DICOM Correction Item

Correction Number	CP 744
Log Summary: Add diffusion b matrix	
Type of Modification Addition	Name of Standard PS 3.3, 3.6 2007 + CP 743 on b value units
Rationale for Correction For diffusion tensor imaging, the directional diffusion sensitization can be expressed as a 3x3 matrix with diagonal symmetry (six unique elements).	
Sections of documents affected PS 3.3 C.8.13.5.9 PS 3.6	
Correction Wording:	

Add Diffusion b-matrix Sequence and BMATRIX defined term to PS 3.3 C.8.13.5.9:

C.8.13.5.9 MR Diffusion Macro

Table C.8-96 specifies the attributes of the MR Diffusion Functional Group macro.

Table C.8-96
MR DIFFUSION MACRO ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
MR Diffusion Sequence	(0018,9117)	1	Identifies the diffusion parameters of this frame. One Item shall be included in this sequence.
>Diffusion b-value	(0018,9087)	1C	Diffusion sensitization factor in ms/mm^2. This is the actual b-value for original frames and those derived from frames with the same b-value, or the most representative b-value when derived from images with different b-values. Required if Frame Type (0008,9007) Value 1 of this frame is ORIGINAL **and Diffusion b-matrix (0018,9xx1) is not present**. May be present otherwise.
>Diffusion Directionality	(0018,9075)	1C	Specifies whether diffusion conditions for the frame are directional, or isotropic with respect to direction. Defined Terms: DIRECTIONAL **BMATRIX** ISOTROPIC NONE = to be used when Frame Type (0008,9007) value 4 equals DIFFUSION_ANISO or

			Diffusion b-value (0018,9087) is 0 (zero). Required if Frame Type (0008,9007) Value 1 of this frame is ORIGINAL. May be present otherwise.
>Diffusion Gradient Direction Sequence	(0018,9076)	1C	Sequence containing orientations of all diffusion sensitization gradients that were applied during the preparation phase for this frame. One or more Items may be present. Required if Diffusion Directionality (0018,9075) equals DIRECTIONAL
>>Diffusion Gradient Orientation	(0018,9089)	1C	The direction cosines of the diffusion gradient vector with respect to the patient Required if Frame Type (0008,9007) Value 1 of this frame is ORIGINAL. May be present otherwise.
>Diffusion b-matrix Sequence	**(0018,9xx1)**	**1C**	**The directional diffusion sensitization expressed as a 3x3 matrix with diagonal symmetry (with six unique elements from which the other elements can be derived).** **The rows and columns of the matrix are the X (right to left), Y (anterior to posterior) and Z (foot to head) patient-relative orthogonal axes as defined in C.7.6.2.1.1.** **The values are in units of ms/mm^2.** **Exactly one Item shall be present.** **Required if Diffusion Directionality (0018,9075) equals BMATRIX.**
>>Diffusion b-value XX	**(0018,9xx2)**	**1**	**The value of b[X,X].**
>>Diffusion b-value XY	**(0018,9xx3)**	**1**	**The value of b[X,Y].**
>>Diffusion b-value XZ	**(0018,9xx4)**	**1**	**The value of b[X,Z].**
>>Diffusion b-value YY	**(0018,9xx5)**	**1**	**The value of b[Y,Y].**
>>Diffusion b-value YZ	**(0018,9xx6)**	**1**	**The value of b[Y,Z].**
>>Diffusion b-value ZZ	**(0018,9xx7)**	**1**	**The value of b[Z,Z].**
>Diffusion Anisotropy Type	(0018,9147)	1C	Class of diffusion anisotropy calculation. Defined Terms: FRACTIONAL RELATIVE VOLUME_RATIO Required if Frame Type (0008,9007) value 4 equals DIFFUSION_ANISO.

Add new elements to PS 3.6:

(0018,9xx1)	**Diffusion b-matrix Sequence**	**FD**	**1**
(0018,9xx2)	**Diffusion b-value XX**	**FD**	**1**
(0018,9xx3)	**Diffusion b-value XY**	**FD**	**1**
(0018,9xx4)	**Diffusion b-value XZ**	**FD**	**1**
(0018,9xx5)	**Diffusion b-value YY**	**FD**	**1**
(0018,9xx6)	**Diffusion b-value YZ**	**FD**	**1**
(0018,9xx7)	**Diffusion b-value ZZ**	**FD**	**1**