# Distinct Functional Advantages of PMOD Software

## 1   Main PMOD USP: Unique Full PET Quantification

- Most extensive collection of kinetic model configurations (>60) and parametric mapping (>35) tools.
- Individual and population-based metabolite correction supported.
- All blood components and their combination can be fitted by smooth functions.
- Extensive range of methods for improving stability and reproducibility of iterative fits: initialization by linearized solution, randomized fitting, grid fitting, weighted fitting, parameter constraints.
- Simultaneous fitting of several regional TACs while coupling a common parameter (e.g. $k_2'$, DV, blood delay) to impose physiological constraints and improve parameter identifiability.
- Simultaneous fitting of several data sets (e.g. test/retest) at the same time to incorporate prior knowledge.
- Standard error indication for the parameter estimates.
- Procedure to assess sensitivity of parameters to acquisition timing and duration.
- Monte Carlo simulations to empirically assess the reliability of fitting results.
- Generation of synthetic data sets including noise for testing the impact of model simplifications.
- Batch fitting to test the impact of alternative model configuration changes for the data of group studies.
- Reference for in-house and industrial solutions, e.g., Siemens whole-body parametric mapping.

## 2   Image Viewing and Processing

- User friendly interface which is homogeneous across all processing modules.
- More than 30 image processing tools ranging from CT table removal to the skull stripping of MR images of the brain.
- Facility to include the NIH software ImageJ and other external tools in processing pipelines.
- Segmentation of human brain MRI images into gray and white matter.
- Convenient tools for merging multiple PET studies into a single, decay corrected time series (tracer kinetics for long half-life tracers, dosimetry).

## 3   Volume-of-Interest (VOI) Definition and Evaluation

- Widest range of manual and automatic segmentation methods for lesions and brain regions.
- Interactive hot-key driven lesion segmentation on defined percentage of $SUV_{max}$, $SUV_{mean}$, $SUV_{peak}$ or an absolute SUV value in local neighborhood.
- Adaptive tumor segmentation methodology developed by Prof. Jentzen.
- Many VOI statistics results beyond the traditional set: $SUV_{peak}$, maximal lesion diameter in 3D, surface area, sphericity, fractal dimension.
- Validated texture analysis for radiomics studies.
- Workflow for the segmentation of oncology lesions according to PERCIST for human and rodent data.
- Five different methodologies for partial volume correction of PET VOI statistics.
- 3D rendering of VOIs with surface texturing from the image.

## 4   Image Registration
- Rigid registration supporting masking and 6 different cost functions.
- Rigid registration based on defined landmarks.
- Three different deformable matching procedures with parameter presets for human data and data from various animal species.
- Motion correction of dynamic PET series.
- Batch functionality to register the data from a big population.
- Image algebra combining the registered images as with a handheld calculator.

## 5   Brain Image Analysis
- 14 included brain atlases for humans, rats, mice, pigs and different monkeys.
- Support for simple atlas creation by the user.
- Fully streamlined workflow for the analysis of PET/MR, PET or MR brain images of humans or animals.
- Segmentation of human brain MR images into gray and white matter and usage for optimized brain VOIs.
- Automatic transfer of the MR-derived VOIs to the PET images which are registered as part of the workflow.
- Calculation of the VOI statistics in the anatomical space of choice such as atlas, MR or PET.
- Functionality to create databases of the normal uptake pattern of a new PET tracer, and compare patient images against it.
- Batch functionality to process the data from a big population and to test the impact of changed analysis parameters.
- Dedicated, automatic module for the analysis of human FDG brain images from subjects with suspected Alzheimer's disease.

## 6   Heart Image Analysis
- Two modules for the analysis of PET or SPECT and MR images.
- Support for the analysis of static, dynamic and gated images.
- Wide range of models for the quantification of dynamic PET images to assess perfusion or metabolism.
- Streamlined workflow with semi-automatic procedures and full control of each intermediate result.
- Various flexible inspection tools for scrutinizing the results in detail.
- Manual tools for fixing difficult cases for which the semi-automatic procedures fail.

## 7   General
- Java software, running on all platforms (Windows, MacOSX, Linux).
- Available and professionally developed since 1998.
- >700 sites worldwide, >2000 users.
- >4000 publications with PMOD usage (>400 per year).
- "Swiss Knife for Image Quantification": 12 interacting modules covering all processing functionality needed in PET research.
- Transparent pricing with online quoting on website.
- Eternal license, and one free annual upgrade after license purchase.
- Acclaimed support which responds quickly.
- Publicly available trainings.
- Individual online training & support can be purchased at CHF 850 / 5 hours.