

DICOM Correction Item

Correction Number		CP 744
Log Summary: Add diffusion b matrix		
Type of Modification	Name of Standard	
Addition	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 sec/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 <u>and Diffusion b-matrix Sequence (0018,9601) is not present</u> . 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

			<p>DIFFUSION_ANISO or Diffusion b-value (0018,9087) is 0 (zero).</p> <p>Required if Frame Type (0008,9007) Value 1 of this frame is ORIGINAL. May be present otherwise.</p>
>Diffusion Gradient Direction Sequence	(0018,9076)	1C	<p>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.</p> <p>Required if Diffusion Directionality (0018,9075) equals DIRECTIONAL</p>
>>Diffusion Gradient Orientation	(0018,9089)	1C	<p>The direction cosines of the diffusion gradient vector with respect to the patient</p> <p>Required if Frame Type (0008,9007) Value 1 of this frame is ORIGINAL. May be present otherwise.</p>
>Diffusion b-matrix Sequence	(0018,9601)	1C	<p><u>The directional diffusion sensitization expressed as a 3x3 matrix with diagonal symmetry (with six unique elements from which the other elements can be derived).</u></p> <p><u>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.</u></p> <p><u>The values are in units of ms/mm².</u></p> <p><u>Exactly one Item shall be present.</u></p> <p><u>Required if Diffusion Directionality (0018,9075) equals BMATRIX.</u></p>
>>Diffusion b-value XX	(0018,9602)	1	<u>The value of b[X,X].</u>
>>Diffusion b-value XY	(0018,9603)	1	<u>The value of b[X,Y].</u>
>>Diffusion b-value XZ	(0018,9604)	1	<u>The value of b[X,Z].</u>
>>Diffusion b-value YY	(0018,9605)	1	<u>The value of b[Y,Y].</u>
>>Diffusion b-value YZ	(0018,9606)	1	<u>The value of b[Y,Z].</u>
>>Diffusion b-value ZZ	(0018,9607)	1	<u>The value of b[Z,Z].</u>
>Diffusion Anisotropy Type	(0018,9147)	1C	<p>Class of diffusion anisotropy calculation.</p> <p>Defined Terms:</p> <p>FRACTIONAL RELATIVE VOLUME_RATIO</p> <p>Required if Frame Type (0008,9007) value 4 equals DIFFUSION_ANISO.</p>

Add new elements to PS 3.6:

<u>(0018,9601)</u>	<u>Diffusion b-matrix Sequence</u>	<u>SQ</u>	<u>1</u>
<u>(0018,9602)</u>	<u>Diffusion b-value XX</u>	<u>FD</u>	<u>1</u>
<u>(0018,9603)</u>	<u>Diffusion b-value XY</u>	<u>FD</u>	<u>1</u>
<u>(0018,9604)</u>	<u>Diffusion b-value XZ</u>	<u>FD</u>	<u>1</u>
<u>(0018,9605)</u>	<u>Diffusion b-value YY</u>	<u>FD</u>	<u>1</u>
<u>(0018,9606)</u>	<u>Diffusion b-value YZ</u>	<u>FD</u>	<u>1</u>
<u>(0018,9607)</u>	<u>Diffusion b-value ZZ</u>	<u>FD</u>	<u>1</u>