#Run <Mcflirt on the IHMT .nii file

Mcflirt -in IHMT.nii

#Calculate all the individual components of the maps (these don’t need to be done – this is just to know what volumes are part of each component)

subject\_list=ids.txt #defining list of subjects to use for loop  
  
subjects=$( cat ${subject\_list} )  
  
for id in $subjects  
  
do  
  
   
cd /Users/jess/Documents/IHMT/${id}

3dcalc -a ${id}\_mcf.nii.gz[0] -expr 'a\*1' -prefix MTR\_Ref.nii

3dcalc -a ${id}\_mcf.nii.gz[1] -expr 'a\*1' -prefix MT\_Ref.nii

3dcalc -a ${id}\_mcf.nii.gz[2,6,10] -expr 'a\*1' -prefix Positive.nii

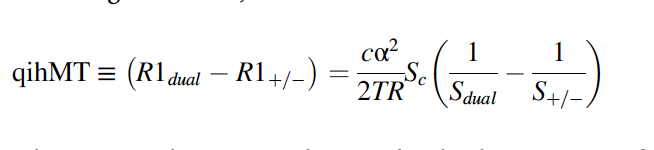
3dcalc -a ${id}\_mcf.nii.gz[3,5,7,9,11,13] -expr 'a\*1' -prefix Dual.nii

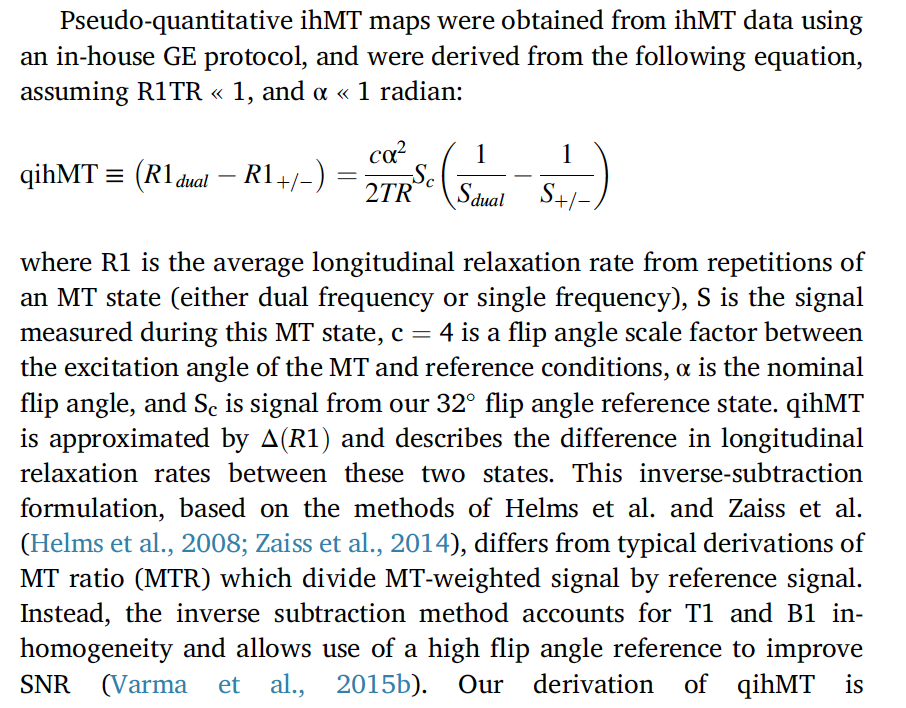
3dcalc -a ${id}\_mcf.nii.gz[4,8,12] -expr 'a\*1' -prefix Negative.nii

cd /Users/jess/Documents/IHMT/

done

#Formula for calc qihMT maps





α = 8 (needs to then be converted to radians)

c = 4

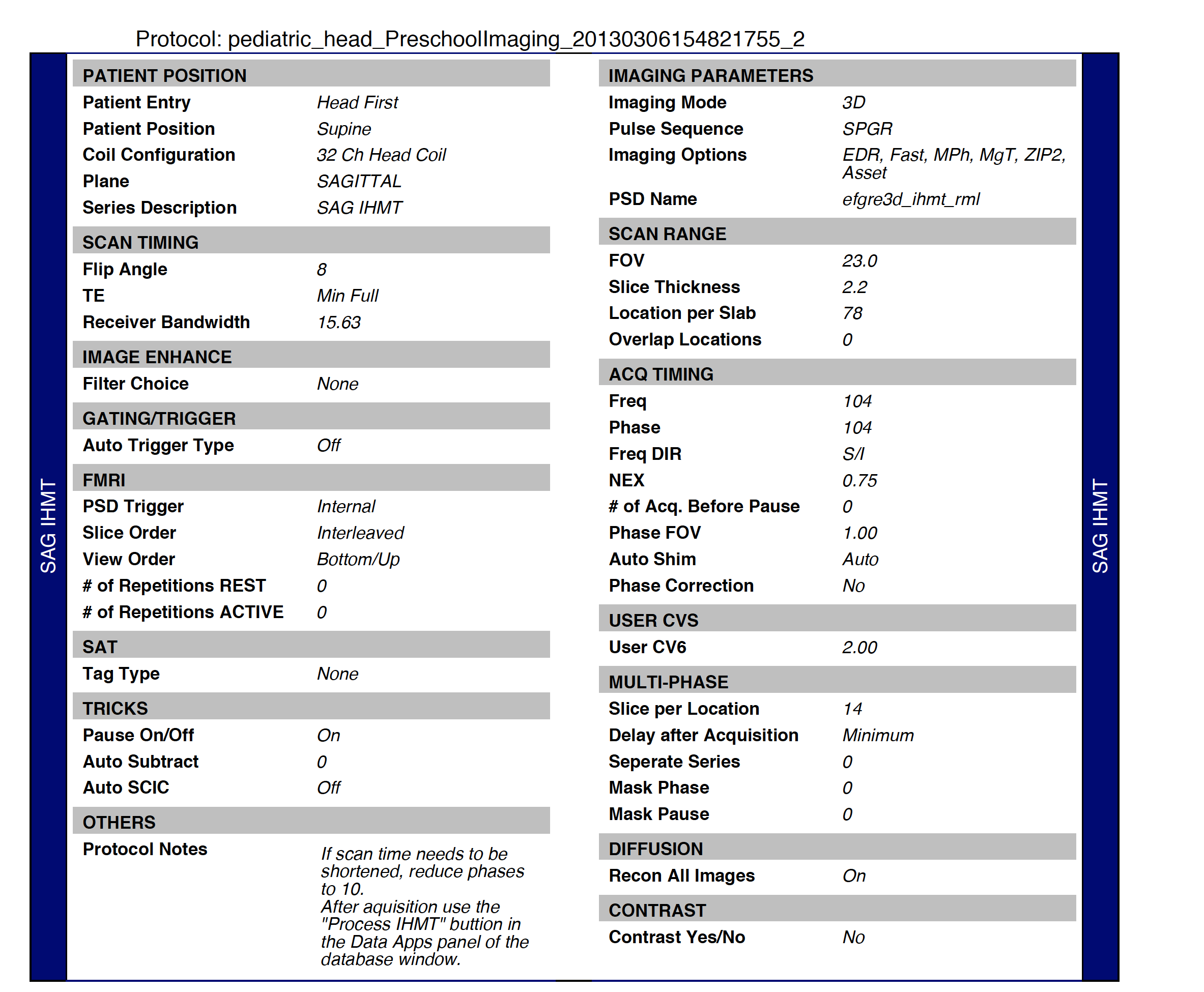


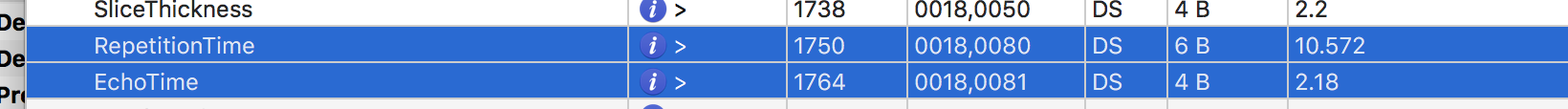
Sc = Reference Image

TR = 10.572ms

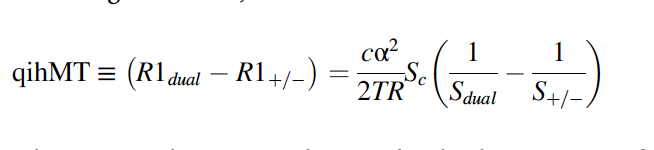
Sdual = average of all dual images

S+/- = average of all positive and negative – as uneven in some cases, average each separately and then average?





qihMT



3dcalc -datum float -a Positive.nii[0] -b Positive.nii[1] -c Positive.nii[2] -expr '(a+b+c)/3' -prefix Positive\_Avg.nii

#average of positive

3dcalc -datum float -a Negative.nii[0] -b Negative.nii[1] -c Negative.nii[2] -expr '(a+b+c)/3' -prefix Negative\_Avg.nii

#average of negative

3dcalc -datum float -a Positive\_Avg.nii -b Negative\_Avg.nii -expr '(a+b)/2' -prefix S\_PosNeg.nii

#average of negative and positive

3dcalc -datum float -a Dual.nii[0] -b Dual.nii[1] -c Dual.nii[2] -d Dual.nii[3] -e Dual.nii[4] -f Dual.nii[5] -expr '(a+b+c+d+e+f)/6' -prefix S\_Dual.nii

#average of dual

3dcalc -datum float -a S\_Dual.nii -expr '1/a' -prefix 1\_S\_Dual.nii

#1/Sdual image

3dcalc -datum float -a S\_PosNeg.nii -expr '1/a' -prefix 1\_S\_PosNeg.nii

#1/S+/- image

3dcalc -datum float -a 1\_S\_Dual.nii -b 1\_S\_PosNeg.nii -expr 'a-b' -prefix S\_Star.nii

#S\* image = 1/Sdual image minus 1/S+/- image

Final Equation

3dcalc -datum float -a MT\_Ref.nii -b S\_Star.nii -expr '((((4\*(8\*PI/180)\* (8\*PI/180))/0.021144)\*a\*b)\*1000)' -prefix qihMT\_Manual.nii

**MTR**

“MTR = (Mo - Msat)/Mo”

3dcalc -datum float -a Positive.nii[0] -b Positive.nii[1] -c Positive.nii[2] -expr '(a+b+c)/3' -prefix Positive\_Avg.nii

#average of positive

3dcalc -datum float -a Negative.nii[0] -b Negative.nii[1] -c Negative.nii[2] -expr '(a+b+c)/3' -prefix Negative\_Avg.nii

#average of negative

3dcalc -datum float -a Positive\_Avg.nii -b Negative\_Avg.nii -expr '(a+b)/2' -prefix S\_PosNeg.nii

#average of negative and positive

Final Equation

3dcalc -datum float -a S\_PosNeg.nii -b MTR\_Ref.nii -expr '((b-a)/b)\*10000' -prefix MTR\_Manual.nii

Further processing:

Swap dimensions

subject\_list=ids\_good.txt #defining list of subjects to use for loop  
subjects=$( cat ${subject\_list} )  
for id in $subjects  
do  
cd /Users/jess/Documents/IHMT/${id}

fslswapdim MTR\_Manual.nii RL PA IS ${id}\_MTR\_Manual\_swap.nii

cd /Users/jess/Documents/IHMT/

done

Create brain masks using MTR maps

#create brain masks based on MTR and apply these to the qihMT images

Step3.a

subject\_list=ids\_good.txt #defining list of subjects to use for loop  
subjects=$( cat ${subject\_list} )  
for id in $subjects  
do

cd /Users/jess/Documents/IHMT/${id}

bet2 ${id}\_MTR\_Manual\_swap.nii ${id}\_MTRBrain.nii -f 0.8

cd /Users/jess/Documents/IHMT/

done

Step3.b

subject\_list=ids\_good.txt #defining list of subjects to use for loop  
subjects=$( cat ${subject\_list} )  
for id in $subjects  
do  
cd /Users/jess/Documents/IHMT/${id}

bet ${id}\_MTRBrain.nii ${id}\_MTRBrainR2.nii -R -m

cd /Users/jess/Documents/IHMT/

done

Swap dimensions of qihMT and then apply brain mask (created from MTR bet) to qihMT

subject\_list=ids\_missing.txt #defining list of subjects to use for loop  
subjects=$( cat ${subject\_list} )  
for id in $subjects  
do  
cd /Users/jess/Documents/IHMT/${id}

fslswapdim qihMT\_Manual.nii RL PA IS ${id}\_qihMT\_swap.nii

fslmaths ${id}\_qihMT\_swap.nii.gz -mas ${id}\_MTRBrainR2\_mask.nii.gz ${id}\_qihMTMasked.nii

cd /Users/jess/Documents/IHMT/

done

subject\_list=ids\_missing.txt #defining list of subjects to use for loop  
subjects=$( cat ${subject\_list} )  
for id in $subjects  
do  
cd /Users/jess/Documents/IHMT/${id}

fslmaths ${id}\_qihMT\_swap.nii.gz -mas ${id}\_MTRBrainR2\_mask.nii.gz ${id}\_qihMTMasked.nii

cd /Users/jess/Documents/IHMT/

done

#subject\_list=ids.txt #defining list of subjects to use for loop  
  
subjects=$( cat ${subject\_list} )  
  
for id in $subjects  
  
do  
  
#threshold the image maps so they don’t have any negative values  
cd /Users/jess/Documents/IHMT/ProcessedData/${id}/autoReg/qihMT

mv qihMTBrain.nii qihMTBrain\_orig.nii

fslmaths qihMTBrain\_orig.nii -thr 0 qihMTBrain.nii

gunzip qihMTBrain.nii  
cd /Users/jess/Documents/IHMT/

done

#theshold it to only have 0 and no neg values