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ROUTINE PEDIATRIC CHEST CT PROTOCOLS

Indications (include but are not limited to)
- Evaluation of chest, vasculature, heart or lung screening developmental or congenital anomalies
- Evaluation of masses, cysts or suspected malignancy in the chest
- Evaluation of infections or inflammation or embolism of the chest
- Evaluation of acquired disorders of the great vessels
- Evaluation of disorders of the tracheobronchial tree
- Evaluation of cardiac function
- Evaluation of interstitial lung disease
- Evaluation of chest trauma
- Post-operative evaluation of surgical complications

These routine pediatric chest CT protocols are provided as general guidelines to help in designing protocols applicable to their pediatric population. They were developed to encompass of a variety of indications, however it must be noted that pediatric protocols are generally more tailored to specific indications than adult protocols.

Reference: ACR–SCBT-MR–SPR Practice Parameter for the Performance of Thoracic Computed Tomography (CT)

Diagnostic Tasks (include but are not limited to)
- Detect nodules or masses and characterize their size and shape and relationships to organs
- Identify abnormal aeration or expansion of the lungs
- Detect abnormal fluid collections in the chest
- Identify abnormal air collections both in and around the lungs
- Detect mediastinal and paravascular masses and nodules
- Characterize chest wall masses or including collection related to the pleura
- Detect calcifications in soft tissues or the mediastinum
- Detect air space disease
- Detect congenital or acquired anomalous anatomy
- Detect acquired tracheobronchial abnormalities (e.g., bronchiectasis)
- Detect traumatic changes within the chest (e.g. broken bones, torn vessels, etc.)
- Detect blood clots

Key Elements
- Contrast enhancement
- Patient positioning is very important (see below)
- Radiation dose management is very important (see below)
- High-contrast diagnostic exam where the anomalous finding is easily discernable from the background anatomy (in this case, the lungs which have low HU)
- One breath-hold (motion is problematic) in cooperative patients, otherwise quiet breathing
- Volumetric or multi-planar reconstruction

Contrast
- **Oral**: None.
- **Injected**: Certain indications require administration of intravenous contrast media.

The disclaimer on page 1 is an integral part of this document.

- Intravenous contrast enhancement should be performed as directed by the supervising radiologist using appropriate injection protocols and in accordance with the ACR-SPR Practice Guideline for the Use of Intravascular Contrast Media and the ACR Manual on Contrast Media.

Patient Positioning
- Center the patient within the gantry; this is critical for proper functioning of AEC systems.
- Patient supine, arms above head.
- It is common practice to employ a variety of motion-restriction devices (patient safety straps, for example) when working with non-cooperative pediatric patients.

Scan Range
- From top of lungs through the bottom of lungs. Instruct patient to hold breath at inspiration, in cooperative patients, during entire scan.
- Limit the scan range to the anatomy of interest to avoid unintentional exposure of sensitive organs from overrranging.

Suspension of Respiration
- Patient should be instructed to hold his/her breath at end of inspiration in cooperative patients.

Additional Image Reconstructions
- The provided protocols are to be considered as a baseline for CT imaging of the pediatric chest. Additional customization for specific indications may be required.
- Certain indications may require that images be reconstructed in coronal and/or sagittal planes.
- Very thin images (approximately ≤ 1 mm) may need to be reconstructed to serve as source images for the sagittal and/or coronal reformatted images.
- Creation, use, and archival of these additional images are at the discretion of the supervising radiologist and/or departmental policy. Very large datasets may result from these additional reconstructions.

Radiation Dose Management
- In children, it is especially important to use the lowest dose necessary to achieve the specified diagnostic task.
- AEC should be used whenever possible.
- Reduce tube potential, especially in smaller pediatric patients. The resulting dose reduction is accompanied by an improvement in subject contrast in the image.
- Repeated scans and delayed scans discouraged unless medically indicated.
- Pay careful attention to the values selected to define the desired level of image quality (eg, Noise Index, Quality Reference mAs, Standard Deviation).
- Each manufacturer will have recommendations unique to their systems and system features. Be sure to work with your CT equipment manufacturer and a qualified medical physicist to ensure safe and appropriate operation of AEC systems.
- If more than one CT localizer radiograph is acquired, AEC systems from different manufacturers can differ with respect to which one is used to determine mA and/or kV settings. Please refer to individual manufacturer protocol instructions.
- If iterative reconstruction is available, it should be used as a dose reduction technique when possible, given the underlying indication.

The disclaimer on page 1 is an integral part of this document.

- The AAPM has released a position statement counseling against the use of Bismuth Shields to reduce breast, eye or thyroid dose in CT[1].
- Alternative methods such as organ-based tube current modulation and an overall reduction in tube current are recommended, as they achieve the same dose reduction.
- Dose Reference Levels (DRLs) are broad indicators of patient doses compiled for a standard patient and diagnostic task, across a multitude of scanner manufacturers. DRLs were developed as guidelines for the process of protocol development and dose reduction[2, 3].
- In Annex B of the 2013 report titled "Sources, effects and risks of ionizing radiation", UNSCEAR[4] discusses the effects of radiation exposure of children. This publication presents scientific findings on the risk of cancer induction in children, which can be higher, the same or lower than adults, depending on several factors.

References:

[1] PP 26-A, Use of Bismuth Shielding for the Purpose of Dose Reduction in CT Scanning, 2/7/2012.
[2] Diagnostic reference ranges and the American College of Radiology Dose Index Registry: the pediatric experience. Goske MJ. Pediatr Radiol. 2014 Oct; 44 Suppl 3:506-10
[3] Strauss KJ, Goske M, Towbin AJ, et al. Pediatric chest CT diagnostic reference ranges: development and application. Radiology (online ahead of print: http://pubs.rsna.org/doi/pdf/10.1148/radiol.2017161530)
[4] http://www.unscear.org/unscear/en/publications/2013_2.html

CTDI measurements and calculations

- Some manufacturers utilize a z-axis “flying focal spot”, in which two unique projections are acquired at the same z-axis table position. When this technique is used, we identify it with **. The CTDIvol on the console accurately accounts for use of this feature.

Volume scanning

- With the introduction of wide detectors, new scanning options are possible which can decrease radiation dose and time.
- With these scanner configurations, some artifacts such as cone-beam artifacts and motion artifacts are more prevalent.

Axial CT protocols

- AEC is preferred for pediatric chest but in some cases a manual technique chart may be appropriate. The Image Gently website provides guidance on axial techniques http://www.imagegently.org/Procedures/Interventional-Radiology/Protocols.
- Manufacturers may provide manual mA values if they are available.
- AEC values may also require different quality parameters for different patient sizes.
- When using AEC in pediatric chest scans, it should be noted that due to the smaller body habitus and smaller voxel size, some anatomy might be difficult to visualize

Approximate Volume CT Dose Index (CTDIvol) Ranges

Average Age	CTDI-vol (mGy) 32 cm CTDI phantom
<1	1.9-2.5
1-5 y	2.4-3.4
5-10 y	2.7-4.3
10-15 y	3.5-5.7
>15 y	5.2-8.8

The approximate CTDIvol ranges are for reference only and represent a dose to the CT Dose Index phantom under very specific conditions. The CTDIvol displayed on the scanner for a patient of a given size should be similar, but not necessarily an exact match, to those listed above.

CTDIvol ranges are provided for the pediatric categories listed in Table 1 below. The effective diameter is the diameter of a circle with the same area as the patient cross section, which does not commonly approximate a circle. It is calculated as $\sqrt{AP \times LAT}$ and used in the calculation of Size-Specific Dose Estimates (SSDE)[+]. This methodology estimates patient dose based on the CTDIvol and patient size and is therefore very pertinent to pediatric CT. The AP and LAT dimensions should be measured at the "xiphoid process, one slice below the image containing visible sternal bone"*.

Table 1. Pediatric categories used to report CTDIvol and protocol parameters

Average Age	AP* (cm)	Lat[#] (cm)	Effective Diameter[+] (cm)	Average Weight[#] (kg)
<1	7 - 10	7 - 11	7 - 10	2.5-12.2
1-5 y	11 - 13	12 - 18	11 - 15	8.1-23.8
5-10 y	14 - 16	19 - 23	16 - 19	14.7-45.6
10-15 y	17 - 20	24 - 28	20 - 23	24.9-78.3
>15 y	21 - 23	29 - 33	24 - 27	40.5-95.7

The provided values are all based on the 32 cm diameter CTDI phantom, which is the new international standard for all body CTDIvol measurements in the body region [International Electrotechnical Commission (IEC). Medical Electrical Equipment. Part 2-44: Particular requirements for the safety of x-ray equipment for computed tomography. IEC publication No. 60601-2-44: 2009+AMD1:2012 CSV
Consolidated version. Ed. 3. International Electrotechnical Commission (IEC) Central Office: Geneva, Switzerland, 2012.].

It is important to note which phantom CTDIvol is referencing, as it could result in a factor of 2 over- or under-dose estimate. The software on older units might report the CTDIvol for the 16 cm phantom. If this is the case, divide by approximately 2 for an estimate of what the CTDIvol would be for the 32 cm diameter CTDI phantom.

It is essential that users recognize that the CTDIvol values reported on the user console prior to acquiring CT localizer radiographs on a particular patient do not represent the CTDIvol that will be delivered during that patient's scan. CT systems rely on the CT localizer radiograph to 1) estimate the patient's size, 2) determine the tube current settings for each tube angle and table position that will

yield the requested level of image quality, and 3) calculate the average CTDIvol for the patient over the prescribed scan range. Until the CT localizer radiograph is acquired, the reported CTDIvol is not patient-specific, but is based on a generic patient size.

The CTDIvol value ranges in the table are approximate, and are intended only to provide reference ranges for the user to consider. The task group analyzed CTDIvol values provided by the vendors and representative hospitals. From this aggregate data, the arithmetic mean of the minimum CTDIvol values provided and the mean of the maximum CTDIvol values are presented as the ranges below. The lower part of the range corresponds to CTDIvol values typically found in dedicated pediatric hospitals, whereas the upper range would be more appropriate/suited for general community hospitals. Radiologist preference and training will also impact the choice of CTDIvol. These CTDIvol values are for a routine CT of a pediatric chest for the general indications given at the beginning of this document. Other indications or diagnostic tasks may have different image quality and dose requirements, and hence reasonable ranges of CTDIvol may differ according to those requirements.

References:

Image Gently Pediatric CT Protocols and Instructions 2014

* P. L. Kleinman, K. J. Strauss, D. Zurakowski, K. S. Buckley, and G. A. Taylor. Patient Size Measured on CT Images as a Function of Age at a Tertiary Care Children's Hospital. *American Journal of Roentgenology.* 194(6): 1611-1619, 2010. DOI:10.2214/AJR.09.3771

Clinical Growth Charts Centers for Disease Control and Prevention, 2009. Web. Jan. 2016. http://www.cdc.gov/growthcharts/clinical_charts.htm 5th to 95th percentiles.

+ Task Group Task Group 204. Size-specific dose estimates (SSDE) in pediatric and adult body CT examinations. Technical Report 204, American Association of Physicists in Medicine, 2011. https://www.aapm.org/pubs/reports/RPT_204.pdf

INDEX OF ROUTINE PEDIATRIC CHEST PROTOCOLS (by manufacturer)

PEDIATRIC CHEST ROUTINE (Selected GE scanners)

(Back to INDEX)

SCOUT: Scan from top of shoulder through mid-liver, if AEC is used. PA scout if manual mA is used.

GE		Optima CT 520	Optima CT 540	EVO (ASIR)	EVO (ASIRV)
Scan Type		Helical	Helical	Helical	Helical
Rotation Time (s)	7-11 cm: 12-33 cm:	0.8 0.8	0.5 0.5	0.4 0.6	0.4 0.6
Beam Collimation (mm)	7-11 cm: 12-33 cm:	20 20	20 20	20 40	20 40
Pitch		1.375	1.375	1.375	1.375
Speed (mm/rot)		20 mm: 27.5 40 mm: N/A	20 mm: 27.5 40 mm: N/A	20 mm: 27.5 40 mm: 55	20 mm: 27.5 40 mm: 55
kV		120	120	120	120
Manual mA range	7-11 cm: 12-18 cm: 19-23 cm: 24-28 cm: 29-33 cm:	70-80 DR* 55 DR 70-75 DR 80 DR 85 DR	70-80 DR 55 DR 70-75 DR 80 DR 85 DR	55-85 65-70 75 85 90	50-70 55-60 65 70 80
Noise Index, NI (min mA – max mA)	7-11 cm: 12-18 cm: 19-23 cm: 24-28 cm: 29-33 cm:	10.8 (32-170) 12.4 (40-200) 12.7 (42-240) 14.3 (55-360) 14.6 (70-430)	10.8 (32-170) 12.4 (40-200) 12.7 (42-240) 14.3 (55-360) 14.6 (70-430)	10.8 (32-170) 12.4 (40-200) 12.7 (42-240) 14.3 (55-360) 14.6 (70-430)	10.8 (32-170) 12.4 (40-200) 12.7 (42-240) 14.3 (55-360) 14.6 (70-430)
SFOV	7-11 cm: 12-23 cm: 24-33 cm:	Small Large Large	Small Large Large	PedBody SmallBody LargeBody	PedBody SmallBody LargeBody

RECON 1

Series Description		Mediastinum	Mediastinum	Mediastinum	Mediastinum
Plane		Axial	Axial	Axial	Axial
Algorithm		Standard	Standard	Standard Plus	Standard Plus
Recon Mode		Full	Full	Full	Full
Thickness and Interval (mm)	7-11 cm:	3.75	3.75	3.75	3.75
	12-33 cm:	5	5	5	5
ASiR		40%	None	30%	40% ASIRV

RECON 2

Series Description		Lung	Lung	Lung	Lung
Plane		Axial	Axial	Axial	Axial
Algorithm		Lung	Lung	Lung	Lung
Recon Mode		Full	Full	Full	Full
Thickness and Interval (mm)	7-11 cm:	2.5	2.5	2.5	2.5
	12-33 cm:	2.5	2.5	2.5	2.5
ASiR		40%	None	30%	40% ASIRV

Lateral dimensions (cm)	Approx. Weight (kg)	Approx. Weight (lbs)	CTDI-vol (mGy) 32 cm CTDI phantom**
7-11	6	13	1.9-2.5
12-18	12	27	2.4-3.4
19-23	18	40	2.7-4.3
24-28	32	71	3.5-5.7
29-33	54	119	5.2-8.8

*DR = Dose Reduction Guidance available on select scanners
**To convert this CTDIvol to an estimate for the 16 cm phantom, multiply by 2

PEDIATRIC CHEST ROUTINE (Selected GE scanners)

(Back to INDEX)

SCOUT: Scan from top of shoulder through mid-liver, if AEC is used. PA scout if manual mA is used.

GE		Optima CT660	LightSpeed VCT	Discovery CT750 HD	Revolution CT
Scan Type		Helical	Helical	Helical	Axial
Rotation Time (s)	7-11 cm:	0.4	0.4	0.4	0.28
	23-28 cm:	0.6	0.4	0.4	0.35
	29-33 cm:	0.6	0.4	0.4	0.5
Beam Collimation (mm)	7-11 cm:	20	20	20	80
	12-33 cm:	40	40	40	80
Pitch		1.375	1.375	1.375	N/A
Speed (mm/rot)		20 mm: 27.5 40 mm: 55	20 mm: 27.5 40 mm: 55	20 mm: 27.5 40 mm: 55	80 mm: N/A
kV		120	See below: kV, mA	See below: kV, mA	See below: kV, mA
Manual mA range	7-11 cm:	55-85	100 kV, 55-85 mA	100 kV, 120 mA	70 kV, 135 mA
	12-18 cm:	65-70	100 kV, 65-70 mA	120 kV, 90 mA	100 kV, 150 mA
	19-23 cm:	75	100 kV, 75 mA	120 kV, 110 mA	100 kV, 170 mA
	24-28 cm:	85	120 kV, 80 mA	120 kV, 120 mA	120 kV, 175 mA
	29-33 cm:	90	120 kV, 90 mA	120 kV, 130 mA	120 kV, 190 mA
Noise Index, NI (min mA – max mA)	7-11 cm:	10.8 (32-170)	10.8 (32-170)	10.8 (32-170)	10.8 (32-170)
	12-18 cm:	12.4 (40-200)	12.4 (40-200)	12.4 (40-200)	12.4 (40-200)
	19-23 cm:	12.7 (42-240)	12.7 (42-240)	12.7 (42-240)	12.7 (42-240)
	24-28 cm:	14.3 (55-360)	14.3 (55-360)	14.3 (55-360)	14.3 (55-360)
	29-33 cm:	14.6 (70-430)	14.6 (70-430)	14.6 (70-430)	14.6 (70-430)
SFOV	7-11 cm:	PedBody	PedBody	PedBody	PedBody
	12-23 cm:	SmallBody	SmallBody	SmallBody	SmallBody
	24-33 cm:	LargeBody	LargeBody	LargeBody	LargeBody

RECON 1

Series Description		Mediastinum	Mediastinum	Mediastinum	Mediastinum
Plane		Axial	Axial	Axial	Axial
Algorithm		Standard	Standard	Standard Plus	Standard Plus
Recon Mode		Full	Full	Full	Full
Thickness and Interval (mm)	7-11 cm:	3.75	3.75	3.75	2.5
	12-33 cm:	5	5	5	2.5
ASiR		30%	30%	None	50% ASIRV

RECON 2

Series Description		Lung	Lung	Lung	Lung
Plane		Axial	Axial	Axial	Axial
Algorithm		Lung	Lung	Lung	Lung
Recon Mode		Full	Full	Full	Full
Thickness and Interval (mm)	7-11 cm:	2.5	2.5	2.5	2.5
	12-33 cm:	2.5	2.5	2.5	2.5
ASiR		30%	30%	None	50% ASIRV

Lateral dimensions (cm)	Approx. Weight (kg)	Approx. Weight (lbs)	CTDI-vol (mGy) 32 cm CTDI phantom**
7-11	6	13	1.9-2.5
12-18	12	27	2.4-3.4
19-23	18	40	2.7-4.3
24-28	32	71	3.5-5.7
29-33	54	119	5.2-8.8

*To convert this CTDIvol to an estimate for the 16 cm phantom, multiply by 2

The disclaimer on page 1 is an integral part of this document.

PEDIATRIC CHEST ROUTINE (selected HITACHI scanners)

(Back to INDEX)

SCANOGRAM: PA and lateral; scan top of lungs to base of lungs.

HITACHI		CXR4	ECLOS 16
Scan Type		Volume	Volume
Rotation Time (s)		0.8	0.8
Detector Configuration		4 x 1.25 mm	16 x 1.25 mm
Pitch		1.75	1.1
Speed (mm/rot)		8.75	21.25
kVp		100	100
mA	100	10-75	10-75
	125	25-100	25-100
	150	25-125	25-125
	175	50-150	50-150
	250	50-200	50-200
Adaptive mA/IntelliEC		NA	SD 19.5
SFOV (mm)		50	50

RECON 1

Series Description	Mediastinum	Mediastinum
Type	Axial	Axial
Filter	4	32
Slice Thickness (mm)	2.5	2.5
Interval (mm)	2.5	2.5

RECON 2

Series Description	Lung	Lung
Type	Axial	Axial
Filter	9	22
Thickness (mm)	2.5	2.5
Interval (mm)	2.5	2.5

Lateral dimensions (cm)	Approx. Weight (kg)	Approx. Weight (lbs)	CTDI-vol (mGy) 32 cm CTDI phantom*
7-11	6	13	1.9-2.5
12-18	12	27	2.4-3.4
19-23	18	40	2.7-4.3
24-28	32	71	3.5-5.7
29-33	54	119	5.2-8.8

*To convert this CTDIvol to an estimate for the 16 cm phantom, multiply by 2

Additional reconstructions may be needed based on the clinical indication.

PEDIATRIC CHEST ROUTINE (selected HITACHI scanners)

(Back to INDEX)

SCANOGRAM: PA and lateral; scan top of lungs to base of lungs.

HITACHI		Supria 16	Supria 16^{IR}	Scenaria 64	Scenaria 64^{IR}
Scan Type		Volume	Volume	Volume	Volume
Rotation Time (s)		0.75	0.75	0.5	0.5
Detector Configuration		16 x 1.25 mm	16 x 1.25 mm	64 x 0.625 mm	64 x 0.625 mm
Pitch		1.1	1.1	1.1	1.1
Speed (mm/rot)		21.25	21.25	42.5	42.5
kVp		100	100	100	100
mA	25-115	15-65	30-125	5-70	5-70
	30-125	15-70	25-150	20-85	20-85
	35-150	20-85	50-200	25-100	25-100
	45-175	25-100	55-225	30-130	30-130
	60-250	30-145	80-325	40-175	40-175
Adaptive mA/IntelliEC		SD 16.9	SD 20	SD 20.8	SD 24.3
SFOV (mm)		50	50	50	50

RECON 1

Series Description	Mediastinum	Mediastinum	Mediastinum	Mediastinum
Type	Axial	Axial	Axial	Axial
Filter	32C	32 Level 3 IIP	32C	32 Level 3 IIP
Slice Thickness (mm)	2.5	2.5	2.5	2.5
Interval (mm)	2.5	2.5	2.5	2.5

RECON 2

Series Description	Lung	Lung	Lung	Lung
Type	Axial	Axial	Axial	Axial
Filter	22C	22C	22C	22C
Thickness (mm)	2.5	2.5	2.5	2.5
Interval (mm)	2.5	2.5	2.5	2.5

Lateral dimensions (cm)	Approx. Weight (kg)	Approx. Weight (lbs)	CTDI-vol (mGy) 32 cm CTDI phantom*
7-11	6	13	1.9-2.5
12-18	12	27	2.4-3.4
19-23	18	40	2.7-4.3
24-28	32	71	3.5-5.7
29-33	54	119	5.2-8.8

^{IR} = Iterative Reconstruction
*To convert this CTDIvol to an estimate for the 16 cm phantom, multiply by 2

Additional reconstructions may be needed based on the clinical indication.

PEDIATRIC CHEST ROUTINE (selected NEUSOFT scanners)

(Back to INDEX)

SURVIEW: PA & LAT recommended. Top of lungs through the bottom of lungs.

NV16 surview: 7-28 cm lateral dimension 40 mA, 90 kV
NV16 surview: 29-33 cm lateral dimension 40 mA, 120 kV
NV 64 surview: 7-28 cm lateral dimension 10 mA, 100 kV
NV 64 surview: 29-33c m lateral dimension 40 mA, 120 kV
NV128 surview: 7-28 cm lateral dimension 10 mA, 100 kV
NV128 surview; 29-33 cm lateral dimension 40 mA, 120 kV

NEUSOFT		NeuViz 128	NeuViz64i/e with ClearView	NeuViz 16
Scan Type		Helical	Helical	Helical
Rotation Time (s)		0.5	0.5	0.6
Detector Configuration		128 x 0.625 mm*	64 x 0.625 mm*	16 x 1.5 mm
kVp		80/100	100/120*	120
Speed (mm/rot)		48	24	24.2
Reference mAs	7-11 cm:	50	50	50
	12-18 cm:	100	100	80
	19-23 cm:	100	100	80
	24-28 cm:	100	100	100
	29-33 cm:	150	150	140
Pitch		1.2	1.2	1.0069
FOV (mm)		180-350	180-350	180-350
Resolution		High/STD	STD	STD
Dose Modulation		O-DOSE	O-DOSE	Dose Right

RECON 1

Series Description	Mediastinum	Mediastinum	Mediastinum
Type	Axial	Axial	Axial
Filter	F20	F20	SB
Thickness (mm)	3	3	3
Increment (mm)	3	3	3
ClearView	20%	20%	N/A

RECON 2

Series Description	Lung	Lung	Lung
Type	Axial	Axial	Axial
Filter	Lung20	Lung20	Lung B
Thickness (mm)	3	3	3
Interval (mm)	3	3	3
ClearView	20%	20%	N/A

A z-axis “flying focal spot” is utilized, in which two unique projections are acquired at the same z-axis table position. When this technique is used, we identify the collimation with *. The CTDIvol on the console accurately accounts for use of this feature.

Lateral dimensions (cm)	Approx. Weight (kg)	Approx. Weight (lbs)	CTDI-vol (mGy) 32 cm CTDI phantom**
7-11	6	13	1.9-2.5
12-18	12	27	2.4-3.4
19-23	18	40	2.7-4.3
24-28	32	71	3.5-5.7
29-33	54	119	5.2-8.8

**To convert this CTDIvol to an estimate for the 16 cm phantom, multiply by 2

PEDIATRIC CHEST ROUTINE (selected PHILIPS scanners)

(Back to INDEX)

SURVIEW: PA, scan from top of shoulder through mid-liver.

PHILIPS		Brilliance 16 slice	Brilliance 64 ch with iPatient	Ingenuity CT with iPatient	Brilliance iCT SP with iPatient	Brilliance iCT with iPatient
Scan Type*		Chest/HR	Chest/HR	Chest/HR	Chest/HR	Chest/HR
Rotation Time (s)		0.5	0.5	0.4	0.33	0.33
Detector Configuration		16 x 1.5 mm	64 x 0.625 mm	64 x 0.625 mm	64 x 0.625 mm	128 x 0.625 mm
kV		120	100	100	100	100
Manual mAs/slice	7-11 cm:	40	75	75	75	75
	12-18 cm:	70	125	125	125	125
	19-23 cm:	70	125	125	125	125
	24-28 cm:	100	150	150	150	150
	29-33 cm:	140	225	225	225	225
AEC approach**		DRI = 22	DRI=22	DRI=22	DRI=22	DRI=22
Pitch		0.68	0.6	0.8	0.6	0.6
FOV (mm)		180-360	180-360	180-360	180-360	180-360
RECON 1						
Series Description		Mediastinum	Mediastinum	Mediastinum	Mediastinum	Mediastinum
Type		Axial	Axial	Axial	Axial	Axial
Filter		B	C	C	C	C
Thickness (mm)		3	3	3	3	3
Increment (mm)		1.5	1.5	1.5	1.5	1.5
RECON 2						
Series Description		Lung	Lung	Lung	Lung	Lung
Type		Axial	Axial	Axial	Axial	Axial
Filter		YC	YC	YC	YC	YC
Thickness (mm)		3	3	3	3	3
Interval (mm)		1.5	1.5	1.5	1.5	1.5

Lateral dimensions (cm)	Approx. Weight (kg)	Approx. Weight (lbs)	CTDI-vol (mGy) 32 cm CTDI phantom***
7-11	6	13	1.9-2.5
12-18	12	27	2.4-3.4
19-23	18	40	2.7-4.3
24-28	32	71	3.5-5.7
29-33	54	119	5.2-8.8

*Philips recommends high resolution mode for chest scans (small focal spot)
**Only recommended with iPatient. The manual technique can be used for guidance in the absence of Patient.
***To convert this CTDIvol to an estimate for the 16 cm phantom, multiply by 2

PEDIATRIC CHEST ROUTINE (selected SIEMENS scanners)

(Back to INDEX)

TOPOGRAM: PA, 512 mm, 100 kV; scan from top of shoulder through mid-liver.

SIEMENS	Emotion 16	Sensation 64	Perspective 64 / Perspective 128	Definition Dual Source‡	Definition Dual Source‡ DS
Scan type	Spiral	Spiral	Spiral	Spiral	Spiral
Rotation Time (s)	0.6	0.5	0.6	0.5	0.33
Detector Configuration	16 x 1.2 mm	24 x 1.2 mm	32 x 1.2 mm / 64 x 0.6 mm	24 x 1.2 mm	64 x 0.6
Pitch	1.5	1.4	1.4	1.4	3.0
kV	110	120	110	120	120
Quality ref. mAs[CD]	114	126	114	110	100
CARE kV	-	-	-	ON	ON
CARE Dose4D	ON	ON	ON	ON	ON
RECON 1					
Series Description	Mediastinum	Mediastinum	Mediastinum	Mediastinum	Mediastinum
Type	Axial	Axial	Axial	Axial	Axial
Filter[IR]	B41s / B60s	B30f / B60f	B41s / B60s	B30f / B60f	B30f / B60f
Slice (mm)	3.0	3.0	3.0	3.0	3.0
Increment (mm)	3.0	3.0	3.0	3.0	3.0
RECON 2					
Series Description	Lung	Lung	Lung	Lung	Lung
Type	Axial	Axial	Axial	Axial	Axial
Filter[IR]	B41s / B60s	B30f / B60f	B41s / B60s	B30f / B60f	B30f / B60f
Thickness (mm)	1.5	1.5	1.5	1.5	1.5
Interval (mm)	1.0	1.0	1.0	1.0	1.0

ADDITIONAL RECONSTRUCTIONS MAY BE NEEDED BASED ON THE CLINICAL INDICATION.

Lateral dimensions (cm)	Approx. Weight (kg)	Approx. Weight (lbs)	CTDI-vol (mGy) 32 cm CTDI phantom*
7-11	6	13	1.9-2.5
12-18	12	27	2.4-3.4
19-23	18	40	2.7-4.3
24-28	32	71	3.5-5.7
29-33	54	119	5.2-8.8

‡ Dual Source capable scanners
[DS] Dual Source high pitch mode
[CD] Automatic exposure control (CareDose) modulation curves are at an *average* strength by default.
[CV] Automatic kV control should be adjusted based on intended application (eg. soft tissue, soft tissue + contrast, contrast only (CTA))
[IR] Iterative reconstruction (SAFIRE/ADMIRE) default settings are set to *3*.
*To convert this CTDIvol to an estimate for the 16 cm phantom, multiply by 2

PEDIATRIC CHEST ROUTINE (selected SIEMENS scanners)

(Back to INDEX)

TOPOGRAM: PA, 512 mm, 100 kV; scan from top of shoulder through mid-liver.

SIEMENS	Definition AS+/ Edge (128-slice)	Definition Flash Dual source (128-slice) ‡	Definition Flash Dual source (128-slice) ‡ DS	Somatom Force Dual source (192-slice) ‡	Somatom Force Dual source (192-slice) ‡ DS
Scan type	Spiral	Spiral	Spiral	Spiral	Spiral
Rotation time (s)	0.5	0.5	0.285	0.5	0.25
Detector Configuration	32 x 1.2 mm	32 x 1.2 mm	64 x 0.6 (128 x 0.6) FS	96 x 0.6 mm	96 x 0.6 (192 x 0.6) FS
Pitch	1.4	1.4	3.0	1.4	1.9
kV	100	100	120 | 120 DS	100	100 | 100 DS
Quality ref. mAs CD	155	155	112	62	64
CARE Dose4D	ON	ON	ON	ON	ON
CARE kV	ON	ON	ON	ON	ON
RECON 1					
Series Description	Mediastinum	Mediastinum	Mediastinum	Mediastinum	Mediastinum
Type	Axial	Axial	Axial	Axial	Axial
Filter IR	B30f	B30f	B30f	Br40	Br40
Slice (mm)	3.0	3.0	3.0	3.0	3.0
Increment (mm)	3.0	3.0	3.0	3.0	3.0
RECON 2					
Series Description	Lung	Lung	Lung	Lung	Lung
Type	Axial	Axial	Axial	Axial	Axial
Filter IR	B60f	B60f	B60f	Bl57	Bl57
Thickness (mm)	3.0	3.0	3.0	3.0	3.0
Interval (mm)	3.0	3.0	3.0	3.0	3.0

ADDITIONAL RECONSTRUCTIONS MAY BE NEEDED BASED ON THE CLINICAL INDICATION.

Lateral dimensions (cm)	Approx. Weight (kg)	Approx. Weight (lbs)	CTDI-vol (mGy) 32 cm CTDI phantom*
7-11	6	13	1.9-2.5
12-18	12	27	2.4-3.4
19-23	18	40	2.7-4.3
24-28	32	71	3.5-5.7
29-33	54	119	5.2-8.8

‡ Dual Source capable scanners
DS Dual Source high pitch mode
FS Optimized double z-sampling through periodic motion of the Focal Spot
CD Automatic exposure modulation (CareDose) curves are at an *average* strength by default.
CV Automatic kV control should be adjusted based on intended application (eg. soft tissue, soft tissue + contrast, contrast only (CTA))
IR Iterative reconstruction (SAFIRE/ADMIRE) default settings are set to *3*.
*To convert this CTDIvol to an estimate for the 16 cm phantom, multiply by 2

PEDIATRIC CHEST ROUTINE (selected TOSHIBA scanners)

(Back to INDEX)

SCANOGRAM: Above shoulders to below liver.
7-13 cm lateral dimension: 30 AP mA, 30 Lat mA, 80 kV, 200 mm range
14-16 cm lateral dimension: 30 AP mA, 30 Lat mA, 100 kV, 300 mm range
17-22 cm lateral dimension 30 AP mA, 30 Lat mA, 100 kV, 350 mm range
23-27 cm lateral dimension: 30 AP mA, 30 Lat mA, 120 kV, 500 mm range
28-32 cm lateral dimension: 50 AP mA, 50 Lat mA, 120 kV, 500 mm range

TOSHIBA		Aq RXL	Aq 32	Aq 64
Scan Type		Helical	Helical	Helical
Rotation Time (s)		0.5	0.5	0.5
Detector Configuration		16 x 0.5 mm	32 x 0.5 mm	64 x 0.5 mm
Pitch		Standard (0.938)	Standard (0.844)	Standard (0.828)
Speed (mm/rot)		7.5	13.5	26.4
SURE Exposure approach	7-11 cm:	80 kV	5 SD	30-150 mA
	12-18 cm:	80 kV	5 SD	30-150 mA
	19-23 cm:	100 kV	7.5 SD	40-200 mA
	24-28 cm:	100 kV	10 SD	50-300 mA
	29-33 cm:	120 kV	12.5 SD	60-400 mA
AIDR 3D		AIDR 3D	AIDR 3D	AIDR 3D
Scan FOV		S (240 mm) or M (320 mm)	S (240 mm) or M (320 mm)	S (240 mm) or M (320 mm)

RECON 1

Series Description	Mediastinum	Mediastinum	Mediastinum
Type	Axial	Axial	Axial
SURE IQ*	Ped Body	Ped Body	Ped Body
Thickness (mm)	3	3	3
Interval (mm)	3	3	3

RECON 2

Series Description	Lung	Lung	Lung
Type	Axial	Axial	Axial
SURE IQ*	Ped Lung	Ped Lung	Ped Lung
Thickness (mm)	3	3	3
Interval (mm)	3	3	3

ADDITIONAL RECONSTRUCTIONS MAY BE NEEDED BASED ON THE CLINICAL INDICATION.

*The SURE IQ setting determines the reconstruction FC as well as other post-processing and reconstruction options, such as AIDR. The SURE IQ settings listed here refer to the manufacturer default settings.

Lateral dimensions (cm)	Approx. Weight (kg)	Approx. Weight (lbs)	CTDI-vol (mGy) 32 cm CTDI phantom**
7-11	6	13	1.9-2.5
12-18	12	27	2.4-3.4
19-23	18	40	2.7-4.3
24-28	32	71	3.5-5.7
29-33	54	119	5.2-8.8

**To convert this CTDIvol to an estimate for the 16 cm phantom, multiply 2

PEDIATRIC CHEST ROUTINE (selected TOSHIBA scanners)

(Back to INDEX)

SCANOGRAM: Above shoulders to below liver.
7-13 cm lateral dimension: 30 AP mA, 30 Lat mA, 80 kV, 200 mm range
14-16 cm lateral dimension: 30 AP mA, 30 Lat mA, 100 kV, 300 mm range
17-22 cm lateral dimension 30 AP mA, 30 Lat mA, 100 kV, 350 mm range
23-27 cm lateral dimension: 30 AP mA, 30 Lat mA, 120 kV, 500 mm range
28-32 cm lateral dimension: 50 AP mA, 50 Lat mA, 120 kV, 500 mm range

TOSHIBA		Aq PRIME	Aq ONE Premium	Aq ONE/ ONE Vision	Aq ONE/ ONE Vision
Scan Type		Helical	Helical	Volume / Helical	Volume / Helical
Rotation Time (s)		0.5	0.5	0.35	0.275
Detector Configuration		80 x 0.5 mm	80 x 0.5 mm	320 x 0.5 mm / 80 x 0.5 mm	320 x 0.5 mm / 80 x 0.5 mm
Pitch		Standard (0.813)	Standard (0.813)	None / 0.813	None / 0.813
Speed (mm/rot)		32.5	32.5	None / 32.5	None / 32.5
SURE Exposure approach	7-11 cm:	80 kV	5 SD	30-150 mA	
	12-18 cm:	80 kV	5 SD	30-150 mA	
	19-23 cm:	100 kV	7.5 SD	40-200 mA	
	24-28 cm:	100 kV	10 SD	50-300 mA	
	29-33 cm:	120 kV	12.5 SD	60-400 mA	
AIDR 3D		AIDR 3D	AIDR 3D	AIDR 3D	AIDR 3D
Scan FOV		S (240 mm) or M (320 mm)	S (240 mm) or M (320 mm)	S (240 mm) or M (320 mm)	S (240 mm) or M (320 mm)

RECON 1

Series Description	Mediastinum	Mediastinum	Mediastinum	Mediastinum
Type	Axial	Axial	Axial	Axial
SURE IQ*	Ped Body	Ped Body	Ped Body	Ped Body
Thickness (mm)	3	3	3	3
Interval (mm)	3	3	3	3

RECON 2

Series Description	Lung	Lung	Lung	Lung
Type	Axial	Axial	Axial	Axial
SURE IQ*	Ped Lung	Ped Lung	Ped Lung	Ped Lung
Thickness (mm)	3	3	3	3
Interval (mm)	3	3	3	3

ADDITIONAL RECONSTRUCTIONS MAY BE NEEDED BASED ON THE CLINICAL INDICATION.

*The SURE IQ setting determines the reconstruction FC as well as other post-processing and reconstruction options, such as AIDR. The SURE IQ settings listed here refer to the manufacturer default settings.

Lateral dimensions (cm)	Approx. Weight (kg)	Approx. Weight (lbs)	CTDI-vol (mGy) 32 cm CTDI phantom**
7-11	6	13	1.9-2.5
12-18	12	27	2.4-3.4
19-23	18	40	2.7-4.3
24-28	32	71	3.5-5.7
29-33	54	119	5.2-8.8

**To convert this CTDIvol to an estimate for the 16 cm phantom, multiply 2