TMTV Auto-Segmentation

The automatic segmentation algorithm is a useful help to calculate TMTV, reduce time consuming ROI drawing and determination time.

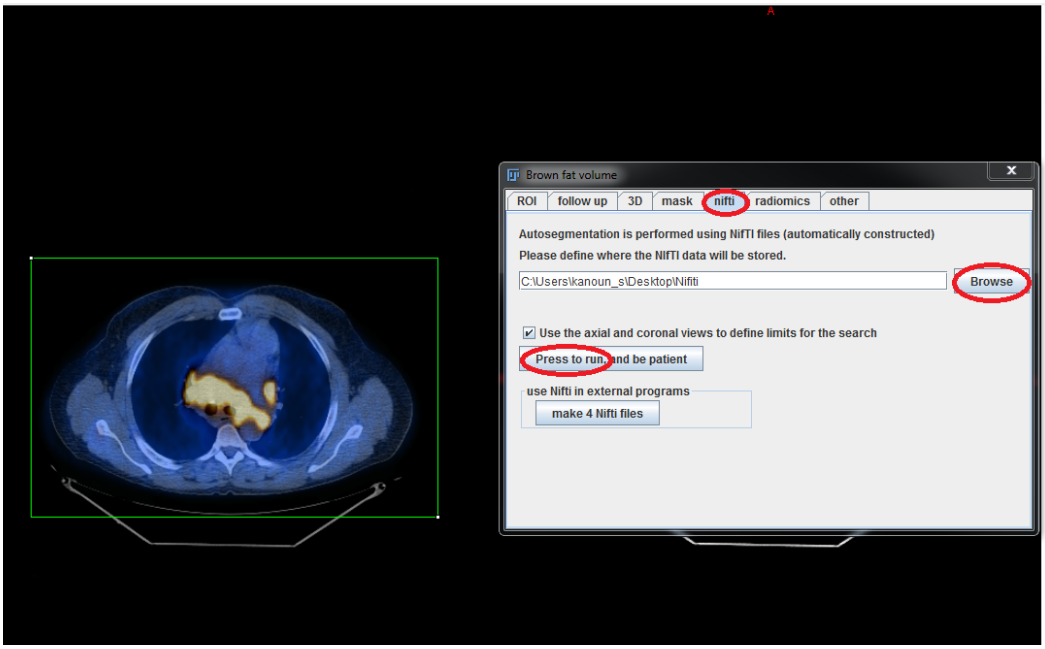
The auto segmentation algorithm identifies focal uptakes in the image and then from these uptakes a region-growing algorithm defines the region of interest around the tumor. You will be able to define a SUV threshold (fixed or relative to SUVmax) on these automatic ROIs to reproduce same results than manual delineation.

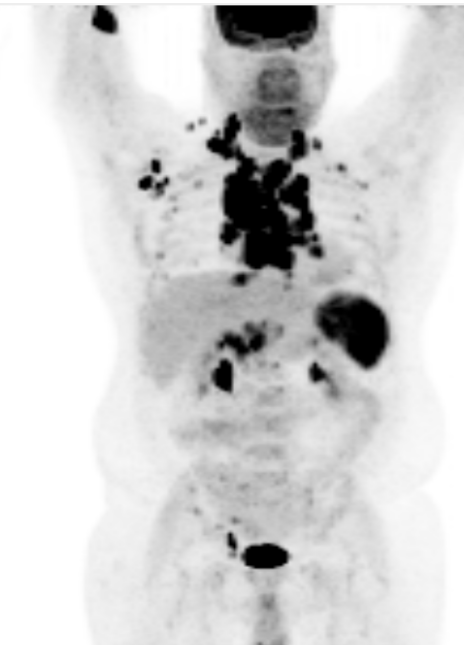
The automatic segmentation feature relies on 4 steps:

- Define area limit of automatic segmentation
- Automatic ROI review and erase of false positive
- Activation of segmentation threshold
- Add additional manual ROI for missing uptake area.

A) Selection of the area of automatic segmentation

In the viewer go to the quantification tool (Edit => Brown Fat, ROIs) and go to the “NIFTI” tab.





- If it is the first use, define a folder where the software will write exchange files for software needs (click “Browse” and select the folder of your choice, it should differ from the place where you will save the results of your TMTV measurements).

- At selecting the NIFTI tab you will see a rectangular green ROI over the images, this box will be the area of calculation of automatic segmentation. Display the Coronal view to set the limits of this area by clicking and moving the points located at the upper left and lower right angles of the box.

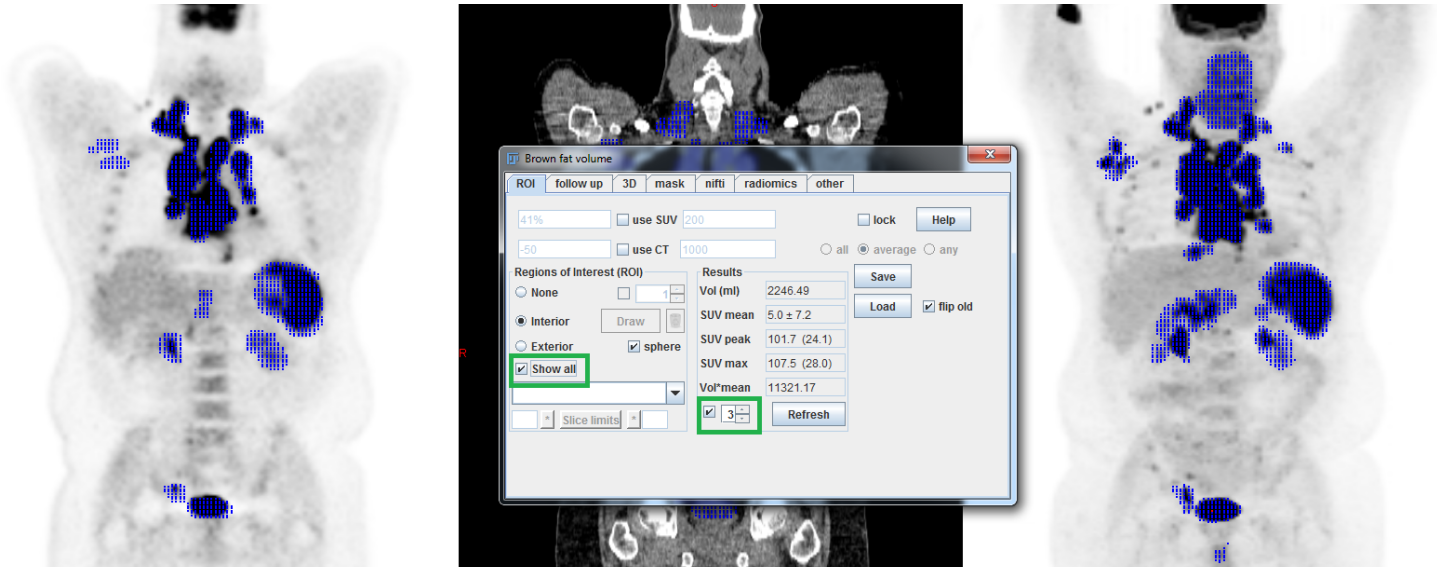
If the tumor is localized in a fraction of the body, we recommend limiting the box to this area. You will reduce the calculation time and limit the chance to take delineation of physiological uptake (as brain, kidney or bladder if you can exclude them for the analysis area).
If necessary you can control on axial view the limits of this box.

- Once this area set, click on “Press to run” and wait for the results, the calculation time is usually less than 1 minute. A new window will appear shortly and the run button will display “Done” and the time used for the calculation, the automatic segmentation result is ready.

B) ROI review and erase of false positive

Go to the “Roi” tab to review the all the automatic ROIs. Click on “Show all” (Green) , activate the checkbox choose 3 in the box (see Green box in the illustration) to see the different volumes selected.

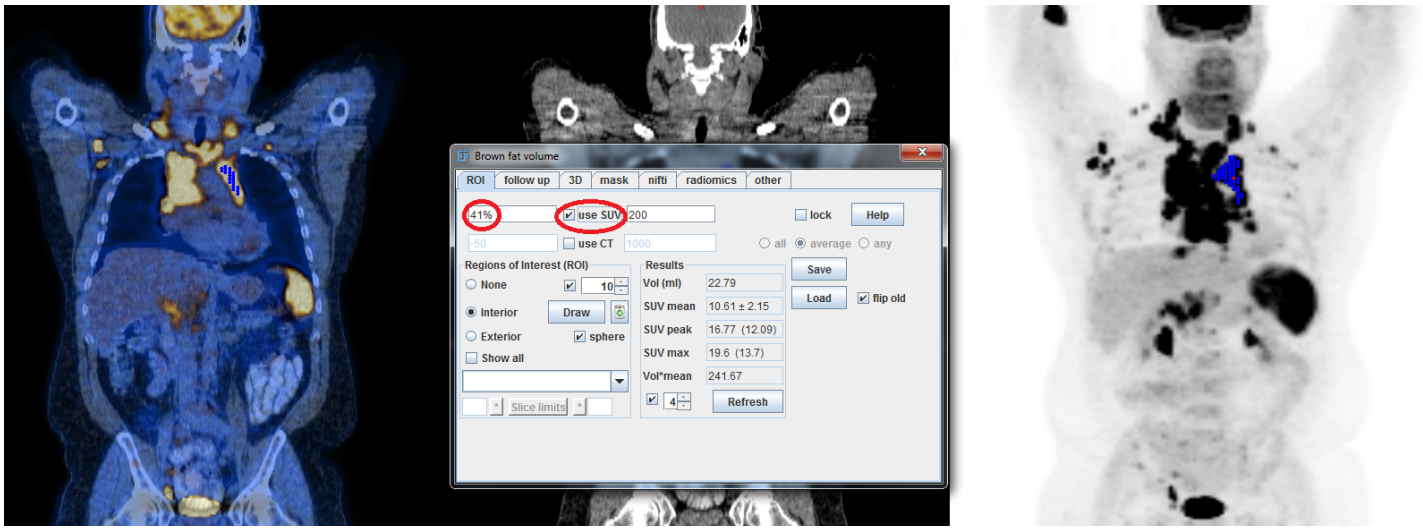
The algorithm is not specific, it include each focal uptake which could include brain, bladder or kidney (if previously included in the area of calculation). Sometimes it can include these structures even if excluded due to the process of region growing. The value of the TMTV displayed is this obtained before any segmentation.



At this time you can either proceed on segmentation or start to suppress the false positive volumes before segmentation (see below).

C) Activation of segmentation threshold

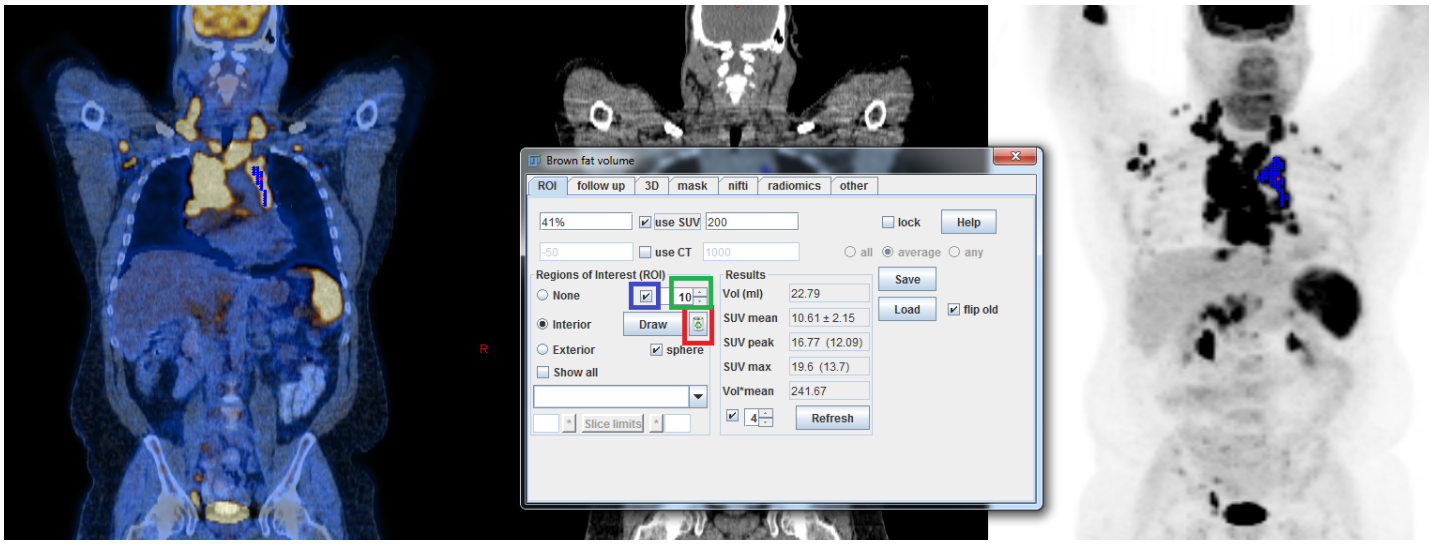
To apply segmentation threshold (as 41%) simply activate the segmentation rule you want (in this example 41% of the SUVmax or each ROI), you can use SUV fixed or relative to SUV and/or use also CT threshold value.



D) Suppression of false positive ROI

It is simple to review automatic ROI and delete false positive,

For that it is preferable to select the transverse slices. Then deselect show all; activate the check box (blue), the first ROI (number one) is displayed on the transaxial slice. If you keep it click on the up and down cursor (green) to display the following automatic ROI. To erase a false positive ROI simply click on the trash icon (red). You can display the ROI one by one moving the up and down cursor.



D) Add manual ROIs

Small or low uptake tumor could be missed by the automatic segmentation.

If needed you are free to add manual ROIs, simply click on “Draw” to add an irregular or sphere ROIs, the add ROIs will be add to the automatic ROIs for the final TMTV computation.

E) Storage of the results

Store your results in the final CSV file as usual, by clicking on the Save button the generated CSV will contains all quantitative data and ROI coordinate (it is possible to load this CSV later to correct or continue the delineation by clicking on the Load button).