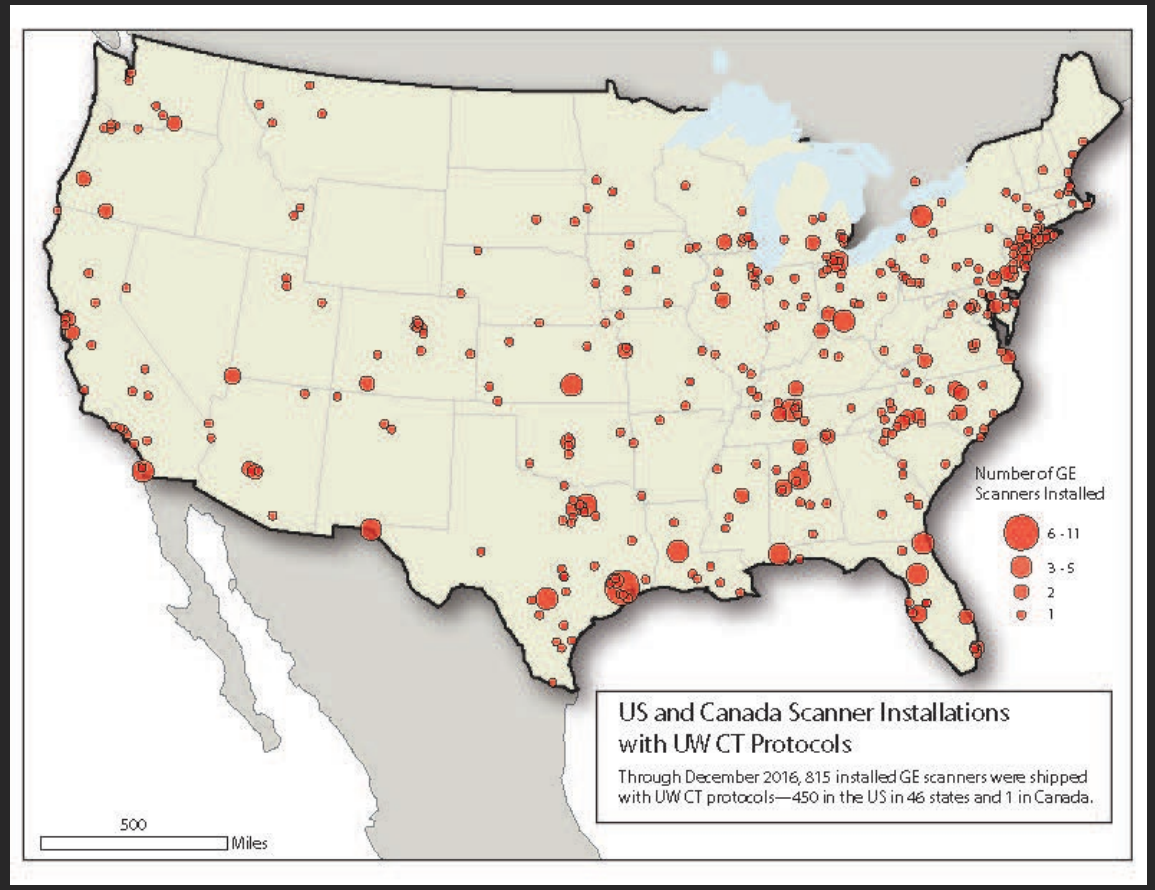
Series 2, Scan Phase

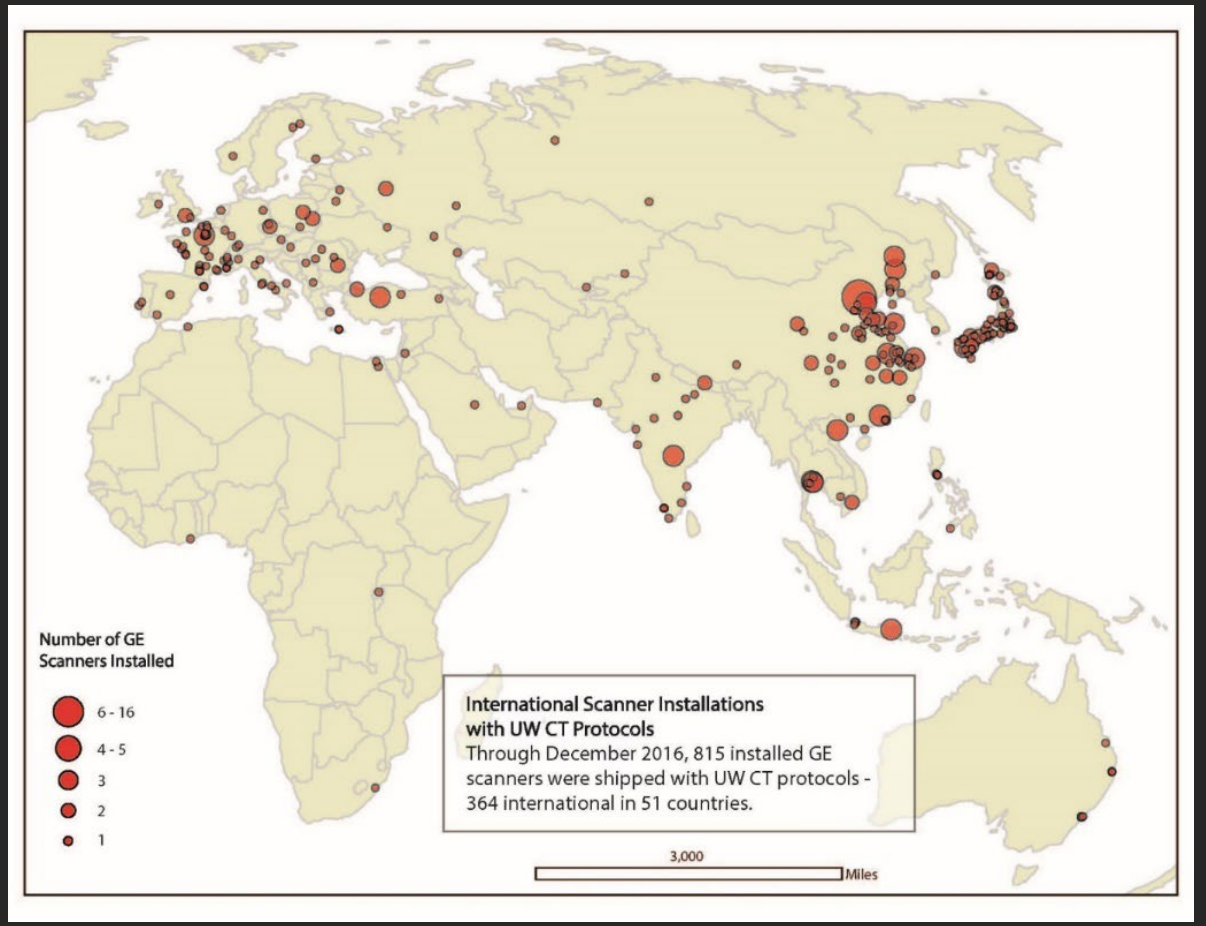
	Small	Medium	Large
Scan Type	Helical	Helical	Helical
Beam Collimation	40	40	40
Detector Rows	64.0	64.0	64.0
Detector Configuration	64x0.625	64x0.625	64x0.625
Scan FOV	Medium Body	Large Body	Large Body
Pitch	0.516	0.516	0.516
Speed (mm/rot)	20.60	20.60	20.60
Rotation Time (s)	0.4	0.4	0.4
kV	100	120	140
AEC type	smart mA	smart mA	smart mA
mA Range	(50-400)	(50-500)	(60-630)
Manual mA	200.0	250.0	380.0
Noise Index	15.5	18.0	22.0
Slice Thickness (mm)	3.75	5	5
Interval (mm)	2.25	3.0	3.0

Series 2, Recons

	Small	Medium	Large
Recon 1			
DFOV	30	36	50
Recon Type	Standard	Standard	Standard
WW/WL	460/60	400/50	350/40
Recon Option	Plus	Plus	Plus
Recon Option			
ASIR Setup	Slice 40%	Slice 40%	Slice 40%
Slice Thickness (mm)	3.75	5.0	5.0
Interval (mm)	2.25	3.0	3.0
Recon 2			
DFOV	30	36	50
Recon Type	Standard	Standard	Standard
WW/WL	460/60	400/50	350/40
Recon Option	Plus	Plus	Plus
Recon Option	IQ Enhance	IQ Enhance	IQ Enhance
ASIR Setup	Slice 40%	Slice 40%	Slice 40%
Slice Thickness (mm)	1.25	1.25	1.25
Interval (mm)	0.625	0.625	0.625

UW Protocol sites





UW GE CT Protocol Partnership

Department of Radiology

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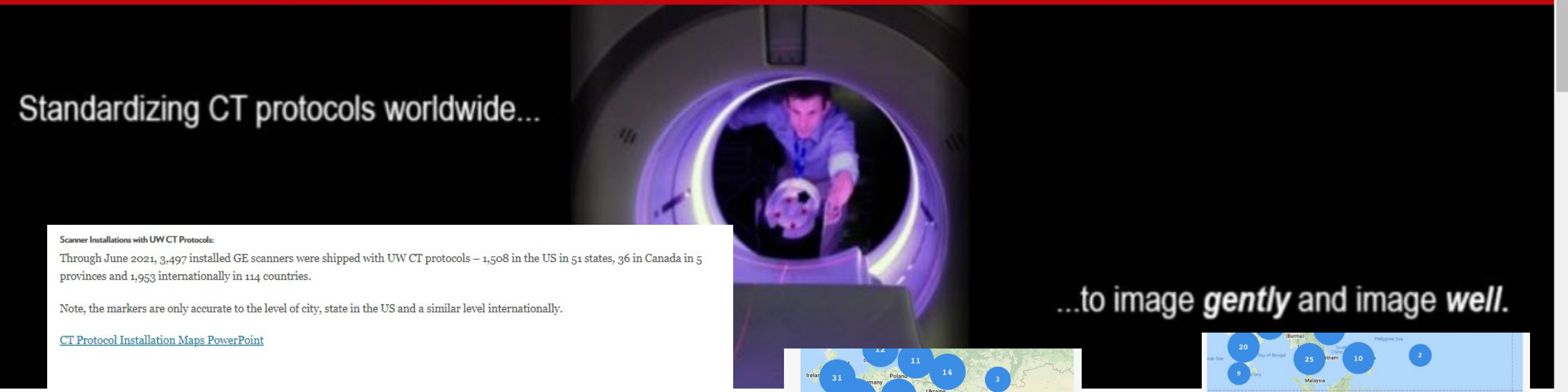
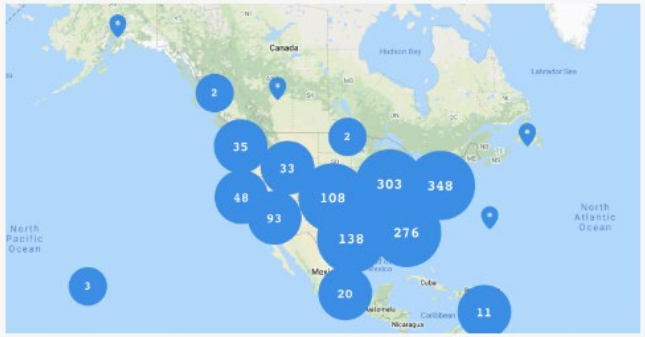


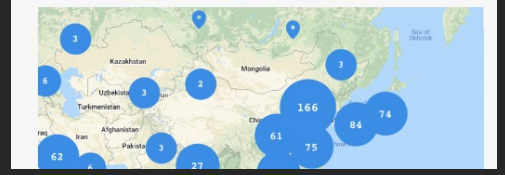
Scanner Installations with UW CT Protocols:

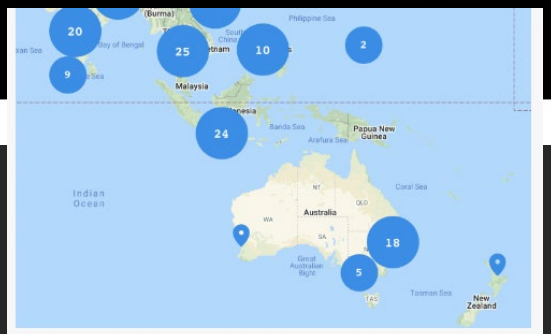
Through June 2021, 3,497 installed GE scanners were shipped with UW CT protocols – 1,508 in the US in 51 states, 36 in Canada in 5 provinces and 1,953 internationally in 114 countries.

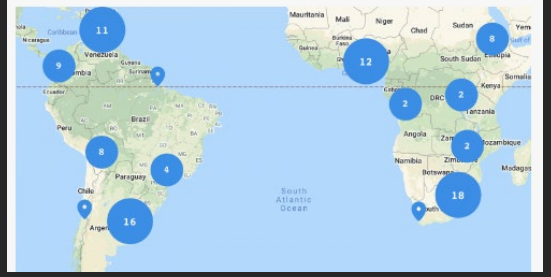
Note, the markers are only accurate to the level of city, state in the US and a similar level internationally.

CT Protocol Installation Maps PowerPoint









UW GE CT Protocol Partnership
Department of Radiology

The C-TECC (CT Education and Collaboration Center) is a forward-thinking program focused on educating and collaborating with radiology professionals—radiologists, technologists, physicists, and trainees—on the latest CT scanner technologies, with an emphasis on Photon Counting Detector (PCD) CT.

Training and education

CT-POW!

Vendor show site and clinical experience opportunities

Research collaboration

Motivation

AAPM outputs TG reports that are not in line with clinical reality

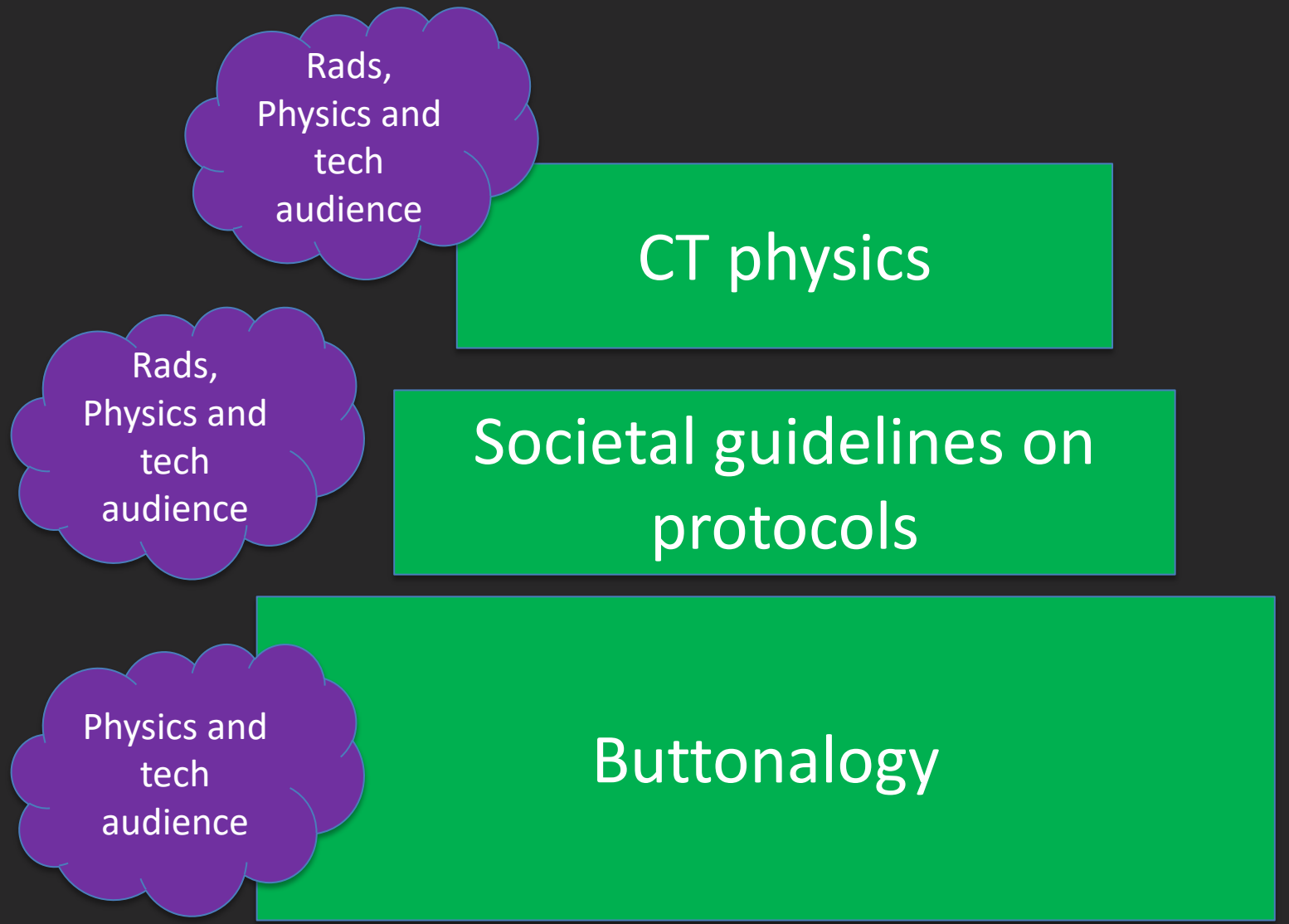
Major conferences offer CE credits with academic lectures→ low clinical applicability

Technologists fear changes, so ANY change management for acquisition/reconstruction/practice culture MUST appreciate clinical workflow

Radiologists want more from physics, but physicists are ACR/TJC robots w/o training in protocol optimization

Physicists and techs and rads interact with many vendors CT scanners, but few get to receive apps training on all units

Solution


Rads, Physics and tech audience
CT physics
Rads, Physics and tech audience
Societal guidelines on protocols
Physics and tech audience
Buttonalogy


POW!


POW!