
American College of Radiology

**Dose Index Registry
(DIR)**

Measures

March 21, 2014

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Measures

Normalized Volume Computed Tomography Dose Index (CTDI _{vol})	
<u>Data Elements</u>	<u>Clinical Performance measure</u>
<p>Per <u>scan</u></p> <ul style="list-style-type: none"> • Mean CTDI_{vol} (TID 10013) • CTDI_w Phantom Type (TID10013) • Study Description (0008,1030) • Acquisition Protocol (TID 10013) 	<p>Measures: Median, 25th, and 75th percentile values of Normalized CTDI_{vol} per scan for each exam name (for example, CT HEAD BRAIN WO IVCON, CT ABDOMEN PELVIS W IVCON).</p> <p><u>Normalized CTDI_{vol} per scan</u></p> <p>Mean CTDI_{vol} for the highest-dose irradiation event across all irradiation events for an exam excluding the timing runs,^a normalized for phantom size^b.</p>
<p>Per <u>exam</u></p> <ul style="list-style-type: none"> • Mean CTDI_{vol} (TID 10013) • CTDI_w Phantom Type (TID10013) • Study Description (0008,1030) • Acquisition Protocol (TID 10013) 	<p>Measures: Median, 25th, and 75th percentile values of Normalized CTDI_{vol} per exam for each exam name (for example, CT HEAD BRAIN WO IVCON, CT ABDOMEN PELVIS W IVCON).</p> <p><u>Normalized CTDI_{vol} per exam</u></p> <p>Sum of the mean CTDI_{vol} across all irradiation events for an exam excluding the timing runs,^a normalized for phantom size^b.</p>

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Normalized CT Dose Length Product (DLP)	
<u>Data Elements</u>	<u>Clinical Performance measure</u>
<p>Per <u>scan</u></p> <ul style="list-style-type: none"> • DLP (TID 10013) • CTDI_w Phantom Type (TID10013) • Study Description (0008,1030) • Acquisition Protocol (TID 10013) 	<p>Measures: Median, 25th, and 75th percentile values of Normalized CT DLP per scan for each exam name (for example, CT HEAD BRAIN WO IVCON, CT ABDOMEN PELVIS W IVCON).</p> <p><u>Normalized CT DLP per scan</u></p> <p>DLP for the highest-dose irradiation event across all irradiation events in a single exam, excluding timing runs,^a normalized for phantom size^b.</p>
<p>Per <u>exam</u></p> <ul style="list-style-type: none"> • DLP (TID 10013) • CTDI_w Phantom Type (TID10013) • Study Description (0008,1030) • Acquisition Protocol (TID 10013) 	<p>Measures: Median, 25th, and 75th percentile values of Normalized CT DLP per exam for each exam name (for example, CT HEAD BRAIN WO IVCON, CT ABDOMEN PELVIS W IVCON).</p> <p><u>Normalized CT DLP per exam</u></p> <p>Sum of DLP across all irradiation events for an exam excluding the timing runs,^a normalized for phantom size^b.</p>

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Normalized Size Specific Dose Estimate (SSDE)	
<p>Per <u>scan</u>, Body exams only</p> <ul style="list-style-type: none"> • Normalized CTDI_{vol} of each scan • Effective Diameter^c <p>OR</p> <ul style="list-style-type: none"> • Patient thickness and orientation calculated from localizer images 	<p>Measures: Median, 25th, and 75th percentile values of SSDE per scan for each exam name (for example, CT HEAD BRAIN WO IVCON, CT ABDOMEN PELVIS W IVCON).</p> <p><u>SSDE per scan</u></p> <p>SSDE that corresponds to CTDI_{vol} per scan, or highest dose scan for an exam excluding the timing runs,^a normalized for phantom size,^b and applying the correction factor^c (CF) appropriate for 32cm phantom per AAPM TG 204.</p>
<p>Per <u>exam</u>, Body exams only</p> <ul style="list-style-type: none"> • Normalized CTDI_{vol} of each scan • Effective Diameter^c <p>OR</p> <ul style="list-style-type: none"> • Patient thickness and orientation calculated from localizer images 	<p>Measures: Median, 25th, and 75th percentile values of SSDE per exam for each exam name (for example, CT HEAD BRAIN WO IVCON, CT ABDOMEN PELVIS W IVCON)</p> <p><u>SSDE per exam</u></p> <p>Sum of SSDE across all irradiation events for an exam excluding the timing runs,^a normalized for phantom size^b and applying the correction factor^c (CF) appropriate for 32cm phantom per AAPM TG 204.</p>

^a An irradiation event is identified as a timing run IF:

- Acquisition Protocol contains one of the following:
 - Monitoring
 - PreMonitoring
 - TestBolus
- If mean CTDI_{vol} > DLP AND either of the following are true:
 - Shortname contains (“W IVCON” or “WO & W IVCON” or “ANGIO” or “PERFUS”)

^bDose indices for head exams are normalized to a 16cm phantom, and dose indices for body exams are normalized to a 32cm phantom for comparison.

For exams involving head region, using a phantom size 32 the normalized CTDI_{vol} is obtained by multiplying the mean CTDI_{vol} and normalized DLP is obtained by multiplying the DLP by

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the conversion factor of 2.3. For head exams using a 16cm phantom, the normalized $CTDI_{vol}$ and DLP are the same as the original $CTDI_{vol}$ and DLP.

For body exams excluding with a phantom size 16, normalized $CTDI_{vol}$ and DLP are calculated by dividing the mean $CTDI_{vol}$ and DLP by a conversion factor of 2.3. For body exams using a 32cm phantom, the normalized $CTDI_{vol}$ and DLP are the same as the original $CTDI_{vol}$ and DLP.

^c From AAPM Report 204:

If AP thickness (AP) and Lateral thickness (Lat) both provided, *effective diameter (ED)* is calculated as

$$ED = a + b * (AP + Lat), \text{ where } a = -.203128, b = .4958912$$

If AP is provided but Lat is not provided then ED is calculated as

$$ED = a + b * AP + c * (AP)^2, \text{ where } a = -3.744858, b = 1.671734, \text{ and } c = -.01338955$$

If AP is not provided but Lat is provided then the ED is calculated as

$$ED = a + b * Lat + c * (Lat)^2, \text{ where } a = 5.899298, b = .3270494, \text{ and } c = .009978896$$

$$\text{Correction Factor (CF)} = x * \exp(-y * ED), \text{ where } x = 3.704369 \text{ and } y = .03671937$$

(CF calculated only for body exams)

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Appendix. List of exam names for which detailed reports were generated for the July-December 2013 period

CT ABDOMEN
CT ABDOMEN PELVIS
CT ABDOMEN PELVIS KIDNEY CALC WO IVCON
CT ABDOMEN PELVIS W IVCON
CT ABDOMEN PELVIS WO IVCON
CT ABDOMEN PELVIS WO THEN W IVCON
CT ABDOMEN W IVCON
CT C SPINE W IVCON (No SSDE)
CT C SPINE WO IVCON (No SSDE)
CT CHEST
CT CHEST ABDOMEN PELVIS W IVCON
CT CHEST ANGIO W IVCON
CT CHEST ANGIO WO THEN W IVCON
CT CHEST PULMONARY ARTERIES W IVCON
CT CHEST W IVCON
CT CHEST WO IVCON
CT HEAD (No SSDE)
CT HEAD BRAIN WO IVCON (No SSDE)
CT HEAD MAXILLOFACIAL WO IVCON (No SSDE)
CT HEAD PARANASAL SINUSES WO IVCON (No SSDE)
CT HEAD WO IVCON (No SSDE)
CT L SPINE WO IVCON
CT NECK W IVCON (No SSDE)

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References:

AAPM. Size-Specific Dose Estimates (SSDE) in Pediatric and Adult Body CT Examinations. American Association of Physicists in Medicine Report No. 204, 2011.
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AAPM. The measurement, reporting, and management of radiation dose in CT. American Association of Physicists in Medicine Report No. 96, 2008.
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<http://www.acr.org/~media/ACR/Documents/PDF/QualitySafety/NRDR/DIR/DIR%205%20Million%20Examinations%20Update.pdf>

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