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<th>Software</th>
<th>Contact name</th>
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<td>ASLtbx</td>
<td>Ze Wang</td>
<td>Pennsylvania, USA</td>
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<td>PMI</td>
<td>Steven Sourbron</td>
<td>Leeds, UK</td>
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<td>DUSTER</td>
<td>Dafna Ben Bashat</td>
<td>Tel Aviv, Israel</td>
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<td>PMA</td>
<td>Kohsuke Kudo</td>
<td>Sapporo, Japan</td>
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<td>FSL</td>
<td>Michael Chappell</td>
<td>Oxford, UK</td>
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<td>EnABIE</td>
<td>Zahra Shirzadi</td>
<td>Toronto, Canada</td>
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ASLtbx: ASL signal processing toolbox

https://cfn.upenn.edu/~zewang/ASLtbx.php. >3400 downloads since 2009

Main features:
1. Matlab and SPM(5, 8, 12) based scripts.
2. ASL specific motion correction.
3. Nuisance regression before CBF calculation.
5. Compatible with PASL, CASL, and pCASL.
6. Other denoising methods to be included (ongoing).
7. Sample data with customized scripts.
8. A discussion board:
   https://groups.google.com/forum/#!forum/asltbx-discussion-board

Ze Wang, PhD
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Hangzhou Normal University, University of Pennsylvania
Platform for Research in Medical Imaging (PMI)
Steven Sourbron (s.sourbron@leeds.ac.uk)
https://sites.google.com/site/plaresmedima/
DUSTER: DCE Up-Sampled Temporal Resolution analysis method
Gilad Liberman, Yoram Louzoun, Moran Artzi, Guy Nadav, James R. Ewing and Dafna Ben Bashat

- Runs on Linux/Windows on data obtained from GE, Philips and Siemens
- Fully automatic Analysis of DCE data using the Extended Tofts Model with BAT, producing parametric maps $K^{\text{trans}}, K^{\text{ep}}, v_p, v_e$, BAT using model selection
- Includes calculation of baseline T1 maps using DESPOT1, with FAs correction; motion correction; brain extraction; removing and compensation of noisy time-points; raw-signal-to-T1-to-CTC conversion; $B_1$ inhomogeneity correction; artery localization; AIF extraction at temporal super-resolution and model fitting with model selection
- The user may choose to intervene in a fully manual or semi-automatic way in voxel selection and in choice of AIF
- The program is designed as an open-source software, and provides a user-friendly interface for exploration of the results at all levels of the analysis

WIP: Incorporating the ACoPeD (AIF-corrected-perfusion-DCE-MRI) feature

Dr. Dafna Ben Bashat
Tel Aviv Sourasky Medical Center;
Tel Aviv, Israel
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ISMRRM 2015 Toronto, Canada
DSC and CT Perfusion (automated analysis)
Diffusion-Perfusion mismatch (automated ROI)

SWI
QSM based OEF

Fully automated analysis
✓ Segmentation
✓ Bolus detection
✓ AIF selection

Kohsuke Kudo, MD, PhD (kkudo@huhp.hokudai.ac.jp)
Perfusion in FSL

- **FSL**: The FMRIB Software Library (v5.0)
  - OS X, Linux and Windows* compatible.

- **BASIL**: a toolset for resting ASL quantification:
  - All varieties of ASL
    - Single and multi-delay, pASL and pcASL, time-encoded ...
  - Absolute perfusion quantification.
    - Calibration / M0 estimation.
  - Corrections for acro-vascular contamination and dispersion
  - Partial volume correction.

- **VERBENA**: Vascular model quantification of DSC perfusion
  - Correction for macro-vascular contamination.

Michael Chappell
michael.chappell@eng.ox.ac.uk

www.fmrib.ox.ac.uk/fsl
ASL post-processing pipeline: 

Enhanced Automated Blood-flow Estimate (EnABLE)

- **Pre-processing** (smoothing & motion correction)
- **Quality control** (ASL difference images)
- **Perfusion image calculation**
- **Perfusion images improvement**

- **Maximize detectability** (percentage of detected voxels)
- **Increase SNR**
- **Region based optimization** (when desired)

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Shirzadi Z et al. JMRI 2015