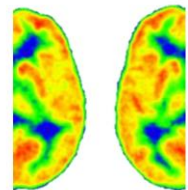# Computation of Standardized Uptake Value (SUV) Images

Where can necessary information been found?

Using Matlab

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[18F]FDG-PET WORKSHOP

Assessing Brain Glucose Metabolism in Patients with Disorders of Consciousness: from Acquisition to Interpretation

Sat. 2.10.21 Online Event

Find the data

- Use the *cd* command or navigate from the Matlab *Current Folder* windows

- The images are all together in a folder, they are saved slice by slice.

- When you open the folder, you'll find a collection of file.
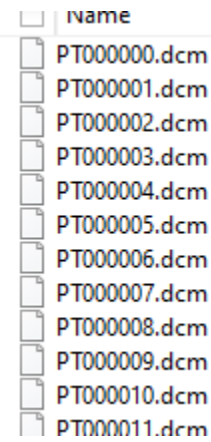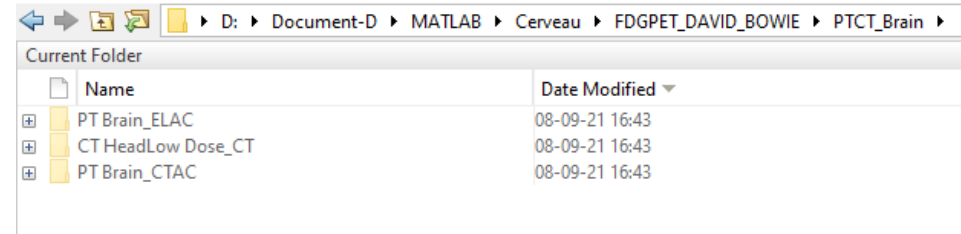
Extract the dicom information

- In the Command Window type

Info=dicominfo('PT000000.dcm')

This will put all the information in the info variable. It will help to retrieve the necessary data.

```
>> dicominfo('PT000000.dcm')

ans =

  struct with fields:

                      Filename: 'D:\Document-D\MATLAB\Cerveau\FDGPET_DAVID_BOWIE\PTCT_Brain\PT Brain
                   FileModDate: '08-sept.-2021 16:43:55'
                      FileSize: 48688
                        Format: 'DICOM'
                 FormatVersion: 3
                         Width: 128
                        Height: 128
                      BitDepth: 16
                     ColorType: 'grayscale'
    FileMetaInformationGroupLength: 222
       FileMetaInformationVersion: [2×1 uint8]
          MediaStorageSOPClassUID: '1.2.840.10008.5.1.4.1.1.128'
       MediaStorageSOPInstanceUID: '1.3.46.670589.28.2.15.30.26391.63333.3.2192.0.1593093645'
              TransferSyntaxUID: '1.2.840.10008.1.2.1'
          ImplementationClassUID: '1.2.276.0.7230010.3.0.3.6.4'
       ImplementationVersionName: 'OFFIS_DCMTK_364'
    SourceApplicationEntityTitle: 'DicomBrowser'
          SpecificCharacterSet: 'ISO_IR 100'
                     ImageType: 'ORIGINAL\PRIMARY'
          InstanceCreationDate: '20200101'
          InstanceCreationTime: '154332'
                   SOPClassUID: '1.2.840.10008.5.1.4.1.1.128'
                SOPInstanceUID: '1.3.46.670589.28.2.15.30.26391.63333.3.2192.0.1593093645'
                     StudyDate: '20200101'
                    SeriesDate: '20200101'
               AcquisitionDate: '20200101'
                   ContentDate: '20200101'
           AcquisitionDateTime: '20200101154751'
                     StudyTime: '154703'
                    SeriesTime: '154706'
               AcquisitionTime: '154751'
```

Formula used

- $SUV = \dfrac{Uptake\ [Bq/ml]}{A_{inj}[Bq]} \cdot Weight[g] \quad [g/ml]$

- $A_t = A_0 \cdot e^{-0,693 \cdot \frac{\Delta t}{T}}$ gives the activity at the time Δt after it has been measured at A_0 (to take into accound the natural radioactive decrease)

Extract the information from data

- Weight : w= info.PatientWeight

- Activity (in MBq)

    A0= info.RadiopharmaceuticalInformationSequence.Item_1.RadionuclideTotalDose / 1000000

- Time of measurement

    Tm = info.RadiopharmaceuticalInformationSequence.Item_1.RadiopharmaceuticalStartTime

- Time of acquisition : Here you must be carrefull. Be sure the slice you selected is the FIRST one acquired. In doubt use the SeriesTime instead of the acquisition time.

    Ta=info.AcquisitionTime

- Half live :

    T= info.RadiopharmaceuticalInformationSequence.Item_1.RadionuclideHalfLife

- Delay (in s)

DT=str2num(Ta(1:2))*3600+str2num(Ta(3:4))*60+str2num(Ta(5:6))-str2num(Tm(1:2))*3600-str2num(Tm(3:4))*60-str2num(Tm(5:6))

DT/60   to have the delay in min instead of s.

- Activity at time of acquisition (in MBq)

    A=A0*exp((-0.693)*DT/T)

- Factor used to multiply the image in SPM-PET→ imcalc

    F=w/(A*1000)