

# Medical Radiation Reporting: A Manufacturer's Perspective

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# Vendor Responsibilities

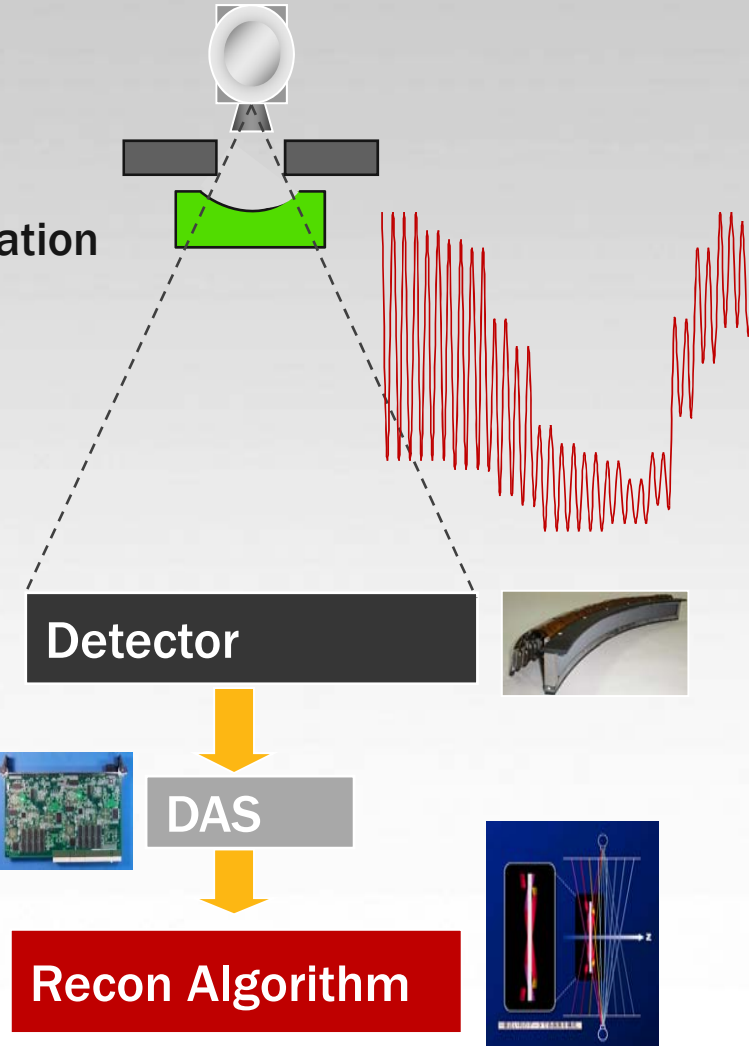
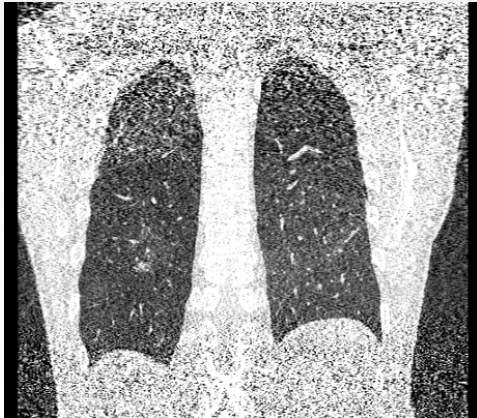
- **Build a Dose Conscious Machine**
- **Help ensure appropriate dose is used**
- **Report relevant dose information as part of the imaging exam**

# Vendor Responsibilities

## ➤ Build a Dose Conscious Machine

- Efficient Tube, Detectors, and DAS
- Collimation, Filtration, and Bowtie
- Automatic exposure control and active collimation
- Advanced and efficient reconstruction

- Help ensure appropriate dose is used
- Report doses as part of the imaging exam



# Vendor Responsibilities

- Build a Dose Conscious Machine
- **Help ensure appropriate dose is used**
  - Clear dose displays (including phantom size)
  - 
  - 
  -
- Report relevant dose information as part of the imaging exam

# Clear Dose Displays

## ➤ Key data

➤ CTDI<sub>vol</sub>

➤ DLP

➤ Phantom size

## ➤ Cumulative DLP

➤ Protocol total

➤ Patient total

## ➤ Reference info

➤ Links to relevant DRLs and dose information

DOSE		Reference Info.
Scan Total	CTDI vol.e	5.0 mGy
	DLP.e	213.9 mGy.cm
		Dose Calculation Method  32cm diameter
		Z-Axis Efficiency - %
Protocol Total	DLP.e	213.9 mGy.cm
Patient Total	DLP.e	432.0 mGy.cm

# Vendor Responsibilities

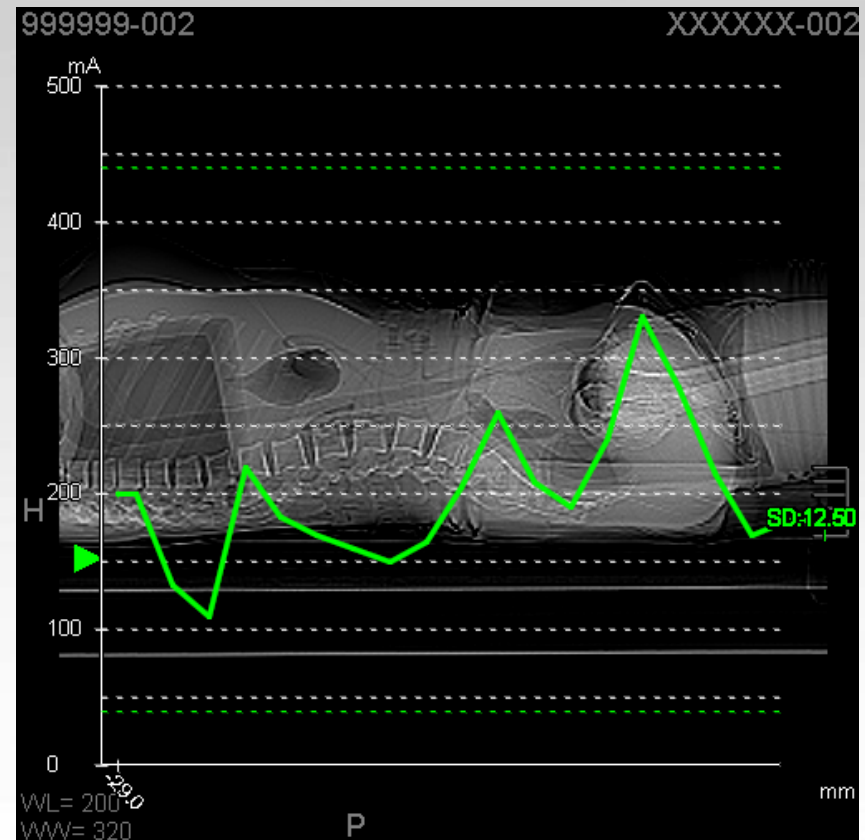
- Build a Dose Conscious Machine
- **Help ensure appropriate dose is used**
  - Clear dose displays (including phantom size)
  - Integrated Exposure Control
  - 
  - 
  -
- Report relevant dose information as part of the imaging exam

# CT Patients Come in All Shapes and Sizes



# Integrated Exposure Control

- **AEC should automatically adjust for**
  - Requested IQ
  - Patient size
  - Patient shape
  - Reconstruction image thickness
  - Convolution kernel
  - Reconstruction algorithm



# Vendor Responsibilities

- Build a Dose Conscious Machine
- **Help ensure appropriate dose is used**
  - Clear dose displays (including phantom size)
  - Integrated Exposure Control
  - Reference Protocols
  - 
  -
- Report relevant dose information as part of the imaging exam

# Reference Protocols

- **Built based on**
  - Vendor expertise
  - Collaboration with luminary users
- **Represent**
  - Reference best practice
  - Are not “one size fits all”



- **Often used as a starting point for clinical site customization**
  - Based on clinical practice, patient population, etc
  - Requires local protocol review and monitoring
  - Protocol access controls

# Vendor Responsibilities

- Build a Dose Conscious Machine
- **Help ensure appropriate dose is used**
  - Clear dose displays (including phantom size)
  - Integrated Exposure Control
  - Reference Protocols
  - User Training
  -
- Report relevant dose information as part of the imaging exam

# Toshiba Training Academy

- Irvine, CA
- Institute of Advanced Imaging
- Dedicated work
  - Dose Management
  - Dose reduction tools



# Managing Radiation Dose

## Objectives

- Understand the Safe and Effective use of the CT System
- Reduce Radiation Exposure Risks
- Understand Dose Management Tools



# Principles of Radiation Protection

- Fundamental Radiation Safety Guideline
  - Minimize radiation to accomplish the diagnostic task
- ALARA – As Low As Reasonably Achievable
- Considerations:
  - Image Quality
  - Age and Size of patient



# Vendor Responsibilities

- Build a Dose Conscious Machine
- **Help ensure appropriate dose is used**
  - Clear dose displays (including phantom size)
  - Integrated Exposure Control
  - Reference Protocols
  - User Training
  - Dose Check (MITA Standard XR-25)
- Report relevant dose information as part of the imaging exam

# Dose Check

- Toshiba supports MITA Initiative on Patient Safety
- Dose Safeguards - NEMA Standard XR25 “Dose Check”
- The Dose Check standard contains two main components:
  - Dose Notification Feature
  - Dose Alert Feature
- Different dose levels can be set for pediatric patients

**DOSE NOTIFICATION**

One or more elements in this exam plan will exceed the dose notification level that has been set.

Element	Predicted CTDvol	Predicted DLP	Notification CTDvol	Notification DLP
Helical	11.4 mGy	342 mGy.cm	30 mGy	1000 mGy.cm
Helical	34.6 mGy	1038 mGy.cm	30 mGy	1000 mGy.cm

Edit OK

**! DOSE ALERT**

A dose alert value will be exceeded !

Proceeding with this exam will exceed the dose alert level that has been set.

	Predicted Dose	Alert Level
Cumulative CTDvol	063.7 mGy	1000.0 mGy
Patient total DLP	6643.0 mGy.cm	6500.0 mGy.cm

Edit OK

**Input Name & Password**

Name

Password

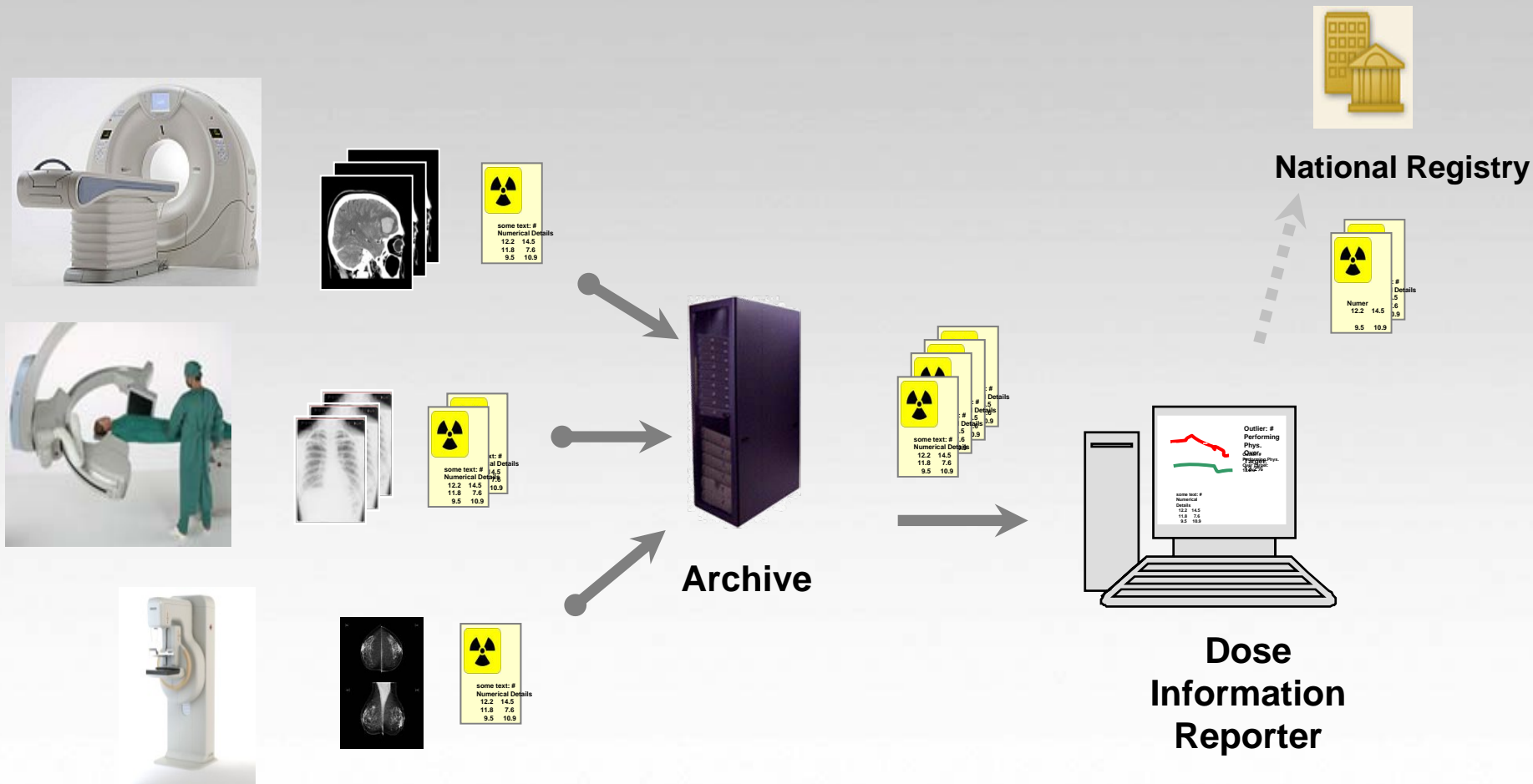
OK Quit

Currently available on software version 4.6 and above for Aquilion Prime, Aquilion Premium and Aquilion ONE

# Vendor Responsibilities

- Build a Dose Conscious Machine
- Help ensure appropriate dose is used
- **Report relevant dose information as part of the imaging exam**
  - Post-scan report
  - IHE REM Profile (DICOM dose structured report)
  - Compatible with ACR dose registry

# IHE Radiation Exposure Monitoring Profile



# Values to be reported

## ➤ Immediate term

➤  $CTDI_{vol}$ , DLP

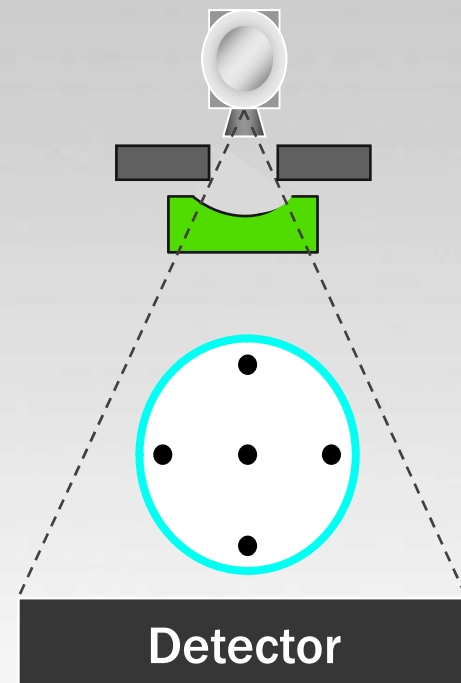
➤ Height, weight, gender, age

## ➤ Short Term

➤ Size specific dose estimate

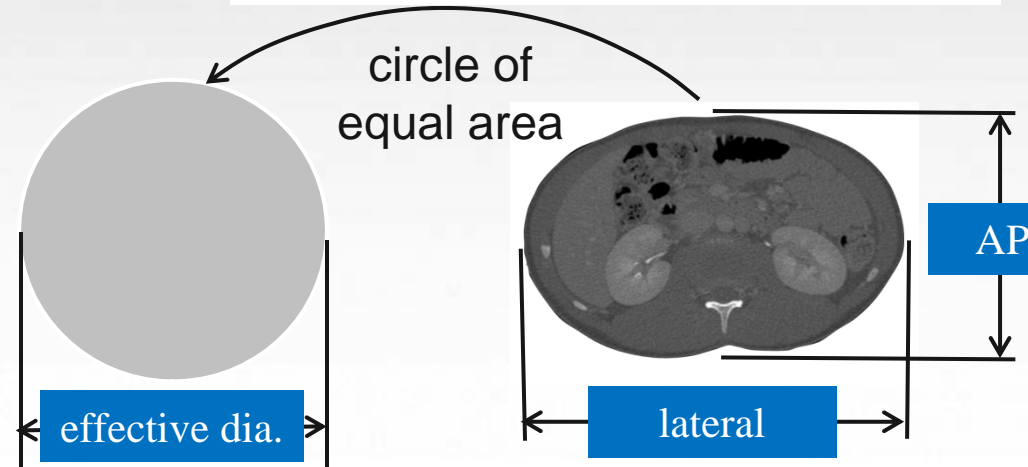
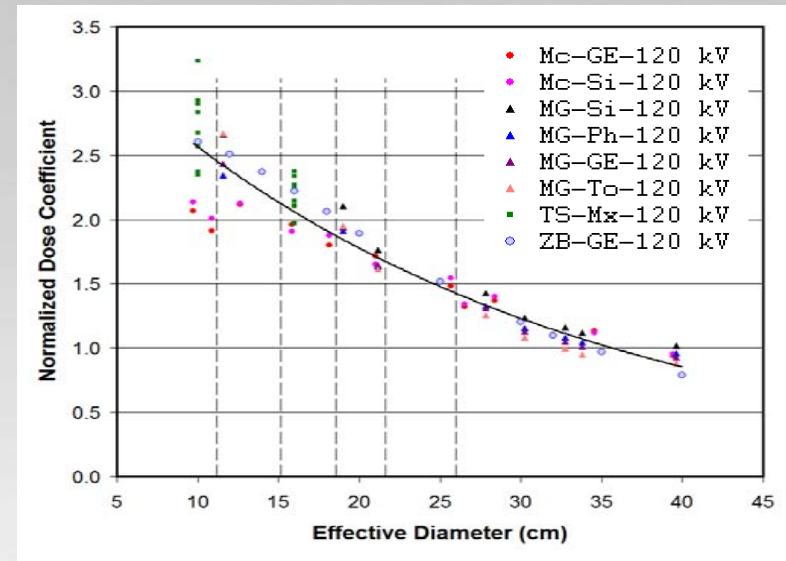
## ➤ Longer term

➤ Organ dose



# Values to be reported

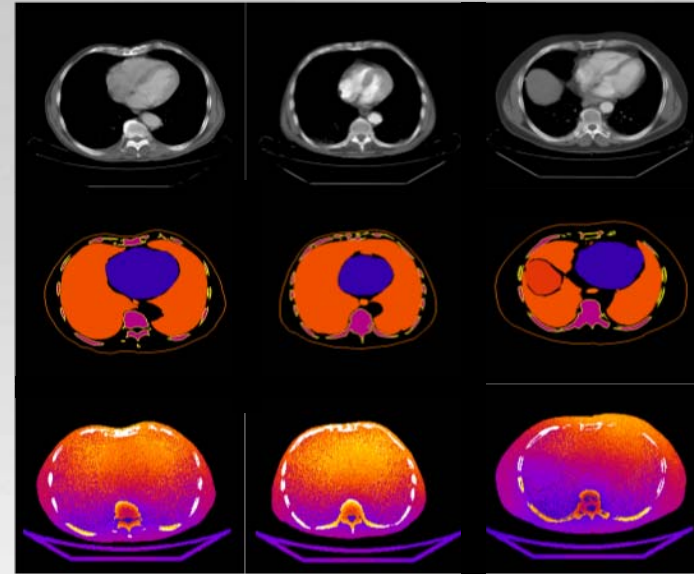
- Immediate term
  - $CTDI_{vol}$ , DLP
  - Height, weight, gender, age
- **Short Term**
  - Size specific dose estimate
- Longer term
  - Organ dose



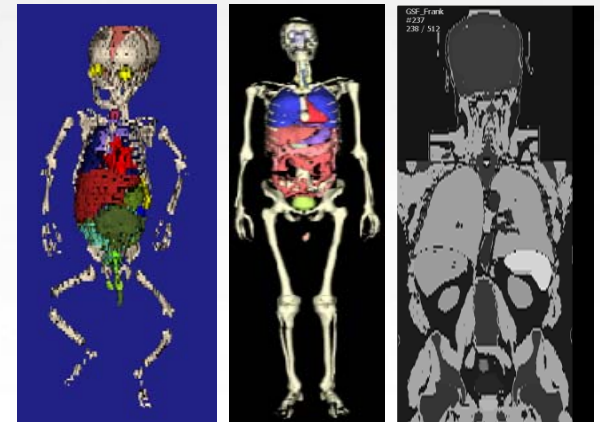
Adapted from TG 204

# Values to be reported

- Immediate term
  - $CTDI_{vol}$ , DLP
  - Height, weight, gender, age
- Short Term
  - Size specific dose estimate
- **Longer term**
  - Organ dose



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McNitt-Gray

# Summary

- **Build a Dose Conscious Machine**
  - Efficient hardware and scan software
  - Advanced and efficient reconstruction
- **Help ensure appropriate dose is used**
  - Clear dose displays (including phantom size)
  - Dose Check (MITA Standard XR25)
- **Report doses as part of the imaging exam**
  - IHE REM Profile (DICOM dose structured report)
  - Size specific dose estimate (TG204)
  - Organ dose estimations