## FitModeldData file main parameters

### Model Definition

The first line of the file states which model will be used by the fitting program

1 fitModel: AzzEPG

The model chosen must come from the eight fit models defined in lines 24 to 32. For each model there is a corresponding parameter file defined. These lines in the file, together with lines 34 to 42 should not be altered.

24 paramsModelName:  
25 AzzEPG: fitModelParameterJsonFiles/azz\_fatmuscle\_epg\_model\_params.json  
26 fatEPG2: fitModelParameterJsonFiles/two\_fat\_epg2\_model\_params.json  
27 fatEPG1: fitModelParameterJsonFiles/one\_fat\_epg1\_model\_params.json  
28 muscleEPG1: fitModelParameterJsonFiles/one\_fatmuscle\_epg1\_model\_params.json  
29 muscleEPG2 : fitModelParameterJsonFiles/two\_fatmuscle\_epg2\_model\_params.json  
30 phantomEPG1: fitModelParameterJsonFiles/oneParamEPGphantom\_model\_params.json  
31 phantomEPG2: fitModelParameterJsonFiles/twoParamEPGphantom\_model\_params.json  
32 Azzabou: fitModelParameterJsonFiles/azz\_params.json

##### Study Data Directory Structure Used or Not.

It was stated earlier that this file can be used to work on data found in a study directory structure or directly on files in a single directory. This is achieved by either putting a list of participants in the **fitSubject** list or setting it to empty.

44 fitSubject: [HC-001]

In this configuration we will use data found in study directory structure. If the line had been set in the following manner

44 fitSubject: []

then the program would work on named files within the fitModeldata file defined in lines 54 to 59

54 #roisIndividual: simpleModelData/DMD\_001\_FOREARM\_RoiSet.zip  
55   
56 roiOutline: simpleModelData/EH\_DMDT\_001\_1\_foreArm\_outline.zip  
57   
58 analyzeHdr: simpleModelData/WIP\_Forearm\_T2\_CLEAR.hdr  
59 analyzeImg: simpleModelData/WIP\_Forearm\_T2\_CLEAR.img

### Defining sessions, imaged regions and slices

If the fitting program is taking data from the Data Directory Structure then the sessions and imaged regions to be used are defined as lists in lines 45 and 47. If defined data is used then the ***fitSession*** and ***fitImagedRegions*** fields are ignored.

45 fitSession: [sess-1]  
46 fitImagedRegions: [forearm]  
47 fitSlices: [1,2,3]

The slices to be used in the fitting are defined in line 47. The slices defined in this list are also used when the program works on defined data.

### Updating the values in the LMFIT parameter structures.

Initial starting values for parameters can be set within the file by updating the fields starting at lines 18 to 22

14 # EPGAZZ model parameters to update  
15 # Always include the echo value  
16   
17 ParamVals:  
18 echo:  
19 value: 8  
20 min: 0  
21 max: 10  
22 vary: False

As shown in the example the echo spacing time must always be set in the file. Further parameters within the fitting model can be set in a similar manner. Parameters that might want to be changed could be the the T2 values of the fat in the model, or the initial guess of the muscle T2.

As an example, further items may be added to the file in the following manner to set the long and short T2 components of the fat.

ParamVals:  
 echo:  
 value: 8.0  
 t2\_l:  
 value: 250.0  
 min: 0.0  
 max: 300.0  
 vary: False  
 t2\_s:  
 value: 80.0  
 min: 0.0  
 max: 300.0  
 vary: False

In this example all the attributes of the two T2 fat parameters are set, i.e. value,minimum, maximum and is it varied in the model. The minimum and maximum are set so that they cover the new value for the parameter. If the value is beyond the range present in the original parameter file then it will be incorrectly set. The vary attribute could be omitted from the definition. If is is changed from its original setting within the original parameter file then the model will be changed as more or less parameters are varied during the fit. It is best not to change the ***vary*** attribute from its original setting.

The parameters that can be altered are listed below:

A\_f  
A\_m  
B1  
T1\_f  
T1\_m  
c\_l  
c\_s  
echo  
t2\_fl  
t2\_fs  
t2\_m

The flag ***setParamValsIndividually*** is set to ***True*** in the file in this example. In this case, then fat values are calculated from previous model data in the study directory structure for each participant in the ***fitSubject*** list. This flag can only be set to ***True*** when data is being fit from a study directory structure. When this is the case the path to the fat data should be indicated using the ***fatResultsDir*** flag

11 fatResultsDir: T2/results/fat/fatEPG2

When the flag ***setParamValsIndividually*** is set to ***False*** then all the fat parameters for certain models are set from within the file if they are present, for all participants.

### ROI Author Preferences :: roiAuthorPreference

The field ***roiAuthorPreferences*** at line 51 gives a list of author initials that are used to choose which ROI files are used.

51 roiAuthorPreference: [EH]

The order of the list gives the priority, if a certain author cannot be found, then the next author initials will be used to choose the correct ROI files. This option is only acted upon when the fitting scripts are used within a study dierctory structure.

### Use Roi Outline :: useRoiOutline

This option is set to ***True*** when an outline ROI is used to define which part of the image is to be fit.

38 useRoiOutline: False

Outline ROI filenames must include the word ***outline*** in their name for the programs to function correctly

### Image Data Format :: imageDataFormat

The fitting progams can now read in both analyze and nifti data formats. This must be indicated in the file

52 imageDataFormat: Analyze

For Analyze format the program expects to find the image data as a file, therefore when the fitting program is fitting individual data then a file name with a relative or complete path should be given.

58 analyzeHdr: simpleModelData/WIP\_Forearm\_T2\_CLEAR.hdr  
59 analyzeImg: simpleModelData/WIP\_Forearm\_T2\_CLEAR.img

Nifti data can come in the form of a single file, either zipped or not, or as a series of files, perhaps corresponding to individual echo times for the T2 data. If this is the case then the directory where the data can be found must be entered.

imageDataFormat: nifti  
  
# when individual files   
  
niftiData: C:\Users\NEH69\Dropbox\projects\programming\2019\MRIstudyDescription\simpleModelData\WIP\_Forearm\_T2\_CLEAR.nii.gz  
  
# when a series of nifti files  
  
niftiData: C:\Users\NEH69\Dropbox\projects\programming\2019\MRIstudyDescription\simpleModelData\niffti