

Whole-body Diffusion MRI in Oncologic Imaging

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Whole-body diffusion adds an important new dimension to cancer imaging and has captured the imagination of our oncologists.

Patient history

A 74-year-old woman with treated lymphoma referred for detailed tumor evaluation.

MR technique

Whole-body, diffusion-weighted MRI was performed using the body coil with multiple axial eDWI stacks. Conventional abdominal and pelvic MRI was also performed with 3D dual echo T1 SGE, FRFSE T2, eDWI b500, and dynamic LAVA Flex imaging.

Patient and prescription setup

The whole-body eDWI acquisition is acquired in multiple stacks using pre-prescribed locations and offsets minimizing effort in prescription. Five stacks are depicted in this case. Additional stacks may be used if more coverage is needed. Scan time is 1:35 min for two b values and 1:10 min for one b value.

- The patient is positioned, either head or feet first, on the table.
- A localized body array is positioned for high resolution abdomen/pelvic imaging.
- The landmark is selected at the top of the head to take advantage of the pre-prescribed eDWI WBI protocol.

The prescription offsets are as follows:

1: S 0 – I 168 3: I 352 – I 520 5: I 704 – I 872 7: I 1056 – I 1224
 2: I 176 – I 344 4: I 528 – I 696 6: I 880 – I 1048 8: I 1232 – I 1400

Stacks: (S=Superior, I=Inferior)

WBI eDWI Parameters

Coil	Body coil
Plane	Axial
Imaging Options	
Mode	2D
Family	EPI
Pulse Sequence	DW EPI
Options	IR Prep
Scan Timing	
TE	Min
TR	5700 ms
TI	160 ms
BW	auto
Scan Range	
FOV	40-46
Slice Thickness	8
Slice Spacing	0
# Slices	22

Acq. Timing	
Freq	80
Phase	128
Freq Dir	R/L
Phase FOV	1
Auto Shim	auto
Phase Correction	on
User CVs	
CV0 Ramp Sampling	1
CV5 Recon Type	1
CV7 Grad Optimization	0
CT18 Enhanced Prep	1
Diffusion	
Number of b values	1
Nex for T2	na
Diffusion Direction	All
Num. of Diff. Dir	na
Num of T2 images	0
Optimized TE	on
Dual Spin Echo	off
B value	600
Nex	4





Dr. Russell N. Low

Russell N. Low, MD, is Medical Director at Sharp and Children's MRI Center in San Diego and since 1991 has practiced with San Diego Imaging Medical Group. He received his medical degree from the University of California, San Diego, with honors and participated in the NIH Research Training Program. Dr. Low interned at St. Mary's Hospital and Medical Center in San Francisco and completed his residency in diagnostic radiology at the University of California, San Francisco and his fellowship in MRI/CT/Ultrasound at Stanford University Medical Center. He has authored over 60 articles and five book chapters, and is a frequent speaker at symposiums and conferences, including RSNA and ISMRM.



Dr. S.Y. Song

S.Y. Thomas Song, MD, is an oncologist specializing in Hepatology with San Diego Oncology Medical Clinic. He received his medical degree from Catholic Medical Center (Manchester, NH), interned at Albert Einstein Medical Center (Philadelphia), and completed his residency at the V.A. Medical Center—Philadelphia. Dr. Song has held fellowships at Dana-Farber Cancer Institute, Roswell Park Cancer Institute and St. Jude's Children's Hospital.

MR findings

Whole-body DWI and anatomic MRI depict gastric lymphoma (blue arrows), pelvic masses (yellow arrow), and scattered lymph nodes in the chest, abdomen, and pelvis (Figure 1). The MIP of the whole-body eDWI provides an effective way to quickly demonstrate the extent of tumor in a rotating 3D model.

Histopathology: Diffuse large B cell lymphoma with predominant gastric involvement.

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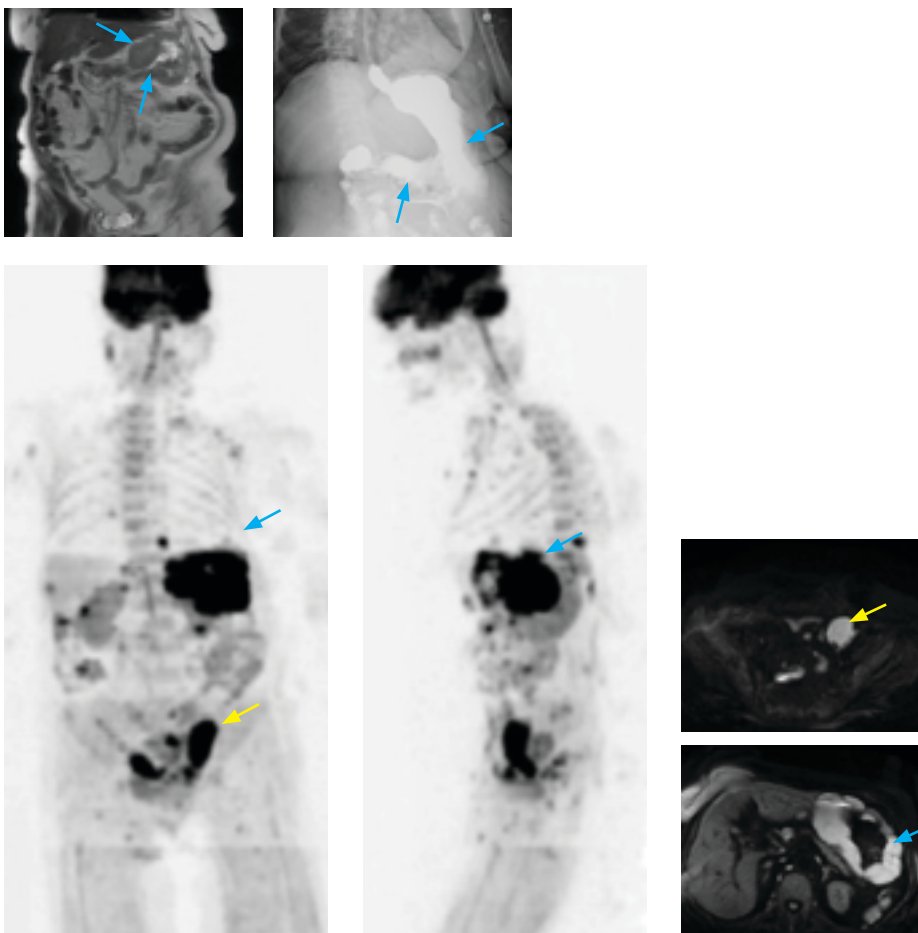


Figure 1. 3D inverted MIP is used as an overview. Note the gastric lymphoma (blue arrows) and pelvic masses (yellow arrow).

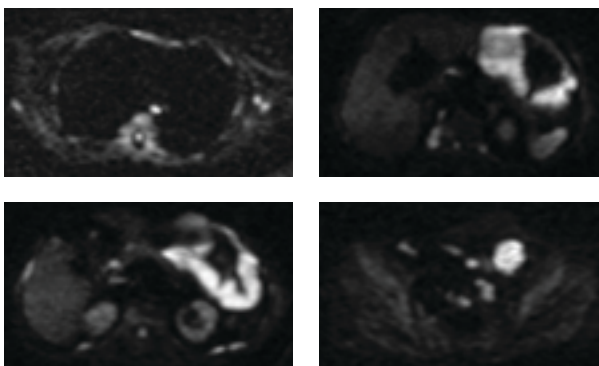


Figure 2. 2D eDWI source images are used for more detailed analysis.