

DICOM Correction Proposal

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| STATUS | Assigned |
| Date of Last Update | 2025/03/28 |
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| Submission Date | 2025/02/17 |

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| Correction Number | CP-2535 |
| Log Summary: Add new defined terms for Dose Summation Type to RT Dose Module | |
| Name of Standard | PS3.16 |
| <p>Rationale for Correction:</p> <p>For RT Doses the attribute Dose Summation Type (3004,000A) exist describing what the dose represents with possible values like PLAN, BEAM, FRACTION_SESSION, etc. This value is mandatory and does in part determine whether the Referenced RT Plan Sequence shall be included in the instance or not. Using these attributes work well when the dose relayed in the RT Dose instance is the “main” dose connected to an RT Plan.</p> <p>However, in modern Treatment Planning Systems, it is typically possible to create doses related to the “main” dose in different ways and workflows. Examples of such doses are doses calculated based on a perturbation of the patient setup, deformed doses, doses calculated on image sets other than the planning image set and more.</p> <p>Even though there are some ways to denote that an RT Dose is not the “main” planning dose by e.g. using the Spatial Transform of Dose (3004,0005) attribute or the Derivation Code Sequence (0008,9215), these are all optional attributes which existing implementations do not read. In such systems, there is a risk that the “main” RT Dose is inadvertently replaced with one of the “related” RT Doses during a transfer of information between systems. This related dose is then presented as the “main” plan dose. As an example, such errors can potentially lead to incorrect decisions being made regarding if a certain RT Plan/RT Ion Plan shall be used for treatment or not. Hence, it is not safe to produce “related” RT Doses with the existing Dose Summation Types which requires that the Referenced RT Plan Sequence is included. However, having the RT Plan reference is still valuable information for the “related” RT Doses.</p> <p>This Correction Proposal suggests introducing new defined terms for Dose Summation Type that would be possible to use safely with existing applications and allows for the presence of the Referenced RT Plan Sequence.</p> | |
| Correction Wording: | |

In PS 3.3, Section C.8.8.3. RT Dose Module update Table C.8-39 as follows:

Table C.8-39. RT Dose Module Attributes

| Attribute Name | Tag | Type | Attribute Description |
|---------------------------|-------------|------|--|
| ... | | | |
| Spatial Transform of Dose | (3004,0005) | 3 | The use of transformation in the calculation of the combined dose. |

| Attribute Name | Tag | Type | Attribute Description |
|-----------------------------|-------------|------|---|
| | | | <p>Defined Terms:</p> <p>NONE No transformation. Calculated on the original image set</p> <p>RIGID Only Rigid transform used (see definition in Section C.20.2.1.2)</p> <p>NON_RIGID Any other transform used</p> |
| ... | | | |
| Dose Summation Type | (3004,000A) | 1 | <p>Type of dose summation.</p> <p>Defined Terms:</p> <p>PLAN dose calculated for entire delivery of all fraction groups of RT Plan</p> <p>MULTI_PLAN dose calculated for entire delivery of 2 or more RT Plans</p> <p>PLAN_OVERVIEW dose calculated with respect to plan overview parameters</p> <p>FRACTION dose calculated for entire delivery of a single Fraction Group within RT Plan</p> <p>BEAM dose calculated for entire delivery of one or more Beams within RT Plan</p> <p>BRACHY dose calculated for entire delivery of one or more Brachy Application Setups within RT Plan</p> <p>FRACTION_SESSION dose calculated for a single session ("fraction") of a single Fraction Group within RT Plan</p> <p>BEAM_SESSION dose calculated for a single session ("fraction") of one or more Beams within RT Plan</p> <p>BRACHY_SESSION dose calculated for a single session ("fraction") of one or more Brachy Application Setups within RT Plan</p> <p>CONTROL_POINT dose calculated for one or more Control Points within a Beam for a single fraction</p> <p>RECORD dose calculated for RT Beams Treatment Record</p> <p>ALT PLAN <u>alternative dose calculated for entire delivery of all fraction groups of RT Plan</u></p> <p>ALT MULTI PLAN <u>alternative dose calculated for entire delivery of 2 or more RT Plans</u></p> <p>ALT BEAM <u>alternative dose calculated for entire delivery of one or more Beams within RT Plan</u></p> <p>OTHER <u>dose with unspecified dose summation</u></p> |
| Referenced RT Plan Sequence | (300C,0002) | 1C | <p>Sequence describing RT Plan associated with dose.</p> <p>Required if Dose Summation Type (3004,000A) is PLAN, MULTI_PLAN, FRACTION, BEAM, BRACHY, FRACTION_SESSION, BEAM_SESSION, BRACHY_SESSION or CONTROL_POINT, <u>ALT PLAN, ALT MULTI PLAN or ALT BEAM.</u></p> |

| Attribute Name | Tag | Type | Attribute Description |
|---|-------------|------|--|
| | | | <p>May be present if Dose Summation Type (3004,000A) is PLAN_OVERVIEW <u>or OTHER</u>.</p> <p>Only a single Item shall be included in this Sequence, unless Dose Summation Type (3004,000A) is MULTI_PLAN <u>or ALT MULTI PLAN</u>, in which case two or more Items shall be included in this Sequence. See Note 1. <u>If Dose Summation Type (3004,000A) is OTHER, one or more items might be included.</u></p> |
| ... | | | |
| >Referenced Fraction Group Sequence | (300C,0020) | 1C | <p>Sequence of one Fraction Group containing beams or brachy application setups contributing to dose.</p> <p>Required if Dose Summation Type (3004,000A) is FRACTION, BEAM, BRACHY, FRACTION_SESSION, BEAM_SESSION, BRACHY_SESSION <u>or</u> CONTROL_POINT <u>or ALT BEAM</u>.</p> <p>Only a single Item shall be included in this Sequence. See Note 1.</p> |
| >>Referenced Fraction Group Number | (300C,0022) | 1 | Uniquely identifies Fraction Group specified by Fraction Group Number (300A,0071) in Fraction Group Sequence of RT Fraction Scheme Module within RT Plan referenced in Referenced RT Plan Sequence (300C,0002). |
| >>>Referenced Beam Sequence | (300C,0004) | 1C | <p>Sequence of Beams in current Fraction Group contributing to dose. Required if Dose Summation Type (3004,000A) is BEAM, BEAM_SESSION <u>or</u> CONTROL_POINT <u>or ALT BEAM</u>.</p> <p>One or more Items shall be included in this Sequence.</p> |
| >>>>Referenced Beam Number | (300C,0006) | 1 | Uniquely identifies Beam specified by Beam Number (300A,00C0) in Beam Sequence (300A,00B0) of RT Beams Module within RT Plan referenced in Referenced RT Plan Sequence (300C,0002) or in Ion Beam Sequence (300A,03A2) of RT Ion Beams Module within RT Ion Plan referenced in Referenced RT Plan Sequence (300C,0002). |
| >>>>Referenced Control Point Sequence | (300C,00F2) | 1C | <p>Sequence defining the Control Points in current Beam contributing to dose.</p> <p>Required if Dose Summation Type (3004,000A) is CONTROL_POINT.</p> <p>Only a single Item shall be included in this Sequence.</p> |
| >>>>>Referenced Start Control Point Index | (300C,00F4) | 1 | Identifies Control Point specified by Control Point Index (300A,0112) within Beam referenced by Referenced Beam Number (300C,0006). This is the first of the two Control Points from which the Dose contribution to the Control Point can be calculated. |
| >>>>>Referenced Stop Control Point Index | (300C,00F6) | 1 | Identifies Control Point specified by Control Point Index (300A,0112) within Beam referenced by Referenced Beam Number (300C,0006). This is the second of the two Control Points from which the Dose contribution to the Control Point can be calculated. |

| Attribute Name | Tag | Type | Attribute Description |
|---|-------------|------------|--|
| | | | <p>The Control Point Index (300A,0112) referenced by Referenced</p> <p>Stop Control Point Index (300C,00F6) shall be the Control Point Index (300A,0112) immediately following the Control Point Index (300A,0112) referenced by Referenced Start Control Point Index (300C,00F4) within the Referenced Beam Number (300C,0006).</p> |
| >>Referenced Brachy Application Setup Sequence | (300C,000A) | 1C | Sequence of Brachy Application Setups in current Fraction Group contributing to dose. Required if Dose Summation Type (3004,000A) is BRACHY or BRACHY_SESSION. One or more Items shall be included in this Sequence. |
| >>>Referenced Brachy Application Setup Number | (300C,000C) | 1 | Uniquely identifies Brachy Application Setup specified by Brachy Application Setup Number (300A,0234) in Brachy Application Setup Sequence (300A,0230) of RT Brachy Application Setups Module within RT Plan referenced in Referenced RT Plan Sequence (300C,0002). |
| ... | | | |
| Derivation Code Sequence | (0008,9215) | 31C | <p>A coded description of how this dose was derived from other RT Dose and/or RT Plan objects.</p> <p>One or more Items are permitted in this Sequence. More than one Item indicates that successive derivation steps have been applied.</p> <p><u>Required if Dose Summation Type (3004,000A) is ALT PLAN, ALT MULTI PLAN, ALT BEAM . May be present otherwise.</u></p> |
| >Include Table 8.8-1 “Code Sequence Macro Attributes” | | | DCID 7220 “RT Dose Derivation”. |
| ... | | | |
| Plan Overview Sequence | (300C,0116) | 1C | <p>Parameters providing an overview of the plan used to create this RT Dose Instance.</p> <p>Required if Dose Summation Type (3004,000A) is PLAN_OVERVIEW. May be present if Dose Summation Type (3004,000A) is PLAN, MULTI_PLAN or RECORD.</p> <p>One or more Items shall be included in this Sequence if Dose Summation Type (3004,000A) is PLAN_OVERVIEW.</p> <p>Only one Item shall be included in this Sequence if Dose Summation Type (3004,000A) is PLAN or RECORD.</p> <p>Two or more Items shall be included in this Sequence if Dose Summation Type (3004,000A) is MULTI_PLAN.</p> |
| >Plan Overview Index | (300C,0117) | 1 | <p>The index of the Plan Overview within this Sequence.</p> <p>The value shall start at 1 and increase monotonically by 1.</p> |
| >RT Plan Label | (300A,0002) | 2 | User-defined label of treatment plan. |
| >Number of Fractions Included | (300C,0119) | 1C | Number of fractions of the plan included in this RT Dose Instance. |

| Attribute Name | Tag | Type | Attribute Description |
|---|-------------|------|---|
| | | | <p>Required if Dose Summation Type (3004,000A) is PLAN_OVERVIEW, PLAN or MULTI_PLAN.</p> <p>If Dose Summation Type is PLAN or MULTI_PLAN the Number of Fractions Included (300C,0119) shall equal the Number of Fractions Planned (300A,0078) of the referenced RT Plan Instance.</p> |
| >Current Fraction Number | (3008,0022) | 1C | <p>Fraction Number of the fraction included in this RT Dose Instance.</p> <p>Required if Dose Summation Type (3004,000A) is RECORD.</p> |
| >Treatment Site | (3010,0077) | 2 | A free-text label describing the anatomical treatment site. |
| >Treatment Site Code Sequence | (3010,0078) | 2 | <p>Coded description of the treatment site.</p> <p>Zero or more Items are permitted in this Sequence.</p> |
| >>Include Table 8.8-1 "Code Sequence Macro Attributes" | | | BCID 4 "Anatomic Region". |
| >>Treatment Site Modifier Code Sequence | (3010,0089) | 3 | <p>Coded description of the laterality of the treatment site.</p> <p>Only a single Item is permitted in this Sequence.</p> |
| >>>Include Table 8.8-1 "Code Sequence Macro Attributes" | | | BCID 244 "Laterality". |
| >Prescription Overview Sequence | (300C,0114) | 2 | <p>Prescription parameters for evaluation of the dose matrix.</p> <p>Zero or more Items shall be included in this Sequence.</p> |
| >>Entity Long Label | (3010,0038) | 1C | <p>Label identifying the Prescription Overview.</p> <p>For example, this may be the name of the related target ROI or the description of a Dose Reference.</p> <p>Required if Prescription Overview Sequence (300C,0114) has more than one Item. May be present otherwise.</p> |
| >>Total Prescription Dose | (300C,0115) | 1 | Prescribed total dose in Gy for all fractions for the dose type defined in Dose Type (3004,0004). |
| >>Referenced ROI Number | (3006,0084) | 3 | ROI for which the prescription parameters in this Sequence apply, specified by ROI Number (3006,0022) in the Instance referenced by Referenced Structure Set Sequence (300C,0060). |
| >Referenced Structure Set Sequence | (300C,0060) | 1C | <p>Structure Set containing structures that were used to calculate the RT Dose.</p> <p>Required if Referenced Image Sequence (0008,1140) is not present.</p> <p>Only a single Item shall be included in this Sequence.</p> |
| >>Include Table 10-11 "SOP Instance Reference Macro Attributes" | | | |
| >Referenced Image Sequence | (0008,1140) | 1C | <p>Images used to calculate the RT Dose.</p> <p>Required if Referenced Structure Set Sequence (300C,0060) is not present.</p> |

| Attribute Name | Tag | Type | Attribute Description |
|---|-----|------|---|
| | | | One or more Items shall be included in this Sequence. |
| >>Include Table 10-11 "SOP Instance Reference Macro Attributes" | | | |
| ... | | | |

Note

1. In order to prevent misrepresentation of the dose summation:
 - a. If the Dose Summation Type (3004,000A) is PLAN or ALT PLAN, then only a single Instance of RT Plan is referenced and the dose will be for the entire plan (i.e., it is not viable to combine only certain fraction groups of different plans).
 - b. If the Dose Summation Type (3004,000A) is MULTI_PLAN or ALT MULTI PLAN, then 2 or more Instances of RT Plan may be referenced. As above, each reference will be for the entire plan.
 - c. If the Dose Summation Type (3004,000A) is FRACTION or FRACTION_SESSION, then only a single Instance of RT PLAN and a single Fraction Group are referenced (i.e., component beams or brachy application setups are not referenced).