1	Status	June 2018 Voting Packet		
2	Date of Last Update	2018/03/27		
3	Person Assigned	David Clunie		
4		mailto:dclunie@dclunie.com		
5	Submitter Name	QIICR		
6	Submission Date	2017/02/26		
7	Correction Number CP-1700			
8 9	Log Summary: Replace use of Derived Pix Definition Sequence	el Contrast Image/Frame Type Value 4 and Image Derivation with RWVM Quantity		
10	Name of Standard			
11	PS3.3, PS3.16			
12	Rationale for Correction:			
13 14	Image and Frame Type Value 4 were introduce pixel data, and were reused in subsequent a	uced in the Enhanced Multiframe MR IOD to describe the characteristics of processed additions to the Enhanced IOD family, including the Parametric Map IOD.		
15 16 17	The Real World Value Map mechanism used which is a much more robust and extensible r as a quantity (as opposed to a derivation me	by these and other IODs was later extended to included a Quantity Definition Sequence, means of characteristing the acquired or derived pixel contrast when it can be described ethod).		
18 19	Allow Derived Pixel Contrast Image/Frame Type Value 4 to be have a non-specific value when Quantity Definition Sequence is present.			
20 21 22	Also, the Context Group used in Derivation derived quantity, not the derivation process, extend the list of derivation description mech	Code Sequence, CID 7203 Image Derivation, contains many codes that describe the which were also introduced with the Enhanced Multiframe MR IOD. Remove these and nanisms. I.e., CID 7203 should describe "how", not "what".		
23	Correction Wording:			

1 Amend DICOM PS3.3 as follows (changes to existing text are bold and <u>underlined</u> for additions and struckthrough for removals):

A.75.5.1 Parametric Map Functional Groups Description

For the Derivation Image Functional Group Macro, the Baseline CID for:

- Purpose of Reference Sequence (0040,A170) is ???.
- Derivation Code Sequence (0008,9215) is CID 7203 "Image Derivation".

For the Real World Value Mapping Functional Group Macro, which defines the type of quantity, the method of generation and the units for the pixel values, the Baseline CID for:

- Concept Name Code Sequence of Quantity Definition Sequence (0040,9220) is ???.
- Concept Code Sequence for Concept Name of (G-C1C6, SRT, "Quantity") of Quantity Definition Sequence (0040,9220) is CID 7180 "Abstract Multi-dimensional Image Model Component Semantics".
- Measurement Units Code Sequence (0040,08EA) is ???.

12 C.7.6.16.2.6 Derivation Image Macro

13 Table C.7.6.16-7 specifies the attributes of the Derivation Image Functional Group Macro.

15	Attribute Name	Tag	Туре	Attribute Description	
16 17	Derivation Image Sequence	(0008,9124)	2	The set of Images or other composite SOP Instances that were used to derive this frame.	
18				Zero or more Items shall be included in this Sequence.	
19 20	>Derivation Description	(0008,2111)	3	A text description of how this frame data was derived. See ??? for further explanation.	
21 22	>Derivation Code Sequence	(0008,9215)	1C	A coded description of how this frame was derived. See ??? for further explanation.	
23 24				One or more Items shall be included in this Sequence. More than one Item indicates that successive derivation steps have been applied.	
25 26 27				Required if SOP Class UID is not "1.2.840.10008.5.1.4.1.1.2.2" (Legacy Converted Enhanced CT Image Storage) and not "1 2 840 10008 5 1 4 1 1 4 4" (Legacy Converted Enhanced MR Image	
28 29				Storage) and not "1.2.840.10008.5.1.4.1.1.128.1" (Legacy Converted Enhanced PET Image Storage), may be present otherwise.	
30	>>Include ???			Defined CID 7203 "Image Derivation".	
31 32	>Source Image Sequence	(0008,2112)	2	The set of Images or other Composite SOP Instances that were used to derive this frame.	
33 34				Zero or more Items shall be included in this Sequence. See ??? for further explanation.	
35	>>Include ???				

Table C.7.6.16-7. Derivation Image Macro Attributes

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Attribute Name	Tag	Туре	Attribute Description		
>>Purpose of Reference (Code Sequence	0040,A170)	1C	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 included in this Sequence.		
			Required if SOP Class UID is not "1.2.840.10008.5.1.4.1.1.2.2" (Legacy Converted Enhanced CT Image Storage) and not "1.2.840.10008.5.1.4.1.1.4.4" (Legacy Converted Enhanced MR Image Storage) and not "1.2.840.10008.5.1.4.1.1.128.1" (Legacy Converted Enhanced PET Image Storage), may be present otherwise.		
>>>Include ???		•	Defined ???.		
C.8.12.4.1 Whole S C.8.12.4.1.1 Image Ty Image Type (0008,0008) is sp	Slide Mic pe becified to be ⁻	roscop	by Image Attribute Descriptions		
Value 1 shall have a value of	ORIGINAL or	DERIVED			
Value 2 shall have a value of	PRIMARY				
Value 3 (Image Flavor) shall h	nave the Defin	ed Terms ir	1 Table C.8.12.4-2.		
	Table C.8.1	2.4-2. Wł	ole Slide Microscopy Image Flavors		
LOCALIZER	Collec	ted for the p	urpose of planning or navigating other images.		
VOLUME	Set of	frames that	define a regularly sampled volume		
LABEL Purpose of image purpose.		se of image se.	is to capture the slide label; any non-label area captured is incidental to that		
Value 4 (Derived Pixel) shall h	nave the Defin	ed Terms s	pecified in Table C.8.12.4-3.		
Tab	le C.8.12.4	-3. Whole	Slide Microscopy Image Derived Pixels		
NONE		No derivatio	n of pixels (original)		
RESAMPLED		Pixels were	derived by down sampling a higher resolution image		
No additional values shall be	present.				
C.8.13.1.1 Enhanc	ed MR Ir	nage M	odule Attribute Description		
C.8.13.1.1.1 Image Ty	pe and Fr	ame Typ	0e		
Image Type (0008,0008) and Module or Macro that invokes	Image Type (0008,0008) and Frame Type (0008,9007) are not included in this Macro but one or the other is always included in th Module or Macro that invokes this Macro, and they are therefore described here.				
Module of Macro that invokes					
In addition to the requirements Defined Terms are specified.	s specified in S	Section C.8.	16.1 Image Type and Frame Type, the following additional requirements and		
In addition to the requirements Defined Terms are specified.	s specified in S	Section C.8.	16.1 Image Type and Frame Type, the following additional requirements and		

Table C.8-81 specifies the Defined Terms for MR additional to those defined in Section C.8.16.1.4 for Value 4 for Image Type (0008,0008) and Frame Type (0008,9007).

Table C.8-81. MR-Specific Image Type and Frame Type Value 4

2	Defined Term Name	Defined Term Description
1	ADC	Apparent Diffusion Coefficient
ļ	DIFFUSION	Diffusion weighted
5	DIFFUSION_ANISO	Diffusion Anisotropy
6 7	DIFFUSION_ATTNTD	Diffusion Attenuated. Derived by removing the T2 contributions from a Diffusion Weighted image.
3	DIFFUSION_ISO	Isotropic images derived from Directional Diffusion images
9	FAT	Fat images derived using Dixon or other techniques
0	FAT_FRACTION	Fat Fraction images derived using Dixon or other techniques
1	FIELD_MAP	Field Map images derived using Dixon or other techniques
12	IN_PHASE	Water/Fat In Phase images derived using Dixon or other techniques
13	METABOLITE_MAP	Metabolite Maps from spectroscopy data
4	NEI	Created through Negative Enhancement Integral operation
15	OUT_OF_PHASE	Water/Fat Out of phase images derived using Dixon or other techniques
16	PERFUSION_ASL	Perfusion from an ASL series obtained by subtraction of control and label data
17	R_COEFFICIENT	R-Coefficient Map (fMRI)
18	R2_MAP	R2 Map
9	R2_STAR_MAP	R2* Map images derived using Dixon or other techniques
20	RHO	Proton Density map
21	SCM	Signal Change Map
22	SNR_MAP	Signal to Noise Map
23	T1_MAP	T1 Map
24	T2_STAR_MAP	T2* Map images derived using Dixon or other techniques
25	T2_MAP	T2 Map
26	TCS	Time Course of Signal
27	TEMPERATURE	Temperature encoded
28	VELOCITY	Velocity encoded
29	WATER	Water images derived using Dixon or other techniques
30	WATER_FRACTION	Water fraction images derived using Dixon or other techniques

Note

This table formerly contained defined terms such as ADC, etc. These have been replaced with the use of QUANTITY and the appropriate coded entry used in Quantity Definition Sequence (0040,9220) of the Real World Value Mapping Functional Group Macro. For former defined terms, see PS3.3 2017x.

35 C.8.14.5.1 MR Spectroscopy Description Attribute Description

36 C.8.14.5.1.1 Image Type and Frame Type

- Image Type (0008,0008) and Frame Type (0008,9007) are not included in this Macro but one or the other is always included in the
 Module or Macro that invokes this Macro, and they are therefore described here.
- In addition to the requirements specified in Section C.8.16.1 Image Type and Frame Type, the following additional requirements and
 Defined Terms are specified.
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C.8.14.5.1.1.4 Derived Pixel Contrast

See Section C.8.16.1.4 for requirements, but not Defined Terms.

Table C.8-109 specifies the Defined Terms for Value 4 for Image Type (0008,0008) and Frame Type (0008,9007).

Table C.8-109. MR Spectroscopy Image Type and Frame Type Value 4

5	Defined Term Name	Defined Term Description
6	ADDITION	Created through point by point addition operation
7	DIVISION	Created through point by point division operation
3	MAXIMUM	Created through point by point maximum operation
)	MEAN	Created through point by point mean operation
0	MINIMUM	Created through point by point minimum operation
1	MULTIPLICATION	Created through point by point multiplication operation
2	STD_DEVIATION	Standard Deviation
3	SUBTRACTION	Created through point by point subtraction operation
4	NONE	Not calculated
5	MIXED	Used only as value in Image Type (0008,0008) if frames within the spectroscopy SOP Instance contain different values for value 4 in their Frame Type (0008,9007) attribute.

17 C.8.15.2.1 CT Image Description Attribute Description

18 C.8.15.2.1.1 Image Type and Frame Type

In addition to the requirements specified in Section C.8.16.1 Image Type and Frame Type, the following additional requirements and
 Defined Terms are specified.

- 21 These requirements and Defined Terms are also applicable to Frame Type (0008,9007).
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C.8.15.2.1.1.4 Derived Pixel Contrast

Table C.8-116 specifies the Defined Terms for CT additional to those defined in Section C.8.16.1.4 for Value 4 for Image Type (0008,0008) and Frame Type (0008,9007).

Table C.8-116. Image Type and Frame Type Value 4 for CT

27	Defined Term Name	Defined Term Description
28	FILTERED	An image filter has been applied
29	MEDIAN	Pixel by pixel median
30 31	ENERGY_PROP_WT	Image pixels created through proportional weighting of multiple acquisitions at distinct X-Ray energies.

32 C.8.16 Common CT, MR and US Descriptions

This section contains descriptions of Macros and Attributes used in Modules and Functional Group Macros that are common to the Enhanced CT Image, Enhanced MR Images, MR Spectroscopy and Enhanced US Volume IODs.

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C.8.16.1 Image Type and Frame Type

Image Type (0008,0008) and associated Image Type related attributes provide a high level description of a multi-frame SOP Instance. These attributes describe properties that provide key summary information to users of the SOP Instance. Image Type (0008,0008) contains the highest level summary of what is in the SOP Instance.

Frame Type (0008,9007) mirrors the corresponding Image Type attribute and applies to the frame level rather than to the image level.

6 If more than one value is used by the set of frames for a given Frame Type (0008,9007) attribute value or associated attribute value 7 then the corresponding value of Image Type (0008,0008) or associated attribute shall contain a value of MIXED. This indicates that 8 a mixed set of values exists within the multi-frame SOP Instance.

9 The value MIXED shall only be used in Image Type (0008,0008) when the corresponding values for the individual frames are not 10 equal. When a value of an attribute is equal for all frames, the same value shall be used for the corresponding value of Image Type 11 (0008,0008). Values 2 and 3 of Image Type (0008,0008) are an exception to the rule for MIXED: Values 2 and 3 may never have the 12 value of MIXED as described in ??? and ???.

- 13 Image Type (0008,0008) and Frame Type (0008,9007) shall consist of four values.
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15 C.8.16.1.4 Derived Pixel Contrast

Value 4 shall be used to indicate derived pixel contrast - generally, contrast created by combining or processing images with the same
 geometry. Value 4 shall have a value of NONE when Value 1 is ORIGINAL.

Value 4 may have the value QUANTITY if the derived pixel contrast is described in the Quantity Definition Sequence (0040,9220) of the Real World Value Mapping Functional Group Macro.

Note

If more than one of the following derived types is applicable, then it is up to the generating application to specify the value that best characterizes the derived image.

 23
 Value 4 of Image Type (0008,0008) and Value 4 of Frame Type (0008,9007) shall not be zero length unless the SOP Class UID is

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 "1.2.840.10008.5.1.4.1.1.2.2" or "1.2.840.10008.5.1.4.1.1.4.4" or "1.2.840.10008.5.1.4.1.1.128.1" (Legacy Converted).

Table C.8-130 specifies the Defined Terms for Value 4 for Image Type (0008,0008) and Frame Type (0008,9007) that are common to CT and MR. Additional Defined Terms are defined in the modality-specific Module and Macro definitions.

28	Defined Term Name	Defined Term Description
29	ADDITION	Created through Pixel by pixel addition operation
30	DIVISION	Created through Pixel by pixel division operation
31	MASKED	Created through Pixel by pixel masking operation
32	MAXIMUM	Created through Pixel by Pixel maximum operation
33	MEAN	Created through Pixel by pixel mean operation
34	MINIMUM	Created through Pixel by Pixel minimum operation
35	MTT	Mean Transit Time
36	MULTIPLICATION	Created through Pixel by pixel multiplication operation
37	RCBF	Regional Cerebral Blood Flow (rCBF)
38	RCBV	Regional Cerebral Blood Volume (rCBV)
39	RESAMPLED	Pixels have been spatially re-sampled, e.g., MPR
40	STD_DEVIATION	Standard Deviation
41	SUBTRACTION	Created through Pixel by pixel subtraction operation

Table C.8-130. Image Type and Frame Type Value 4 Common

1	Defined Term Name	Defined Term Description
2	T_TEST	Student's T-Test
3	TTP	Time To Peak map
4	Z_SCORE	Z-Score Map
5	NONE	Not a calculated image
6 7	QUANTITY	Derived pixel values are a quantity described by Quantity Definition Sequence (0040,9220) of the Real World Value Mapping Functional Group Macro.
8 9	MIXED	Used only as value in Image Type (0008,0008) if frames within the image SOP Instance contain different values for value 4 in their Frame Type (0008,9007) attribute.

10 C.8.19.2.1 Enhanced XA/XRF Image Module Attribute Description

11 C.8.19.2.1.1 Image Type and Frame Type

In addition to the requirements specified in Section C.8.16.1 Image Type, the following additional requirements and Defined Terms
 are specified.

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15 C.8.19.2.1.1.4 Derived Pixel Contrast

Value 4 of Image Type (0008,0008) and Frame Type (0008,9007) is discussed in Section C.8.16.1.4. The value shall be NONE.

17 C.8.21.1.1 X-Ray 3D Image Module Attribute Description

18 C.8.21.1.1.1 Image Type and Frame Type

In addition to the requirements specified in Section C.8.16.1 Image Type, the following additional requirements and Defined Terms
 are specified.

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22 C.8.21.1.1.4 Derived Pixel Contrast

23 Value 4 of Image Type (0008,0008) and Frame Type (0008,9007) is discussed in Section C.8.16.1.4. The value shall be NONE.

C.8.22.3.1 Enhanced PET Image Description Attribute Description

25 C.8.22.3.1.1 Image Type and Frame Type

The Image Type Attribute (0008,0008) and Frame Type (0008,9007) identifies important image characteristics in a multiple valued data element. In addition to the requirements specified in Section C.8.16.1 Image Type and Frame Type, the following additional requirements and Defined Terms are specified:

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30 C.8.22.3.1.1.4 Derived Pixel Contrast

Value 4 of Image Type (0008,0008) and Frame Type (0008,9007) is discussed in Section C.8.16.1.4. No additional requirements or Defined Terms.

C.8.24.3 Enhanced US Image Module

C.8.24.3.2 Image Type

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C.8.24.3.2.4 Derived Pixel Contrast

Value 4 of Image Type (0008,0008) and Frame Type (0008,9007) is discussed in Section C.8.16.1.4. No additional requirements or Defined Terms.

C.8.32.2 Parametric Map Image Module

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Table C.8.32-2. Parametric Map Image Module Attributes

Page 8

0	Attribute Name	Tag	Туре	Attribute Description
1	Image Type	(0008,0008)	1	Image identification characteristics.
2				Enumerated Values for Value 1:
3				DERIVED
4				Enumerated Values for Value 2:
5				PRIMARY
6				Value 3 shall be Image Flavor, Defined Terms for which are specified in ???.
7				Value 4 shall be Derived Pixel Contrast, common Defined Terms for which are
8 9				specified in Section C.8.16.1.4 and MR-specific Defined Terms for which are specified in Section C.8.13.1.1.1.4.

Amend DICOM PS3.16 as follows (changes to existing text are bold and <u>underlined</u> for additions and struckthrough for removals):

21 CID 7180 Abstract Multi-dimensional Image Model Component Semantics

22 Type: 25 Versio

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Extensible 20161106yyyymmdd

Version:

Table CID 7180. Abstract Multi-dimensional Image Model Component Semantics

27 28 29	Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
30	Include CID 4033 "MR P	roton Spectroscopy Metabolite	S″		
31	DCM	113063	T1		
32	DCM	113065	T2		
33	DCM	113064	T2*		
34	DCM	113058	Proton Density		
35	DCM	110800	Spin Tagging Perfusion MR Signal Intensity		
36	DCM	113070	Velocity encoded		
37	DCM	113067	Temperature encoded		

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1 2 3	Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
4	DCM	110801	Contrast Agent Angio MR Signal Intensity		
5	DCM	110802	Time Of Flight Angio MR Signal Intensity		
6	DCM	110803	Proton Density Weighted MR Signal Intensity		
7	DCM	110804	T1 Weighted MR Signal Intensity		
8	DCM	110805	T2 Weighted MR Signal Intensity		
9	DCM	110806	T2* Weighted MR Signal Intensity		
10	DCM	113043	Diffusion weighted		
11	DCM	110807	Field Map MR Signal Intensity		
12	DCM	110808	Fractional Anisotropy		
13	DCM	110809	Relative Anisotropy		
14	DCM	113041	Apparent Diffusion Coefficient		
15	DCM	110810	Volumetric Diffusion Dxx Component		
16	DCM	110811	Volumetric Diffusion Dxy Component		
17	DCM	110812	Volumetric Diffusion Dxz Component		
18	DCM	110813	Volumetric Diffusion Dyy Component		
19	DCM	110814	Volumetric Diffusion Dyz Component		
20	DCM	110815	Volumetric Diffusion Dzz Component		
21 22	DCM	110816	T1 Weighted Dynamic Contrast Enhanced MR Signal Intensity		
23 24	DCM	110817	T2 Weighted Dynamic Contrast Enhanced MR Signal Intensity		
25 26	DCM	110818	T2* Weighted Dynamic Contrast Enhanced MR Signal Intensity		
27	DCM	110819	Blood Oxygenation Level		
28	DCM	110820	Nuclear Medicine Projection Activity		
29	DCM	110821	Nuclear Medicine Tomographic Activity		
30	DCM	110822	Spatial Displacement X Component		
31	DCM	110823	Spatial Displacement Y Component		
32	DCM	110824	Spatial Displacement Z Component		
33	DCM	110825	Hemodynamic Resistance		
34	DCM	110826	Indexed Hemodynamic Resistance		
35	DCM	112031	Attenuation Coefficient		
36	DCM	110827	Tissue Velocity		
37	DCM	110828	Flow Velocity		
38	SRT	P0-02241	Power Doppler	425704008	C1960437
39	DCM	110829	Flow Variance		
40	DCM	110830	Elasticity		
41	DCM	110831	Perfusion		
42	DCM	110832	Speed of sound		
43	DCM	110833	Ultrasound Attenuation		
44	DCM	113068	Student's T-test		

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RWVM Quantity Definition Sequence	

	Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID	
	DCM	113071	Z-score			
	DCM	113057	R-Coefficient			
	DCM	126220	R2-Coefficient			
	DCM	110834	RGB R Component			
	DCM	110835	RGB G Component			
	DCM	110836	RGB B Component			
	DCM	110837	YBR FULL Y Component			
	DCM	110838	YBR FULL CB Component			
	DCM	110839	YBR FULL CR Component			
F	DCM	110840	YBR PARTIAL Y Component			
F	DCM	110841	YBR PARTIAL CB Component			
F	DCM	110842	YBR PARTIAL CR Component			
	DCM	110843	YBR ICT Y Component			
F	DCM	110844	YBR ICT CB Component			
	DCM	110845	YBR ICT CR Component			
	DCM	110846	YBR RCT Y Component			
┢	DCM	110847	YBR RCT CB Component			
┢	DCM	110848	YBR RCT CR Component			
F	DCM	110849	Echogenicity			
	DCM	110850	X-Ray Attenuation			
F	DCM	110852	MR signal intensity			
	DCM	110853	Binary Segmentation			
F	DCM	110854	Fractional Probabilistic Segmentation			
F	DCM	110855	Fractional Occupancy Segmentation			
F	DCM	126393	R1			
F	DCM	126394	R2			
	DCM	126395	R2*			
F	DCM	113098	Magnetization Transfer Ratio			
F	DCM	126396	Magnetic Susceptibility			
Ir	nclude Section CID 410	7 "Tracer Kinetic Model Para	meters"			
Ir	nclude Section CID 410	3 "Perfusion Model Paramete	ers"			
Ir	nclude Section CID 410	9 "Model-Independent Dynar	nic Contrast Analysis Parameters"			
	DCM	126400	Standardized Uptake Value			
	DCM	126401	SUVbw			
F	DCM	126402	SUVIbm			
\vdash	DCM	126406	SUVIbm(James128)			
	DCM	126405	SUVIbm(Janma)			
\vdash	DCM	126403	SUVbsa			
\vdash	DCM	126404	SUVibw			
\vdash	SRT		Fat	256674009	C0015677	

1 2 3	Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
4	DCM	<u>ddd002</u>	Fat fraction		
5	DCM	<u>ddd004</u>	Water/fat in phase		
6	DCM	<u>ddd005</u>	Water/fat out of phase		
7	DCM	<u>113054</u>	Negative enhancement integral		
8	DCM	<u>113059</u>	Signal change		
9	DCM	<u>113060</u>	Signal to noise ratio		
10	DCM	<u>113066</u>	Time course of signal		
11	<u>SRT</u>	<u>C-10120</u>	Water	<u>11713004</u>	<u>C0043047</u>
12	DCM	<u>ddd011</u>	Water fraction		

CID 7203 Image Derivation 13

15	Туре:	Extensible
16	Version:	20161106yyyymmdd

Table CID 7203. Image Derivation

19	Coding Scheme Designator	Code Value	Code Meaning
20	DCM	113040	Lossy Compression
21	ĐCM	113041	Apparent Diffusion Coefficient
22	DCM	113042	Pixel by pixel addition
23	DCM	113043	Diffusion weighted
24	DCM	113044	Diffusion Anisotropy
25	DCM	113045	Diffusion Attenuated
26	DCM	113046	Pixel by pixel division
27	DCM	113047	Pixel by pixel mask
28	DCM	113048	Pixel by pixel Maximum
29	DCM	113049	Pixel by pixel mean
30	DCM	113050	Metabolite Maps from spectroscopy data
31	DCM	113051	Pixel by pixel Minimum
32	DCM	113052	Mean Transit Time
33	DCM	113053	Pixel by pixel multiplication
34	DCM	113054	Negative Enhancement Integral
35	DCM	113055	Regional Cerebral Blood Flow
36	DCM	113056	Regional Cerebral Blood Volume
37	DCM	113057	R-Coefficient
38	DCM	113058	Proton Density
39	DCM	113059	Signal Change
40	DCM	113060	Signal to Noise
41	DCM	113061	Standard Deviation
42	DCM	113062	Pixel by pixel subtraction
43	DCM	113063	T1

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1	Coding Scheme Designator	Code Value	Code Meaning
2	DCM	113064	T2*
3	ĐCM	113065	T2
4	DCM	113066	Time Course of Signal
5	DCM	113067	Temperature encoded
6	DCM	113068	Student's T-Test
7	DCM	113069	Time To Peak
8	DCM	113084	Tmax
9	DCM	113070	Velocity encoded
10	DCM	113071	Z-Score
11	DCM	113072	Multiplanar reformatting
12	DCM	113073	Curved multiplanar reformatting
13	DCM	113074	Volume rendering
14	DCM	113075	Surface rendering
15	DCM	113076	Segmentation
16	DCM	113077	Volume editing
17	DCM	113078	Maximum intensity projection
18	DCM	113079	Minimum intensity projection
19	DCM	113085	Spatial resampling
20	DCM	113086	Edge enhancement
21	DCM	113087	Smoothing
22	DCM	113088	Gaussian blur
23	DCM	113089	Unsharp mask
24	DCM	113090	Image stitching
25	DCM	113091	Spatially-related frames extracted from the volume
26	DCM	113092	Temporally-related frames extracted from the set of volumes
27	DCM	113097	Multi-energy proportional weighting
28	DCM	113093	Polar to Rectangular Scan Conversion
29	DCM	113131	Extraction of individual subject from group
30	DCM	<u>ddd100</u>	Perfusion image analysis
31	DCM	<u>ddd101</u>	Diffusion image analysis
32	DCM	<u>ddd102</u>	Diffusion tractography

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This context group contains relaively generic descriptions of image processing, e.g., (ddd100, DCM, "Perfusion image analysis"). More specific descriptions of the exact derivation method can be expected in the Quantity Definition Sequence (0040,9220) in a Real World Value Map describing pixel values, or the describing numeric measurements from regions of interest, e.g., using CID 4102 "Perfusion Measurement Methods".

38 CID 4100 T1 Measurement Methods

39	Туре:	Extensible
42	Version:	20141110

Table CID 4100. T1 Measurement Methods

2.014		/alue Code Meaning
DCM	1263	50 T1 by Multiple Flip Angles
DCM	1263	51 T1 by Inversion Recovery
DCM	1263	52 T1 by Fixed Value
Note CID 4101 Tracer Kin	etic Models	
Type: Version:	Extensible 20160316	
	Table CID 4101	. Tracer Kinetic Models
Coding Scheme Designator	Code Value	Code Meaning
DCM	126340	Standard Tofts Model
DCM	126341	Extended Tofts Model
DCM	126343	First Pass Leakage Profile (FPLP) Model
DCM	126344	Shutter-Speed Model (SSM)
DCM	126345	Gamma Capillary Transit Time (GCTT) Model
DCM	126346	Adiabatic Tissue Homogeneity (ATH) Model
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DCM	126347	Two Compartment Exchange (2CX) Model
DCM Note CID 4102 Perfusion Type: Version:	126347 Measurement M Extensible 20141110 Table CID 4102. Perf	Two Compartment Exchange (2CX) Model ethods usion Measurement Methods
DCM Note CID 4102 Perfusion Type: Version: Coding Scheme Designator	126347 Measurement M Extensible 20141110 Table CID 4102. Perf Code Value	Two Compartment Exchange (2CX) Model ethods usion Measurement Methods Code Meaning
DCM Note CID 4102 Perfusion Type: Version: Coding Scheme Designator DCM	126347 Measurement Me Extensible 20141110 Table CID 4102. Perf Code Value 126300	Two Compartment Exchange (2CX) Model ethods usion Measurement Methods Code Meaning Perfusion analysis by Stable Xenon CT technique
DCM Note CID 4102 Perfusion Type: Version: Coding Scheme Designator DCM DCM	126347 Measurement Me Extensible 20141110 Table CID 4102. Perf Code Value 126300 126301	Two Compartment Exchange (2CX) Model ethods usion Measurement Methods Code Meaning Perfusion analysis by Stable Xenon CT technique Perfusion analysis by IV Iodinated Contrast CT technique
DCM Note CID 4102 Perfusion Type: Version: Coding Scheme Designator DCM DCM DCM	126347 Measurement Measurement	Two Compartment Exchange (2CX) Model ethods usion Measurement Methods Code Meaning Perfusion analysis by Stable Xenon CT technique Perfusion analysis by IV Iodinated Contrast CT technique Perfusion analysis by Arterial Spin Labeling MR technique
DCM Note CID 4102 Perfusion Type: Version: Coding Scheme Designator DCM DCM DCM DCM	126347 Measurement Me Extensible 20141110 Table CID 4102. Perf Code Value 126300 126301 126302 126303	Two Compartment Exchange (2CX) Model ethods usion Measurement Methods Code Meaning Perfusion analysis by Stable Xenon CT technique Perfusion analysis by IV Iodinated Contrast CT technique Perfusion analysis by Arterial Spin Labeling MR technique Perfusion analysis by Susceptibility MR technique

34 CID 4103 Arterial Input Function Measurement Methods

36 38	Type: E Version: 2	xtensible 0141110	
39	Table CI	D 4103. Arterial Input Functi	on Measurement Methods
40	Coding Scheme Designator	Code Value	Code Mea

Coding Scheme DesignatorCode ValueCode MeaningDCM126360AIF IgnoredDCM126361Population Averaged AIF

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Coding Scheme Designator	Code Value	Code Meaning
DCM	126362	User-defined AIF ROI
DCM	126363	Automatically Detected AIF ROI
DCM	126364	Blind Estimation of AIF

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The anatomic location relevant to the application of any AIF method is not pre-coordinated in concepts in this Context Group. Typically these would be described by the Finding Site of any related measurements in the appropriate Template.

CID 4104 Bolus Arrival Time Derivation Methods

90	Туре:	Extensible
12	Version:	20141110

Table CID 4104. Bolus Arrival Time Derivation Methods

14	Coding Scheme Designator	Code Value	Code Meaning
15	DCM	126373	Temporal Derivative Exceeds Threshold
16	DCM	126370	Time of Peak Concentration
17	DCM	126372	Time of Leading Half-Peak Concentration

Note

CID 4105 Perfusion Analysis Methods 19

20 Type: Extensible Version: 20141110 23

Table CID 4105. Perfusion Analysis Methods

Coding Scheme Designator	Code Value	Code Meaning
DCM	126310	Least Mean Square (LMS) deconvolution
DCM	126311	Singular Value Decomposition (SVD) deconvolution

Note

CID 4106 Quantitative Methods used for Perfusion And Tracer Kinetic Models

30 Type: 32 Version:

Extensible 20141110

Table CID 4106. Quantitative Methods used for Perfusion And Tracer Kinetic Models

35	Coding Scheme Designator	Code Value	Code Meaning		
36	Include CID 4100 "T1 Measurement Methods"				
37	Include CID 4101 "Tracer Kinetic Models"				
38	Include CID 4102 "Perfusion Measurement Methods"				
39	Include CID 4103 "Arterial Input Function Measurement Methods"				
40	Include CID 4104 "Bolus Arrival Time Derivation Methods"				
41	Include CID 4105 "Perfusion Analysis Methods"				
42	DCM	126342	Model-free concentration-time quantitification		

N d 1.				CP-1700 - Replace use of Derived Pixel Contrast Image/Frame Type Value 4 and Image Derivation with Page 15 RWVM Quantity Definition Sequence					
1.	ote								
	 Concepts from this context group may be used in measurement Templates to describe the measurement method of measurement on an ROI. 								
	E.g., NUM (126312, DCN Tofts Model")	1, "Ktrans") = 0.0185 /min; (G-0	C036, SRT, "Measure	ement Method") = (126341, DCM, "Extended					
CID	4107 Tracer Kin	etic Model Parame	eters						
Type: Versio	Type:ExtensibleVersion:20141110								
		Table CID 4107. Tracer	Kinetic Model F	Parameters					
	Coding Scheme Design	ator	Code Value	Code Meaning					
	DCM		126312	Ktrans					
	DCM		126313	kep					
	DCM		126314	ve					
	DCM		126330	tau_m					
No CID Type: Versio	DCM ote 4108 Perfusion	Model Parameters Extensible 20161106	126331	νp					
No CID Type: Versio	DCM ote 4108 Perfusion	Model Parameters Extensible 20161106 Table CID 4108. Perf	126331 usion Model Par	rameters					
No CID Type: Versio	DCM ote 4108 Perfusion	Model Parameters Extensible 20161106 Table CID 4108. Perf Code Value	126331 usion Model Par	rameters Code Meaning					
No CID Type: Versio	DCM ote 4108 Perfusion n: ding Scheme Designator DCM	Model Parameters Extensible 20161106 Table CID 4108. Perf Code Value 113055	126331 usion Model Par Regiona	rameters Code Meaning al Cerebral Blood Flow					
No CID Type: Versio	DCM ote 4108 Perfusion	Model Parameters Extensible 20161106 Table CID 4108. Perf Code Value 113055 126390	126331 usion Model Par Regiona Regiona	rameters Code Meaning al Cerebral Blood Flow al Blood Flow					
No CID Type: Versio	DCM ote 4108 Perfusion n: ding Scheme Designator DCM DCM DCM	Model Parameters Extensible 20161106 Table CID 4108. Perf Code Value 113055 126390 113056	126331 usion Model Par Regiona Regiona	rameters Code Meaning al Cerebral Blood Flow al Blood Flow al Cerebral Blood Volume					
No CID Type: Versio	DCM ote 4108 Perfusion I n: ding Scheme Designator DCM DCM DCM DCM	Codel Parameters Extensible 20161106 Table CID 4108. Perf Code Value 113055 126390 113056 126391	126331 usion Model Par Regiona Regiona Regiona	rameters Code Meaning al Cerebral Blood Flow al Blood Flow al Cerebral Blood Volume al Blood Volume					
No CID Type: Versio	DCM ote 4108 Perfusion I n: ding Scheme Designator DCM DCM DCM DCM DCM	Codel Parameters Extensible 20161106 Table CID 4108. Perf Code Value 113055 126390 113056 126391 113052	126331 usion Model Par Regiona Regiona Regiona Regiona	rameters Code Meaning I Cerebral Blood Flow I Blood Flow I Cerebral Blood Volume I Blood Volume ransit Time					
No CID Type: Versio	DCM pte 4108 Perfusion I n: ding Scheme Designator DCM DCM DCM DCM DCM DCM	Codel Parameters Extensible 20161106 Table CID 4108. Perf Code Value 113055 126390 113056 126391 113052 113069	126331 usion Model Par Regiona Regiona Regiona Mean T Time To	rameters Code Meaning al Cerebral Blood Flow al Blood Flow al Blood Flow al Cerebral Blood Volume al Blood Volume ransit Time Peak Extended Flow					
No CID Type: Versio	DCM ote 4108 Perfusion I n: ding Scheme Designator DCM DCM DCM DCM DCM DCM DCM	Codel Parameters Extensible 20161106 Table CID 4108. Perf Code Value 113055 126390 113056 126391 113052 113059 126391 113052 113052	126331 usion Model Par Regiona Regiona Regiona Regiona Mean T Time To Oxygen	rameters Code Meaning Code Mean					

IAUC60

126321

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DCM

1	Coding Scheme Designator	Code Value	Code Meaning
2	DCM	126322	IAUC90
3	DCM	126323	IAUC180
4	DCM	126324	IAUCBN
5	DCM	126325	IAUC60BN
6	DCM	126326	IAUC90BN
7	DCM	126327	IAUC180BN
8	DCM	126370	Time of Peak Concentration
9	DCM	126372	Time of Leading Half-Peak Concentration
10	DCM	126371	Bolus Arrival Time
11	DCM	113069	Time To Peak
12	DCM	126374	Temporal Derivative Threshold
13	DCM	126375	Maximum Slope
14	DCM	126376	Maximum Difference
15	DCM	126377	Tracer Concentration

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26 27 (126326, DCM, "IAUC90BN") can be used for DCE-MRI using a Gd-based contrast agent to represent the IAUGC_{BN} measurement in the claim of the QIBA DCE MRI Quantification Profile, though the concept itself is not specific to the modality or the contast agent used. See https://www.rsna.org/QIBA_Protocols_and_Profiles.aspx. See also Ng, CS., et al. "Reproducibility of Perfusion Parameters in Dynamic Contrast-Enhanced MRI of Lung and Liver Tumors: Effect on Estimates of Patient Sample Size in Clinical Trials and on Individual Patient Responses." *AJR* 194, no. 2 (February 1, 2010): W134–40. http:// dx.doi.org/10.2214/AJR.09.3116.

The type of contrast agent and the AIF used for blood normalization may or may not be post-coordinated.

E.g., voxel-wise IAUC_{BN} measurements encoded as a parametric map with the quantity defined by the Quantity Definition Sequence (0040,9220) in a Real World Value Map might be encoded as:

- 28 (G-C1C6, SRT, "Quantity") = (126326, DCM, "IAUC90BN")
- 29 (G-C036, SRT, "Measurement Method") = (126362, DCM, "User-defined AIF ROI")
- 30 (123011, DCM, "Contrast Bolus/Agent") = (C-17800, SRT, "Gadolinium")
- E.g., an IAUC_{BN} measurement for an ROI encoded in a structured report might be encoded as:
- 33 NUM (126326, DCM, "IAUC90BN") = 0.230 (UNITS = ({normalized}, UCUM, "normalized")
- 34 >HAS CONCEPT MOD: CODE (G-C036, SRT, "Measurement Method") = (126364, DCM, "Blind Estimation of AIF")

Note that the generic ROI measurement templates do not have the contrast/bolus agent as a parameter; this may be implicit from context, or inherited from the (121058, DCM,"Procedure reported") in the parent template.

37 CID 4033 MR Proton Spectroscopy Metabolites

39Type:40Version:

Extensible 20160314

Table CID 4033. MR Proton Spectroscopy Metabolites

43 44	Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
45	SRT	F-65C50	N-acetylaspartate	115391007	C0067684

1 2	Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
3	SRT	F-61080	Citrate	59351004	C0376259
ţ	SRT	F-61620	Choline	65123005	C0008405
5	SRT	F-61380	Creatine	14804005	C0010286
6	DCM	113094	Creatine and Choline		
7	SRT	F-61760	Lactate	83036002	C0376261
3	SRT	F-63600	Lipid	70106000	C0023779
9	DCM	113095	Lipid and Lactate		
10	DCM	113080	Glutamate and glutamine		
11	SRT	F-64210	Glutamine	25761002	C0017797
12	SRT	F-64460	Tuarine	10944007	C0039350
13	SRT	F-61A90	Inositol	72164009	C0021547
14	DCM	113081	Choline/Creatine Ratio		
15	DCM	113082	N-acetylaspartate/Creatine Ratio		
16	DCM	113083	N-acetylaspartate/Choline Ratio		
17	DCM	113096	Creatine+Choline/Citrate Ratio		

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For the purpose of this context group, where possible, the resonance peak in the spectrum corresponding to a particular metabolite is described using the concept from SNOMED for the substance corresponding to the metabolite. E.g., the code used for "lipid" is the code for "lipid (substance) ", as this concept is effectively post-coordinated by its use in the Metabolite Map Code Sequence (0018,9083) to mean "lipid resonance peaks in MR spectroscopy".

D DICOM Controlled Terminology Definitions (Normative)

Table D-1. DICOM Controlled Terminology Definitions

25	Code Value	Code Meaning	Definition	Notes
26 27 28 29	113054	Negative Enhancement Integral	Values are derived by calculating negative enhancement integral values. The area described by the baseline and the signal loss due to passage of contrast bolus in tissue in a perfusion experiment. Abbreviated NEI or N1.	
30 31	113059	Signal Change	Values are derived by calculating signal change values <u>The</u> relative change in signal.	
32 33	113060	Signal to Noise	Values are derived by calculating the signal to noise ratio <u>The</u> ratio of the desired signal to the level of noise.	
34 35	113066	Time Course of Signal	Values are derived by calculating values based on t <u>T</u> he time course of signal.	
36 37	<u>ddd001</u>	Fat	The amount of fat present, derived using Dixon or other techniques.	
38 39	<u>ddd002</u>	Fat fraction	The fraction of fat present, derived using Dixon or other techniques.	
40 41	<u>ddd004</u>	Water/fat in phase	Water/Fat In Phase signal, derived using Dixon or other techniques.	
42 43	<u>ddd005</u>	Water/fat out of phase	Water/Fat Out of phase signal, derived using Dixon or other techniques.	

Code Value	Code Meaning	Definition	Notes
<u>ddd010</u>	Water	The amount of water present, derived using Dixon or other techniques.	
<u>ddd011</u>	Water fraction	The fraction of water present, derived using Dixon or other techniques.	
<u>ddd100</u>	Perfusion image analysis	Analysis of perfusion images.	
<u>ddd101</u>	Diffusion image analysis	Analysis of diffusion images.	
<u>ddd102</u>	Diffusion tractography	Estimation of the course of fiber tracts by analysis of anisotropic diffusion.	