

Diffusion-related DICOM tags: experience across sites

Contents

- [1 University of Michigan](#)
 - [1.1 SIEMENS MRI](#)
 - [1.2 GE MRI](#)
 - [1.3 Philips MRI](#)
 - [1.4 Comments](#)
 - [1.5 Disclaimer](#)
- [2 BWH/3D Slicer community](#)
 - [2.1 Comments from Dariya](#)
- [3 MITK](#)
- [4 TCIA](#)
- [5 Relevant components of the DICOM standard](#)

University of Michigan

Contributed by Tom Chenevert and Dariya Malyarenko

SIEMENS MRI

The software version at least B15V (0018; 1020), follow tag value would be useful —> (PRIVATE TAGS)

- 0019; 100A; Number Of Images In Mosaic
- 0019; 100B; Slice Measurement Duration
- 0019; 100C; B_value
- 0019; 100D; Diffusion Directionality
- 0019; 100E; Diffusion Gradient Direction
- 0019; 100F; Gradient Mode
- 0019; 1027; B_matrix
- 0019; 1028; Bandwidth Per Pixel Phase Encode

GE MRI

Software version 12.0 (0018; 1020) —> (PRIVATE TAGS)

- 0043; 1039; first string is b value
- 0043; 1030; ** for LAB-DWI only: 3-R/L; 4-A/P; 5-S/I (Tr: 14-b=0; 15-b> 0)
- 0019; 10BB; x gradient; (for non-Lab DWI)
- 0019; 10BC; y gradient;

- 0019; 10BD; z gradient;

Philips MRI

Software version 3.2.1 (0018; 1020)→ PUBLIC TAGS – C1-conditional

- 0018; 9087; b value
- 0018; 9089; Diffusion direction

Comments

Also as discussed, interpretation of what's in these tags varies with scanner sw version, or the path the images took in getting to us. In GE, for example, we've occasionally seen `stored_bvalue = true_bvalue + 1e9`. For Siemens, sometimes tag (0019;100C) requires conversion from unit8 to character string, then to number. As such, we've had to build in logic to deal with these conditions. (Now my disclaimer ...)

Disclaimer

Neither TL Chenevert, D Malyarenko, nor the University of Michigan shall be held liable for any improper or incorrect use of the information described and/or contained herein and assumes no responsibility for anyone's use of the information. Although the information is believed to be reliable, no warranty expressed or implied is made regarding accuracy, adequacy, completeness, legality, reliability or usefulness of any information. This disclaimer applies to both isolated and aggregate uses of the information. Dasha and I are not clear on best way to share notes (Fred, was it you that mentioned accessible "information base"?), thus the limited email list here. Of course best result is to get all this in public tags. Other insights from the group welcome.

BWH/3D Slicer community

A converter from DICOM DWI representation to research format (NRRD) has been developed by the 3D Slicer community over years. As a result, this converter became the "repository" of the domain knowledge for that community. This tool is now developed and maintained by Hans Johnson group at U. of Iowa.

<https://github.com/BRAINSia/BRAINSTools/tree/master/DWIConvert>

Various notes for different vendors are available here: http://www.namc.org/Wiki/index.php/NAMIC_Wiki:DTI:DICOM_for_DWI_and_DTI

Comments from Dariya

We looked at the "vendor-specific" converters for this tool to compare the "diffusion tags" with our list, and they mostly overlap, except for the following differences:

1. For Siemens: we did not use (0029;1010) (maybe redundant, or needed for N> 6 multi-direction DTI only?)
2. For GE: the converter does not utilize (0043; 1030) to account for “non-oblique” LAB-DWI case
3. For Philips: we found it sufficient to use only “public” DWI tags, while converter also lists a bunch of private tags (e.g., (2001;1003/4), (2005;10b0/1/2) seem redundant with “public”, or maybe needed for DTI only?)

MITK

Various DWI-specific readers are available here:

<http://svn.mitk.org/trunk/mitk/Modules/DiffusionImaging/DicomImport/>

TCIA

TCIA collected an [extensive knowledge base](#) of the private tags for the purposes of facilitating de-identification.

Relevant components of the DICOM standard

- [DICOM MR Diffusion macro documentation](#)