

Some protocol suggestions for
ksfse.e

15 Dec 2016

mrphysics@neuroradkarolinska.se

kfsse - Imaging options



- ☒ FSE with fast recovery (CV opfr). Allows T2-w with short TR
- ☒ FSE with flexible inversion options (see Advanced tab). Single & dual IR
- ☒ Standard FSE mode. Good for T1-w (ETL = 1) and T2-w
- ☒ Single-shot FSE (use NEX < 1 to control TE)
- ☒ Single-shot FSE with inversion
- ☐ T1-FLAIR
- ☐ T2-FLAIR

FSE-XL

Try work with TR = *Minimum* and control the approved TR interval in the advanced tab.

FSE-IR

CV26:

1-IR: Simple IR

2-SA-IR: Slice-ahead IR (as for T1-FLAIR)

3-FLAIR: FLAIR-block as for T2FLAIR

ksfse - T1-w

Plane: Oblique

Mode: 2D

Imaging Option

Family

Echo Planar Imaging

Fast Spin Echo

Gradient Echo

MNS

Spin Echo

Vascular

FRFSE-XL

FSE-IR

FSE-XL

SSFSE

SSFSE-IR

T1Flair

T2Flair

None

ARC

ASSET

Acoustic Reduction

Extended Dynamic Range

Multi-Phase

Tailored RF

ZIP512

Application

3DASL

BREASE

COSMIC

IDEAL IQ

MAVRIC SL

QUICK-STEP

T2MAP

UNKNOWN

BRAVO

CINEIR

DISCO

LAVA-Flex

MR-Touch

Silenz

TRICKS

PSD Name: ksfse

Accept

ksfse T1w

GRx

3:10

Details

Advanced

Scan Plane: Oblique

Freq. Dir: A/P

Freq. FOV: 24.0

Phase FOV: 0.80

Slice Thickness: 4.0

Spacing: Intleave

R/L: 0.0

A/P: A30.4

S/I: 177.1

Start: 0.0

End: 0.0

A15.5

S78.2

Chem SAT: None

Contrast:

Freq. Dir: A/P

TR: Minimur

Slices: 40

Total # Slices: 40

Max # Slices: 27

of Acqs: 2

Rel. SNR(%): 22

of TE(s) per Scan: 1.0

TE: Minimur

Refocus Flip Angle: 180

Echo Train Length: 1

Intensity Correction: SCIC

Intensity Filter: None

3D Geometry Correction:

Frequency: 320

Phase: 256

NEX: 1.00

Bandwidth: 31.25

Excitation Mode: Select...

Shim: Off

RF Drive Mode: Preset

Phase Correct: Off

Table Delta: 0.00

WB-SAR: 1.36

B₁ RMS: 3.10µT

Mode: First

dB/dt: First

Minimum TE: 5.7

Maximum TE: 5.7

Details

Advanced

User Control Variables

		Min	Max
CV0	Excitation flip angle [deg] PSD version: a1e076:	90.00	0.0 180.0
CV1	ETL controls TE:	0.00	0.0 1.0
CV4	Min TR (ms) [0: Disabled]:	450.00	0.0 10000.0
CV5	Max TR (ms) [0: Disabled]:	650.00	0.0 20000.0

ksfse - T2-w

Plane: **Oblique** Mode: **2D**

Imaging Option

Family

- ☐ Echo Planar Imaging
- ☒ Fast Spin Echo
- ☐ Gradient Echo
- ☐ MNS
- ☐ Spin Echo
- ☐ Vascular

Pulse

- ☐ FRFSE-XL
- ☐ FSE-IR
- ☒ FSE-XL
- ☐ SSFSE
- ☐ SSFSE-IR
- ☐ T1Flair
- ☐ T2Flair

Imaging Option

- ☐ None
- ☒ ARC
- ☐ ASSET
- ☐ Acoustic Reduction
- ☒ Extended Dynamic Range
- ☐ Multi-Phase
- ☒ Tailored RF
- ☐ ZIP512

Application

- ☐ 3DASL
- ☐ BRAVO
- ☐ BREASE
- ☐ CINEIR
- ☐ COSMIC
- ☐ DISCO
- ☐ IDEAL IQ
- ☐ LAVA-Flex
- ☐ MAVRIC SL
- ☐ MR-Touch
- ☐ Quick-STEP
- ☐ Silenz
- ☐ T2MAP
- ☐ TRICKS

PSD Name: **ksfse**

Accept

ksfse T2w GRX 0:57

Details Acceleration Advanced

Scan Plane: **Oblique** Freq. Dir: **A/P** # of TE(s) per Scan: **1.0** Frequency: **320**

Freq. FOV: **24.0** TR: **Minimur** TE: **86.0** Phase: **256**

Phase FOV: **0.80** # Slices: **40** Refocus Flip Angle: **180** NEX: **1.00**

Slice Thickness: **4.0** Echo Train Length: **18** Bandwidth: **31.25**

Spacing: **Intleave** Intensity Correction: **SCIC** Excitation Mode: **Select...**

Intensity Filter: **None** Shim: **Off**

3D Geometry Correction: ☐ RF Drive Mode: **Preset**

Phase Correct: **Off**

Table Delta: **0.00**

Total # Slices: **40**

Max # Slices: **21**

of Acqs: **2**

Rel. SNR@: **103**

R/L A/P S/I

Start **0.0** **A26.6** **I77.1**

End **0.0** **A13.5** **S78.3**

Chem SAT: **None**

Contrast: ☐

Details Acceleration Advanced

Phase: **2.00** Slice: **1.00**

WB-SAR: 1.72 B_{1s} RMS: 3.0

Details Acceleration Advanced

User Control Variables

		Min	Max
CV0	Excitation flip angle [deg] PSD version: a1e076:	90.00	0.0 180.0
CV1	ETL controls TE:	1.00	0.0 1.0
CV3	T1-w Optimization [0:OFF 1:ON]:	0.00	0.0 1.0
CV4	Min TR (ms) [0: Disabled]:	3500.00	0.0 10000.0
CV5	Max TR (ms) [0: Disabled]:	5000.00	0.0 20000.0

ksfse - T2-FLAIR

Plane: Oblique Mode: 2D Imaging Option:

Family:

- ☐ Echo Planar Imaging
- ☒ Fast Spin Echo
- ☐ Gradient Echo
- ☐ MNS
- ☐ Spin Echo
- ☐ Vascular

Pulse:

- ☐ FRFSE-XL
- ☐ FSE-IR
- ☐ FSE-XL
- ☐ SSFSE
- ☐ SSFSE-IR
- ☐ T1Flair
- ☒ T2Flair

Imaging Option:

- ☐ None
- ☐ ARC
- ☐ ASSET
- ☐ Acoustic Reduction
- ☐ Extended Dynamic Range
- ☐ Multi-Phase
- ☒ Tailored RF
- ☐ ZIP512

Application:

- ☐ 3DASL
- ☐ BRAVE
- ☐ BREASE
- ☐ CINE-IR
- ☒ COSMIC
- ☐ DISCO
- ☐ IDEAL IQ
- ☐ LAVA-Flex
- ☐ MAVRIC-SL
- ☐ MR-Touch
- ☐ QuickSTEP
- ☐ SILENZ
- ☐ T2MAP
- ☐ TRICKS

PSD Name: ksfse

Accept

ksfse T2FLAIR GRx 2:54

Details Advanced

Scan Plane: Oblique Freq. Dir: A/P

Freq. FOV: 24.0 TR: Minimax

Phase FOV: 0.80 # Slices: 40

Slice Thickness: 4.0

Spacing: Intleave

Total # Slices: 40

Max # Slices: 20

of Acqs: 2

Rel. SNR@: 103

Chem SAT: None

Contrast:

WB-SAR: 0.47 B_{1s}RMS: 1.56μT Mode: First dB/ dt: First

of TE(s)per Scan: 1.0

TE: 122.1

Refocus Flip Angle: 110

Echo Train Length: 28

Auto Inv. Time: 2713

Intensity Correction: SCIC

Intensity Filter: None

3D Geometry Correction:

Frequency: 320

Phase: 256

NEX: 1.00

Bandwidth: 31.25

Excitation Mode: Select...

Shim: Off

RF Drive Mode: Preset

Phase Correct: Off

Table Delta: 0.00

Details Advanced

User Control Variables

		Min	Max
CV0	Excitation flip angle [deg] PSD version: a1e076:	90.00	0.0 180.0
CV1	ETL controls TE:	1.00	0.0 1.0
CV27	IR1 - T1 to null [CSE:4500 GM:1400 WM:750 Fat:340]	4500.00	0.0 10000.0

CV27

Recommended T1 Null values for 3T.
On 1.5T, the recommendation changes to lower values

ksfse - T1-FLAIR

Plane: Oblique Mode: 2D

Family:

- ☐ Echo Planar Imaging
- ☒ Fast Spin Echo
- ☐ Gradient Echo
- ☐ MNS
- ☐ Spin Echo
- ☐ Vascular

Pulse:

- ☐ FRFSE-XL
- ☐ FSE-IR
- ☐ FSE-XL
- ☐ SSFSE
- ☐ SSFSE-IR
- ☒ T1Flair
- ☐ T2Flair

Imaging Option:

- ☐ None
- ☐ ARC
- ☐ ASSET
- ☐ Acoustic Reduction
- ☐ Extended Dynamic Range
- ☐ Multi-Phase
- ☒ Tailored RF
- ☐ ZIP512

Application:

- ☐ BREASE
- ☐ CINE-IR
- ☒ COSMIC
- ☐ DISCO
- ☐ IDEAL IQ
- ☐ LAVA-Flex
- ☐ MAVRIC SL
- ☐ MR-Touch
- ☐ QuickSTEP
- ☐ Silence
- ☐ T2MAP
- ☐ TRICKS
- ☐ VIBRANT-Flex

PSD Name: ksfse

Accept

ksfse T1FLAIR GRx 1:50

Details Advanced

Scan Plane: Oblique Freq. Dir: A/P

Freq. FOV: 24.0 TR: Minimum

Phase FOV: 0.80 # Slices: 40

Slice Thickness: 4.0

Spacing: Intleave

Refocus Flip Angle: 130

Echo Train Length: 7

Auto Inv. Time: 813

Intensity Correction: SCIC

Intensity Filter: None

3D Geometry Correction: ☐

Frequency: 320

Phase: 256

NEX: 1.00

Bandwidth: 31.25

Excitation Mode: Select...

Shim: Off

RF Drive Mode: Preset

Phase Correct: Off

Table Delta: 0.00

Total # Slices: 40

Max # Slices: 20

of Acqs: 2

Rel. SNR: 115

Chem SAT: None

Contrast: ☐

WB-SAR: 1.64 B₁-RMS: 2.51μT Mode: First dB/dt: First

Details Advanced

User Control Variables

		Min	Max
CV0	Excitation flip angle [deg] PSD version: a1e076	90.00	0.0 180.0
CV1	ETL controls TE	1.00	0.0 1.0
CV27	IR1 - T1 to null [CSF:4500 GM:1400 WM:750 Fat:340]	4500.00	0.0 10000.0

CV27

Recommended T1 Null values for 3T.
On 1.5T, the recommendation changes to lower values

kfsse - T1-FLAIR

alternative

Plane: **Oblique** Mode: **2D**

Family

- ☐ Echo Planar Imaging
- ☒ Fast Spin Echo
- ☐ Gradient Echo
- ☐ MNS
- ☐ Spin Echo
- ☐ Vascular

Pulse

- ☐ FRFSE-XL
- ☐ FSE-IR
- ☐ FSE-XL
- ☐ SSFSE
- ☐ SSFSE-IR
- ☒ T1Flair
- ☐ T2Flair

Imaging Option

- ☐ None
- ☐ ARC
- ☐ ASSET
- ☐ Acoustic Reduction
- ☐ Extended Dynamic Range
- ☐ Multi-Phase
- ☒ Tailored RF
- ☐ ZIP512

Application

- ☐ BREAST
- ☐ CINE-IR
- ☐ COSMIC
- ☐ DISCO
- ☐ IDEAL IQ
- ☐ LAVA-Flex
- ☐ MAVRIC SL
- ☐ MR-Touch
- ☐ QuickSTEP
- ☐ Silence
- ☐ T2MAP
- ☐ TRICKS
- ☐ VIBRANT-Flex

PSD Name: **kfsse**

Accept

kfsse T1FLAIR alt GRx 1:30 Details Advanced

Scan Plane: **Oblique** Freq. Dir: **A/P** # of TE(s) per Scan: **1.0** Frequency: **320**

Freq. FOV: **24.0** TR: **Minimum** TE: **27.2** Phase: **256**

Phase FOV: **0.80** # Slices: **40** Refocus Flip Angle: **130** NEX: **1.00**

Slice Thickness: **4.0** Echo Train Length: **10** Bandwidth: **41.67**

Spacing: **Intleave** Auto Inv. Time: **834** Excitation Mode: **Select...**

R/L A/P S/I Intensity Correction: **SCIC** Shim: **Off**

Start **0.0** **A26.6** **I77.1** Intensity Filter: **None** RF Drive Mode: **Preset**

End **0.0** **A13.5** **S78.3** 3D Geometry Correction: ☐ Phase Correct: **Off**

Act End **R0.0, A13.5, S78.3** Table Delta: **0.00**

Chem SAT: **None**

☐ Contrast

MB-SAR: 1.67 B₁:RMS: 2.68μT Mode: First dB/dt: First

Details Advanced

User Control Variables

		Min	Max
CV0	Excitation flip angle [deg] PSD version: a1e076:	0.0	180.0
CV1	ETL controls TE:	0.0	1.0
CV27	IR1 - T1 to null [CSF:4500 GM:1400 WM:750 Fat:340:	4500.00	10000.0

ksfse - T2 STIR

Plane: Oblique Mode: 2D

Family:

- ☐ Echo Planar Imaging
- ☒ Fast Spin Echo
- ☐ Gradient Echo
- ☐ MNS
- ☐ Spin Echo
- ☐ Spiral
- ☐ Vascular

Pulse:

- ☐ FRFSE-XL
- ☒ FSE-IR
- ☐ FSE-XL
- ☐ SSFSE
- ☐ SSFSE-IR
- ☐ T1Flair
- ☐ T2Flair

Imaging Option:

- ☐ None
- ☐ ARC
- ☐ ASSET
- ☐ Acoustic Reduction
- ☐ Extended Dynamic Range
- ☐ Multi-Phase
- ☒ Tailored RF
- ☐ ZIP512

Application:

- ☐ 3DASL
- ☐ BRAVO
- ☐ BREASE
- ☐ CINE IR
- ☐ COSMIC
- ☐ DISCO
- ☐ IDEAL IQ
- ☐ LAVA-Flex
- ☐ MAVRIC SL
- ☐ MR-Touch
- ☐ QuickSTEP
- ☐ SWIFT
- ☐ T2MAP
- ☐ TRICKS

PSD Name: ksfse

Accept

T2STIR GRx 2:59 Details Advanced

Scan Plane: Oblique Freq. Dir: A/P

Freq. FOV: 24.0 TR: Minimum

Phase FOV: 0.80 # Slices: 40

Slice Thickness: 4.0

Spacing: Intleave

Total # Slices: 40

Max # Slices: 20

of Acqs: 2

Rel. SNR: 103

Chem SAT: None

Contrast:

of TE (Super Scan): 1.0

TE: 103.9

Refocus Flip Angle: 125

Echo Train Length: 22

Auto Inv. Time: 235

Intensity Correction: SCIC

Intensity Filter: None

3D Geometry Correction:

Frequency: 320

Phase: 256

NEX: 1.00

Bandwidth: 31.25

Excitation Mode: Select...

Shim: Off

RF Drive Mode: Preset

Phase Correct: Off

Table Delta: 0.00

Start: 0.0 A20.0 I81.7

End: 0.0 A20.0 S74.3

WB-SAR: 0.58 B₁ RMS: 1.73 μT Mode: First

dB/dt: First

Minimum T

Maximum T

Details Advanced

User Control Variables

		Min	Max
CV0	Excitation flip angle [deg] PSD version: a1e076:	90.00	0.0 180.0
CV1	ETL controls TE:	1.00	0.0 1.0
CV26	IR1 [0:Off 1:IR 2:SA-IR 3:FLAIR]:	1.00	0.0 3.0
CV27	IR1 - T1 to null [CSF:4500 GM:1400 WM:750 Fat:340]:	340.00	0.0 10000.0
CV28	IR2 [0:Off 1:IR 2:SA-IR]:	0.00	0.0 2.0

kfsfse - T2FLAIR + STIR

Experimental!

Plane: **Oblique** Mode: **2D**

Family:

- ☐ Echo Planar Imaging
- ☒ Fast Spin Echo
- ☐ Gradient Echo
- ☐ MNS
- ☐ Spin Echo
- ☐ Spiral
- ☐ Vascular

Pulse:

- ☐ FRFSE-XL
- ☒ FSE-IR
- ☐ FSE-XL
- ☐ SSFSE
- ☐ SSFSE-IR
- ☐ T1Flair
- ☐ T2Flair

Imaging Option:

- ☐ None
- ☐ ARC
- ☐ ASSET
- ☐ Acoustic Reduction
- ☐ Extended Dynamic Range
- ☐ Multi-Phase
- ☒ Tailored RF
- ☐ ZIP512

Application:

- ☐ 3DASL
- ☐ BRAVO
- ☐ BREASE
- ☐ CINE IR
- ☐ COSMIC
- ☐ DISCO
- ☐ IDEAL IQ
- ☐ LAVA-Flex
- ☐ MAVRIC SL
- ☐ MR-Touch
- ☐ QuickSTEP
- ☐ SWIFT
- ☐ T2MAP
- ☐ TRICKS

PSD Name: **kfsfse**

Accept

T2FLAIR_STIR GRx 4:34 Details Advanced

Scan Plane: **Oblique** Freq. Dir: **A/P** # of TE (per Scan): **1.0** Frequency: **320**

Freq. FOV: **24.0** TR: **Minimum** TE: **135.7** Phase: **256**

Phase FOV: **0.80** # Slices: **40** Refocus Flip Angle: **125** NEX: **1.00**

Slice Thickness: **4.0** Echo Train Length: **34** Bandwidth: **41.67**

Spacing: **Intleave** Auto Inv. Time: **3089** Excitation Mode: **Select...**

R/L A/P S/I Total # Slices: **40** Intensity Correction: **SCIC** Shim: **Off**

Start **0.0** **A20.0** **181.7** Max # Slices: **20** Intensity Filter: **None** RF Drive Mode: **Preset**

End **0.0** **A20.0** **574.3** # of Acqs: **2** 3D Geometry Correction: ☐ Phase Correct: **Off**

Act End **R0.0, A20.0, S74.3** Rel. SNR: **89** Table Delta: **0.00**

Chem SAT: **None**

☐ Contrast:

WB-SAR: 0.37 B_{1s} RMS: 1.33 μ T Mode: First dB/dt: First Minimum TE: 135.7 Maximum TE: 135.7

Details		Advanced		User Control Variables		
					Min	Max
CV0	Excitation flip angle [deg]	90.00	0.0	180.0		
PSD version: a1e076						
CV1	ETL controls TE:	1.00	0.0	1.0		
CV26	IR1 [0:Off 1:IR 2:SA-IR 3:FLAIR]:	3.00	0.0	3.0		
CV27	IR1 - T1 to null [CSF:4500 GM:1400 WM:750 Fat:340]:	4500.00	0.0	10000.0		
CV28	IR2 [0:Off 1:IR 2:SA-IR]:	1.00	0.0	2.0		
CV29	IR2 - T1 to null (T1=235 ms):	340.00	0.0	10000.0		