Rodent In Vivo Myocardial Perfusion MRI Package

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Cine-ASL – LLFAIRGE Myocardial perfusion mapping in rodents

A package of two fully non-invasive and robust ASL MRI methods for quantitative mapping of myocardial perfusion in rodents

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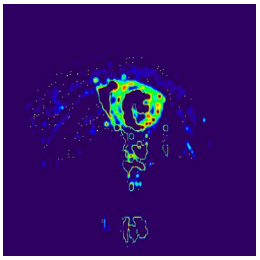
Package content

Acquisition method **cineASL** for Bruker Paravision 4.0, 5.1, 6.0.1, 360
Features
- Method implemented as described in *Troalen et al. Magn Reson Med. 70. 2013: 1389-1398*
- Allows fast high-resolution myocardial blood flow mapping of the myocardium

Acquisition method **LLFAIRGE** for Bruker Paravision 4.0, 5.1, 6.0.1, 360
Features
- Method implemented as described in *Kober et al. Magn Reson Med. 51. 2004: 62-67*
- Allows high-resolution T1- and myocardial blood flow mapping of the myocardium

Features common to both methods
- Supports GRAPPA acceleration (PV >= 6.0.1)
- Interleaved and non-interleaved Tag/Control acquisition
- Convenient setting of geometry and ASL timing



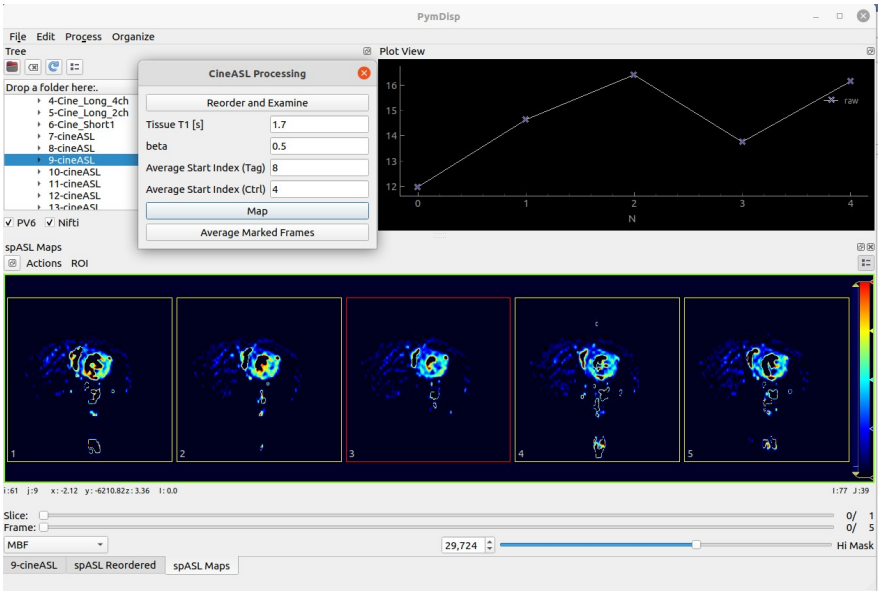
IDL Post-processing tool Imdisp running in *IDL Virtual Machine*
Python post-processing tool *PymDisp* (Beta Version)

PymDisp post-processing

Features
Reading of Bruker native format
Reading of DICOM format

Two-click MBF map calculation
Visualization by cardiac frame
Summation of frames
ROI analysis
Plot of ROI result per cardiac frame

ROIs saved to disk
Maps saved to disk (Nifti format)
One-click saving of animated GIF



Software package released for distribution to partners under non-disclosure agreement (NDA)

2016-2021 production by partners using this method

1. Ku M-C, Kober F, Lai Y-C, Pohlmann A, Qadri F, Bader M, Carrier L, Niendorf T. Cardiovascular magnetic resonance detects microvascular dysfunction in a mouse model of hypertrophic cardiomyopathy. J Cardiovasc Magn Reson 2021;23:63. doi: 10.1186/s12968-021-00754-z.
2. Ku M-C, Kober F, Pohlmann A, Fatimunnisa Q, Bader M, Niendorf T. Cardiac MRI for quantifying myocardial perfusion deficits in a mouse model of hypertrophic cardiomyopathy. In: Proceedings. 27th Annual Meeting of the International Society for Magnetic Resonance in Medicine, 11-17 May. Montréal, Canada; 2019. p. 2198.
3. Kwiatkowski G, Kober F, Kozerke S. Accelerating Myocardial Arterial Spin Labeling in Small Animals by Exploiting Spatiotemporal Correlations. In: Proceedings. 28th Annual Meeting of the International Society for Magnetic Resonance in Medicine, 08-14 August. Virtual Meeting; 2020. p. 1089.

2016-2021 production by CRMBM using this method

Journal Articles

1. Gaborit B, Ancel P, Abdullah AE, Maurice F, Abdesselam I, Calen A, Soghomonian A, Houssays M, Varlet I, Eisinger M, Lasbleiz A, Peiretti F, Bornet CE, Lefur Y, Pini L, Rapacchi S, Bernard M, Resseguier N, Darmon P, Kober F, Dutour A. Effect of empagliflozin on ectopic fat stores and myocardial energetics in type 2 diabetes: the EMPACEF study. Cardiovasc Diabetol 2021;20:57. doi: 10.1186/s12933-021-01237-2.
2. Fourny N, Lan C, Kober F, Boulghobra D, Bresciani J, Reboul C, Bernard M, Desrois M. Cardiac remodeling and higher sensitivity to ischemia-reperfusion injury in female rats submitted to high-fat high-sucrose diet: An in vivo/ex vivo longitudinal follow-up. J. Nutr. Biochem. 2019;69:139–150. doi: 10.1016/j.jnutbio.2019.03.022.
3. Mathieu C, Desrois M, Kober F, Lalevée N, Lan C, Fourny N, Iché-Torres M, Tran TT, Lê LT, Singer M, Mège J-L, Bernard M, Leone M. Sex-Mediated Response to the Beta-Blocker Landiolol in Sepsis: An Experimental, Randomized Study. Crit. Care Med. 2018. doi: 10.1097/CCM.0000000000003146.
4. Kober F, Jao T, Troalen T, Nayak KS. Myocardial arterial spin labeling. Journal of Cardiovascular Magnetic Resonance 2016;18:22. doi: 10.1186/s12968-016-0235-4.

Conference papers

6. Tonson A, Trabelsi A, Bernard M, Kober F. Effect of nicotine administration on myocardial perfusion under adenosine stress: A dynamic investigation using cine-ASL in mice. In: Proceedings. 27th Annual Meeting of the International Society for Magnetic Resonance in Medicine, 11-17 May. Montréal, Canada; 2019. p. 2190.
7. Maurice F, Ancel P, Mayoux E, Abdesselam I, Kober F, Darmon P, Grino M, Gaborit B, Bernard M, Dutour A. SGLT2 inhibition by empagliflozin attenuates ectopic fat accumulation and improves cardiac index in parallel to ketone bodies production: the EMPAFAT study. In: Diabetologia. Vol. 60 Supplement 1. 53rd Annual Meeting of the European Association for the Study of Diabetes (EASD), September 11-15. Lisbon/PT; 2017. pp. S414–S414.
8. Fourny N, Lan C, Kober F, Bernard M, Desrois M. Modification of cardiac morphology was associated with impaired myocardial sensitivity to ischemia-reperfusion injury in a diet-induced metabolic syndrome model. In: Diabetologia. Vol. 60 Supplement 1. 53rd Annual Meeting of the European Association for the Study of Diabetes (EASD), September 11-15. Lisbon/PT; 2017. pp. S547–S547. doi: 10.1007/s00125-017-4350-z.
9. Abdesselam II, Dutour A, Jacquier A, Kober F, Ancel P, Rider O, Bernard M, Gaborit B. Exenatide decreases ectopic fat accumulation but have no impact on myocardial function and perfusion in patients with obesity and type 2 diabetes. In: Proceedings. Vol. 25. 25th Annual Meeting of the International Society for Magnetic Resonance in Medicine, 22-28 April. Honolulu, HI, USA; 2017. p. 3250.