

DICOM Correction Item

Correction Number		CP 706
Log Summary: Specify number of sequence items when missing		
Type of Modification	Name of Standard	
Clarification	PS 3.3 2007	
Rationale for Correction		
Some sequences do not specify the number of sequence items required.		
Other sequences that are Type 2 specify a single item, when by definition Type 2 requires that zero items be permitted.		
Sections of documents affected		
PS 3.3		
Correction Wording:		

10.2 CONTENT ITEM MACRO

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Table 10-2
Content Item Macro Attributes Description

Attribute Name	Tag	Type	Attribute Description
Value Type	(0040,A040)	1	The type of the value encoded in this name-value Item. Defined Terms: DATETIME DATE TIME PNAME UIDREF TEXT CODE NUMERIC
Concept Name Code Sequence	(0040,A043)	1	Coded concept name of this name-value Item. <u>Only a single item shall be permitted in this Sequence.</u>
<i>>Include 'Code Sequence Macro' Table 8.8-1</i>			<i>No Baseline Context ID is defined.</i>
DateTime	(0040,A120)	1C	Datetime value for this name-value Item. Required if Value Type (0040,A040) is DATETIME.
Date	(0040,A121)	1C	Date value for this name-value Item. Required if Value Type (0040,A040) is DATE.
Time	(0040,A122)	1C	Time value for this name-value Item. Required if Value Type (0040,A040) is TIME.
Person Name	(0040,A123)	1C	Person name value for this name-value Item.

			Required if Value Type (0040,A040) is PNAME.
UID	(0040,A124)	1C	UID value for this name-value Item. Required if Value Type (0040,A040) is UIDREF.
Text Value	(0040,A160)	1C	Text value for this name-value Item. Required if Value Type (0040,A040) is TEXT.
Concept Code Sequence	(0040,A168)	1C	Coded concept value of this name-value Item. Only a single item shall be permitted in this Sequence. Required if Value Type (0040,A040) is CODE.
>Include 'Code Sequence Macro' Table 8.8-1			No Baseline Context ID is defined.
Numeric Value	(0040,A30A)	1C	Numeric value for this name-value Item. Required if Value Type (0040,A040) is NUMERIC.
Measurement Units Code Sequence	(0040,08EA)	1C	Units of measurement for a numeric value in this name-value Item. Only a single item shall be permitted in this Sequence. Required if Value Type (0040,A040) is NUMERIC.
>Include 'Code Sequence Macro' Table 8.8-1			Baseline Context ID 82

C.7.6.1 General Image Module

Table C.7-9 specifies the Attributes that identify and describe an image within a particular series.

**Table C.7-9
GENERAL IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Icon Image Sequence	(0088,0200)	3	This icon image is representative of the Image. Only a single Item shall be permitted in this Sequence.
> Include 'Image Pixel Macro' Table C.7-11b			See C.7.6.1.1.6 for further explanation.
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C.7.6.10 Mask Module

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**Table C.7-16
MASK MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Mask Subtraction Sequence	(0028,6100)	1	Defines a sequence that describes mask subtraction operations for a Multi-frame Image. One or more items may be included in this sequence.
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C.7.6.16.2.6 Derivation Image Macro

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**Table C.7.6.16-7
DERIVATION IMAGE MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Derivation Image Sequence	(0008,9124)	2	A sequence that provides reference to the set of SOP Class/Instance pairs of the Images or other composite SOP Instances which were used to derive this frame. Zero or more Items may be included in this Sequence.
>Derivation Description	(0008,2111)	3	A text description of how this frame data was derived. See C.7.6.1.1.3 for further explanation.
>Derivation Code Sequence	(0008,9215)	1	A coded description of how this frame was derived. See C.7.6.1.1.3 for further explanation. Zero One or more Items may be included in this Sequence. More than one Item indicates that successive derivation steps have been applied.
>>Include 'Code Sequence Macro' Table 8.8-1			Defined Context ID is 7203.
>Source Image Sequence	(0008,2112)	2	A Sequence which identifies the set of Image or other SOP Class/Instance pairs of the Instances which were used to derive this frame. Zero or more Items may be included in this Sequence. See C.7.6.1.1.4 for further explanation.
>>Include 'Image SOP Instance Reference Macro' Table 10-3			
>>Purpose of Reference Code Sequence	(0040,A170)	1	Describes the purpose for which the reference is made, that is what role the source image or frame played in the derivation of this image or frame. Only a single Item shall be permitted in this sequence.
>>>Include 'Code Sequence Macro' Table 8.8-1			Defined Context ID is 7202.

C.8.4.6 NM/PET Patient Orientation Module

Table C.8-5 specifies the Attributes that describe the NM/PET Patient Orientation.

**Table C.8-5
NM/PET PATIENT ORIENTATION MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Patient Orientation Code Sequence	(0054,0410)	2	Sequence that describes the orientation of the patient with respect to gravity. See C.8.4.6.1.1 for further explanation. <u>Zero or one item shall be present in the sequence.</u>
<i>>Include 'Code Sequence Macro' Table 8.8-1</i>			<i>Baseline Context ID is 19. The Coding Scheme Designator (0008,0102) shall have an Enumerated Value of "99SDM" for historical reasons. Code Meaning (0008,0104) shall be Type 3 for historical reasons.</i>
> Patient Orientation Modifier Code Sequence	(0054,0412)	2C	Patient Orientation Modifier. Required if needed to fully specify the orientation of the patient with respect to gravity. See C.8.4.6.1.2 for further explanation. <u>Zero or one item shall be present in the sequence.</u>
<i>>>Include 'Code Sequence Macro' Table 8.8-1</i>			<i>Baseline Context ID is 20. The Coding Scheme Designator (0008,0102) shall have an Enumerated Value of "99SDM" for historical reasons. Code Meaning (0008,0104) shall be Type 3 for historical reasons.</i>
Patient Gantry Relationship Code Sequence	(0054,0414)	2	Sequence which describes the orientation of the patient with respect to the gantry. See Section C.8.4.6.1.3 for further explanation. <u>Zero or one item shall be present in the sequence.</u>
<i>>Include 'Code Sequence Macro' Table 8.8-1</i>			<i>Baseline Context ID is 21. The Coding Scheme Designator (0008,0102) shall have an Enumerated Value of "99SDM" for historical reasons. Code Meaning (0008,0104) shall be Type 3 for historical reasons.</i>

C.8.4.6.1 NM/PET Patient Orientation Attribute Descriptions

C.8.4.6.1.1 Patient Orientation Code Sequence

The Patient Orientation Code Sequence (0054,0410) is used to describe the orientation of the patient with respect to gravity, and is independent of the position in the gantry. **Only a single item shall be permitted in this sequence.**

C.8.4.6.1.2 Patient Orientation Modifier Code Sequence

The Patient Orientation Modifier Code Sequence (0054,0412) is used to modify or enhance the orientation specified by Patient Orientation Code Sequence (0054,0410). ~~Only a single item shall be permitted in this sequence.~~

C.8.4.6.1.3 Patient Gantry Relationship Code Sequence

Patient Gantry Relationship Code Sequence (0054,0414) is used to describe the patient direction within the gantry, such as head-first or feet-first. When imaging the extremities, these directions are related to normal anatomic position.

Example: In normal anatomic position, the fingers point towards the feet.

~~Only a single item shall be permitted in this sequence.~~

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C.8.4.10 NM Isotope Module

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**Table C.8-10
NM ISOTOPE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Energy Window Information Sequence	(0054,0012)	2	Sequence of Repeating Items that describe the energy window groups used. <u>Zero or more items may be included in this sequence.</u> The number of items shall be equal to Number of Energy Windows (0054,0011). The first item corresponds to frames with value of 1 in the Energy Window Vector (0054,0010), the second item with value 2, etc.
>Energy Window Name	(0054,0018)	3	A user defined name which describes this Energy Window.
>Energy Window Range Sequence	(0054,0013)	3	Sequence of Repeating Items that describes this energy window group. <u>One or more items may be included in this Sequence.</u>
>>Energy Window Lower Limit	(0054,0014)	3	The lower limit of the energy window in KeV. See C.8.4.10.1.1 for further explanation.
>>Energy Window Upper Limit	(0054,0015)	3	The upper limit of the energy window in KeV. See C.8.4.10.1.2 for further explanation.
Radiopharmaceutical Information Sequence	(0054,0016)	2	Sequence of Repeating Items that describe isotope information. Zero or more items may be included in this sequence.
>Radionuclide Code Sequence	(0054,0300)	2C	Sequence that identifies the radionuclide. <u>This sequence shall contain exactly one item. Zero or one item shall be present in the sequence.</u> Required if a

			sequence Item is present.
>>Include 'Code Sequence Macro' Table 8.8-1		<p>Baseline Context ID is 18.</p> <p>The Coding Scheme Designator (0008,0102) shall have an Enumerated Value of "99SDM" for historical reasons.</p> <p>Code Meaning (0008,0104) shall be Type 3 for historical reasons.</p>	
>Radiopharmaceutical Route	(0018,1070)	3	Route of injection.
>Administration Route Code Sequence	(0054,0302)	3	Sequence that identifies the administration route for the radiopharmaceutical. This sequence shall contain exactly one item.
>>Include 'Code Sequence Macro' Table 8.8-1		<p>Baseline Context ID is 11.</p> <p>Code Meaning (0008,0104) shall be Type 3 for historical reasons.</p>	
>Radiopharmaceutical Volume	(0018,1071)	3	Volume of injection in cubic cm.
>Radiopharmaceutical Start Time	(0018,1072)	3	Time of start of injection. See C.8.4.10.1.5 for further explanation.
>Radiopharmaceutical Stop Time	(0018,1073)	3	Time of end of injection. See C.8.4.10.1.6 for further explanation.
>Radionuclide Total Dose	(0018,1074)	3	Total amount of radionuclide injected. See C.8.4.10.1.7 for further explanation.
>Calibration Data Sequence	(0054,0306)	3	Sequence that contains calibration data. One or more Items may be included in this Sequence.
>>Energy Window Number	(0054,0308)	1C	The Item number in the Energy Window Information Sequence to which the following calibration data relates. The Items are numbered starting from 1. Required if a sequence Item is present.
>>Syringe Counts	(0018,1045)	3	Pre-injection syringe count rate in counts/sec. See C.8.4.10.1.8 for further explanation.
>>Residual Syringe Counts	(0054,0017)	3	Post-injection residue syringe count rate in counts/sec. See C.8.4.10.1.9 for further explanation.
>Radiopharmaceutical	(0018,0031)	3	Name of the radiopharmaceutical.
>Radiopharmaceutical Code Sequence	(0054,0304)	3	Sequence that identifies the radiopharmaceutical. This sequence shall contain exactly one item.
>>Include 'Code Sequence Macro' Table 8.8-1		<p>Baseline Context ID is 25.</p> <p>Code Meaning (0008,0104) shall be Type 3 for historical reasons.</p>	
Intervention Drug Information Sequence	(0018,0026)	3	Sequence of Repeating Items that describes the intervention drugs used. Zero or more Items may be included in this sequence.

>Intervention Drug Name	(0018,0034)	3	Name of intervention drug.
>Intervention Drug Code Sequence	(0018,0029)	3	Sequence that identifies the intervention drug name. Only a single Item shall be permitted in this Sequence.
>>Include 'Code Sequence Macro' Table 8.8-1		Baseline Context ID is 10. Code Meaning (0008,0104) shall be Type 3 for historical reasons.	
>Administration Route Code Sequence	(0054,0302)	3	Sequence that identifies the administration route for the intervention drug. This sequence shall contain exactly one item.
>>Include 'Code Sequence Macro' Table 8.8-1		Baseline Context ID is 11. Code Meaning (0008,0104) shall be Type 3 for historical reasons.	
>Intervention Drug Start Time	(0018,0035)	3	Time of administration of the intervention drug, using the same time base as for the Acquisition Start Time (0008,0032).
>Intervention Drug Stop Time	(0018,0027)	3	Time of completion of administration of the intervention drug, using the same time base as for the Acquisition Start Time (0008,0032).
>Intervention Drug Dose	(0018,0028)	3	Intervention drug dose, in mg.

C.8.4.11 NM Detector Module

Table C.8-11 contains IOD Attributes that describe Nuclear Medicine Detectors used to produce an image.

**Table C.8-11
NM DETECTOR MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Detector Information Sequence	(0054,0022)	2	Sequence of Repeating Items that describe the detectors used. Zero or more Items may be included in this sequence. The number of items shall be equal to Number of Detectors (0054,0021). The first item corresponds to frames with value of 1 in the Detector Vector (0054,0020), the second item with value 2, etc.
...
>View Code Sequence	(0054,0220)	3	Sequence that describes the projection of the anatomic region of interest on the image receptor. See Section C.8.4.11.1.7 for further explanation. Only a single Item shall be permitted in this sequence.
>>Include 'Code Sequence Macro' Table 8.8-1		Baseline Context ID is 26 .	

		<i>Code Meaning (0008,0104) shall be Type 3 for historical reasons.</i>	
>>View Modifier Code Sequence	(0054,0222)	2C	View Modifier. Required if needed to fully specify the View. See Section C.8.4.11.1.8 for further explanation. Only a single Item shall be permitted in this sequence.
>>>Include 'Code Sequence Macro' Table 8.8-1		<i>Baseline Context ID is 23. Code Meaning (0008,0104) shall be Type 3 for historical reasons.</i>	

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C.8.4.11.1.7 View Code Sequence

Only a single Item shall be permitted in this sequence.

C.8.4.11.1.8 View Modifier Code Sequence

Only a single Item shall be permitted in this sequence.

C.8.4.12 NM TOMO Acquisition Module

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**Table C.8-12
NM TOMO ACQUISITION MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Rotation Information Sequence	(0054,0052)	2	Sequence of Repeating Items that describe TOMO rotational groups. A new rotation is defined whenever the direction of the detector motion changes, or the Table Traverse (0018,1131) changes. Zero or more Items may be included in this sequence. The number of items shall be equal to Number of Rotations (0054,0051). If Rotation Vector (0054,0050) is present, the first item corresponds to frames with value of 1 in the Rotation Vector (0054,0050), the second item with value 2, etc.
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C.8.4.13 NM Multi-gated Acquisition Module

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**Table C.8-13
NM MULTI-GATED ACQUISITION MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Gated Information Sequence	(0054,0062)	2C	Sequence of Repeating Items that describe R-R intervals. Each gated interval is defined by an upper and lower range of heart beat durations. Required if the Frame Increment Pointer (0028,0009) contains the Tag for R-R Interval Vector (0054,0060). <u>Zero or more Items may be included in this sequence.</u> The number of items shall be equal to Number of R-R Intervals (0054,0061). The first item corresponds to frames with value of 1 in the R-R Interval Vector (0054,0060), the second item with value 2, etc.
...
>Data Information Sequence	(0054,0063)	2C	Sequence of Repeating Items that describe gating criteria. <u>Zero or more Items may be included in this sequence.</u> See C.8.4.13.1.1 <u>for the required number of Items. Required if a sequence item is present.</u>
...
>>Time Slot Information Sequence	(0054,0072)	2C	Sequence of Repeating Items that describe Time Slot Information. Required if the Frame Increment Pointer (0028,0009) contains the Tag for Time Slot Vector (0054,0070). <u>Zero or more Items may be included in this sequence.</u> The number of items shall be equal to Number of Time Slots (0054,0071). The first item corresponds to frames with value of 1 in the Time Slot Vector (0054,0070), the second item with value 2, etc.
>>>Time Slot Time	(0054,0073)	3	The total amount of time, in msec, that the acquisition accumulates gamma events into this frame. See C.8.4.13.1.2.

C.8.4.13.1 NM Multi-gated Acquisition Attribute Descriptions

C.8.4.13.1.1 Data Information Sequence

Data Information Sequence (0054,0063) shall contain a single sequence item which applies to the sum of all angular views, except when Image Type (0008,0008) Value 3 is GATED TOMO. In this case it shall have either a single item which applies to the sum of all angular views, or it shall have one item for each angular view.

C.8.4.13.1.2 Time Slot Time

The Time Slot Time (0054,0073) records the effective imaging time of each Time Slot. For example, if some of the accepted beats are shorter than others then the last frames may not receive a contribution from the shorter beats. The Time Slot Time for a Time Slot is the total acquisition time for that Time Slot. It is approximately equal to the Frame Time (0018,1063) multiplied by the number of accepted beats contributing to the Time Slot.

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C.8.4.14 NM Phase Module

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**Table C.8-14
NM PHASE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Phase Information Sequence	(0054,0032)	2C	Sequence of Repeating Items that describes each dynamic phase. Required if the Frame Increment Pointer (0028,0009) contains the Tag for Phase Vector (0054,0030). <u>Zero or more Items may be included in this sequence.</u> The number of items shall be equal to Number of Phases (0054,0031). The first item corresponds to frames with value of 1 in the Phase Vector (0054,0030), the second item with value 2, etc.
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C.8.5.6 US Image Module

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**Table C.8-18
US IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Stage Code Sequence	(0040,000A)	3	Sequence of Items describing the performed Ultrasound Protocol Stage(s). <u>One or more Items may be included in this Sequence.</u>
>Include "Code Sequence Macro" Table 8.8-1.		Baseline Context ID is 12002.	
...

C.8.7.1 X-Ray Image Module

**Table C.8-26
X-RAY IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Referenced Image Sequence	(0008,1140)	1C	A sequence which provides reference to a set of Image SOP Class/Instance identifying other images significantly related to this image. Shall be present if Image Type (0008,0008) Value 3 is BIPLANE A or BIPLANE B. May be present otherwise. One or more items may be included in this sequence.. See Section C.8.7.1.1.12.
<i>>Include 'Image SOP Instance Reference Macro' Table 10-3</i>			
>Purpose of Reference Code Sequence	(0040,A170)	2	Describes the purpose for which the reference is made. Only a single item shall be permitted in this Sequence. Zero or one item shall be present in the sequence.
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C.8.8.2 RT Image Module

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Table C.8-38—RT IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
...
Exposure Sequence	(3002,0030)	3	Introduces sequence of Exposure parameter sets, corresponding to exposures used in generating the image. One or more items may be included in this sequence. See C.8.8.2.4.
...
>Number of Blocks	(300A,00F0)	1C	Number of shielding blocks associated with Beam. Required if Exposure Sequence (3002,0030) is sent.
>Block Sequence	(300A,00F4)	2C	Introduces sequence of blocks associated with Beam. Required if Number of Blocks (300A,00F0) is non-zero. ZeroOne or more items may be included in this sequence.
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C.8.8.4 RT DVH Module

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Table C.8-40—RT DVH MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
...
DVH Sequence	(3004,0050)	1	Introduces sequence of DVHs. One or more items may be included in this sequence.
>DVH Referenced ROI Sequence	(3004,0060)	1	Introduces sequence of referenced ROIs used to calculate DVH. One or more items may be included in this sequence.
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C.8.8.5 Structure Set Module

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Table C.8-41—STRUCTURE SET MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
...
Referenced Frame of Reference Sequence	(3006,0010)	3	Introduces sequence of items describing Frames of Reference in which the ROIs are defined. One or more items may be included in this sequence. See C.8.8.5.1.
...
>Frame of Reference Relationship Sequence	(3006,00C0)	3	Introduces sequence of transforms that relate other Frames of Reference to this Frame of Reference. One or more items may be included in this sequence.
...

C.8.8.17 RT General Treatment Record Module

Table C.8-53—RT GENERAL TREATMENT RECORD MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
...
Referenced RT Plan Sequence	(300C,0002)	2	A sequence which provides reference to a RT Plan SOP Class/Instance pair. Only a single item shall be permitted in this Sequence. Zero or one item shall be present in the sequence.
...

C.8.8.26 RT Ion Beams Session Record Module

Table C.8.8.26-1 specifies the Attributes that describe the measured and recorded settings acquired during Ion Radiation Treatments.

**Table C.8.8.26-1
RT ION BEAMS SESSION RECORD MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Description
...
>Number of Wedges	(300A,00D0)	1	Number of wedges associated with current beam.
>Recorded Wedge Sequence	(3008,00B0)	1C	Introduces sequence of treatment wedges. Required if Number of Wedges (300A,00D0) is non-zero. <u>One or more items may be included in this sequence.</u> The number of items shall be identical to the value of Number of Wedges (300A,00D0).
...
>Recorded Compensator Sequence	(3008,00C0)	1C	Introduces sequence of treatment compensators. Required if Number of Compensators (300A,00E0) is non-zero. <u>One or more items may be included in this sequence.</u> The number of items shall be identical to the value of Number of Compensators (300A,00E0).
...
>Referenced Bolus Sequence	(300C,00B0)	1C	Introduces sequence of boli associated with Beam. Required if Number of Boli (300A,00ED) is non-zero. <u>One or more items may be included in this sequence.</u> The number of items shall be identical to the value of Number of Boli (300A,00ED).
...
>Recorded Block Sequence	(3008,00D0)	1C	Introduces sequence of blocks associated with Beam. Required if Number of Blocks (300A,00F0) is non-zero. <u>One or more items may be included in this sequence.</u> The number of items shall be identical to the value of Number of Blocks (300A,00F0).
...
>Recorded Range Shifter Sequence	(3008,00F2)	1C	Introduces sequence of range shifters recorded with Beam. Required if Number of Range Shifters (300A,0312) is non-zero. <u>One or more items may be included in this sequence.</u> The number of items shall be identical to the value of Number of Range Shifters (300A,0312).
...
>Recorded Lateral Spreading Device Sequence	(3008,00F4)	1C	Introduces sequence of lateral spreading devices associated with Beam. Required if Number of Lateral Spreading Devices

Attribute Name	Tag	Type	Description
			(300A,0330) is non-zero. <u>One or more items may be included in this sequence.</u> The number of items shall be identical to the value of Number of Lateral Spreading Devices (300A,0330).
...
>Recorded Range Modulator Sequence	(3008,00F6)	1C	Introduces sequence of range modulators associated with Beam. <u>One or more items may be included in this sequence.</u> Required if Number of Range Modulators (300A,0340) is non-zero. The number of items shall be identical to the value of Number of Range Modulators (300A,0340).
...
>Number of Control Points	(300A,0110)	1	Number of control points in Beam.
>Ion Control Point Delivery Sequence	(3008,0041)	1	Introduces sequence of beam control points for current ion treatment beam. <u>One or more items may be included in this sequence.</u> The number of items shall be identical to the value of Number of Control Points (300A,0110). See section C.8.8.21.1.
...
>>Ion Wedge Position Sequence	(300A,03AC)	1C	Introduces sequence of Wedge positions for current control point. Required for first item of Ion Control Point Sequence if Number of Wedges (300A,00D0) is non-zero, and in subsequent control points if Wedge Position (300A,0118) or Wedge Thin Edge Position (300A,00DB) changes during beam. <u>One or more items may be included in this sequence.</u> The number of items shall be identical to the value of Number of Wedges (300A,00D0). <u>The number of items shall be identical to the value of Number of Wedges (300A,00D0).</u>
...
>>Range Shifter Settings Sequence	(300A,0360)	1C	Introduces sequence of Range Shifter settings for the current control point. One or more items may be included in this sequence. Required for Control Point 0 of Ion Control Point Delivery Sequence (3008,0041) or if Range Shifter Setting (300A,0362) changes during beam administration, and Number of Range Shifters (300A,0312) is non-zero.

Attribute Name	Tag	Type	Description
...
>>Lateral Spreading Device Settings Sequence	(300A,0370)	1C	Introduces sequence of Lateral Spreading Device settings for the current control point. One or more items may be included in this sequence. Required for Control Point 0 of Ion Control Point Delivery Sequence (3008,0041) or if Lateral Spreading Device Setting (300A,0372) changes during beam administration, and Number of Lateral Spreading Devices (300A,0330) is non-zero.
...
>>Range Modulator Settings Sequence	(300A,0380)	1C	Introduces sequence of Range Modulator Settings for current control point. One or more items may be included in this sequence. Required for Control Point 0 of Ion Control Point Delivery Sequence (3008,0041), or if Range Modulator Settings change during beam administration, and Number of Range Modulators (300A,0340) is non-zero.
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C.8.9.2 PET Isotope Module

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Table C.8-61 - PET ISOTOPE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Radiopharmaceutical Information Sequence	(0054,0016)	2	Sequence of Items that describe isotope information. Zero or more Items may be included in this sequence.
>Radionuclide Code Sequence	(0054,0300)	2	Sequence that identifies the radionuclide. This sequence shall contain exactly one item. Zero or one item shall be present in the sequence.
>>Include 'Code Sequence Macro' Table 8.8-1		Baseline Context ID is 4020 .	
...
Intervention Drug Information Sequence	(0018,0026)	3	Sequence of Repeating Items that describes the intervention drugs used. Zero One or more items may be included in this sequence.
>Intervention Drug Name	(0018,0034)	3	Name of the intervention drug.
>Intervention Drug Code Sequence	(0018,0029)	3	Sequence that identifies the intervention drug name. Only a single Item shall be permitted in this Sequence.
>>Include 'Code Sequence Macro' Table 8.8-1		Baseline Context ID is 10 .	

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C.8.11.3 DX Image Module

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**Table C.8-70
DX IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
VOI LUT Sequence	(0028,3010)	1C	Defines a sequence of VOI LUTs. See C.8.11.3.1.5 for further explanation. <u>One or more Items may be included in this Sequence.</u> Required if Presentation Intent Type (0008,0068) is FOR PRESENTATION and Window Center (0028,1050) is not present. May also be present if Window Center (0028,1050) is present.
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C.8.11.3.1.5 VOI Attributes

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If multiple items are present in VOI LUT Sequence (0028,3010), only one shall be applied. Multiple items indicate that multiple alternative views should be presented.

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C.8.12.1 VL Image Module

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**Table C.8-77
VL IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Referenced Image Sequence	(0008,1140)	1C	A Sequence that references other images significantly related to this image. One or more items may be included in this sequence. Required if Image Type (0008,0008) Value 3 is present and has a value of "STEREO L" or "STEREO R". May also be present otherwise. See Section C.8.12.1.1.7.
<i>>Include 'Image SOP Instance Reference Macro' Table 10-3</i>			
>Purpose of Reference Code Sequence	(0040,A170)	2	Describes the purpose for which the reference is made. <u>Only a single Item shall be permitted in this Sequence. Zero or one item shall be present in the sequence.</u>

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C.8.12.2 Slide Coordinates Module

...

**Table C.8-78
Slide Coordinates Module Attributes**

Attribute Name	Tag	Type	Attribute Description
Image Center Point Coordinates Sequence	(0040,071A)	2	The coordinates of the center point of the Image in the Slide Coordinate System Frame of Reference. This sequence shall contain exactly one item. Zero or one item shall be present in the sequence. See Section C.8.12.2.1.1 of this Part for further explanation.
...

...

C.8.13.1 Enhanced MR Image Module

...

**Table C.8-79
ENHANCED MR IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Icon Image Sequence	(0088,0200)	3	This icon image is representative of the Image. Only a single Item shall be permitted in this Sequence.
> Include 'Image Pixel Macro' Table C.7-11b			See Section F.7.

...

C.8.13.5.12 MR Metabolite Map Macro

Table C.8-99 specifies the attributes of the MR Metabolite Map Functional Group macro.

**TABLE C.8-99
MR METABOLITE MAP MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
MR Metabolite Map Sequence	(0018,9152)	1	Identifies chemical shift parameters of this frame. Only a single Item shall be permitted in this sequence.
...
>Metabolite Map Code Sequence	(0018,9083)	3	Code describing the Metabolite Map. One or more items may be included in this sequence.

...	...
-----	-----

...

C.8.15.2 Enhanced CT Image Module

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**Table C.8-114
ENHANCED CT IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Icon Image Sequence	(0088,0200)	3	This icon image is representative of the Image. Only a single Item shall be permitted in this Sequence.
> Include 'Image Pixel Macro' Table C.7-11b		See Section F.7.	

...

C.8.17.2 Ophthalmic Photography Image Module

...

**Table C.8.17.2-1
OPHTHALMIC PHOTOGRAPHY IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Source Image Sequence	(0008,2112)	2C	A Sequence that identifies the set of Image SOP Class/Instance pairs of the Images that were used to derive this Image. Required if Image Type Value 1 is DERIVED. Zero or more items may be present in the sequence. See C.7.6.1.1.4 for further explanation.
>Include Image SOP Instance Reference Macro, Table 10-3			
>Purpose of Reference Code Sequence	(0040,A170)	1	Describes the purpose for which the reference is made, that is what role the source image or frame(s) played in the derivation of this image. Only a single Item shall be permitted in this sequence.
...

...

C.8.17.5 Ocular Region Imaged Module

....

**Table C.8.17.5-1
OCULAR REGION IMAGED MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Relative Image Position Code Sequence	(0022,001D)	3	The position of this image on the retina (as defined by a specified nomenclature; the nomenclature is implicit in the code used). Only a single item shall be permitted in this sequence.
<i>>Include 'Code Sequence Macro' Table 8.8.1</i>			Baseline Context ID 4207
<i>Include 'General Anatomy Mandatory Macro' Table 10-5</i>			Defined Context ID 4209 for Anatomic Region Sequence

...

C.8.19.2 Enhanced XA/XRF Image Module

This section describes the Enhanced XA/XRF Image Module. Table C.8.19.2-1 contains IOD Attributes that describe a XA/XRF Image by specializing Attributes of the General Image and Image Pixel Modules, and adding additional Attributes.

**Table C.8.19.2-1
Enhanced XA/XRF Image Module Table**

Attribute Name	Tag	Type	Attribute Description
...
Patient Gantry Relationship Code Sequence	(0054,0414)	2C	Sequence that describes the orientation of the patient with respect to the head of the table. See Section C.8.4.6.1.3 for further explanation. Only a single item shall be permitted in this Sequence. Zero or one item shall be present in the sequence. Required if Positioner Type (0018,1508) equals CARM and C-arm Positioner Tabletop Relationship (0018,9474) equals YES. May be present otherwise.
...
Icon Image Sequence	(0088,0200)	3	This icon image is representative of the Image. Only a single item shall be permitted in this Sequence.
<i>> Include 'Image Pixel Macro' Table C.7-11b</i>			See C.7.6.1.1.6 for further explanation.
...

...

C.8.19.6.1 XA/XRF Frame Characteristics Macro

Table C.8.19.6-1 specifies the attributes of the XA/XRF Frame Characteristics Functional Group macro.

**Table C.8.19.6-1
XA/XRF FRAME CHARACTERISTICS MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
XA/XRF Frame Characteristics Sequence	(0018,9412)	1	A sequence that describes general characteristics of this frame. Only a single Item shall be permitted in this sequence.
...
>Derivation Code Sequence	(0008,9215)	3	A coded description of how this frame was derived. See C.7.6.1.1.3 for further explanation. One or more Items may be included in this Sequence. More than one Item indicates that successive derivation steps have been applied.
>>Include 'Code Sequence Macro' Table 8.8-1			Defined Context ID is 7203.
...

...

C.10.4 Displayed Area Module

...

**Table C.10-4
DISPLAYED AREA MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Displayed Area Selection Sequence	(0070,005A)	1	A sequence of Items each of which describes the displayed area selection for a group of images or frames. Sufficient Items shall be present to describe every image and frame listed in the Presentation State Module. One or more Items shall be present.
>Referenced Image Sequence	(0008,1140)	1C	Sequence of Repeating Items where each Item provides reference to a selected set of Image SOP Class/SOP Instance pairs that are defined in the Presentation State Module. One or more Items shall be present. Required if a sequence item is present, and if the displayed area selection in this Item does not apply to all the images listed in the Presentation State Module.
>>Include 'Image SOP Instance Reference Macro' Table 10-3			
...

...

C.10.5 Graphic Annotation Module

...

**Table C.10-5
GRAPHIC ANNOTATION MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Graphic Annotation Sequence	(0070,0001)	1	A sequence of Items each of which represents a group of annotations composed of graphics or text or both. One or more Items shall be present.
>Referenced Image Sequence	(0008,1140)	1C	Sequence of Repeating Items where each Item provides reference to a selected set of Image SOP Class/SOP Instance pairs that are defined in the Presentation State Module. <u>One or more Items shall be present.</u> Required if a sequence item is present, and if graphic annotations in this Item do not apply to all the images listed in the Presentation State Module.
>>Include 'Image SOP Instance Reference Macro' Table 10-3			
...

...

C.10.7 Graphic Layer Module

...

**Table C.10-7
GRAPHIC LAYER MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Graphic Layer Sequence	(0070,0060)	1	A sequence of Items each of which represents a single layer in which overlays, curves, graphics or text may be rendered. <u>One or more Items shall be present.</u> An Item is required for each layer referenced from the Graphic Annotation Module or the Overlay Activation Module.
...

...

C.10.10 Waveform Annotation Module

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Table C.10-11 – Waveform Annotation Module Attributes

Attribute Name	Tag	Type	Attribute Description
Waveform Annotation Sequence	(0040,B020)	1	Sequence of Annotation Items; one or more items shall be present
...

> Concept Name Code Sequence	(0040,A043)	1C	Code representing the fully specified name of the NUMERIC measurement or CODED concept. This sequence shall contain exactly one item. Mutually exclusive with Text Value (0070,0006).
>>Include 'Code Sequence Macro' Table 8.8-1			Baseline Context ID may be defined in IOD definition.
>> Modifier Code Sequence	(0040,A195)	1C	A sequence of items modifying or specializing the Concept Name. Any number of items may be present. One or more Items may be included in this Sequence. Required if Concept Name Code Sequence (0040,A043) is sent and the value does not fully describe the semantics of the measurement or concept.
>>>Include 'Code Sequence Macro' Table 8.8-1			Baseline Context ID may be defined in IOD definition.
> Concept Code Sequence	(0040,A168)	3	A sequence that conveys the categorical coded nominal value. <u>This sequence shall contain exactly one item.</u>
>>Include 'Code Sequence Macro' Table 8.8-1			Baseline Context ID may be defined in IOD definition.
>> Modifier Code Sequence	(0040,A195)	1C	A sequence of items modifying or specializing the Concept. Any number of items may be present. One or more Items may be included in this Sequence. Required if Concept Code Sequence (0040,A168) is sent and the value does not fully describe the semantics of the concept value.
...			...

...

C.11.8 Softcopy VOI LUT module

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**Table C.11.8-1
SOFTCOPY VOI LUT MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Softcopy VOI LUT Sequence	(0028,3110)	1	Defines a sequence of VOI LUTs or Window Centers and Widths and to which images and frames they apply. No more than one VOI LUT Sequence containing a single Item or one pair of Window Center/Width values shall be specified for each image or frame. One or more Items shall be present.
>Referenced Image Sequence	(0008,1140)	1C	Sequence of Items where each Item provides reference to a selected set of Image SOP Class/SOP Instance pairs that are defined in the Presentation State Module, to which this VOI LUT or Window Center and Width applies. One or more Items shall be present. Required if the VOI LUT transformation in this Item does not apply to all the images listed in the Presentation State Module.
<i>>>Include Image SOP Instance Reference Macro Table 10-3</i>			
...			

...

C.11.14 Presentation State Blending Module

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**Table C.11.14-1
PRESENTATION STATE BLENDING MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Blending Sequence	(0070,0402)	1	A Sequence of exactly two Items, one identifying and describing transformations upon a set of underlying grayscale images, and the other identifying and describing transformations upon a set of superimposed grayscale images. See C.11.14.1.1.
...
>Softcopy VOI LUT Sequence	(0028,3110)	1	Defines a sequence of VOI LUTs or Window Centers and Widths and to which images and frames they apply. No more than one VOI LUT Sequence containing a single Item or one pair of Window Center/Width values shall be specified for each image or frame.

			One or more Items shall be present.
>>Referenced Image Sequence	(0008,1140)	1C	Sequence of Items identifying images that are defined in the enclosing Item of the Blending Sequence (0070,0402), to which this VOI LUT or Window Center and Width applies. <u>One or more Items shall be present.</u> Required if the VOI LUT transformation in this Item does not apply to all the images in the enclosing Item of the Blending Sequence (0070,0402).
...			

...

C.12.1.1.3 Digital Signatures Macro

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**Table C.12-6
DIGITAL SIGNATURES MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
MAC Parameters Sequence	(4FFE,0001)	3	A sequence of one or more items that describe the parameters used to calculate a MAC for use in Digital Signatures.
...
Digital Signatures Sequence	(FFFA,FFFA)	3	Sequence holding one or more Digital Signatures. <u>One or more items may be included in this sequence.</u>
...
>Digital Signature Purpose Code Sequence	(0400,0401)	3	The purpose of this Digital Signature. <u>Only a single item shall be permitted in this sequence.</u>
>>Include 'Code Sequence Macro' Table 8.8-1			Baseline Context ID is 7007

...

C.17 SR DOCUMENT MODULES

C.17.1 SR Document Series Module

...

**Table C.17-1
SR DOCUMENT SERIES MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Referenced Performed Procedure Step Sequence	(0008,1111)	2	Uniquely identifies the Performed Procedure Step SOP Instance for which the Series is created. Only a single item shall be permitted in this sequence. <u>Zero or one item shall be present in the sequence.</u>

			Notes: 1. The Performed Procedure Step_referred to by this Attribute is the Step during which this Document is generated. 2. If this Document is generated during the same Modality or General Purpose Performed Procedure Step as the evidence in the current interpretation procedure, this attribute may contain reference to that Modality or General Purpose Performed Procedure Step. 3. This Attribute is not used to convey reference to the evidence in the current interpretation procedure. See Current Requested Procedure Evidence Sequence (0040,A375). 4. This Sequence may be sent zero length if the Performed Procedure Step is unknown.
...

C.17.6.1 Key Object Document Series Module

KEY OBJECT DOCUMENT SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
...
Referenced Performed Procedure Step Sequence	(0008,1111)	2	Uniquely identifies the Performed Procedure Step SOP Instance for which the Series is created. Only a single item shall be permitted in this sequence. Zero or one item shall be present in the sequence. Notes: See notes on this attribute in Section C.17.1 SR Document Series Module
...

C.18.4 Image Reference Macro

Table C.18.4-1 specifies the Attributes that convey a reference to a DICOM image.

Table C.18.4-1
IMAGE REFERENCE MACRO ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
...
>Icon Image Sequence	(0088,0200)	3	This Icon Image is representative of the Image. Only a single item shall be permitted in this Sequence. The Icon Image may be no greater than 128 rows by 128 columns.
>> Include 'Image Pixel Macro' Table C.7-11b			See Section F.7.

C.20.2 Spatial Registration Module

....

**Table C.20.2-1
SPATIAL REGISTRATION MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
>>Registration Type Code Sequence	(0070,030D)	2	Describes the information input into the registration process. Only one item may be present. Zero or one Items may be present in this Sequence.
...

...

C.23.1 Hanging Protocol Definition Module

....

**Table C.23.1-1
Hanging Protocol Definition Module Attributes**

Attribute Name	Tag	Type	Attribute Description
...
Hanging Protocol Definition Sequence	(0072,000C)	1	Sequence that defines the type of imaging studies to which this Hanging Protocol applies. One or more sequence items shall be present. See C.23.1.1.1.
...
> Procedure Code Sequence	(0008,1032)	2	Sequence that identifies a procedure to which this Hanging Protocol applies. ZeroOne or more sequence items may be present.
>>Include Code Sequence Macro Table 8.8-1			<i>No Baseline Context ID is defined</i>
>Reason for Requested Procedure Code Sequence	(0040,100A)	2	Sequence that identifies a reason for procedure to which this Hanging Protocol applies. ZeroOne or more sequence items may be present.
>>Include Code Sequence Macro Table 8.8-1			<i>No Baseline Context ID is defined</i>
...
Hanging Protocol User Identification Code Sequence	(0072,000E)	2	Sequence that provides a coded identifier for the person, group, or site for which this Hanging Protocol was defined. Only one sequence item may be present. Zero or one item shall be present in the sequence. Note: If a standardized naming schema becomes available, it should be used. Meanwhile, local coding schemes such as employee numbers and department numbers are

Attribute Name	Tag	Type	Attribute Description
			likely to be used.
>Include Code Sequence Macro Table 8.8-1			No baseline context ID is defined.
...

...

F.5.3 Series Directory Record Definition

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**Table F.5-3
SERIES KEYS**

Key	Tag	Type	Attribute Description
...
Icon Image Sequence	(0088,0200)	3	This Icon Image is representative of the Series. It may or may not correspond to one of the images of the Series. Only a single item shall be permitted in this Sequence.
> Include 'Image Pixel Macro' Table C.7-11b			See Section F.7 of this Part.
...

F.5.4 Image directory record definition

...

**Table F.5-4
IMAGE KEYS**

Key	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	Required if an extended or replacement character set is used in one of the keys.
Instance Number	(0020,0013)	1	
Icon Image Sequence	(0088,0200)	3	This Icon Image is representative of the Image. Only a single item shall be permitted in this Sequence.
> Include 'Image Pixel Macro' Table C.7-11b			See Section F.7 of this Part.
...

...

F.5.19 RT Dose Directory Record Definition

...

**Table F.5-19
RT DOSE KEYS**

Key	Tag	Type	Attribute Description
...
Icon Image Sequence	(0088,0200)	3	This Icon Image is representative of the RT Dose. <u>Only a single Item shall be permitted in this Sequence.</u>
> Include 'Image Pixel Macro' Table C.7-11b			See Section F.7 of this part.
...

...

F.5.27 Spectroscopy directory record definition

...

**Table F.5-27
SPECTROSCOPY KEYS**

Key	Tag	Type	Attribute Description
...
Referenced Image Evidence Sequence	(0088,9092)	1C	Required if present in the spectroscopy instance. <u>One or more Items may be included in this Sequence.</u>
>Include 'SOP Instance Reference Macro' Table C.17-3			
...
Icon Image Sequence	(0088,0200)	3	This Icon Image is representative of the Spectroscopy instance. <u>Only a single Item shall be permitted in this Sequence.</u>
>Image Pixel Module			See Section F.7 of this Part.
...

F.5.28 Raw Data directory record definition

...

**Table F.5-28
RAW DATA KEYS**

Key	Tag	Type	Attribute Description
...
Icon Image Sequence	(0088,0200)	3	This Icon Image is representative of the Raw Data instance. <u>Only a single Item shall be permitted in this Sequence.</u>
>Image Pixel Module			See Section F.7 of this Part.
...

...

F.5.33 HL7 Structured Document Directory Record Definition

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**Table F.5-33
HL7 Structured Document Keys**

Key	Tag	Type	Attribute Description
...
HL7 Document Type Code Sequence	(0040,E006)	1C	Document Type Code from the referenced HL7 Structured Document. Required if the HL7 Structured Document contains a Document Type Code. <u>Only a single item shall be permitted in this Sequence.</u>
<i>>Include 'Code Sequence Macro' Table 8.8-1</i>			<i>No BCID defined</i>
...