

1	Status	Jan 2019 Voting Packet
2	Date of Last Update	2018/11/12
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5	Submitter Name	QIICR
6	Submission Date	2018/08/17

7	Correction Number CP-1849	
8	Log Summary: Brain tumor segmentation codes	
9	Name of Standard	
10	PS3.16	
11	Rationale for Correction:	
12	Brain tumor segmentation often involves categorization of sub-regions that are more specific than simply "tumor" or "not tumor" categories.	
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14	The Multimodal Brain Tumor Segmentation Challenges (MICCAI BraTS) have over time identified four specific categories of tissue, necrosis, non-enhancing tumor, enhancing tumor and peri-tumoral edema, sometimes combining necrosis and non-enhancing tumor [1]. This approach has also been used in other projects such as TCGA [2].	
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16		
17	The current context groups do not distinguish enhancing from non-enhancing tumor.	
18	Add new context groups specific to the brain tumor segmentation task, reusing existing codes where appropriate, and adding new codes from standard lexicons as necessary.	
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20	The search strategy followed for selecting the new codes to add was as follows:	
21	<ul style="list-style-type: none"> • found existing (generic) codes for necrosis and edema in PS3.16 (CID) 	
22	<ul style="list-style-type: none"> • checked that no concepts for non-enhancing tumor and enhancing tumor were present in PS3.16 	
23	<ul style="list-style-type: none"> • searched SNOMED and found no concepts for non-enhancing and enhancing tumor or lesions or similar 	
24	<ul style="list-style-type: none"> • searched UMLS and found concepts for non-enhancing lesion and enhancing lesion that were mapped from the NCI Thesaurus 	
25	<ul style="list-style-type: none"> • checked the NCI Thesaurus and confirmed the suitability of the concepts and their definitions 	
26	<ul style="list-style-type: none"> • also searched RadLex but found only descriptive terms of enhancement patterns, not specific concepts to identify the parts of a tumor or lesion 	
27		
28	<i>[Ed.Note.: Include link to BRATS converted data set using these codes if it is ready +/- available on TCIA (check with Andrew Beers)]</i>	
29	1. Menze BH, Jakab A, Bauer S, Kalpathy-Cramer J, Farahani K, Kirby J, et al. The Multimodal Brain Tumor Image Segmentation Benchmark (BRATS). IEEE Trans Med Imaging. 2015 Oct;34(10):1993–2024.	
30		
31	2. Bakas S, Akbari H, Sotiras A, Bilello M, Rozycki M, Kirby JS, et al. Advancing The Cancer Genome Atlas glioma MRI collections with expert segmentation labels and radiomic features. Scientific Data. 2017 Sep 5;4:170117.	
32		
33	Correction Wording:	

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

CID 7159 Lesion Segmentation Types

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: ~~20150106~~yyvymdd
 UID: 1.2.840.10008.6.1.505

Table CID 7159. Lesion Segmentation Types

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
SRT	M-41610	Abscess	44132006	C0000833
SRT	M-35000	Blood clot	75753009	C0302148
SRT	M-3340A	Cyst	367643001	C0010709
SRT	M-36300	Edema	79654002	C0013604
SRT	M-35300	Embolus	55584005	C1704212
SRT	M-37000	Hemorrhage	50960005	C0019080
SRT	M-40000	Inflammation	23583003	C0021368
SRT	M-03000	Mass	4147007	C0577559
SRT	M-54000	Necrosis	6574001	C0027540
SRT	M-8FFFF	Neoplasm	108369006	C0027651
SRT	M-80003	Neoplasm, Primary	86049000	C1306459
SRT	M-80006	Neoplasm, Secondary	14799000	C2939419
SRT	M-03010	Nodule	27925004	C0028259

Include CID ccc1 "Brain Lesion Segmentation Types With Necrosis"

CID 7165 Abstract Segmentation Types

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Type: Extensible
 Version: ~~20151113~~yyvymdd
 UID: 1.2.840.10008.6.1.962

Table CID 7165. Abstract Segmentation Types

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
DCM	125040	Background		
SRT	T-D0050	Tissue	85756007	C0040300
SRT	F-61779	Waste Material	289925000	C0043045
DCM	125041	Registration Input		
DCM	113132	Single subject extracted from group		
NCIt	C94970	Reference Region		C2986814
<u>SRT</u>	<u>G-A460</u>	<u>Normal</u>	<u>17621005</u>	<u>C0205307</u>

Note

The concept (G-A460, SRT, "Normal") is a general normality qualifier used here to mean normal in the context of the structural or functional image being segmented, whether it be "normal tissue" or "normal function". Normal may be distinguished from background (e.g., where there is no tissue at all).

Amend DICOM PS3.16 adding the following new content:

CID ccc1 Brain Lesion Segmentation Types With Necrosis

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
Type: Extensible
Version: yyyyymmdd
UID: 1.2.840.10008.6.1.uuu1

Table CID ccc1. Brain Lesion Segmentation Types With Necrosis

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
<i>Include CID ccc2 "Brain Lesion Segmentation Types Without Necrosis"</i>				
SRT	M-54000	Necrosis	6574001	C0027540

Note

The same concept for non-enhancing tumor is used in this Content Group and when included in CID ccc2 "Brain Lesion Segmentation Types Without Necrosis". When used in this Context Group, non-enhancing tumor excludes any necrotic region, whereas when used in CID ccc2, it does not.

CID ccc2 Brain Lesion Segmentation Types Without Necrosis

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
Type: Extensible
Version: yyyyymmdd
UID: 1.2.840.10008.6.1.uuu2

Table CID ccc2. Brain Lesion Segmentation Types Without Necrosis

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-CT Concept ID	UMLS Concept Unique ID
DCM	125040	Background		
SRT	G-A460	Normal	17621005	C0205307
SRT	M-36300	Edema	79654002	C0013604
NCIt	C81175	Non-Enhancing Lesion		C2825493
NCIt	C113842	Enhancing Lesion		C3830314

Note

- The concept (G-A460, SRT, "Normal") is a general normality qualifier used here in context to mean normally appearing brain tissue on an imaging study. Some coding schemes contain more specific concepts such as "normal tissue" (but may be part of a coding scheme for histopathology rather than imaging) or "normal brain" or "normal white matter". Normal may be distinguished from background (e.g., where there is no tissue at all).
- A generic concept for edema is used for consistency with other segmentation-related Context Groups, rather than a more specific anatomy or tumor-related concept such as (C121674, NCIt, "Peritumoral Brain Edema") UMLS:C4054192.

- 3. The same concept for non-enhancing tumor is used in this Content Group and when included in CID ccc1 "Brain Lesion Segmentation Types With Necrosis". When used in this Context Group, non-enhancing tumor includes any necrotic region, whereas when used in CID ccc1, it does not.

D DICOM Controlled Terminology Definitions (Normative)

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

Code Value	Code Meaning	Definition	Notes
125040	Background	That which is not part of an object.	E.g., background of an image (that which might be encoded with Pixel Padding Value, or a Segmentation Property Type.