

1	STATUS	Letter Ballot
2	Date of Last Update	2014/09/08
3	Person Assigned	David Clunie
4		mailto:dclunie@dclunie.com
5	Submitter Name	Andriy Fedorov
6		mailto:fedorov@bwh.harvard.edu
7	Submission Date	2014/03/03

8	Correction Number CP-1391	
9	Log Summary: Addition of Quantity Descriptors for Perfusion and Tracer Kinetic Modelling	
10	Name of Standard	
11	PS3.16 2014b	
12	Rationale for Correction:	
13	The "Abstract Multi-dimensional Image Model Component Semantics" and related units context groups have very limited support	
14	for perfusion and tracer kinetic modelling concepts, whether it is performed by CT, PET or MR. Further, many concepts lack meaningful	
15	definitions (i.e., are circular).	
16	Add definitions where relevant and add new concepts specifically to support CT perfusion, and Dynamic Contrast Enhanced (DCE)	
17	MRI, whether it be performed using relaxivity (T1) or susceptibility (T2*) methods.	
18	Concepts are added that reflect common usage in specific body parts (e.g., regional "cerebral" blood flow) as well as more general	
19	terms that reflect spread of the technique to other body parts (e.g., "regional blood flow" for use in breast, etc.).	
20	Tracer kinetic (pharmaco-kinetic) model parameter concepts (like Ktrans) are described generally, without specifying their measurement	
21	method or modality, allowing their re-use (e.g., for MR or PET) (and post-coordination by the appropriate technique concepts).	
22	These concepts are useful both for encoding of measurements of ROIs in SRs as well as RWVMs in images or as separate objects	
23	that describe images.	
24	Resolve duplicates for "Attenuation Coefficient" (112031 and 110851).	
25	Editor's Notes:	
26	Correction Wording:	

Amend DICOM PS3.16 - Content Mapping Resource - Context Groups to add the following new Context Groups:

CID cc2c2a T1 Measurement Methods

Type: Extensible

Version: yyyyymmdd

Table CID cc2c2a. T1 Measurement Methods

Coding Scheme Designator	Code Value	Code Meaning
DCM	dd2d81	T1 by Multiple Flip Angles
DCM	dd2d82	T1 by Inversion Recovery
DCM	dd2d83	T1 by Fixed Value

Note

CID cc2c2b Tracer Kinetic Models

Type: Extensible

Version: yyyyymmdd

Table CID cc2c2b. Tracer Kinetic Models

Coding Scheme Designator	Code Value	Code Meaning
DCM	dd2d71	Standard Tofts Model
DCM	dd2d72	Extended Tofts Model
DCM	dd2d74	First Pass Leakage Profile (FPLP)
DCM	dd2d75	Shutter-Speed Model (SSM)

Note

CID cc2c2c Perfusion Measurement Methods

Type: Extensible

Version: yyyyymmdd

Table CID cc2c2c. Perfusion Measurement Methods

Coding Scheme Designator	Code Value	Code Meaning
DCM	dd2d40	Perfusion analysis by Stable Xenon CT technique
DCM	dd2d41	Perfusion analysis by IV Iodinated Contrast CT technique
DCM	dd2d42	Perfusion analysis by Arterial Spin Labeling MR technique
DCM	dd2d43	Perfusion analysis by Susceptibility MR technique

Note

CID cc2c2d Arterial Input Function Measurement Methods

Type: Extensible

Version: yyyyymmdd

Table CID cc2c2d. Arterial Input Function Measurement Methods

Coding Scheme Designator	Code Value	Code Meaning
DCM	dd3d01	AIF Ignored
DCM	dd3d02	Population Averaged AIF
DCM	dd3d03	User-defined AIF ROI
DCM	dd3d04	Automatically Detected AIF ROI
DCM	dd3d05	Blind Estimation of AIF

Note

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 cc2c2e Bolus Arrival Time Derivation Methods

Type: Extensible

Version: yyyyymmdd

Table CID cc2c2e. Bolus Arrival Time Derivation Methods

Coding Scheme Designator	Code Value	Code Meaning
DCM	dd3d23	Temporal Derivative Exceeds Threshold
DCM	dd3d20	Time of Peak Concentration
DCM	dd3d22	Time of Leading Half-Peak Concentration

Note**CID cc2c2f Perfusion Analysis Methods**

Type: Extensible

Version: yyyyymmdd

Table CID cc2c2f. Perfusion Analysis Methods

Coding Scheme Designator	Code Value	Code Meaning
DCM	dd2d51	Least Mean Square (LMS) deconvolution
DCM	dd2d52	Singular Value Decomposition (SVD) deconvolution

Note**CID cc2c2 Quantitative Methods used for Perfusion And Tracer Kinetic Models**

Type: Extensible

Version: yyyyymmdd

Table CID cc2c2. Quantitative Methods used for Perfusion And Tracer Kinetic Models

Coding Scheme Designator	Code Value	Code Meaning
		Include CID cc2c2a "T1 Measurement Methods"
		Include CID cc2c2b "Tracer Kinetic Models"
		Include CID cc2c2c "Perfusion Measurement Methods"

Coding Scheme Designator	Code Value	Code Meaning
Include CID cc2c2d "Arterial Input Function Measurement Methods"		
Include CID cc2c2e "Bolus Arrival Time Derivation Methods"		
Include CID cc2c2f "Perfusion Analysis Methods"		
DCM	dd2d73	Model-free concentration-time quantification

Note

1. Concepts from this context group may be used in measurement templates to describe the measurement method of measurement on an ROI.

E.g., NUM (dd2d60, DCM, "Ktrans") = 0.0185 /min; (G-C036, SRT, "Measurement Method") = (dd2d72, DCM, "Extended Tofts Model")

CID cc6c1 Tracer Kinetic Model Parameters

Type: Extensible

Version: yyyyymmdd

Table CID cc6c1. Tracer Kinetic Model Parameters

Coding Scheme Designator	Code Value	Code Meaning
DCM	dd2d60	Ktrans
DCM	dd2d61	kep
DCM	dd2d62	ve
DCM	dd2d66	tau_m
DCM	dd2d67	vp

Note**CID cc6c2 Perfusion Model Parameters**

Type: Extensible

Version: yyyyymmdd

Table CID cc6c2. Perfusion Model Parameters

Coding Scheme Designator	Code Value	Code Meaning
DCM	113055	Regional Cerebral Blood Flow
DCM	dd6d01	Regional Blood Flow
DCM	113056	Regional Cerebral Blood Volume
DCM	dd6d02	Regional Blood Volume
DCM	113052	Mean Transit Time
DCM	113069	Time To Peak
DCM	dd6d03	Oxygen Extraction Fraction

Note**CID cc6c3 Model-Independent Dynamic Contrast Analysis Parameters**

Type: Extensible

Version: **yyyymmdd**

Table CID cc6c3. Model-Independent Dynamic Contrast Analysis Parameters

Coding Scheme Designator	Code Value	Code Meaning
DCM	dd2d63	IAUC
DCM	dd2d64	IAUC60
DCM	dd2d65	IAUC90
DCM	dd3d20	Time of Peak Concentration
DCM	dd3d22	Time of Leading Half-Peak Concentration
DCM	dd3d21	Bolus Arrival Time
DCM	113069	Time To Peak
DCM	dd3d24	Temporal Derivative Threshold
DCM	dd3d25	Maximum Slope
DCM	dd3d26	Maximum Difference
DCM	dd3d27	Tracer Concentration

Note

CID cc7c1 Tracer Kinetic Modeling Covariates

Type: **Extensible**

Version: **yyyymmdd**

Table CID cc7c1. Tracer Kinetic Modeling Covariates

Coding Scheme Designator	Code Value	Code Meaning
LN	20570-8	Hematocrit

CID cc7c2 Contrast Characteristics

Type: **Extensible**

Version: **yyyymmdd**

Table CID cc7c2. Contrast Characteristics

Coding Scheme Designator	Code Value	Code Meaning
DCM	dd4d01	Contrast Relaxivity

Amend DICOM PS3.16 - Content Mapping Resource - Context Groups to amend the following context groups to refactor and add new values:

CID 7180 Abstract Multi-dimensional Image Model Component Semantics

Type: **Extensible**

Version: **~~20100825~~yyyymmdd**

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

Coding Scheme Designator	Code Value	Code Meaning
...		

Coding Scheme Designator	Code Value	Code Meaning
DCM	113063	T1- Map
DCM	113065	T2- Map
DCM	113064	T2*- Map
DCM	113058	Proton Density- Map
DCM	110800	Spin Tagging Perfusion MR Signal Intensity
...
DCM	110801	Contrast Agent Angio MR Signal Intensity
DCM	110802	Time Of Flight Angio MR Signal Intensity
DCM	110803	Proton Density Weighted MR Signal Intensity
DCM	110804	T1 Weighted MR Signal Intensity
DCM	110805	T2 Weighted MR Signal Intensity
DCM	110806	T2* Weighted MR Signal Intensity
...
DCM	110807	Field Map MR Signal Intensity
...
DCM	110816	T1 Weighted Dynamic Contrast Enhanced MR Signal Intensity
DCM	110817	T2 Weighted Dynamic Contrast Enhanced MR Signal Intensity
DCM	110818	T2* Weighted Dynamic Contrast Enhanced MR Signal Intensity
DCM	443055	Regional Cerebral Blood Flow
DCM	443056	Regional Cerebral Blood Volume
DCM	443052	Mean Transit Time
DCM	443069	Time To Peak map
DCM	110819	Blood Oxygenation Level
...
DCM	112031	Attenuation Coefficient
DCM	110827	Tissue Velocity
DCM	110828	Flow Velocity
SRT	P0-02241	Power Doppler
DCM	110829	Flow Variance
DCM	110830	Elasticity
DCM	110831	Perfusion
...
DCM	110850	X-Ray Attenuation
DCM	440854 112031	X-Ray Attenuation Coefficient
DCM	110852	MR signal intensity
...
DCM	dd7d01	R1
DCM	dd7d02	R2
...

Coding Scheme Designator	Code Value	Code Meaning
<u>Include Section CID cc6c1 "Tracer Kinetic Model Parameters"</u>		
<u>Include Section CID cc6c2 "Perfusion Model Parameters"</u>		
<u>Include Section CID cc6c3 "Model-Independent Dynamic Contrast Analysis Parameters"</u>		

CID 7181 Abstract Multi-dimensional Image Model Component Units

Type: Extensible
Version: 20100825yyymmdd

Table CID 7181. Abstract Multi-Dimensional Image Model Component Units

Coding Scheme Designator	Code Value	Code Meaning
...
UCUM	mmol/kg{WetWeight}	millimoles per kg wet weight
UCUM	/min	/min
UCUM	/s	/s

Amend DICOM PS3.16 - Content Mapping Resource - Controlled Terminology Definitions to add the following new concepts:

Table D-1. DICOM Controlled Terminology Definitions

Code Value	Code Meaning	Definition	Notes
dd2d40	Perfusion analysis by Stable Xenon CT technique	Perfusion analysis by Stable Xenon CT technique	
dd2d41	Perfusion analysis by IV Iodinated Contrast CT technique	Perfusion analysis by IV Iodinated Contrast CT technique	
dd2d42	Perfusion analysis by Arterial Spin Labeling MR technique	Perfusion analysis by Arterial Spin Labeling (ASL) MR technique	
dd2d43	Perfusion analysis by Susceptibility MR technique	Perfusion analysis by Susceptibility (T2*) MR technique	
dd2d51	Least Mean Square (LMS) deconvolution	Least Mean Square (LMS) deconvolution	
dd2d52	Singular Value Decomposition (SVD) deconvolution	Singular Value Decomposition (SVD) deconvolution	
dd2d60	Ktrans	K^{trans} , the volume transfer constant of a tracer diffusion kinetic model, specifically the volume transfer constant between blood plasma and extravascular extracellular space (EES) See Tofts et al, "Estimating Kinetic Parameters From Dynamic Contrast-Enhanced T1-Weighted MRI of a Diffusable Tracer: Standardized Quantities and Symbols", Journal of Magnetic Resonance Imaging, vol. 10, pp. 223–232, 1999.	
dd2d61	kep	k_{ep} , the rate constant between extravascular extracellular space (EES) and blood plasma See Tofts et al, "Estimating Kinetic Parameters From Dynamic Contrast-Enhanced T1-Weighted MRI of a Diffusable Tracer: Standardized Quantities and Symbols", Journal of Magnetic Resonance Imaging, vol. 10, pp. 223–232, 1999.	

Code Value	Code Meaning	Definition	Notes
dd2d62	ve	<p>v_e, the fractional (not absolute) volume of extravascular extracellular space (EES) per unit volume of tissue</p> <p>See Tofts et al, "Estimating Kinetic Parameters From Dynamic Contrast-Enhanced T1-Weighted MRI of a Diffusable Tracer: Standardized Quantities and Symbols", Journal of Magnetic Resonance Imaging, vol. 10, pp. 223–232, 1999.</p>	
dd2d63	IAUC	The initial area under the contrast agent concentration–time curve	
dd2d64	IAUC60	The initial area under the contrast agent concentration–time curve at 60 seconds after the onset time	
dd2d65	IAUC90	The initial area under the contrast agent concentration–time curve at 90 seconds after the onset time	
dd2d66	tau_m	τ_m . The mean intracellular water lifetime (τ_i). Used in the Shutter-Speed Model (SSM) of tracer kinetics.	
dd2d67	vp	<p>v_p. The fractional (not absolute) blood plasma volume per unit volume of tissue.</p> <p>See Tofts et al, "Estimating Kinetic Parameters From Dynamic Contrast-Enhanced T1-Weighted MRI of a Diffusable Tracer: Standardized Quantities and Symbols", Journal of Magnetic Resonance Imaging, vol. 10, pp. 223–232, 1999.</p>	
dd2d71	Standard Tofts Model	<p>A tracer diffusion kinetic model in which the permeability is assumed to be isodirectional.</p> <p>See P. Tofts, "Modeling tracer kinetics in dynamic Gd-DTPA MR imaging", Journal of Magnetic Resonance Imaging, vol. 7, pp. 91–101, 1997.</p>	
dd2d72	Extended Tofts Model	<p>A tracer diffusion kinetic model in which the permeability is not assumed to be isodirectional, and which includes the contribution of tracer in the blood plasma to the total tissue concentration.</p> <p>See P. Tofts, "Modeling tracer kinetics in dynamic Gd-DTPA MR imaging", Journal of Magnetic Resonance Imaging, vol. 7, pp. 91–101, 1997.</p>	
dd2d73	Model-free concentration-time quantification	A semiquantitative analysis of the contrast-enhancement concentration versus time curve that avoids the use of a pharmacokinetic model. E.g., integration to compute the initial area under the curve.	
dd2d74	First Pass Leakage Profile (FPLP)	<p>A tracer diffusion kinetic model that accounts for the tumor leakage profile during the first pass of contrast.</p> <p>See Li, Ka-Loh, Xiao Ping Zhu, John Waterton, and Alan Jackson. "Improved 3D Quantitative Mapping of Blood Volume and Endothelial Permeability in Brain Tumors." Journal of Magnetic Resonance Imaging 12, no. 2 (2000): 347–357. doi:10.1002/1522-2586(200008)12:2<347::AID-JMRI19>3.0.CO;2-7.</p>	
dd2d75	Shutter-Speed Model (SSM)	<p>A tracer diffusion kinetic model that does not assume that intercompartmental water molecule exchange is infinitely fast.</p> <p>See Li, Xin, Wei Huang, Thomas E. Yankeelov, Alina Tudorica, William D. Rooney, and Charles S. Springer. "Shutter-Speed Analysis of Contrast Reagent Bolus-Tracking Data: Preliminary Observations in Benign and Malignant Breast Disease." Magnetic Resonance in Medicine 53, no. 3 (2005): 724–29. doi:10.1002/mrm.20405.</p>	
dd2d81	T1 by Multiple Flip Angles	T1 measurement by Multiple Flip Angles (MFA) (variable saturation) method	
dd2d82	T1 by Inversion Recovery	T1 measurement by Inversion Recovery (IR) method	

	Code Value	Code Meaning	Definition	Notes
1	dd2d83	T1 by Fixed Value	Calculation was performed using a fixed value of T1 rather than a measured value. The value could be encoded as the value of (dd2d84, DCM, "T1 Used For Calculation").	
2				
3	dd2d84	T1 Used For Calculation	The fixed value of T1 used for a calculation.	
4				
5	dd3d01	AIF Ignored	No Arterial Input Function was used.	
6	dd3d02	Population Averaged AIF	A population-averaged Arterial Input Function.	
7	dd3d03	User-defined AIF ROI	An Arterial Input Function computed from a user-defined Region of Interest.	
8	dd3d04	Automatically Detected AIF ROI	An Arterial Input Function computed from an automatically detected Region of Interest.	
9	dd3d05	Blind Estimation of AIF	A data-driven blind source separation (BSS) algorithm that estimates AIF from individuals without any presumed AIF model and initialization. See Lin, Yu-Chun, Tsung-Han Chan, Chong-Yung Chi, Shu-Hang Ng, Hao-Li Liu, Kuo-Chen Wei, Yau-Yau Wai, Chun-Chieh Wang, and Jiun-Jie Wang. "Blind Estimation of the Arterial Input Function in Dynamic Contrast-Enhanced MRI Using Purity Maximization." <i>Magnetic Resonance in Medicine</i> 68, no. 5 (November 1, 2012): 1439–49. doi:10.1002/mrm.24144.	
10				
11	dd3d20	Time of Peak Concentration	The time at which the concentration-time curve achieves its peak for the first time. Used as a concept name for a value or as a method. E.g., used as a method of calculation for BAT. See Shpilfoysel <i>Med Phys</i> 2008. doi: 10.1118/1.1288669	
12				
13	dd3d21	Bolus Arrival Time	The nominal time at which arrival of a contrast bolus is detected, which is used as a reference point for subsequent calculations. Used as a concept name for a value or as a method. No specific computational method is implied by this general definition. Abbreviated BAT.	
14				
15	dd3d22	Time of Leading Half-Peak Concentration	The time at which the concentration-time curve achieves half of its peak density for the first time. Used as a concept name for a value or as a method. E.g., used as a method of calculation for BAT. See Shpilfoysel <i>Med Phys</i> 2008. doi: 10.1118/1.1288669	
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17	dd3d23	Temporal Derivative Exceeds Threshold	A method of determining BAT that involves computing the temporal derivative of the concentration-time curve and selecting the time when the temporal derivative exceeds a specified threshold. See Shpilfoysel <i>Med Phys</i> 2008. doi: 10.1118/1.1288669	
18				
19	dd3d24	Temporal Derivative Threshold	A threshold applied to the temporal derivative of the concentration-time curve. E.g., used to establish BAT. See Shpilfoysel <i>Med Phys</i> 2008. doi: 10.1118/1.1288669	
20				
21	dd3d25	Maximum Slope	The maximum rate of signal intensity change within a measured region of a time-activity curve. See Boonsirikamchai, Piyaporn, Harmeet Kaur, Deborah A. Kuban, Edward Jackson, Ping Hou, and Haesun Choi. "Use of Maximum Slope Images Generated From Dynamic Contrast-Enhanced MRI to Detect Locally Recurrent Prostate Carcinoma After Prostatectomy: A Practical Approach." <i>American Journal of Roentgenology</i> 198, no. 3 (March 1, 2012): W228–W236. doi:10.2214/AJR.10.6387.	
22				
23	dd3d26	Maximum Difference	The maximum degree of signal intensity change within a measured region of a time-activity curve. See Boonsirikamchai, Piyaporn, Harmeet Kaur, Deborah A. Kuban, Edward Jackson, Ping Hou, and Haesun Choi. "Use of Maximum Slope Images Generated From Dynamic Contrast-Enhanced MRI to Detect Locally Recurrent Prostate Carcinoma After Prostatectomy: A Practical Approach." <i>American Journal of Roentgenology</i> 198, no. 3 (March 1, 2012): W228–W236. doi:10.2214/AJR.10.6387.	
24				
25	dd3d27	Tracer Concentration	Tracer concentration in tissue. E.g., in a DCE-MR experiment, the concentration of contrast agent in mmol/l.	
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Code Value	Code Meaning	Definition	Notes
dd4d01	Contrast Longitudinal Relaxivity	The degree to which a paramagnetic contrast agent can enhance the proton longitudinal relaxation rate constant ($R1$, $1/T1$), normalized to the concentration of the contrast agent. Also referred to as $r1$. Typically expressed in units of $l/mmol/s$.	
dd6d01	Regional Blood Flow	The flow rate of blood perfusing a region as volume per mass per unit of time.	
dd6d02	Regional Blood Volume	The volume of blood perfusing a region as as volume per mass.	
dd6d03	Oxygen Extraction Fraction	The percent of the oxygen removed from the blood by tissue during its passage through the capillary network. For example, as measured by blood oxygenation level dependent (BOLD) MR. See He, Xiang, and Dmitriy A. Yablonskiy. "Quantitative BOLD: Mapping of Human Cerebral Deoxygenated Blood Volume and Oxygen Extraction Fraction: Default State." <i>Magnetic Resonance in Medicine</i> 57, no. 1 (2007): 115–26.	
dd7d01	R1	The longitudinal relaxation rate constant. The inverse of longitudinal relaxation time, i.e., $R1 = 1/T1$.	
dd7d02	R2	The transverse relaxation rate constant. The inverse of transverse relaxation time, i.e., $R2 = 1/T2$.	

Amend DICOM PS3.16 - Content Mapping Resource - Controlled Terminology Definitions to make suitable for use both as Abstract Multi-dimensional Image Model Component Semantics and Quantity Descriptor:

Table D-1. DICOM Controlled Terminology Definitions

Code Value	Code Meaning	Definition	Notes
...
112031	Attenuation Coefficient	A quantitative numerical statement of the relative attenuation of the X-Ray beam at a specified point. <u>Coefficient that describes the fraction of a beam of X-Rays or gamma rays that is absorbed or scattered per unit thickness of the absorber. This value basically accounts for the number of atoms in a cubic cm volume of material and the probability of a photon being scattered or absorbed from the nucleus or an electron of one of these atoms.</u> Usually expressed in Hounsfield units [referred to as CT Number in Fraser and Pare].	
...
113052	Mean Transit Time	<u>The image is derived by calculating mean transit time valuesThe time required for blood to pass through a region of tissue.</u>	
...
113054	Negative Enhancement Integral	<u>The image isValues are</u> derived by calculating negative enhancement integral values.	
113055	Regional Cerebral Blood Flow	<u>The image is derived by calculating regional cerebral blood flow valuesThe flow rate of blood perfusing a region of the brain as volume per mass per unit of time.</u>	
113056	Regional Cerebral Blood Volume	<u>The image is derived by calculating regional cerebral blood volume valuesThe volume of blood perfusing a region of brain as as volume per mass.</u>	
...
113058	Proton Density- map	<u>The image isValues are</u> derived by calculating proton density values.	
113059	Signal Change- Map	<u>The image isValues are</u> derived by calculating signal change values.	
...
113063	T1- Map	<u>The image isValues are</u> derived by calculating T1 values.	

Code Value	Code Meaning	Definition	Notes
113064	T2*-Map	The image is Values are derived by calculating T2* values.	
113065	T2-Map	The image is Values are derived by calculating T2 values.	
113066	Time Course of Signal	The image is Values are derived by calculating values based on the time course of signal.	
...
113069	Time To Peak-map	The image is derived by calculating values based on the time to peak The time from the start of the contrast agent injection to the maximum enhancement value .	
...
110800	Spin Tagging Perfusion MR Signal Intensity	Signal intensity of a Spin tagging Perfusion MR image. Spin tagging is a technique for the measurement of blood perfusion, based on magnetically labeled arterial blood water as an endogenous tracer.	
110801	Contrast Agent Angio MR Signal Intensity	Signal intensity of a Contrast Agent Angio MR image.	
110802	Time Of Flight Angio MR Signal Intensity	Signal intensity of a Time-of-flight (TOF) MR image. Time-of-flight (TOF) is based on the phenomenon of flow-related enhancement of spins entering into an imaging slice. As a result of being unsaturated, these spins give more signal than surrounding stationary spins.	
110803	Proton Density Weighted MR Signal Intensity	Signal intensity of a Proton Density Weighted MR image. All MR images have intensity proportional to proton density. Images with very little T1 or T2 weighting are called 'PD-weighted'.	
110804	T1 Weighted MR Signal Intensity	Signal intensity of T1 Weighted MR image. A T1 Weighted MR image is created typically by using short TE and TR times.	
110805	T2 Weighted MR Signal Intensity	Signal intensity of a T2 Weighted MR image. T2 Weighted image contrast state is approached by imaging with a TR long compared to tissue T1 (to reduce T1 contribution to image contrast) and a TE between the longest and shortest tissue T2s of interest.	
110806	T2* Weighted MR Signal Intensity	Signal intensity of a T2* Weighted MR image. The T2* phenomenon results from molecular interactions (spin spin relaxation) and local magnetic field non-uniformities, which cause the protons to precess at slightly different frequencies.	
110807	Field Map MR Signal Intensity	Signal intensity of a Field Map MR image. A Field Map MR image provides a direct measure of the B_0 inhomogeneity at each point in the image.	
...
110816	T1 Weighted Dynamic Contrast Enhanced MR Signal Intensity	Signal intensity of a T1 Weighted Dynamic Contrast Enhanced MR image. A T1 Weighted Dynamic Contrast Enhanced MR image reflects the dynamics of diffusion of the exogenous contrast media from the blood pool into the extra vascular extracellular space (EES) of the brain at a rate determined by the blood flow to the tissue, the permeability of the Brain Blood Barrier (BBB), and the surface area of the perfusing vessels.	
110817	T2 Weighted Dynamic Contrast Enhanced MR Signal Intensity	Signal intensity of a T2 Weighted Dynamic Contrast Enhanced MR image. A T2 Weighted Dynamic Contrast Enhanced MR image reflects the T2 of tissue decrease as the Gd contrast agent bolus passes through the brain.	
110818	T2* Weighted Dynamic Contrast Enhanced MR Signal Intensity	Signal intensity of a T2* Weighted Dynamic Contrast Enhanced MR image. A T2* Weighted Dynamic Contrast Enhanced MR image reflects the T2* of tissue decrease as the Gd contrast agent bolus passes through the brain.	

Code Value	Code Meaning	Definition	Notes
110819	Blood Oxygenation Level	Signal intensity of a Blood Oxygenation Level image. BOLD imaging is sensitive to blood oxygenation (but also to cerebral blood flow and volume). This modality is essentially used for detecting brain activation (functional MR).	
...
110827	Tissue Velocity	Velocity of tissue based on Doppler measurements.	
110828	Flow Velocity	Velocity of blood flow based on Doppler measurements.	
110829	Flow Variance	Statistical variance of blood velocity relative to mean.	
110830	Elasticity	Scalar value related to the elastic properties of the tissue.	
110831	Perfusion	Scalar value related to the volume of blood perfusing into tissue.	
110850	X-Ray Attenuation	Decrease in the number of photons in an X-Ray beam due to interactions with the atoms of a material substance. Attenuation is due primarily to two processes, absorption and scattering.	
110851	X-Ray Attenuation Coefficient	<i>Coefficient that describes the fraction of a beam of X-Rays or gamma rays that is absorbed or scattered per unit thickness of the absorber. This value basically accounts for the number of atoms in a cubic cm volume of material and the probability of a photon being scattered or absorbed from the nucleus or an electron of one of these atoms.</i>	<i>Retired. Replaced by (112031, DCM, "Attenuation Coefficient")</i>
110852	MR signal intensity	Signal intensity of an MR image, not otherwise specified.	