

DICOM Correction Proposal

STATUS	Letter Ballot
Date of Last Update	2025/11/10
Person Assigned	Christof Schadt
Submitter Name	Marcus Bergman – marcus.bergman@raysearchlabs.com
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Correction Number	CP-2535
Log Summary: Add new defined terms for Dose Type to RT Dose Module	
Name of Standard PS3.3, PS3.6, PS3.16	
<p>Rationale for Correction:</p> <p>For RT Doses the attribute Dose Type (3004,0004) exists describing what the dose represents. This value is mandatory but its Defined Terms do not reflect what is clinically relevant anymore. A new coded approach is added along a new Defined Term “CODED” to indicate presence of new coded concepts.</p> <p>The main motivation is that 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.</p> <p>Along with this change, also the attribute Dose Units (3004,0002) is adapted to also allow for coded values to include additional units.</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
...			
Dose Units	(3004,0002)	1	Units used to describe dose. Enumerated Values: GY Gray RELATIVE dose relative to implicit reference value CODED Unit described by code.
Dose Units Code Sequence	(gggg,ee01)	1C	Units of measurement for the Dose.

Attribute Name	Tag	Type	Attribute Description
			<p><u>Only a single Item shall be included in this Sequence.</u></p> <p><u>Required if Dose Units (3004,0002) equals CODED.</u></p> <p><u>May be present otherwise.</u></p>
<u>>Include Table 8.8-1 "Code Sequence Macro Attributes"</u>			<u>Defined CID NNN1 'Radiotherapy Dose Real World Units'</u>
Dose Type	(3004,0004)	1	<p>Type of dose.</p> <p>Defined Terms:</p> <p>PHYSICAL</p> <p>EFFECTIVE</p> <p>ERROR</p> <p><u>CODED</u></p> <p>See Section C.8.8.3.6.</p>
<u>RT Dose Interpreted Type Code Sequence</u>	<u>(gggg.ee02)</u>	<u>1C</u>	<p><u>Interpretation of the quantity represented in the dose volume.</u></p> <p><u>Required if Dose Type (3004,0004) equals CODED.</u></p> <p><u>May be present otherwise.</u></p> <p><u>Only a single Item shall be included in this Sequence.</u></p>
<u>>Include Table 8.8-1 "Code Sequence Macro Attributes"</u>			<u>Baseline CID NNN2 'Radiotherapy Dose Interpreted Type Codes'</u>
<u>>RT Dose Interpreted Type Code Modifier Sequence</u>	<u>(gggg.ee03)</u>	<u>3</u>	<p><u>Modifier of the dose interpretation type.</u></p> <p><u>One or more Items shall be included in this Sequence.</u></p>
<u>>>Include Table 8.8-1 "Code Sequence Macro Attributes"</u>			<u>Defined CID NNN3 'Radiotherapy Dose Interpreted Type Modifier Codes'</u>
<u>RT Dose Intent Code Sequence</u>	<u>(gggg.ee05)</u>	<u>1C</u>	<p><u>Intended use of the dose volume.</u></p> <p><u>Required if Dose Type (3004,0004) equals CODED.</u></p> <p><u>May be present otherwise.</u></p> <p><u>Only a single Item shall be included in this Sequence.</u></p>
<u>>Include Table 8.8-1 "Code Sequence Macro Attributes"</u>			<u>Baseline CID NNN4 'Radiotherapy Dose Intent Codes'</u>
<u>Dose Radiobiological Interpretation Sequence</u>	<u>(gggg.ee04)</u>	<u>3</u>	<p><u>Dose radiobiological interpretation of this RT Dose Instance.</u></p> <p><u>Only a single Item shall be present in this Sequence.</u></p>

Attribute Name	Tag	Type	Attribute Description
>Include Table C.36.2.1.5-1 “Radiobiological Dose Effect Description Macro Attributes”			
Spatial Transform of Dose	(3004,0005)	31C	<p>The use of transformation in the calculation of the combined dose.</p> <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> <p><u>Required if RT Dose Interpreted Type Code Modifier Sequence (gggg,ee03) contains (DCM, CCC20, Transformed). May be present otherwise.</u></p>
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><u>Required if RT Dose Interpreted Type Code Modifier Sequence (gggg,ee03) contains (DCM, CCC21, Derived). May be present otherwise.</u></p> <p>One or more Items are permitted in this Sequence. More than one Item indicates that successive derivation steps have been applied.</p>
>Include Table 8.8-1 “Code Sequence Macro Attributes”			<u>DCID 7220 “RT Dose Derivation”.</u>
...			

Add to PS3.6 Annex A, Table A-3

Table A-3 CONTEXT GROUP UID VALUES

Context UID	Context Identifier	Context Group Name
1.2.840.10008.6.1.NNN1	NNN1	Radiotherapy Dose Real World Units
1.2.840.10008.6.1.NNN2	NNN2	Radiotherapy Dose Interpreted Type Codes
1.2.840.10008.6.1.NNN3	NNN3	Radiotherapy Dose Interpreted Type Modifier Codes
1.2.840.10008.6.1.NNN4	NNN4	Radiotherapy Dose Intent Codes

In PS 3.6, section 6. Registry of DICOM Data Elements, add the following

Table 6-1. Registry of DICOM Data Elements

Tag	Name	Keyword	VR	VM	
(gggg,ee01)	Dose Unit Code Sequence	DoseUnitCodeSequence	SQ	1	
(gggg,ee02)	RT Dose Interpreted Type Code Sequence	RTDoseInterpretedTypeCodeSequence	SQ	1	
(gggg,ee03)	RT Dose Interpreted Type Code Modifier Sequence	RTDoseInterpretedTypeCodeModifierSequence	SQ	1	
(gggg,ee04)	Dose Radiobiological Interpretation Sequence	DoseRadiobiologicalInterpretationSequence	SQ	1	
(gggg,ee05)	RT Dose Intent Code Sequence	RTDoseIntentCodeSequence	SQ	1	

In PS3.16, Add to Annex D

CID NNN1 RADIOTHERAPY DOSE REAL WORLD UNITS

Context ID NNN1

Radiotherapy Dose Real World Units

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML

Type: Extensible

Version: yyyyymmdd

UID: 1.2.840.10008.6.1.NNN1

Coding Scheme Designator	Code Value	Code Meaning
UCUM	Gy	Gray
UCUM	1	no units
UCUM	Gy/s	Gray/second
UCUM	keV/um	Kiloelectronvolt/micrometer
UCUM	W/kg	Watt/kilogram

CID NNN2 RADIOTHERAPY DOSE INTERPRETED TYPE CODES

Context ID NNN2

Radiotherapy Dose Interpreted Type Codes

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML

Type: Extensible

Version: yyyyymmdd

UID: 1.2.840.10008.6.1.NNN2

Coding Scheme Designator	Code Value	Code Meaning
DCM	CCC1	Radiation Dose
DCM	CCC2	Dose Rate
MSH	D018499	Linear Energy Transfer
MSH	D012062	Relative Biological Effectiveness
DCM	CCC5	Specific Absorption Rate

CID NNN3 RADIOTHERAPY DOSE INTERPRETED TYPE MODIFIER CODES**Context ID NNN3****Radiotherapy Dose Interpreted Type Modifier Codes****Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML****Type: Extensible****Version: yyyyymmdd****UID: 1.2.840.10008.6.1.NNN3**

Coding Scheme Designator	Code Value	Code Meaning
DCM	CCC20	Spatially Transformed
DCM	CCC21	Derived

CID NNN4 RADIOTHERAPY DOSE INTENT CODES**Context ID NNN4****Radiotherapy Dose Intent Codes****Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML****Type: Extensible****Version: yyyyymmdd****UID: 1.2.840.10008.6.1.NNN4**

Coding Scheme Designator	Code Value	Code Meaning
DCM	CCC10	For treatment delivery
DCM	CCC11	For evaluation
DCM	CCC12	For verification

Add the following to the table in PS3.16, Annex D:**ANNEX D DICOM CONTROLLED TERMINOLOGY DEFINITIONS (NORMATIVE)**

Code Value	Code Meaning	Definition	Notes
CCC1	Radiation Dose	Dose deposited by ionizing radiation.	
CCC2	Dose Rate	Rate of dose deposition.	
CCC5	Specific Absorption Rate	Rate at which energy is absorbed per unit mass.	
CCC10	For treatment delivery	Dose distribution to be delivered and calculated based on an RT Plan.	

Code Value	Code Meaning	Definition	Notes
CCC11	For evaluation	Dose distribution for the evaluation of a plan, not intended for treatment delivery. E.g., the dose may have been derived by a spatial transformation or may include radiobiological effects.	
CCC12	For verification	Dose distribution used for quality assurance verification procedures, not intended for treatment delivery.	
CCC20	Spatially Transformed	Dose is spatially transformed, e.g., by deformable registration.	
CCC21	Derived	Dose is derived from another dose, e.g., by radiobiological weighting.	

For review of this CP, but to be removed before FT:

Code definitions from UMLS:

MSH	D018499	Linear Energy Transfer	Rate of energy dissipation along the path of charged particles. In radiobiology and health physics, exposure is measured in kiloelectron volts per micrometer of tissue (keV/micrometer T). See UMLS Metathesaurus Browser
MSH	D012062	Relative Biological Effectiveness	The ratio of radiation dosages required to produce identical change based on formula comparing other types of radiation with that of gamma or roentgen rays. See UMLS Metathesaurus Browser