

## DICOM Correction Proposal

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Correction Number	CP1486
Log Summary: Add RT Ion References	
Name of Standard PS3.3	
<p>In some modules, whose usage is shared amongst RT Plan and RT Ion Plan, references to the beams are only referring to the Beams Sequence in RT Plan. The IODs in this Change Proposal work in the same way for Ion treatments as for Photon Treatments on Beam level and are used accordingly. This CP clarifies, that the Beam Numbers referenced may reside in the RT Plan IOD or RT Ion Plan IOD.</p>	
Correction Wording:	

*In Part 3, section C.8.8.2 RT Image Module, add the following:*

**Table C.8-38. RT Image Module Attributes**

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	Number of samples (planes) in this image. See Section C.8.8.2.6.1 for specialization.
Photometric Interpretation	(0028,0004)	1	Specifies the intended interpretation of the pixel data. See Section C.8.8.2.6.2 for specialization.
...			
Referenced RT Plan Sequence	(300C,0002)	3	Sequence of one Class/Instance pair describing RT Plan associated with image.  Only a single item is permitted in this sequence.
<i>&gt;Include Table 10-11 "SOP Instance Reference Macro Attributes"</i>			
Referenced Beam Number	(300C,0006)	3	Uniquely identifies the corresponding N-segment treatment beam specified by Beam Number (300A,00C0) within Beam Sequence ( <b>300A,00B0</b> ) in RT Beams Module within the RT Plan referenced in Referenced RT Plan Sequence (300C,0002) <b>or the Ion Beam Sequence (300A,03A2) in the RT Ion Beams Module within the RT Ion Plan referenced in Referenced RT Plan Sequence (300C,0002).</b>

In Part 3, section C.8.8.3 RT Dose Module, add the following:

**Table C.8-39. RT Dose Module Attributes**

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002 )	1C	Number of samples (planes) in this image. See Section C.8.8.3.4.1 for specialization. Required if Pixel Data (7FE0,0010) is present.
Photometric Interpretation	(0028,0004 )	1C	Specifies the intended interpretation of the pixel data. See Section C.8.8.3.4.2 for specialization. Required if Pixel Data (7FE0,0010) is present.
..			
Dose Summation Type	(3004,000A )	1	Type of dose summation.  Defined Terms: PLAN dose calculated for entire delivery of all fraction groups of RT Plan MULTI_PLAN dose calculated for entire delivery of 2 or more RT Plans FRACTION dose calculated for entire delivery of a single Fraction Group within RT Plan BEAM dose calculated for entire delivery of one or more Beams within RT Plan BRACHY dose calculated for entire delivery of one or more Brachy Application Setups within RT Plan FRACTION_SESSION dose calculated for a single session ("fraction") of a single Fraction Group within RT Plan BEAM_SESSION dose calculated for a single session ("fraction") of one or more Beams within RT Plan BRACHY_SESSION dose calculated for a single session ("fraction") of one or more Brachy Application Setups within RT Plan CONTROL_POINT dose calculated for one or more Control Points within a Beam for a single fraction RECORD dose calculated for RT Beams Treatment Record
Referenced RT Plan Sequence	(300C,0002 )	1C	Sequence describing RT Plan associated with dose. Required if Dose Summation Type (3004,000A) is PLAN, MULTI_PLAN, FRACTION, BEAM, BRACHY, FRACTION_SESSION, BEAM_SESSION, BRACHY_SESSION or CONTROL_POINT.

Attribute Name	Tag	Type	Attribute Description
			Only a single item shall be included in this sequence, unless Dose Summation Type (3004,000A) is MULTI_PLAN, in which case two or more items shall be included in this sequence. See Note 1.
<i>&gt;Include Table 10-11 "SOP Instance Reference Macro Attributes"</i>			
>Referenced Fraction Group Sequence	(300C,0020)	1C	Sequence of one Fraction Group containing beams or brachy application setups contributing to dose. Required if Dose Summation Type (3004,000A) is FRACTION, BEAM, BRACHY, FRACTION_SESSION, BEAM_SESSION, BRACHY_SESSION or CONTROL_POINT.  Only a single item shall be included in this sequence. See Note 1.
>>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	Sequence of Beams in current Fraction Group contributing to dose. Required if Dose Summation Type (3004,000A) is BEAM, BEAM_SESSION or CONTROL_POINT.  One or more items shall be included in this sequence.
>>>>Referenced Beam Number	(300C,0006)	1	Uniquely identifies Beam specified by Beam Number (300A,00C0) in Beam Sequence ( <b>300A,00B0</b> ) of RT Beams Module within RT Plan referenced in Referenced RT Plan Sequence (300C,0002) <b>or in Ion Beam Sequence (300A,03A2) of RT Ion Beams Module within RT Ion Plan referenced in Referenced RT Plan Sequence (300C,0002).</b>
>>>>Referenced Control Point Sequence	(300C,00F2)	1C	Sequence defining the Control Points in current Beam contributing to dose.  Required if Dose Summation Type (3004,000A) is CONTROL_POINT.  Only a single item shall be included in this sequence.
>>>>>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.  The Control Point Index (300A,0112) referenced by Referenced  Stop Control Point Index (300C,00F6) shall be the Control Point Index (300A,0112) immediately

Attribute Name	Tag	Type	Attribute Description
			following the Control Point Index (300A,0112) referenced by Referenced Start Control Point Index (300C,00F4) within the Referenced Beam Number (300C,0006).
>>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).
Referenced Treatment Record Sequence	(3008,0030)	1C	Sequence describing RT Beams Treatment Record associated with dose.  One or more Items shall be included in this sequence.  Required if Dose Summation Type (3004,000A) is RECORD.
<i>&gt;Include Table 10-11 "SOP Instance Reference Macro Attributes"</i>			
>Referenced Beam Sequence	(300C,0004)	1C	Sequence of Beams contributing to dose.  One or more items shall be included in this sequence.  Required, if the dose does not apply to the complete RT Beams Treatment Record referenced in the Referenced Treatment Record Sequence (3008,0030).
>>Referenced Beam Number	(300C,0006)	1	Uniquely identifies Beam specified by <b>Referenced Beam Number (300A,0006)</b> in <b>Treatment Session Beam Sequence (3008,0020)</b> of RT Beams <b>Session Record</b> Module within RT Beams Treatment Record referenced in the Referenced Treatment Record Sequence (3008,0030) <b>or in Treatment Session Ion Beam Sequence (3008,0021) of RT Ion Beams Session Record Module within RT Ion Beams Treatment Record referenced in the Referenced Treatment Record Sequence (3008,0030).</b>

In Part 3, section C.8.8.13 RT Fraction Scheme Module, add the following:

**Table C.8-49. RT Fraction Scheme Module Attributes**

Attribute Name	Tag	Type	Attribute Description
Fraction Group Sequence	(300A,0070)	1	Sequence of Fraction Groups in current Fraction Scheme.

Attribute Name	Tag	Type	Attribute Description
			One or more items shall be included in this sequence.
>Fraction Group Number	(300A,0071 )	1	Identification number of the Fraction Group. The value of Fraction Group Number (300A,0071) shall be unique within the RT Plan in which it is created.
...			
>Number of Beams	(300A,0080 )	1	Number of Beams in current Fraction Group. If Number of Beams is greater than zero, Number of Brachy Application Setups (300A,00A0) shall equal zero.
>Referenced Beam Sequence	(300C,0004 )	1C	Sequence of treatment beams in current Fraction Group.  One or more items shall be included in this sequence.  Required if Number of Beams (300A,0080) is greater than zero.
>>Referenced Beam Number	(300C,0006 )	1	Uniquely identifies Beam specified by Beam Number (300A,00C0) within Beam Sequence (300A,00B0) in RT Beams Module <b>or within Ion Beam Sequence (300A,03A2) in RT Ion Beams Module.</b>
>>Beam Dose Specification Point	(300A,0082 )	3	Coordinates (x,y,z) of point at which Beam Dose is specified in the patient based coordinate system described in Section C.7.6.2.1.1 (mm). See Note 3.
>>Beam Dose	(300A,0084 )	3	Dose (in Gy) at Beam Dose Specification Point (300A,0082) due to current Beam.

*In Part 3, section C.8.8.29 RT Beams Delivery Instruction Module, add the following:*

**Table C.8.8.29-1. RT Beams Delivery Instruction Module Attributes**

Attribute Name	Tag	Type	Description
Referenced RT Plan Sequence	(300C,0002)	1	Reference to a single RT Plan or RT Ion Plan SOP Instance (whose UID is also supplied in the Input Information Sequence - see PS3.4) containing all the Beams and the Fraction Group referenced in this SOP Instance.  Only a single item shall be included in this sequence.
<i>&gt;Include Table 10-11 "SOP Instance Reference Macro Attributes"</i>			
Beam Task Sequence	(0074,1020)	1	Specification of beams to be delivered and/or verified.  One or more Items shall be included in this sequence.

Attribute Name	Tag	Type	Description
>Beam Task Type	(0074,1022)	1	Indication whether beam is to be verified, treated (delivered), or both.  Enumerated Values: <b>VERIFY</b> Beam verification only <b>TREAT</b> Beam treatment only <b>VERIFY_AND_TREAT</b> Beam verification and treatment
...			
>Referenced Beam Number	(300C,0006)	1	Uniquely identifies the Beam that is specified by Beam Number (300A,00C0) within Beam Sequence (300A,00B0) in RT Beams Module of referenced RT Plan or <b>within Ion Beam Sequence (300A,03A2) in RT Ion Beams Module of the referenced</b> RT Ion Plan.
>Beam Order Index	(0074,1324)	3	Identifies required ordering of beam delivery, monotonically increasing by 1, starting from 1. See Section C.8.8.29.5.
...			
Omitted Beam Task Sequence	(300C,0111)	3	Beams not to be delivered and/or verified.  One or more Items are permitted in this Sequence.
>Referenced Beam Number	(300C,0006)	1	Uniquely identifies the Beam that is specified by Beam Number (300A,00C0) within Beam Sequence (300A,00B0) in RT Beams Module of referenced RT Plan or <b>within Ion Beam Sequence (300A,03A2) in RT Ion Beams Module of the referenced</b> RT Ion Plan.

### C.31.1 RT General Machine Verification Module

Table C.31-1 specifies the attributes used to convey the parameters used in external verification of both conventional radiotherapy (photon or electron) and ion treatment deliveries.

**Table C.31-1. RT General Machine Verification Module Attributes**

Attribute Name	Tag	Description
...	...	...
General Machine Verification Sequence	(0074,1042)	Sequence containing general machine verification parameters.  Zero or one Item shall be included in this Sequence.

Attribute Name	Tag	Description
...	...	...
>Referenced Beam Number	(300C,0006)	References Beam specified by Beam Number (300A,00C0) in <b>Beam Sequence (300A,00B0) in RT Beams Module of referenced RT Plan or in</b> Ion Beam Sequence (300A,03A2) in RT Ion Beams Module within the referenced RT Ion Plan.
...	...	...