BETH ISRAEL DEACONESS MEDICAL CENTER
Technology Ventures Office

BIDMC 1180: Pulse Sequence for Positive Contrast in MRI CEST

Conventional MRI CEST monitors signals detected after applying RF radiation at two different frequencies, RF-OFF and RF-ON. The RF-OFF signal is reference, while the RF-ON is selected to match an excitation frequency of the exchanging groups of molecules of interest. The subsequent suppression of the signal of these groups using RF-ON has the effect of decreasing the image signal. The contrast thus generated is small and negative. Molecules of interest are followed as the difference between the control signal and the lesser signal obtained using RF-ON. The difference between the two signals is small compared to the signals themselves, giving low signal-to-noise.

Market:
- ✓ Radiologists seeking higher contrast CEST and PARACEST images
- ✓ Applications monitoring:
  - —Low levels of contrast agent
  - —Small changes in the environments of *-OH* or *–NH* exchanging groups

Commercialization:
- ✓ Method patent for pulse sequence and detection schedule
- ✓ Flexible licensing options

Competitive Advantages:
- ✓ Improved SNR and image clarity
- ✓ Cross-platform MRI CEST functionality

BIDMC's Vinogradov & Lenkinski use a new RF pulse sequence that flips the contrast such that the signal obtained using RF-ON is greater than the control signal. When timed right, this difference is measured as a positive contrast when the control signal is nearly zero, providing increased sensitivity and decreased background artifacts.

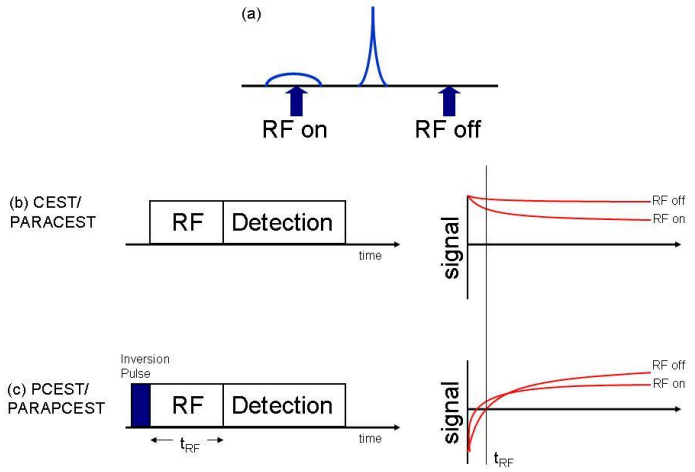
This invention enables new MRI CEST software using a method that combines a novel pulse sequence with a specific timing schedule for detection. Software to control such methods may be used on standard MRI imaging hardware without modification.

Stage of Development:
Validated proof-of-concept with phantoms and animals
Clinical testing to begin 2009

Patent / Licensing Status:
Patent pending; #61/123,534

Lead Investigators:
Elena Vinogradov, PhD
Robert Lenkinski, PhD

Contact:
Wanni Davis, Ph.D., M.B.A.
Tel: 617.667.9490
Fax: 617.667.0646
Email: wadavis@bidmc.harvard.edu



Scheme for CEST/PARACEST with Positive Contrast.
(a) RF applied at the frequency of an exchanging group yields saturation that transfers to surrounding bulk water, resulting in a detectable decrease in the strong water signal. (b) Conventional CEST RF sequence and detected signals; (c) BIDMC 1180 RF pulse yields signals for positive contrast.