

Preview of PMOD Version 3.9

(available in October 2017)

Dedicated Support for Oncology Research

While brain research using dynamic acquisitions has been a main target of PMOD's developments, many scientists working outside the brain field, notably in oncology, have found ways to leverage PMOD's unique functionality. However, the oncologists' needs and workflows have not been specifically addressed to date by PMOD. Therefore, developments for the upcoming PMOD version have a focus on improving functionality and usability for oncology research. Some dedicated features include:

- Global “oncology” preset to tailor the defaults and workflows.
- Extension of SUV support: SUV color bar presets; revision of the SUV control panel for more clarity and additional SUV variants, including the Janmahasatian formula for obese patients; simplified access to the SUV display unit variants.
- Quick, keyboard-driven definition of SUVpeak VOIs and isocontouring VOIs on predefined SUV thresholds.
- Improved lesion documentation by overlaying VOI statistics in the image and keyboard-driven image capturing.
- Workflow-oriented analysis of whole-body PET data implementing PERCIST-like assessment of tumor burden.
- Versatile texture analysis within outline VOIs.
- Tumor heterogeneity assessment by parametric mapping of dynamic data within VOIs.

Improvements and Extensions in all PMOD Tools

Additionally, all PMOD tools have been subject to a rigorous revision and improvement process. Cross-cutting improvements and extensions include:

- Support for the evolving quantitative PET extension of the BIDS data standard (bids.neuroimaging.io), including encoding of ancillary information in the JSON format.
- Use of compressed resource images to save disk space for the installation.
- External preprocessing tool to calculate dynamic z-score images relative to the average and standard deviation in a region, as required for supervised clustering in PSEG.
- Support for MATLAB® image loader extended to 4D matrices.
- New automatic VOI generation approach looking for the hottest connected voxels within a VOI.

A preliminary collection of tool-specific improvements is listed below and will be extended as the release date approaches.

PKIN

- Monte Carlo simulation improvements: saving of the generated data with their fitting results in the model history; support for randomized fitting; addition of noise to measurement instead of model curve; noise generation using bootstrap method.
- Output of cumulated activities for the IDAC2.1 dosimetry program (www.idac-dose.org).
- Standard error supported in the aggregation of kinetic modeling results.
- Massive speed improvements for the transfer of pixel-wise TACs.
- Creation of parametric images also for average tissue TACs when transferred from PBAS.
- Averaging window added to the plasma ratio model for calculation of V_t in bolus-infusion studies.
- Parameter explorer extended such that the fitting history of each region is also available.

PXMOD

- Model for DWI MR images. Supports different calculations of the ADC maps, including fit of mono exponential and stretched exponential.
- Model for PCASL MR images which are organized in two dynamic series (control, label), and a static M_0 series. Supports calculation of average perfusion.

PCARD

- Further improved segmentation of gated PET images.

PGEM

- CFD can use the results of 4D Flow MR acquisitions as boundary conditions for the simulations.
- Multiple improvements and extensions to functionality and interface for CFD and 4D Flow.

PFUS

- Improvements related to the oncologic work-up of whole-body images.

P3D

- Improvements of cutting a surface mesh with oblique planes and texturing the area of the section.

PNEURO

- The dynamic functional image can be shown as background of the generated VOIs alternative to the frame average.
- Batch mode improved in several ways: support for mapping added; option to create and save a quality control image showing the generated VOIs on top of the images; new interface item element for specifying the averaging range of dynamic series; saving of TACs, parametric maps, transformations and protocols.
- Support for user-defined atlases in parcellation improved.

PSEG

- Masking using the brain extraction function added.
- Clustering method when using external TACs replaced: the supervised clustering algorithm developed by Turkheimer et al. for PK11195 is now used instead of k-means.