Status	Final Text
Date of Last Update	2015/09/16
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Correction Number CP-1448
Log Summary: Add blood normalized IAUC codes
Name of Standard PS3.16 2015c
Rationale for Correction: In Dynamic Contrast MR, the initial area under the (Gd) concentration curve may be reported with or without blood normalization using an arterial input function. The QIBA DCE-MRI profile uses the blood normalized variant in its claim. Pre-coordinated codes are added to distinguish the two. Also, a 180 second interval is added, since this is sometimes used instead of 60 or 90 seconds (see the QIBA DCE-MRI profile reproducibility data literature summary). Pre-coordinated codes specific to the type of contrast agent (e.g., IAUGC90BN in addition to IAUC90BN) are not thought to be necessary.
Correction Wording:

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

CID 4109 Model-Independent Dynamic Contrast Analysis Parameters

Type: **Extensible**

Version: **~~20141110~~20150916**

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
...	...	...

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 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:

(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.

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

Table D-1. DICOM Controlled Terminology Definitions

Code Value	Code Meaning	Definition	Notes
126314	ve	v_e, the fractional (not absolute) volume of extravascular extracellular space (EES) per unit volume of tissue 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.	
126320	IAUC	The initial area under the contrast agent concentration–time curve	
126321	IAUC60	The initial area under the contrast agent concentration–time curve at 60 seconds after the onset time	
126322	IAUC90	The initial area under the contrast agent concentration–time curve at 90 seconds after the onset time	
126323	**IAUC180**	**The initial area under the contrast agent concentration–time curve at 180 seconds after the onset time**	
126324	**IAUCBN**	**The initial area under the contrast agent concentration–time curve, normalized with the corresponding arterial input function, such that $IAUC_{BN} = IAUC / IAUC_{AIF}$.**	
126325	**IAUCBN60**	**The initial area under the contrast agent concentration–time curve at 60 seconds after the onset time, normalized with the corresponding arterial input function, such that $IAUC60_{BN} = IAUC60 / IAUC60_{AIF}$.**	
126326	**IAUCBN90**	**The initial area under the contrast agent concentration–time curve at 90 seconds after the onset time, normalized with the corresponding arterial input function, such that $IAUC90_{BN} = IAUC90 / IAUC90_{AIF}$.**	
126327	**IAUCBN180**	**The initial area under the contrast agent concentration–time curve at 180 seconds after the onset time, normalized with the corresponding arterial input function, such that $IAUC180_{BN} = IAUC180 / IAUC180_{AIF}$.**	
126330	tau_m	τ_m. The mean intracellular water lifetime (τ_i). Used in the Shutter-Speed Model (SSM) of tracer kinetics.	
...	...	...	
126370	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 Shpilfoygel Med Phys 2008. doi: 10.1118/1.1288669	