Signa Ovation Quick Steps

Line Scan Diffusion Weighted Imaging (LSDWI)

TiP Training *Choices*

Step 1: Select the Protocol from the GE Protocol Library

- **H.13 DWI**

Step 2: Prepare and Position the Patient

•Patient entry is HEAD first

•Choose the appropriate coil- LSDWI is only compatible with the head coil

•Pad the patient to help reduce the likelihood of artifacts related to motion

•Landmark to the nasion

Step 3: Perform Localizer Series

•Select and Scan the localizer series in the protocol

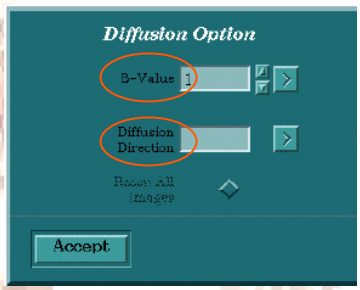
Prescribe a sagittal localizer to include the anatomy to be imaged with the LSDI series

Step 4: Perform LSDWI

•Select the "LSDI" series form the RX Manager.

•Enter the Graphic Rx for the Axial LSDWI series

•Select the "Diffusion Direction" and B-Value



FYI- When performing LSDWI, motion sensitive gradients may be applied in the phase, frequency and slice direction. There are four choices for the Diffusion Direction. They are:

S/I - MPG is applied only in the S/I direction.

A/P - MPG is applied only in the A/P direction

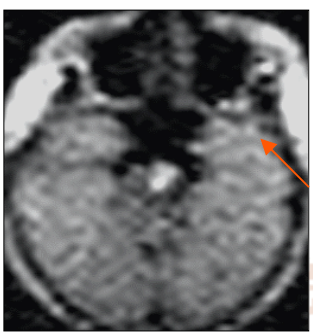
R/L - MPG is applied only in the R/L direction

ALL - MPG is applied in all three directions.

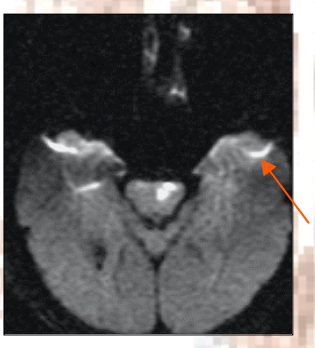
FYI- As "B-Value" increases, so does the diffusion weighting but at the expense of SNR. Select a B-Value that represents the best compromise in IQ and clinical benefit. Typical values are 900-1000

•Save Series/ Prepare to Scan / Scan

Why LSDWI?



LSDI on Ovation



DWEPI on 1.5T

•LSDWI utilizes a Spin Echo sequence which has less susceptibility to motion and distortion as compared to high field DWEPI

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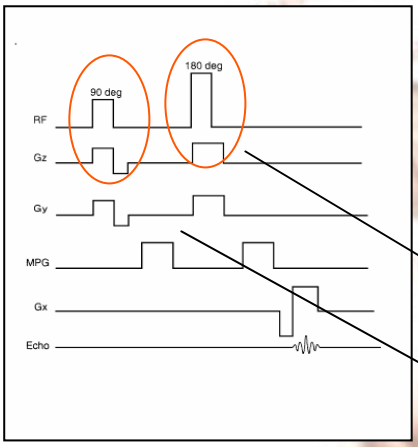
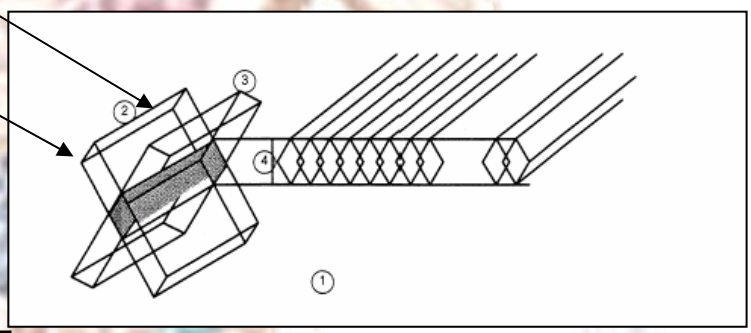
LSDWI: How it Works



90 and 180 degree RF pulses are rotated to excite a "cylinder" of tissue at their intersection

LSDWI is basically a **Spin Echo** sequence with a diffusion sensitizing gradient (Motion Probing Gradient). In a standard SE sequence the effective excitation plane of the 90 and 180 RF pulses are the same. However, in LSDWI, the effective plane of the 90 and 180 excitation pulses are **tilted resulting in the excitation of a cylinder or volume of tissue at their intersection in the slice plane**. The echo produced from this cylinder of excited data is frequency-encoded, and a 1 dimensional Fourier Transformation (1D FT) is performed on the line of data. Lines (cylinders) of data are excited and 1D FTs are performed for each phase encoding step prescribed. These phase steps are then combined to form a 2D image. **One line of data is acquired per TR period**



A. **B.**

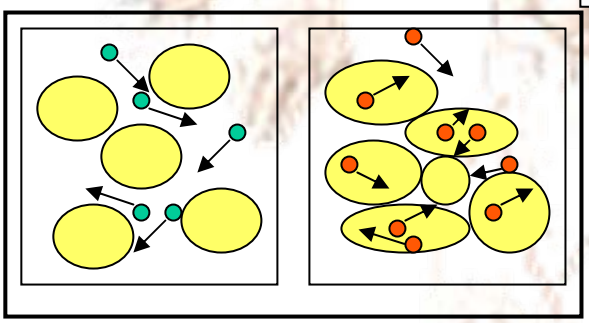


Diagram A: Represents normally diffusing tissue resulting dark signal

Diagram B: Represents restricted diffusion resulting in bright signal

LSDWI is designed to dephase the spins of fast-moving molecules in living tissue. When the motion probing gradient (MPG) is applied, the signal from protons bound in highly mobile water molecules dephase in the direction in which the gradient was applied. This means those same protons produce no signal and thus appear dark or hypo-intense on the final image. Conversely, protons that are bound in molecules that are not moving (dead tissue) will not be dephased. The signal produced from these motionless protons should appear bright or hyper-intense on the final image.The end result of a LSDI acquisition should be a contrast difference between tissues with free diffusion, such as gray matter or CSF, and tissues with restricted diffusion, such as white matter or dead tissue.

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