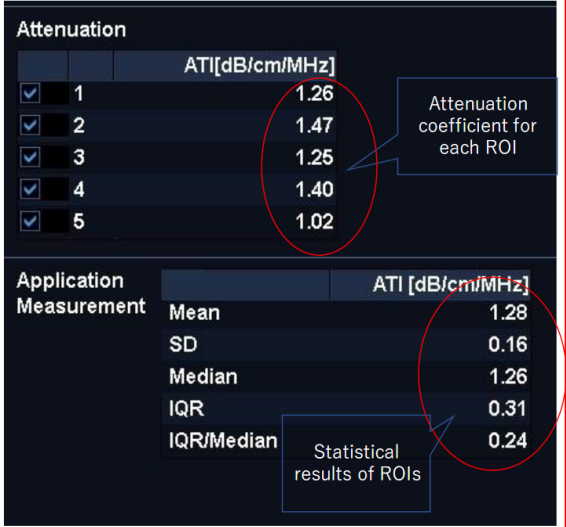


# DICOM Correction Proposal

STATUS	Letter Ballot
Date of Last Update	2025/06/17
Person Assigned	Kevin O'Donnell
Submitter Name	Kevin O'Donnell
Submission Date	2024/10/29

Correction Number	CP-2467
Log Summary:	Add sub-template for UL Attenuation Imaging (ATI) measurements
Name of Standard	PS3.16
Rationale for Correction:	<p>ROI measurements of attenuation coefficients and associated statistics are increasingly captured and reported in ultrasound, in particular for the assessment of liver fat.</p> <p>An Ultrasound Attenuation Coefficient Measurements Section is added to TID 12000 General Ultrasound Report.</p> <p>An attenuation coefficient measurement is typically captured from multiple ROIs and statistical values are computed from those. An example is shown here:</p>  <p>Note: The existing code (112031, DCM, "Attenuation Coefficient") is specifically defined as attenuation of an X-Ray beam (and in fact retired a code for X-Ray Attenuation Coefficient) so a new Ultrasound Attenuation Coefficient code is introduced. Similarly, while several other statistical codes seen in CID 6141, such as (112183, DCM, "Standard Deviation of Attenuation Coefficient"), are defined in terms of statistical relationships, the adjective "X-Ray" also appears once in each, so new codes are introduced.</p>
Correction Wording:	

*Modify PS3.16 TID 4200 as shown*

## TID 12000 GENERAL ULTRASOUND REPORT

This is the Template for the root of the Content Tree for a general ultrasound procedure report.

**Type:** Extensible  
**Order:** Significant  
**Root:** Yes

**Table TID 12000. General Ultrasound Report**

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	BCID 12320 "General Ultrasound Report Document Title"	1	M		Root node
...								
15	>	CONTAINS	INCLUDE	DTID 5401 "Ultrasound Shear Wave Elastography Section"	1-n	U		
16	≥	<u>CONTAINS</u>	<u>INCLUDE</u>	<u>DTID newtid1 "Ultrasound Attenuation Coefficient Section"</u>	<u>1-n</u>	<u>U</u>		

Add PS3.16 TID newtid1 as shown

### TID newtid1 Ultrasound Attenuation Coefficient Section

This section template incorporates a set of measurements for assessing attenuation coefficients.

**Type:** Extensible

**Order:** Significant

**Root:** No

**Table TID newtid1. Ultrasound Attenuation Coefficient Section**

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	DT (59776-5, LN, "Findings")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (121058, DCM, "Procedure Reported")	1	M		DT (newCode0, DCM, "Ultrasound attenuation imaging")
3	>	HAS CONCEPT MOD	CODE	EV (363698007, SCT, "Finding Site")	1	M		BCID newcid1 "Ultrasound Attenuation Imaging Sites"
4	>>	HAS CONCEPT MOD	CODE	EV (272741003, SCT, "Laterality")	1	U		DCID 244 "Laterality"
5	>	HAS ACQ CONTEXT	CODE	EV (399264008, SCT, "Image Mode")	1	U		BCID 12224 "Ultrasound Image Modes"
6	>	HAS ACQ CONTEXT	CODE	EV (111031, DCM, "Image View")	1	U		BCID 5 "Transducer Approach"
7	>>	HAS ACQ CONTEXT	CODE	EV (111032, DCM, "Image View Modifier")	1-n	U		BCID 6 "Transducer Orientation" BCID 7 "Ultrasound Beam Path"
8	>	CONTAINS	CONTAINER	DT (55112-7, LN, "Summary")	1	M		
9	>>	CONTAINS	NUM	EV (newcode02, DCM, "Mean Ultrasound Attenuation Coefficient")	1	U		UNITS= EV (dB/cm/MHz, UCUM, "dB/cm/MHz")
10	>>	HAS PROPERTIES	NUM	EV (newcode03, DCM, "Standard Deviation of Ultrasound Attenuation Coefficient")	1	U		UNITS= EV (dB/cm/MHz, UCUM, "dB/cm/MHz")

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
11	>>	HAS PROPERTIES	NUM	EV (newcode04, SCT, "Median Ultrasound Attenuation Coefficient")	1	U		UNITS= EV (dB/cm/MHz, UCUM, "dB/cm/MHz")
12	>>	HAS PROPERTIES	NUM	EV (newcode05, DCM, "Interquartile Range of Ultrasound Attenuation Coefficient")	1	U		UNITS= EV (dB/cm/MHz, UCUM, "dB/cm/MHz")
13	>>	HAS PROPERTIES	NUM	EV (newcode06, DCM, "Interquartile Range to Median Ratio of Ultrasound Attenuation Coeff")	1	U		UNITS = EV ({ratio}, UCUM, "ratio")
14	>	CONTAINS	CONTAINER	DT (125007, DCM, "Measurement Group")	1-n	M		
15	>>	HAS OBS CONTEXT	TEXT	EV (125010, DCM, "Identifier")	1	M		
16	>>	CONTAINS	INCLUDE	DTID 300 "Measurement"	1	M		\$Measurement = EV (newcode01, DCM, "Ultrasound Attenuation Coefficient") \$Units = EV (dB/cm/MHz, UCUM, "dB/cm/MHz")

#### Content Item Descriptions

Rows 9, 10, 11, 12, 13	These values are a statistical characterization of attenuation coefficient measurements in Rows 14-16.
Row 15	The identifier is used to distinguish the different measurement ROIs. Often a sequential number.

Add a sentence to PS3.16 CID 6141 to make visible that the semantics of the CID is narrower than it appears

### CID 6141 ATTENUATION COEFFICIENT MEASUREMENT

#### Attenuation coefficient measurements related to the attenuation of an X-ray beam.

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML  
Keyword: AttenuationCoefficientMeasurement  
FHIR Keyword: dicom-cid-6141-AttenuationCoefficientMeasurement  
Type: Extensible  
Version: 20030408yyvymdd  
UID: 1.2.840.10008.6.1.461

**Table CID 6141. Attenuation Coefficient Measurement**

Coding Scheme Designator	Code Value	Code Meaning
DCM	112031	Attenuation Coefficient
DCM	112179	Minimum Attenuation Coefficient
DCM	112180	Maximum Attenuation Coefficient
DCM	112181	Mean Attenuation Coefficient
DCM	112182	Median Attenuation Coefficient

Coding Scheme Designator	Code Value	Code Meaning
DCM	112183	Standard Deviation of Attenuation Coefficient

Add newCID1 for attenuation imaging finding sites

#### CID NEWCID1 ULTRASOUND ATTENUATION IMAGING SITES

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML  
 Keyword: UltrasoundAttenuationImagingSites  
 FHIR Keyword: dicom-cid-newCID1-UltrasoundAttenuationImagingSites  
 Type: Extensible  
 Version: yyyymmdd  
 UID: 1.2.840.10008.6.1.newUID1

**Table CID newCID1. Ultrasound Attenuation Imaging Sites**

Coding Scheme Designator	Code Value	Code Meaning
SCT	10200004	Liver
SCT	76752008	Breast
SCT	69748006	Thyroid

Modify definitions to PS 3.16 Annex D (several existing definitions are included for context/comparison)

**Table D-1. DICOM Controlled Terminology Definitions**

Code Value	Code Meaning	Definition	Notes
...			
<b>Newcode0</b>	<b>Ultrasound Attenuation Imaging</b>	<b>A type of ultrasound imaging that generates attenuation coefficient values. Sometimes abbreviated as ATL.</b>	
110851	X-Ray Attenuation Coefficient	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.	Retired. Replaced by (112031, DCM, "Attenuation Coefficient").
112031	Attenuation Coefficient	A quantitative numerical statement of the relative attenuation of the X-Ray beam at a specified point. 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. Usually expressed in Hounsfield units [referred to as CT Number in Fraser and Pare].	
<b>Newcode01</b>	<b>Ultrasound Attenuation Coefficient</b>	<b>A quantitative numerical statement of the relative attenuation of the ultrasound beam at a specified location. Usually expressed in dB/cm/MHz.</b>	

112181	Mean Attenuation Coefficient	The value that is computed by dividing the sum of a set of X-Ray attenuation coefficients by the number of values .	
<b>Newcode02</b>	<b><u>Mean Ultrasound Attenuation Coefficient</u></b>	<b><u>The value that is computed by dividing the sum of a set of Ultrasound attenuation coefficients by the number of values .</u></b>	
112182	Median Attenuation Coefficient	The value in an ordered set of X-Ray attenuation coefficients, below and above which there is an equal number of values.	
<b>Newcode04</b>	<b><u>Median Ultrasound Attenuation Coefficient</u></b>	<b><u>The value in an ordered set of Ultrasound attenuation coefficients, below and above which there is an equal number of values.</u></b>	
112183	Standard Deviation of Attenuation Coefficient	For a set of X-Ray attenuation coefficients: 1) a measure of the dispersion of a frequency distribution that is the square root of the arithmetic mean of the squares of the deviation of each of the class frequencies from the arithmetic mean of the frequency distribution; 2) a parameter that indicates the way in which a probability function or a probability density function is centered around its mean and that is equal to the square root of the moment in which the deviation from the mean is squared.	
<b>Newcode03</b>	<b><u>Standard Deviation of Ultrasound Attenuation Coefficient</u></b>	<b><u>For a set of ultrasound attenuation coefficients: 1) a measure of the dispersion of a frequency distribution that is the square root of the arithmetic mean of the squares of the deviation of each of the class frequencies from the arithmetic mean of the frequency distribution; 2) a parameter that indicates the way in which a probability function or a probability density function is centered around its mean and that is equal to the square root of the moment in which the deviation from the mean is squared.</u></b>	
130614	Interquartile Range of population	The width of the center range within which 50% of the measured values in a reference population fall. The IQR may also be described as the first quartile value subtracted from the third quartile value, or equivalently the 25th percentile value subtracted from the 75th percentile value.	
<b>newcode05</b>	<b><u>Interquartile Range of Ultrasound Attenuation Coefficient</u></b>	<b><u>The width of the center range of a set of ultrasound attenuation coefficients within which 50% of the measured values in a reference population fall. The IQR may also be described as the first quartile value subtracted from the third quartile value, or equivalently the 25th percentile value subtracted from the 75th percentile value.</u></b>	
130615	Interquartile Range to Median Ratio of population	The interquartile range value of a population divided by the median value of the same population. IQR/M, which is one way to describe the variability of a set of measurements, is sometimes used as a metric of measurement quality.	
<b>newcode06</b>	<b><u>Interquartile Range to Median Ratio of Ultrasound Atten Coeff</u></b>	<b><u>The interquartile range value of a set of ultrasound attenuation coefficients divided by the median value of the same set. IQR/M, which is one way to describe the variability of a set of measurements, is sometimes used as a metric of measurement quality.</u></b>	