

1	Status	Letter Ballot
2	Date of Last Update	2018/11/11
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6	Submission Date	2017/12/03

7 Correction Number CP-1764

8 Log Summary: More quantitative image features

9 Name of Standard

10 PS3.16

11 Rationale for Correction:

12 CP 1705 added codes for a comprehensive set of texture features, but more features can be extracted from images than are currently
13 included in DICOM.

14 This CP includes revisions to how to encode features, what features are available, and the description of certain aspects of how they
15 are derived (which affect their interpretation/repeatability).

16 Now that IBSI defines its own codes, some DCM codes are no longer necessary and are retired with reference to the IBSI codes.
17 IBSI is added as a coding scheme. Also add the Radiomics Ontology (RO) as a coding scheme, *since some concepts are required*
18 *from it.*

19 An example of usage of a broad range of radiomic features, without reference to standard definitions and highlighting the need for
20 them, is found in Kalpathy-Cramer J et al. Radiomics of Lung Nodules: A Multi-Institutional Study of Robustness and Agreement of
21 Quantitative Imaging Features. Tomography. 2016 Dec;2(4):430–7. [http://www.ncbi.nlm.nih.gov/pmc/articles/PMC5279995/.](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC5279995/)]

22 The proposed quantitative image features context group includes generic size and intensity measurements and hence the measurement
23 parameters invoked in TID 1500 are simplified. The title of the the context group is "quantitative image features" rather than "radiomics"
24 since these have more general applications than just radiology.

25 *[Ed.Note.: Update IBSI coding scheme with new reference when published (current v6 on arXiv does not contain the codes.)*

26 Correction Wording:

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

2 Normative References

The following standards contain provisions that, through reference in this text, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibilities of applying the most recent editions of the standards indicated below.

2.1 General

[IBSI Features] *arXiv*. Zwanenburg A, Leger S, Vallières M, and Löck S. 17 Apr 2018. arXiv:1612.07003v6. "Image biomarker standardisation initiative - feature definitions". <https://arxiv.org/abs/1612.07003> .

8 Coding Schemes

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Table 8-1. Coding Schemes

Coding Scheme Designator (0008,0102)	Coding Scheme UID (0008,010C)	Coding Scheme Name (0008,0115)	Coding Scheme Responsible Organization (0008,0116)	Coding Scheme Resources Sequence (0008,0109) Type: URL	Description
...					
<u>IBSI</u>		<u>Image Biomarker Standardisation Initiative</u>		<u>DOC: http://arxiv.org/abs/1612.07003</u>	
...					
<u>RO</u>		<u>Radiomics Ontology</u>		<u>DOC: http://bioportal.bioontology.org/ontologies/RO</u>	
...					

TID 315 Equation or Table

Table TID 315. Parameters

Parameter Name	Parameter Usage
\$Equation	Coded term or Context Group for the equation or table from which a measurement was derived or computed

TID 1419 ROI Measurements

Table TID 1419. Parameters

\$Measurement	Coded term or Context Group for Concept Name of measurement
\$Units	Units for the measurement
...	
\$Method	Value for Measurement Method
\$Derivation	Value for Measurement Derivation
...	

1	\$Equation	Coded term or Context Group for the equation or table from which the measurement was derived or computed
2		
3	...	
4	\$DerivationParameter	Coded term or Context Group for Concept Name of a derivation parameter
5	\$DerivationParameterUnits	Units of derivation parameter

Type: Extensible
Order: Non-Significant
Root: No

Table TID 1419. ROI Measurements

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
13								
14								
15	...							
16	5		NUM	\$Measurement	1-n	M		UNITS = \$Units
17	...							
18	8	>	HAS CONCEPT MOD	EV (121401, DCM, "Derivation")	1	U		\$Derivation
19								
20	...							
21	13	>	INFERRED FROM	\$DerivationParameter	1-n	UC	XOR Row 14	\$DerivationParameterUnits
22								
23	14	>	R-INFERRED FROM	\$DerivationParameter	1-n	UC	XOR Row 13	\$DerivationParameterUnits
24								
25	14b	≥	INFERRED FROM	\$DerivationParameter	1-n	U		
26								
27	14c	≥	INFERRED FROM	\$DerivationParameter	1-n	U		
28								
29	15	>	INFERRED FROM	DTID 315 "Equation or Table"	1	UC	XOR Row 16	\$Equation = \$Equation
30								
31	16	>	INFERRED FROM	DCID 228 "Equation or Table"	1	UC	XOR Row 15	
32								
33	...							

TID 1500 Measurement Report

Table TID 1500. Measurement Report

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
36								
37								
38	7	>>	CONTAINS	DTID 1410	1-n	U		\$Measurement = BCID 7469 "Generic Intensity and Size Measurements" \$Measurement = BCID 7468 "Texture Measurements" CID ccc1 "Quantitative Image Features" \$Units = BCID 7181 \$Derivation = BCID 7464 \$Method = BCID 6147
39								
40								
41								
42								
43								
44								
45								

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
8	>>	CONTAINS	INCLUDE	DTID 1411	1-n	U		<p>\$Measurement = BCID 7469 “Generic Intensity and Size Measurements”</p> <p>\$Measurement = BCID 7468 “Texture Measurements” <u>CID ccc1 “Quantitative Image Features”</u></p> <p>\$Units = BCID 7181</p> <p>\$Derivation = BCID 7464</p> <p>\$Method = BCID 6147</p>
9	>>	CONTAINS	INCLUDE	DTID 1501	1-n	U		<p>\$Measurement = BCID 7469 “Generic Intensity and Size Measurements”</p> <p>\$Measurement = BCID 7468 “Texture Measurements” <u>CID ccc1 “Quantitative Image Features”</u></p> <p>\$Units = BCID 7181</p> <p>\$Derivation = BCID 7464</p> <p>\$Method = BCID 6147</p>

Content Item Descriptions

Rows 7, 8, 9	The baseline context groups defined allow for generic intensity and , size, <u>texture and other feature</u> measurements, regardless of the geometry of the ROI (e.g., linear distance can be measured on volumes, or volume can be estimated from a linear distance), and being baseline, do not constrain the invoker from using other appropriate concepts specific to the application.
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CID 228 Equation or Table

Resources: [HTML](#) | [FHIR JSON](#) | [FHIR XML](#) | [IHE SVS XML](#)
Type: Extensible
Version: 20030327
UID: 1.2.840.10008.6.1.33

Table CID 228. Equation or Table

Coding Scheme Designator	Code Value	Code Meaning
DCM	121420	Equation
DCM	121421	Equation Citation
DCM	121424	Table of Values
DCM	121422	Table of Values Citation
DCM	121423	Method Citation

CID ccc1 Quantitative Image Features

Resources: [HTML](#) | [FHIR JSON](#) | [FHIR XML](#) | [IHE SVS XML](#)
Type: Extensible
Version: yyyyymmdd
UID: 1.2.840.10008.6.1.uuu1

Table CID ccc1. Quantitative Image Features

Coding Scheme Designator	Code Value	Code Meaning
<u>Include CID 7468 "Texture Measurements"</u>		
<u>Include CID 7469 "Generic Intensity and Size Measurements"</u>		
<u>Include CID cc10 "Global Shape Descriptors"</u>		

CID cc10 Global Shape Descriptors

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
Type: Extensible
Version: yyymmdd
UID: 1.2.840.10008.6.1.uu10

These features are categorized in [IBSI Features] as "Morphology".

Table CID cc10. Global Shape Descriptors

Coding Scheme Designator	Code Value	Code Meaning
<u>IBSI</u>	<u>RNU0</u>	<u>Volume of Mesh</u>
<u>IBSI</u>	<u>YEKZ</u>	<u>Volume from Voxel Summation</u>
<u>IBSI</u>	<u>C0JK</u>	<u>Surface Area of Mesh</u>
<u>IBSI</u>	<u>2PR5</u>	<u>Surface to Volume Ratio</u>
<u>IBSI</u>	<u>SKGS</u>	<u>Compactness 1</u>
<u>IBSI</u>	<u>BQWJ</u>	<u>Compactness 2</u>
<u>IBSI</u>	<u>KRCK</u>	<u>Spherical Disproportion</u>
<u>IBSI</u>	<u>QCFX</u>	<u>Sphericity</u>
<u>IBSI</u>	<u>25C7</u>	<u>Asphericity</u>
<u>IBSI</u>	<u>KLMA</u>	<u>Centre of Mass Shift</u>
<u>IBSI</u>	<u>L0JK</u>	<u>Maximum 3D Diameter of a Mesh</u>
<u>IBSI</u>	<u>TDIC</u>	<u>Major Axis in 3D Length</u>
<u>IBSI</u>	<u>P9VJ</u>	<u>Minor Axis in 3D Length</u>
<u>IBSI</u>	<u>7J51</u>	<u>Least Axis in 3D Length</u>
<u>IBSI</u>	<u>Q3CK</u>	<u>Elongation</u>
<u>IBSI</u>	<u>N17B</u>	<u>Flatness</u>
<u>IBSI</u>	<u>PBX1</u>	<u>Volume Density in Frame of Reference Axis Aligned Bounding Box</u>
<u>IBSI</u>	<u>R59B</u>	<u>Area Density in Frame of Reference Axis Aligned Bounding Box</u>
<u>IBSI</u>	<u>ZH1A</u>	<u>Volume Density in Oriented Minimum Bounding Box</u>
<u>IBSI</u>	<u>IQYR</u>	<u>Area Density in Oriented Minimum Bounding Box</u>
<u>IBSI</u>	<u>6BDE</u>	<u>Volume Density in Approximate Enclosing Ellipsoid</u>
<u>IBSI</u>	<u>RDD2</u>	<u>Area Density in Approximate Enclosing Ellipsoid</u>
<u>IBSI</u>	<u>SWZ1</u>	<u>Volume Density in Minimum Volume Enclosing Ellipsoid</u>
<u>IBSI</u>	<u>BRI8</u>	<u>Area Density in Minimum Volume Enclosing Ellipsoid</u>
<u>IBSI</u>	<u>R3ER</u>	<u>Volume Density in Convex Hull</u>
<u>IBSI</u>	<u>7T7F</u>	<u>Area Density in Convex Hull</u>
<u>IBSI</u>	<u>99N0</u>	<u>Integrated Intensity</u>

Coding Scheme Designator	Code Value	Code Meaning
<u>IBSI</u>	<u>N365</u>	<u>Moran's I Index</u>
<u>IBSI</u>	<u>NPT7</u>	<u>Geary's C Measure</u>

CID 7466 PET Region of Interest Measurements

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: 20141110
 UID: 1.2.840.10008.6.1.999

Table CID 7466. PET Region of Interest Measurements

Coding Scheme Designator	Code Value	Code Meaning
DCM	126032	Metabolic Volume
DCM	126033	Total Lesion Glycolysis
DCM	126034	Glycolysis
DCM	126035	Total Lesion Proliferation
DCM	126036	Proliferative Activity
DCM	126037	Standardized Added Metabolic Activity
DCM	126038	Standardized Added Metabolic Activity Background
DCM	126039	Lesion to Background SUV Ratio
DCM	126040	Background for Lesion to Background SUV Ratio

CID 7467 Gray Level Co-occurrence Matrix Measurements

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: 20171122yyvymdd
 UID: 1.2.840.10008.6.1.1000

Table CID 7467. Gray Level Co-occurrence Matrix Measurements

Coding Scheme Designator	Code Value	Code Meaning
<u>DGMIBSI</u>	<u>426060TU9B</u>	Joint Entropy of GLCM
DCM	126061	Root Angular Second Moment of GLCM
<u>DGMIBSI</u>	<u>426062WF0Z</u>	Inverse Difference Moment of GLCM
<u>DGMIBSI</u>	<u>426063ACUI</u>	Contrast of GLCM
<u>DGMIBSI</u>	<u>4260648S9J</u>	Dissimilarity of GLCM
<u>DGMIBSI</u>	<u>4260658ZQL</u>	Angular Second Moment of GLCM
<u>DGMIBSI</u>	<u>426066NI2N</u>	Correlation of GLCM
<u>DGMIBSI</u>	<u>428784GYBY</u>	Joint Maximum of GLCM
<u>DGMIBSI</u>	<u>42878260VM</u>	Joint Average of GLCM
<u>DGMIBSI</u>	<u>428783UR99</u>	Joint Variance of GLCM
<u>DGMIBSI</u>	<u>428784TF7R</u>	Difference Average of GLCM
<u>DGMIBSI</u>	<u>428785D3YU</u>	Difference Variance of GLCM
<u>DGMIBSI</u>	<u>428786NTRS</u>	Difference Entropy of GLCM
<u>DGMIBSI</u>	<u>428787ZGXS</u>	Sum Average of GLCM

Coding Scheme Designator	Code Value	Code Meaning
DCM BSI	428788QEEB	Sum Variance of GLCM
DCM BSI	428789P6QZ	Sum Entropy of GLCM
DCM BSI	428790IB1Z	Inverse Difference of GLCM
DCM BSI	428791NDRX	Normalized Inverse Difference of GLCM
DCM BSI	4287921QCO	Normalized Inverse Difference Moment Normalized of GLCM
DCM BSI	428793E8JP	Inverse Variance of GLCM
DCM BSI	428794QWB0	Autocorrelation of GLCM
DCM BSI	428795DG8W	Cluster Tendency of GLCM
DCM BSI	4287967NFM	Cluster Shade of GLCM
DCM BSI	428797AE86	Cluster Prominence of GLCM
DCM BSI	428798R8DG	First Measure of Information Correlation of GLCM
DCM BSI	428799JN9H	Second Measure of Information Correlation of GLCM

CID 7468 Texture Measurements

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
Type: Extensible
Version: 20171122yyymmdd
UID: 1.2.840.10008.6.1.1001

Table CID 7468. Texture Measurements

Coding Scheme Designator	Code Value	Code Meaning
<u>Include CID cc20 "Intensity Histogram Features"</u>		
<i>Include CID 7467 "Gray Level Co-occurrence Matrix Measurements"</i>		
<i>Include CID 7475 "Gray Level Run Length Based Features"</i>		
<i>Include CID 7476 "Gray Level Size Zone Based Features"</i>		
<u>Include CID cc30 "Grey Level Distance Zone Based Features"</u>		
<u>Include CID cc31 "Neighbourhood Grey Tone Difference Based Features"</u>		
<u>Include CID cc32 "Neighbouring Grey Level Dependence Based Features"</u>		
DCM	126050	Fractal Dimension

CID 7469 Generic Intensity and Size Measurements

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
Type: Extensible
Version: 20141110
UID: 1.2.840.10008.6.1.1003

Table CID 7469. Generic Intensity and Size Measurements

Coding Scheme Designator	Code Value	Code Meaning
<i>Include CID 7180 "Abstract Multi-dimensional Image Model Component Semantics"</i>		
<i>Include CID 7470 "Linear Measurements"</i>		
<i>Include CID 7471 "Area Measurements"</i>		
<i>Include CID 7472 "Volume Measurements"</i>		

CID 7470 Linear Measurements

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: ~~20160314~~yyyymmdd
 UID: 1.2.840.10008.6.1.524

Table CID 7470. Linear Measurements

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
SRT	G-D7FE	Length	410668003	C1444754
DCM	121211	Path length		
DCM	121206	Distance		
SRT	G-A220	Width	103355008	C0487742
SRT	G-D785	Depth	131197000	C0205125
SRT	M-02550	Diameter	81827009	C1301886
SRT	G-A185	Long Axis	103339001	C0522487
SRT	G-A186	Short Axis	103340004	C0522488
SRT	G-A193	Major Axis	131187009	C1295723
SRT	G-A194	Minor Axis	131188004	C1295724
SRT	G-A195	Perpendicular Axis	131189007	C1295725
SRT	G-A196	Radius	131190003	C1306504
SRT	G-A197	Perimeter	131191004	C1295726
SRT	M-02560	Circumference	74551000	C0332520
SRT	G-A198	Diameter of circumscribed circle	131192006	C1295727
DCM	121207	Height		
<u>IBSI</u>	<u>L0JK</u>	<u>Maximum 3D Diameter of a Mesh</u>		
<u>IBSI</u>	<u>TDIC</u>	<u>Major Axis in 3D Length</u>		
<u>IBSI</u>	<u>P9VJ</u>	<u>Minor Axis in 3D Length</u>		
<u>IBSI</u>	<u>7J51</u>	<u>Least Axis in 3D Length</u>		

CID 7471 Area Measurements

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: ~~20020904~~yyyymmdd
 UID: 1.2.840.10008.6.1.525

Table CID 7471. Area Measurements

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
SRT	G-A166	Area	42798000	C0205146
SRT	G-A16A	Area of defined region	131184002	C1295720
<u>IBSI</u>	<u>C0JK</u>	<u>Surface Area of Mesh</u>		

CID 7472 Volume Measurements

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: ~~20020904~~yyyymmdd
 UID: 1.2.840.10008.6.1.526

Table CID 7472. Volume Measurements

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
SRT	G-D705	Volume	118565006	C0449468
DCM	121216	Volume estimated from single 2D region		
DCM	121218	Volume estimated from two non-coplanar 2D regions		
DCM	121217	Volume estimated from three or more non-coplanar 2D regions		
DCM	121222	Volume of sphere		
DCM	121221	Volume of ellipsoid		
DCM	121220	Volume of circumscribed sphere		
DCM	121219	Volume of bounding three dimensional region		
<u>IBSI</u>	<u>RNU0</u>	<u>Volume of Mesh</u>		
<u>IBSI</u>	<u>YEKZ</u>	<u>Volume from Voxel Summation</u>		

CID cc20 Intensity Histogram Features

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: yyyymmdd
 UID: 1.2.840.10008.6.1.uu20

Table CID cc20. Intensity Histogram Features

Coding Scheme Designator	Code Value	Code Meaning
<u>IBSI</u>	<u>X6K6</u>	<u>Intensity Histogram Mean</u>
<u>IBSI</u>	<u>CH89</u>	<u>Intensity Histogram Variance</u>
<u>IBSI</u>	<u>88K1</u>	<u>Intensity Histogram Skewness</u>
<u>IBSI</u>	<u>C3I7</u>	<u>Intensity Histogram Kurtosis</u>
<u>IBSI</u>	<u>WIFQ</u>	<u>Intensity Histogram Median</u>
<u>IBSI</u>	<u>1PR8</u>	<u>Intensity Histogram Minimum Gray Level</u>
<u>IBSI</u>	<u>GPMT</u>	<u>Intensity Histogram 10th Percentile</u>
<u>IBSI</u>	<u>OZ0C</u>	<u>Intensity Histogram 90th Percentile</u>
<u>IBSI</u>	<u>3NCY</u>	<u>Intensity Histogram Maximum Gray Level</u>
<u>IBSI</u>	<u>AMMC</u>	<u>Intensity Histogram Mode</u>
<u>IBSI</u>	<u>WR0Q</u>	<u>Intensity Histogram Interquartile Range</u>
<u>IBSI</u>	<u>5Z3W</u>	<u>Intensity Histogram Range</u>
<u>IBSI</u>	<u>D2ZX</u>	<u>Intensity Histogram Mean Absolute Deviation</u>
<u>IBSI</u>	<u>WRZB</u>	<u>Intensity Histogram Robust Mean Absolute Deviation</u>

Coding Scheme Designator	Code Value	Code Meaning
<u>IBSI</u>	<u>4RNL</u>	<u>Intensity Histogram Median Absolute Deviation</u>
<u>IBSI</u>	<u>CWYJ</u>	<u>Intensity Histogram Coefficient of Variation</u>
<u>IBSI</u>	<u>SLWD</u>	<u>Intensity Histogram Quartile Coefficient of Dispersion</u>
<u>IBSI</u>	<u>TLU2</u>	<u>Intensity Histogram Entropy</u>
<u>IBSI</u>	<u>BJ5W</u>	<u>Intensity Histogram Uniformity</u>
<u>IBSI</u>	<u>12CE</u>	<u>Intensity Histogram Maximum Gradient</u>
<u>IBSI</u>	<u>8E6O</u>	<u>Intensity Histogram Maximum Gradient Gray Level</u>
<u>IBSI</u>	<u>VQB3</u>	<u>Intensity Histogram Minimum Gradient</u>
<u>IBSI</u>	<u>RHQZ</u>	<u>Intensity Histogram Minimum Gradient Gray Level</u>

CID 7475 Gray Level Run Length Based Features

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: 20171122yyymmdd
 UID: 1.2.840.10008.6.1.1199.xml

Table CID 7475. Gray Level Run Length Based Features

Coding Scheme Designator	Code Value	Code Meaning
<u>DGMIBSI</u>	<u>42880422OV</u>	Short Runs Emphasis
<u>DGMIBSI</u>	<u>428802W4KF</u>	Long Runs Emphasis
<u>DGMIBSI</u>	<u>428803V3SW</u>	Low Gray Level Run Emphasis
<u>DGMIBSI</u>	<u>428804G3QZ</u>	High Gray Level Run Emphasis
<u>DGMIBSI</u>	<u>428805HTZI</u>	Short Run Low Gray Level Emphasis
<u>DGMIBSI</u>	<u>428806GD3A</u>	Short Run High Gray Level Emphasis
<u>DGMIBSI</u>	<u>428807IVPO</u>	Long Run Low Gray Level Emphasis
<u>DGMIBSI</u>	<u>4288083KUM</u>	Long Run High Gray Level Emphasis
<u>DGMIBSI</u>	<u>428809R5YN</u>	Gray Level Nonuniformity in Runs
<u>DGMIBSI</u>	<u>428810OVBL</u>	<u>Normalized</u> Gray Level Nonuniformity in Runs <u>Normalized</u>
<u>DGMIBSI</u>	<u>428811W92Y</u>	Run Length Nonuniformity
<u>DGMIBSI</u>	<u>428812IC23</u>	<u>Normalized</u> Run Length Nonuniformity- <u>Normalized</u>
<u>DGMIBSI</u>	<u>4288139ZK5</u>	Run Percentage
<u>DGMIBSI</u>	<u>4288148CE5</u>	Gray Level Variance in Runs
<u>DGMIBSI</u>	<u>428815SXLW</u>	Run Length Variance
<u>DGMIBSI</u>	<u>428816HJ9O</u>	Run Entropy

CID 7476 Gray Level Size Zone Based Features

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: 20171122yyymmdd
 UID: 1.2.840.10008.6.1.1200.xml

Table CID 7476. Gray Level Size Zone Based Features

Coding Scheme Designator	Code Value	Code Meaning
<u>DCM</u> <u>IBS</u>	<u>4288245QRC</u>	Small Zone Emphasis
<u>DCM</u> <u>IBS</u>	<u>42882248P8</u>	Large Zone Emphasis
<u>DCM</u> <u>IBS</u>	<u>428823XMSY</u>	Low Gray Level Zone Emphasis
<u>DCM</u> <u>IBS</u>	<u>4288245GN9</u>	High Gray Level Zone Emphasis
<u>DCM</u> <u>IBS</u>	<u>4288255RAI</u>	Small Zone Low Gray Level Emphasis
<u>DCM</u> <u>IBS</u>	<u>428826HW1V</u>	Small Zone High Gray Level Emphasis
<u>DCM</u> <u>IBS</u>	<u>428827YH51</u>	Large Zone Low Gray Level Emphasis
<u>DCM</u> <u>IBS</u>	<u>428828J17V</u>	Large Zone High Gray Level Emphasis
<u>DCM</u> <u>IBS</u>	<u>428829JNSA</u>	Gray Level Nonuniformity of <u>Size</u> Zone Counts
<u>DCM</u> <u>IBS</u>	<u>428830Y1RO</u>	Normalized Gray Level Nonuniformity of <u>Size</u> Zone Counts Normalized
<u>DCM</u> <u>IBS</u>	<u>4288314JP3</u>	Zone Size Nonuniformity
<u>DCM</u> <u>IBS</u>	<u>428832VB3A</u>	Normalized Zone Size Nonuniformity- Normalized
<u>DCM</u> <u>IBS</u>	<u>428833P30P</u>	<u>Size</u> Zone Percentage
<u>DCM</u> <u>IBS</u>	<u>428834BYLV</u>	Gray Level Variance in <u>Size</u> Zones
<u>DCM</u> <u>IBS</u>	<u>4288353NSA</u>	Zone Size Variance
<u>DCM</u> <u>IBS</u>	<u>428836GU8N</u>	Zone Size Entropy

CID cc30 Grey Level Distance Zone Based Features

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: yyyyymmdd
 UID: 1.2.840.10008.6.1.uu30

Table CID cc30. Grey Level Distance Zone Based Features

Coding Scheme Designator	Code Value	Code Meaning
<u>IBS</u>	<u>0GBI</u>	<u>Small Distance Emphasis</u>
<u>IBS</u>	<u>MB4I</u>	<u>Large Distance Emphasis</u>
<u>IBS</u>	<u>S1RA</u>	<u>Low Grey Level Zone Emphasis</u>
<u>IBS</u>	<u>K26C</u>	<u>High Grey Level Zone Emphasis</u>
<u>IBS</u>	<u>RUVG</u>	<u>Small Distance Low Grey Level Emphasis</u>
<u>IBS</u>	<u>DKNJ</u>	<u>Small Distance High Grey Level Emphasis</u>
<u>IBS</u>	<u>A7WM</u>	<u>Large Distance Low Grey Level Emphasis</u>
<u>IBS</u>	<u>KLTH</u>	<u>Large Distance High Grey Level Emphasis</u>
<u>IBS</u>	<u>VFT7</u>	<u>Grey Level Non-uniformity of Distance Zone Counts</u>
<u>IBS</u>	<u>7HP3</u>	<u>Normalized Grey Level Non-uniformity of Distance Zone Counts</u>
<u>IBS</u>	<u>V294</u>	<u>Zone Distance Non-uniformity</u>
<u>IBS</u>	<u>IATH</u>	<u>Normalized Zone Distance Non-uniformity</u>
<u>IBS</u>	<u>VIWW</u>	<u>Distance Zone Percentage</u>
<u>IBS</u>	<u>QK93</u>	<u>Grey Level Variance in Distance Zones</u>
<u>IBS</u>	<u>7WT1</u>	<u>Zone Distance Variance</u>

Coding Scheme Designator	Code Value	Code Meaning
<u>IBSI</u>	<u>GBDU</u>	<u>Zone Distance Entropy</u>

CID cc31 Neighbourhood Grey Tone Difference Based Features

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: yyyyymmdd
 UID: 1.2.840.10008.6.1.uu31

Table CID cc31. Neighbourhood Grey Tone Difference Based Features

Coding Scheme Designator	Code Value	Code Meaning
<u>IBSI</u>	<u>QCDE</u>	<u>Coarseness of NGTDM</u>
<u>IBSI</u>	<u>65HE</u>	<u>Contrast of NGTDM</u>
<u>IBSI</u>	<u>NQ30</u>	<u>Busyness of NGTDM</u>
<u>IBSI</u>	<u>HDEZ</u>	<u>Complexity of NGTDM</u>
<u>IBSI</u>	<u>1X9X</u>	<u>Strength of NGTDM</u>

CID cc32 Neighbouring Grey Level Dependence Based Features

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: yyyyymmdd
 UID: 1.2.840.10008.6.1.uu32

Table CID cc32. Neighbouring Grey Level Dependence Based Features

Coding Scheme Designator	Code Value	Code Meaning
<u>IBSI</u>	<u>SODN</u>	<u>Low dependence emphasis</u>
<u>IBSI</u>	<u>IMOQ</u>	<u>High dependence emphasis</u>
<u>IBSI</u>	<u>TL9H</u>	<u>Low grey level count emphasis</u>
<u>IBSI</u>	<u>OAE7</u>	<u>High grey level count emphasis</u>
<u>IBSI</u>	<u>EQ3F</u>	<u>Low dependence low grey level emphasis</u>
<u>IBSI</u>	<u>JA6D</u>	<u>Low dependence high grey level emphasis</u>
<u>IBSI</u>	<u>NBZI</u>	<u>High dependence low grey level emphasis</u>
<u>IBSI</u>	<u>9QMG</u>	<u>High dependence high grey level emphasis</u>
<u>IBSI</u>	<u>FP8K</u>	<u>Grey level non-uniformity of NGLDM</u>
<u>IBSI</u>	<u>5SPA</u>	<u>Normalized grey level non-uniformity of NGLDM</u>
<u>IBSI</u>	<u>Z87G</u>	<u>Dependence count non-uniformity</u>
<u>IBSI</u>	<u>OKJI</u>	<u>Dependence count non-uniformity normalized</u>
<u>IBSI</u>	<u>6XV8</u>	<u>Dependence count percentage</u>
<u>IBSI</u>	<u>1PFV</u>	<u>Grey level variance of NGLDM</u>
<u>IBSI</u>	<u>DNX2</u>	<u>Dependence count variance</u>
<u>IBSI</u>	<u>FCBV</u>	<u>Dependence count entropy</u>
<u>IBSI</u>	<u>CAS9</u>	<u>Dependence count energy</u>

CID 7180 Abstract Multi-dimensional Image Model Component Semantics

Resources: [HTML](#) | [FHIR JSON](#) | [FHIR XML](#) | [IHE SVS XML](#)
Type: Extensible
Version: 20170914
UID: 1.2.840.10008.6.1.917

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

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
<i>Include CID 4033 "MR Proton Spectroscopy Metabolites"</i>				
DCM	113063	T1		
DCM	113065	T2		
DCM	113064	T2*		
DCM	113058	Proton Density		
DCM	110800	Spin Tagging Perfusion MR Signal Intensity		
DCM	113070	Velocity encoded		
DCM	113067	Temperature encoded		
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		
<i>Include Section CID 7270 "MR Diffusion Component Semantics"</i>				
<i>Include Section CID 7271 "MR Diffusion Anisotropy Indices"</i>				
<i>Include Section CID 7272 "MR Diffusion Model Parameters"</i>				
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	110819	Blood Oxygenation Level		
DCM	110820	Nuclear Medicine Projection Activity		
DCM	110821	Nuclear Medicine Tomographic Activity		
DCM	110822	Spatial Displacement X Component		
DCM	110823	Spatial Displacement Y Component		
DCM	110824	Spatial Displacement Z Component		
DCM	110825	Hemodynamic Resistance		
DCM	110826	Indexed Hemodynamic Resistance		
DCM	112031	Attenuation Coefficient		
DCM	110827	Tissue Velocity		

	Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
1					
2					
3					
4	DCM	110828	Flow Velocity		
5	SRT	P0-02241	Power Doppler	425704008	C1960437
6	DCM	110829	Flow Variance		
7	DCM	110830	Elasticity		
8	DCM	110831	Perfusion		
9	DCM	110832	Speed of sound		
10	DCM	110833	Ultrasound Attenuation		
11	DCM	113068	Student's T-test		
12	DCM	113071	Z-score		
13	DCM	113057	R-Coefficient		
14	DCM	126220	R2-Coefficient		
15	DCM	126221	Chi-square		
16	DCM	126222	D-W		
17	DCM	126223	AIC		
18	DCM	126224	BIC		
19	DCM	110834	RGB R Component		
20	DCM	110835	RGB G Component		
21	DCM	110836	RGB B Component		
22	DCM	110837	YBR FULL Y Component		
23	DCM	110838	YBR FULL CB Component		
24	DCM	110839	YBR FULL CR Component		
25	DCM	110840	YBR PARTIAL Y Component		
26	DCM	110841	YBR PARTIAL CB Component		
27	DCM	110842	YBR PARTIAL CR Component		
28	DCM	110843	YBR ICT Y Component		
29	DCM	110844	YBR ICT CB Component		
30	DCM	110845	YBR ICT CR Component		
31	DCM	110846	YBR RCT Y Component		
32	DCM	110847	YBR RCT CB Component		
33	DCM	110848	YBR RCT CR Component		
34	DCM	110849	Echogenicity		
35	DCM	110850	X-Ray Attenuation		
36	DCM	110852	MR signal intensity		
37	DCM	110853	Binary Segmentation		
38	DCM	110854	Fractional Probabilistic Segmentation		
39	DCM	110855	Fractional Occupancy Segmentation		
40	DCM	126393	R1		
41	DCM	126394	R2		
42	DCM	126395	R2*		
43	DCM	113098	Magnetization Transfer Ratio		

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
DCM	126396	Magnetic Susceptibility		
Include Section CID 4107 "Tracer Kinetic Model Parameters"				
Include Section CID 4108 "Perfusion Model Parameters"				
Include Section CID 4109 "Model-Independent Dynamic Contrast Analysis Parameters"				
DCM	126400	Standardized Uptake Value		
DCM	126401	SUVbw		
DCM	126402	SUVlbm		
DCM	126406	SUVlbm(James128)		
DCM	126405	SUVlbm(Janma)		
DCM	126403	SUVbsa		
DCM	126404	SUVibw		
Include CID 10070 "Radiation Dose Types"				

CID 4107 Tracer Kinetic Model Parameters

Resources: [HTML](#) | [FHIR JSON](#) | [FHIR XML](#) | [IHE SVS XML](#)
Type: Extensible
Version: 20141110
UID: 1.2.840.10008.6.1.992

Table CID 4107. Tracer Kinetic Model Parameters

Coding Scheme Designator	Code Value	Code Meaning
DCM	126312	Ktrans
DCM	126313	kep
DCM	126314	ve
DCM	126330	tau_m
DCM	126331	vp

Note

CID 4108 Perfusion Model Parameters

Resources: [HTML](#) | [FHIR JSON](#) | [FHIR XML](#) | [IHE SVS XML](#)
Type: Extensible
Version: 20161106
UID: 1.2.840.10008.6.1.993

Table CID 4108. Perfusion Model Parameters

Coding Scheme Designator	Code Value	Code Meaning
DCM	113055	Regional Cerebral Blood Flow
DCM	126390	Regional Blood Flow
DCM	113056	Regional Cerebral Blood Volume
DCM	126391	Regional Blood Volume
DCM	113052	Mean Transit Time

Coding Scheme Designator	Code Value	Code Meaning
DCM	113069	Time To Peak
DCM	126392	Oxygen Extraction Fraction
DCM	113084	Tmax

Note**CID 4109 Model-Independent Dynamic Contrast Analysis Parameters**

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: 20150916
 UID: 1.2.840.10008.6.1.994

Table CID 4109. Model-Independent Dynamic Contrast Analysis Parameters

Coding Scheme Designator	Code Value	Code Meaning
DCM	126320	IAUC
DCM	126321	IAUC60
DCM	126322	IAUC90
DCM	126323	IAUC180
DCM	126324	IAUCBN
DCM	126325	IAUC60BN
DCM	126326	IAUC90BN
DCM	126327	IAUC180BN
DCM	126370	Time of Peak Concentration
DCM	126372	Time of Leading Half-Peak Concentration
DCM	126371	Bolus Arrival Time
DCM	113069	Time To Peak
DCM	126374	Temporal Derivative Threshold
DCM	126375	Maximum Slope
DCM	126376	Maximum Difference
DCM	126377	Tracer Concentration

Note

(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 contrast agent used. See http://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:

(G-C1C6, SRT, "Quantity") = (126326, DCM, "IAUC90BN")

(G-C036, SRT, "Measurement Method") = (126362, DCM, "User-defined AIF ROI")

(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:

NUM (126326, DCM, "IAUC90BN") = 0.230 (UNITS = ({normalized}, UCUM, "normalized")

>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.

CID 4033 MR Proton Spectroscopy Metabolites

Resources: [HTML](#) | [FHIR JSON](#) | [FHIR XML](#) | [IHE SVS XML](#)
Type: Extensible
Version: 20160314
UID: 1.2.840.10008.6.1.310

Table CID 4033. MR Proton Spectroscopy Metabolites

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
SRT	F-65C50	N-acetylaspartate	115391007	C0067684
SRT	F-61080	Citrate	59351004	C0376259
SRT	F-61620	Choline	65123005	C0008405
SRT	F-61380	Creatine	14804005	C0010286
DCM	113094	Creatine and Choline		
SRT	F-61760	Lactate	83036002	C0376261
SRT	F-63600	Lipid	70106000	C0023779
DCM	113095	Lipid and Lactate		
DCM	113080	Glutamate and glutamine		
SRT	F-64210	Glutamine	25761002	C0017797
SRT	F-64460	Tuarine	10944007	C0039350
SRT	F-61A90	Inositol	72164009	C0021547
DCM	113081	Choline/Creatine Ratio		
DCM	113082	N-acetylaspartate/Creatine Ratio		
DCM	113083	N-acetylaspartate/Choline Ratio		
DCM	113096	Creatine+Choline/Citrate Ratio		

Note

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".

CID 10070 Radiation Dose Types

Resources: [HTML](#) | [FHIR JSON](#) | [FHIR XML](#) | [IHE SVS XML](#)
Type: Extensible
Version: 20170405
UID: 1.2.840.10008.6.1.1164

Table CID 10070. Radiation Dose Types

Coding Scheme Designator	Code Value	Code Meaning
DCM	128513	Absorbed Dose
DCM	128512	Equivalent Dose

CID 7270 MR Diffusion Component Semantics

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
Type: Extensible
Version: 20170413
UID: 1.2.840.10008.6.1.1165

Table CID 7270. MR Diffusion Component Semantics

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID	Units
DCM	113043	Diffusion weighted			DT (1, UCUM, "no units")
DCM	110810	Volumetric Diffusion Dxx Component			DT (1, UCUM, "no units")
DCM	110811	Volumetric Diffusion Dxy Component			DT (1, UCUM, "no units")
DCM	110812	Volumetric Diffusion Dxz Component			DT (1, UCUM, "no units")
DCM	110813	Volumetric Diffusion Dyy Component			DT (1, UCUM, "no units")
DCM	110814	Volumetric Diffusion Dyz Component			DT (1, UCUM, "no units")
DCM	110815	Volumetric Diffusion Dzz Component			DT (1, UCUM, "no units")

CID 7271 MR Diffusion Anisotropy Indices

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
Type: Extensible
Version: 20170413
UID: 1.2.840.10008.6.1.1166

Table CID 7271. MR Diffusion Anisotropy Indices

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID	Units
DCM	110808	Fractional Anisotropy			DT ({{0:1}}, UCUM, "range 0:1")
DCM	110809	Relative Anisotropy			DT ({{ratio}}, UCUM, "ratio")
DCM	113288	Volume Ratio			DT ({{0:1}}, UCUM, "range 0:1")

CID 7272 MR Diffusion Model Parameters

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

Version: 20170413
 UID: 1.2.840.10008.6.1.1167

Table CID 7272. MR Diffusion Model Parameters

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID	Units
DCM	113041	Apparent Diffusion Coefficient		C3890194	DCID 7277 "Units of Diffusion Rate Area Over Time"
DCM	113289	Diffusion Coefficient			DCID 7277 "Units of Diffusion Rate Area Over Time"
DCM	113290	Mono-exponential Apparent Diffusion Coefficient			DCID 7277 "Units of Diffusion Rate Area Over Time"
DCM	113291	Slow Diffusion Coefficient			DCID 7277 "Units of Diffusion Rate Area Over Time"
DCM	113292	Fast Diffusion Coefficient			DCID 7277 "Units of Diffusion Rate Area Over Time"
DCM	113293	Fast Diffusion Coefficient Fraction			DT ({0:1}, UCUM, "range 0:1")
DCM	113294	Kurtosis Diffusion Coefficient			DCID 7277 "Units of Diffusion Rate Area Over Time"
DCM	113295	Gamma Distribution Scale Parameter			DT (1, UCUM, "no units")
DCM	113296	Gamma Distribution Shape Parameter			DT (1, UCUM, "no units")
DCM	113297	Gamma Distribution Mode			DT (1, UCUM, "no units")
DCM	113298	Distributed Diffusion Coefficient			DCID 7277 "Units of Diffusion Rate Area Over Time"
DCM	113299	Anomalous Exponent Parameter			DT ({0:1}, UCUM, "range 0:1")

CID 7277 Units of Diffusion Rate Area Over Time

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: 20170413
 UID: 1.2.840.10008.6.1.1172

Table CID 7277. Units of Diffusion Rate Area Over Time

Coding Scheme Designator	Code Value	Code Meaning
UCUM	mm2/s	mm2/s
UCUM	um2/ms	um2/ms
UCUM	um2/s	um2/s
UCUM	10-6.mm2/s	10-6.mm2/s

Note

D DICOM Controlled Terminology Definitions (Normative)

Table D-1. DICOM Controlled Terminology Definitions (Coding Scheme Designator "DCM" Coding Scheme Version "01")

Coding Scheme Designator	Code Value	Code Meaning

Code Value	Code Meaning	Definition	Notes
121216	Volume estimated from single 2D region	A three-dimensional numeric measurement that is approximate, based on a two-dimensional region in a single image.	
121217	Volume estimated from three or more non-coplanar 2D regions	A three-dimensional numeric measurement that is approximate, based on three or more non-coplanar two-dimensional image regions.	
121218	Volume estimated from two non-coplanar 2D regions	A three-dimensional numeric measurement that is approximate, based on two non-coplanar two-dimensional image regions.	
121219	Volume of bounding three dimensional region	A three-dimensional numeric measurement of the bounding region of a three-dimensional region of interest in an image set.	
121220	Volume of circumscribed sphere	A three-dimensional numeric measurement of the bounding sphere of a three-dimensional region of interest in an image set.	
121221	Volume of ellipsoid	A three-dimensional numeric measurement of an ellipsoid shaped three-dimensional region of interest in an image set.	
121222	Volume of sphere	A three-dimensional numeric measurement of a sphere shaped three-dimensional region of interest in an image set.	
126050	Fractal Dimension	A statistical index of complexity comparing how detail in a fractal pattern changes with the scale at which it is measured; a ratio of the change in detail to the change in scale.	
126051	Skewness	Measure of the asymmetry of the probability distribution of a real-valued random variable about its mean.	
126052	Kurtosis	Measure of the peakedness of the probability distribution of a real-valued random variable.	
126060	<i>Joint Entropy of GLCM</i>	<i>The zero order entropy of a Gray Level Co-occurrence Matrix (GLCM). A measure of disorder. Abbreviated ENT.</i> <i>See $F_{cm, joint, entr}$ in [IBSI Features].</i>	<u>Retired</u> <u>Replaced by (TU9B, IBSI, "Joint Entropy of GLCM")</u>
126061	Root Angular Second Moment of GLCM	The square root of the Angular Second Moment (ASM) of a Gray Level Co-occurrence Matrix (GLCM). A measure of orderliness. See http://www.fp.ucalgary.ca/mhallbey/equations.htm .	Sometimes referred to as "energy", "uniformity" or "uniformity of energy" but then potentially confused with ASM. Not defined in [IBSI Features]
126062	<i>Inverse Difference Moment of GLCM</i>	<i>The Inverse Difference Moment (homogeneity) of a Gray Level Co-occurrence Matrix (GLCM). Abbreviated IDM.</i> <i>See $F_{cm, inv, diff, mom}$ in [IBSI Features].</i>	<i>Other concepts are sometimes referred to as "homogeneity", e.g., the "inverse difference", which is calculated from the absolute value of differences rather than square of them.</i> <u>Retired</u> <u>Replaced by (WF0Z, IBSI, "Inverse Difference Moment of GLCM")</u>

Code Value	Code Meaning	Definition	Notes
126063	Contrast of GLCM	The sum of squares of a Gray Level Co-occurrence Matrix (GLCM). A measure of gray level variations. Abbreviated CON. See $F_{cm.contrast}$ in [IBSI Features].	Distinct from "joint (sum of squares) variance" and "dissimilarity". Retired Replaced by (ACUI, IBSI, "Contrast of GLCM")
126064	Dissimilarity of GLCM	The dissimilarity of a Gray Level Co-occurrence Matrix (GLCM). Abbreviated DIS. See $F_{cm.dissimilarity}$ in [IBSI Features].	Distinct from "contrast", which uses square rather than absolute value of difference. Retired Replaced by (8S9J, IBSI, "Dissimilarity of GLCM")
126065	Angular Second Moment of GLCM	The Angular Second Moment of a Gray Level Co-occurrence Matrix (GLCM). Abbreviated ASM. See $F_{cm.energy}$ in [IBSI Features].	Sometimes referred to as "energy", "uniformity" or "uniformity of energy" but then potentially confused with square root of ASM. Retired Replaced by (8ZQL, IBSI, "Angular Second Moment of GLCM")
126066	Correlation of GLCM	A measure of the linear dependency of gray levels on those of neighbouring pixels of a Gray Level Co-occurrence Matrix (GLCM). Abbreviated COR. See $F_{cm.corr}$ in [IBSI Features].	Correlation is NaN for a constant image. Retired Replaced by (NI2N, IBSI, "Correlation of GLCM")
126067	Gray Level Co-occurrence Matrix	A tabulation of how often different combinations of pixel values (gray levels) occur in an image. Abbreviated GLCM. See [IBSI Features].	
128776	Gray Level Run Length Matrix	The tabulation of gray level run lengths in a particular direction in an image. Abbreviated GLRLM. See [IBSI Features].	
128777	Gray Level Size Zone Matrix	A tabulation of counts of the number of groups of connected voxels with a specific discretized gray level value and size. Abbreviated GLSZM. See [IBSI Features].	
ddd400	Gray Level Distance Zone Matrix	A tabulation of counts of the number of groups (or zones) of linked voxels that share a specific discretised grey level value and possess the same distance to ROI edge. Abbreviated GLDZM. See [IBSI Features].	

Code Value	Code Meaning	Definition	Notes
ddd401	Neighbourhood Grey Tone Difference Matrix	A matrix containing the sum of grey level differences of pixels/voxels with a discretised grey level and average discretised grey level of neighbouring pixels/voxels within a specified Chebyshev distance. Abbreviated NGTDM. See [IBSI Features].	
ddd402	Neighbouring Grey Level Dependence Matrix	A tabulation of the counts of dependent (within a specified coarseness parameter) neighbouring discretised grey levels within a specified Chebyshev distance. Abbreviated NGLDM. See [IBSI Features].	
128781	Joint Maximum of GLCM	The probability corresponding to the most common gray level co-occurrence in the GLCM. Abbreviated MAX. See $F_{cm,joint,max}$ in [IBSI Features].	Retired Replaced by (GYBY, IBSI, "Joint Maximum of GLCM")
128782	Joint Average of GLCM	The gray level weighted sum of joint probabilities of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm,joint,avg}$ in [IBSI Features].	Retired Replaced by (60VM, IBSI, "Joint Average of GLCM")
128783	Joint Variance of GLCM	The sum of squares of the difference from the joint average of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm,joint,var}$ in [IBSI Features].	Retired Replaced by (UR99, IBSI, "Joint Variance of GLCM")
128784	Difference Average of GLCM	The average for the diagonal probabilities of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm,diff,avg}$ in [IBSI Features].	Retired Replaced by (TF7R, IBSI, "Difference Average of GLCM")
128785	Difference Variance of GLCM	The variance for the diagonal probabilities of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm,diff,var}$ in [IBSI Features].	Retired Replaced by (D3YU, IBSI, "Difference Variance of GLCM")
128786	Difference Entropy of GLCM	The entropy for the diagonal probabilities of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm,diff,entr}$ in [IBSI Features].	Retired Replaced by (NTRS, IBSI, "Difference Entropy of GLCM")
128787	Sum Average of GLCM	The average for the cross-diagonal probabilities of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm,sum,avg}$ in [IBSI Features].	Retired Replaced by (ZGXS, IBSI, "Sum Average of GLCM")
128788	Sum Variance of GLCM	The variance for the cross-diagonal probabilities of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm,sum,var}$ in [IBSI Features].	Retired Replaced by (OEED, IBSI, "Sum Variance of GLCM")
128789	Sum Entropy of GLCM	The entropy for the cross-diagonal probabilities of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm,sum,entr}$ in [IBSI Features].	Retired Replaced by (P6QZ, IBSI, "Sum Entropy of GLCM")

Code Value	Code Meaning	Definition	Notes
128790	Inverse Difference of GLCM	The inverse difference of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm.inv.diff}$ in [IBSI Features].	Sometimes referred to as "homogeneity" but that term is historically used to refer to the "inverse difference moment", which is calculated from the square of differences rather than absolute value of them. Retired Replaced by (IB1Z, IBSI, "Inverse Difference of GLCM")
128791	Inverse Difference Normalized of GLCM	The normalized inverse difference of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm.inv.diff.norm}$ in [IBSI Features].	The US not UK spelling of "normalized" is used to be consistent with the DICOM convention, rather than the IBSI spelling. Retired Replaced by (NDRX, IBSI, "Normalized Inverse Difference of GLCM")
128792	Inverse Difference Moment Normalized of GLCM	The normalized inverse difference moment of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm.inv.diff.mom.norm}$ in [IBSI Features].	The US not UK spelling of "normalized" is used to be consistent with the DICOM convention, rather than the IBSI spelling. Retired Replaced by (1QCO, IBSI, "Normalized Inverse Difference Moment of GLCM")
128793	Inverse Variance of GLCM	The inverse variance of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm.inv.var}$ in [IBSI Features].	Retired Replaced by (E8JP, IBSI, "Inverse Variance of GLCM")
128794	Autocorrelation of GLCM	The autocorrelation of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm.auto.corr}$ in [IBSI Features].	Retired Replaced by (QWB0, IBSI, "Autocorrelation of GLCM")
128795	Cluster Tendency of GLCM	The cluster tendency of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm.clust.tend}$ in [IBSI Features].	Retired Replaced by (DG8W, IBSI, "Cluster Tendency of GLCM")
128796	Cluster Shade of GLCM	The cluster shade of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm.clust.shade}$ in [IBSI Features].	Retired Replaced by (7NFM, IBSI, "Cluster Shade of GLCM")
128797	Cluster Prominence of GLCM	The cluster prominence of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm.clust.prom}$ in [IBSI Features].	Retired Replaced by (AE86, IBSI, "Cluster Prominence of GLCM")
128798	First Measure of Information Correlation of GLCM	The first measure of information correlation of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm.info.corr.1}$ in [IBSI Features].	Retired Replaced by (R8DG, IBSI, "First Measure of Information Correlation of GLCM")

Code Value	Code Meaning	Definition	Notes
128799	Second Measure of Information Correlation of GLCM	The second measure of information correlation of a Gray Level Co-occurrence Matrix (GLCM). See $F_{cm.info.corr.2}$ in [IBSI Features].	Retired Replaced by (JN9H, IBSI, "Second Measure of Information Correlation of GLCM")
128801	Short Runs Emphasis	A measure of the distribution of short runs in a gray level run length matrix. Abbreviated SRE. See $F_{rlm.sre}$ in [IBSI Features].	Retired Replaced by (22OV, IBSI, "Short Runs Emphasis")
128802	Long Runs Emphasis	A measure of the distribution of long runs in a gray level run length matrix. Abbreviated LRE. See $F_{rlm.lre}$ in [IBSI Features].	Retired Replaced by (W4KF, IBSI, "Long Runs Emphasis")
128803	Low Gray Level Run Emphasis	A measure of the distribution of low gray level values in a gray level run length matrix. Abbreviated LGRE. See $F_{rlm.lgre}$ in [IBSI Features].	Retired Replaced by (V3SW, IBSI, "Low Gray Level Run Emphasis")
128804	High Gray Level Run Emphasis	A measure of the distribution of high gray level values in a gray level run length matrix. Abbreviated HGRE. See $F_{rlm.hgre}$ in [IBSI Features].	Retired Replaced by (G3QZ, IBSI, "High Gray Level Run Emphasis")
128805	Short Run Low Gray Level Emphasis	A measure of the joint distribution of short runs and low gray level values in a gray level run length matrix. Abbreviated SRLGE. See $F_{rlm.srlge}$ in [IBSI Features].	Retired Replaced by (HTZT, IBSI, "Short Run Low Gray Level Emphasis")
128806	Short Run High Gray Level Emphasis	A measure of the joint distribution of short runs and high gray level values in a gray level run length matrix. Abbreviated SRHGE. See $F_{rlm.srhge}$ in [IBSI Features].	Retired Replaced by (GD3A, IBSI, "Short Run High Gray Level Emphasis")
128807	Long Run Low Gray Level Emphasis	A measure of the joint distribution of long runs and low gray level values in a gray level run length matrix. Abbreviated LRLGE. See $F_{rlm.lrlge}$ in [IBSI Features].	Retired Replaced by (IVPO, IBSI, "Long Run Low Gray Level Emphasis")
128808	Long Run High Gray Level Emphasis	A measure of the the joint distribution of long runs and high gray level values in a gray level run length matrix. Abbreviated LRHGE. See $F_{rlm.lrhge}$ in [IBSI Features].	Retired Replaced by (3KUM, IBSI, "Long Run High Gray Level Emphasis")
128809	Gray Level Nonuniformity in Runs	A measure of the similarity of gray level values throughout the image in a gray level run length matrix. Abbreviated RLM.GLNU. See $F_{rlm.glnu}$ in [IBSI Features].	Retired Replaced by (R5YN, IBSI, "Gray Level Nonuniformity in Runs")
128810	Gray Level Nonuniformity in Runs Normalized	A normalized measure of the similarity of gray level values throughout the image in a gray level run length matrix. See $F_{rlm.glnu.norm}$ in [IBSI Features].	The US not UK spelling of "normalized" is used to be consistent with the DICOM convention, rather than the IBSI spelling. Retired Replaced by (OVBL, IBSI, "Normalized Gray Level Nonuniformity in Runs")

Code Value	Code Meaning	Definition	Notes
128811	Run Length Nonuniformity	A measure of the the similarity of the length of runs throughout the image in a gray level run length matrix. Abbreviated RLNU. See $F_{rlm.rlnu}$ in [IBSI Features].	Retired Replaced by (W92Y, IBSI, "Run Length Nonuniformity")
128812	Run Length Nonuniformity Normalized	A normalized measure of the the similarity of the length of runs throughout the image in a gray level run length matrix. See $F_{rlm.rlnu.norm}$ in [IBSI Features].	The US not UK spelling of "normalized" is used to be consistent with the DICOM convention, rather than the IBSI spelling. Retired Replaced by (IC23, IBSI, "Normalized Run Length Nonuniformity")
128813	Run Percentage	A measure of the homogeneity and distribution of runs of an image in a specific direction in a gray level run length matrix. Abbreviated RPC. See $F_{rlm.r.perc}$ in [IBSI Features].	Retired Replaced by (9ZK5, IBSI, "Run Percentage")
128814	Gray Level Variance in Runs	The variance in runs for the gray levels in a gray level run length matrix. See $F_{rlm.gl.var}$ in [IBSI Features].	Retired Replaced by (8CE5, IBSI, "Gray Level Variance in Runs")
128815	Run Length Variance	The variance in runs for run lengths in a gray level run length matrix. See $F_{rlm.rl.var}$ in [IBSI Features].	Retired Replaced by (SXLW, IBSI, "Run Length Variance")
128816	Run Entropy	The entropy of runs in a gray level run length matrix. See $F_{rlm.rl.entr}$ in [IBSI Features].	Retired Replaced by (HJ9O, IBSI, "Run Entropy")
128821	Small Zone Emphasis	A feature that emphasizes small zones from a gray level size zone matrix. Abbreviated SZE. See $F_{szm.sze}$ in [IBSI Features].	Retired Replaced by (5QRC, IBSI, "Small Zone Emphasis")
128822	Large Zone Emphasis	A feature that emphasizes large zones from a gray level size zone matrix. Abbreviated LZE. See $F_{szm.lze}$ in [IBSI Features].	Retired Replaced by (48P8, IBSI, "Large Zone Emphasis")
128823	Low Gray Level Zone Emphasis	A feature that emphasizes low gray level zones from a gray level size zone matrix. Abbreviated LGZE. See $F_{szm.lgze}$ in [IBSI Features].	Retired Replaced by (XMSY, IBSI, "Low Gray Level Zone Emphasis")
128824	High Gray Level Zone Emphasis	A feature that emphasizes high gray level zones from a gray level size zone matrix. Abbreviated LGZE. See $F_{szm.hgze}$ in [IBSI Features].	Retired Replaced by (5GN9, IBSI, "High Gray Level Zone Emphasis")
128825	Small Zone Low Gray Level Emphasis	A feature that emphasizes small zone sizes and low gray levels from a gray level size zone matrix. Abbreviated SZLGE. See $F_{szm.szlge}$ in [IBSI Features].	Retired Replaced by (5RAI, IBSI, "Small Zone Low Gray Level Emphasis")

Code Value	Code Meaning	Definition	Notes
128826	Small Zone High Gray Level Emphasis	A feature that emphasizes small zone sizes and high gray levels from a gray level size zone matrix. Abbreviated SZHGE. See $F_{szm.szhge}$ in [IBSI Features].	Retired Replaced by (HW1V, IBSI, "Small Zone High Gray Level Emphasis")
128827	Large Zone Low Gray Level Emphasis	A feature that emphasizes large zone sizes and low gray levels from a gray level size zone matrix. Abbreviated LZLGE. See $F_{szm.lzlg}$ in [IBSI Features].	Retired Replaced by (YH51, IBSI, "Large Zone Low Gray Level Emphasis")
128828	Large Zone High Gray Level Emphasis	A feature that emphasizes large zone sizes and high gray levels from a gray level size zone matrix. Abbreviated LZHGE. See $F_{szm.lzhge}$ in [IBSI Features].	Retired Replaced by (J17V, IBSI, "Large Zone High Gray Level Emphasis")
128829	Gray Level Nonuniformity of Zone Counts	The distribution of zone counts over the gray values in a gray level size zone matrix. Abbreviated SZM.GLNU. See $F_{szm.glnu}$ in [IBSI Features].	Retired Replaced by (JNSA, IBSI, "Gray Level Nonuniformity of Size Zone Counts")
128830	Gray Level Nonuniformity of Zone Counts Normalized	The normalized distribution of zone counts over the gray values in a gray level size zone matrix. See $F_{szm.glnu.norm}$ in [IBSI Features].	The US not UK spelling of "normalized" is used to be consistent with the DICOM convention, rather than the IBSI spelling. Retired Replaced by (Y1RO, IBSI, "Normalized Gray Level Nonuniformity of Size Zone Counts")
128831	Zone Size Nonuniformity	The distribution of zone counts over the different zone sizes in a gray level size zone matrix. Abbreviated ZSNU. See $F_{szm.zsnu}$ in [IBSI Features].	Retired Replaced by (4JP3, IBSI, "Zone Size Nonuniformity")
128832	Zone Size Nonuniformity Normalized	The normalized distribution of zone counts over the different zone sizes in a gray level size zone matrix. See $F_{szm.zsnu.norm}$ in [IBSI Features].	The US not UK spelling of "normalized" is used to be consistent with the DICOM convention, rather than the IBSI spelling. Retired Replaced by (VB3A, IBSI, "Normalized Zone Size Nonuniformity")
128833	Zone Percentage	The fraction of the number of realised zones relative to the maximum number of potential zones in a gray level size zone matrix. Abbreviated ZPERC. See $F_{szm.z.perc}$ in [IBSI Features].	Retired Replaced by (P30P, IBSI, "Size Zone Percentage")
128834	Gray Level Variance in Zones	The variance in the variance in zone counts for the gray levels in a gray level size zone matrix. See $F_{szm.gl.var}$ in [IBSI Features].	Retired Replaced by (BYLV, IBSI, "Gray Level Variance in Size Zones")

Code Value	Code Meaning	Definition	Notes
128835	Zone Size Variance	The variance in zone counts for the different zone sizes in a gray level size zone matrix. See $F_{szm.zs.var}$ in [IBSI Features].	<u>Retired</u> <u>Replaced by (3NSA, IBSI, "Zone Size Variance")</u>
128836	Zone Size Entropy	The entropy of zone sizes in a gray level size zone matrix. See $F_{szm.zs.entr}$ in [IBSI Features].	<u>Retired</u> <u>Replaced by (GU8N, IBSI, "Zone Size Entropy")</u>