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MRI images and dataset description

v. 1.0.0

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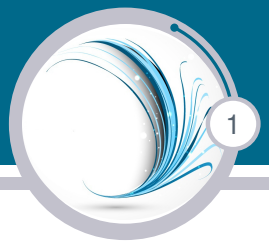
November 30, 2018

Content



Introduction
Dataset description

- This collection is a retrospective set of prostate MR studies. Studies include T2-weighted (T2W), proton density-weighted (PD-W), dynamic contrast-enhanced (DCE), and diffusion-weighted (DW) imaging. The images were acquired on two different types of Siemens 3T MR scanners, the MAGNETOM Trio and Skyra.

T2*-weighted imaging

T2*-weighted imaging is an MRI sequence to quantify effective T2. T2*-weighted sequences are used to detect deoxygenated hemoglobin, methemoglobin, or hemosiderin in lesions and tissues. Diseases with such patterns include intracranial hemorrhage, arteriovenous malformation, cavernoma, hemorrhage in a tumor, punctate hemorrhages in diffuse axonal injury, superficial siderosis, thrombosed aneurysm, phleboliths in vascular lesions, and some forms of calcification.

T2*-weighted sequences are very useful for evaluation of articular cartilages and ligaments because a relatively long T2* makes the articular cartilage becomes more hyperintense, while bone becomes hypointense.

Proton density-weighted

An image produced by controlling the selection of scan parameters to minimize the effects of T1 and T2, resulting in an image dependent primarily on the density of protons in the imaging volume. Proton density contrast is a quantitative summary of the number of protons per unit tissue. The higher the number of protons in a given unit of tissue, the greater the transverse component of magnetization, and the brighter the signal on the proton density contrast image. Conversely the lower the number of protons in a given unit of tissue, the less the transverse magnetization and the darker the signal on the proton density image.
TR- Repetition Time.
TE- Echo Time.

Weighting	TR	TE
T1	Short	Short
T2	Long	Long
PD	Long	Short

Dynamic contrast-enhanced (DCE)

Dynamic contrast-enhanced (DCE) MR perfusion, sometimes also referred to as permeability MRI, is one of the main MRI perfusion techniques which calculates perfusion parameters by evaluating T1 shortening induced by a gadolinium-based contrast bolus passing through tissue. The most commonly calculated parameter is k-trans. K-trans is calculated by measuring the accumulation of gadolinium-based contrast agent in the extravascular-extracellular space.
K-trans is interpreted varied according to permeability and blood flow. In situations where permeability is very low (near-intact blood brain barrier) then ktrans is a useful measure of permeability, whereas in situations where permeability is very high (disrupted blood brain barrier) then ktrans will reflect blood flow.

DWI Diffusion-weighted imaging

Diffusion-weighted magnetic resonance imaging (DWI or DW-MRI) is the use of specific MRI sequences as well as software that generates images from the resulting data, that uses the diffusion of water molecules to generate contrast in MR images.
An apparent diffusion coefficient (ADC) image or an ADC map is an MRI image that more specifically shows diffusion than conventional DWI, by eliminating the T2 weighing that is otherwise inherent in conventional DWI. ADC imaging does so by acquiring multiple conventional DWI images with different amounts of DWI weighing, and the change in signal is proportional to the rate of diffusion.
Contrary to DWI images, the standard grayscale of ADC images is to represent a smaller magnitude of diffusion as darker.

DWI Diffusion-weighted imaging

Diffusion imaging displays the microscopic movement of water molecules in the image.
Diffusion weighting b identifies the measurement's sensitivity to diffusion. The b-value determines the strength and duration of the diffusion gradients.

Thanks for your attention!