Dynamic contrast-enhanced MRI

William B. Morrison, MD
Thomas Jefferson University Hospital
Philadelphia, PA

Technique:
-Baseline noncontrast fast T1 SE, GRE or other fast T1 acquisition (<20sec)
--fat suppression optional (slows acquisition)
-Bolus of Gd contrast (standard dose) injected into peripheral vein
-Immediately repeat T1 SE or GRE MR imaging performed
-Follow out 4-5 runs, immediately following each other
--number of runs depends on vascularity and location (ie, toes in diabetic patients must be followed out longer)
-Perform analysis
  - Objective: ROI measurement of signal intensity in regions of concern
  - Subjective: Subtraction of post-contrast images from pre-contrast mask

Concept:
Post-contrast imaging with delay may not show true vascularity
-Early washout can cause false negative results in highly vascular conditions
-Contrast distribution through extracellular compartment can result in false positive results
-Only imaging post-bolus can define true vascularity

Uses:
Tumor imaging
-vascularity can be defined pre-treatment and on follow-up

Infection
-vascularity can indicate a more aggressive nature
-? Differentiating infection from neuropathic disease

Hyperemia versus osteonecrosis
-Bone marrow edema can indicate hyperemia or ischemia
-May appear identical on T1 and T2w imaging
-i.e., femoral head (subchondral stress fracture vs. AVN) or scaphoid after fracture
-Rapid contrast uptake excludes osteonecrosis
-Gives surgeon information regarding whether bone is viable for fixation / repair

Arthritis
-Analysis of synovial proliferation
-Activity of arthropathy (i.e., rheumatoid arthritis)
-Treatment efficacy

Perfusion mapping

References