

Muskuloskeletální MR protokoly

1,5 Tesla

FN Brno

A. Šprláková-Puková

L. Kopuleťá

Philips

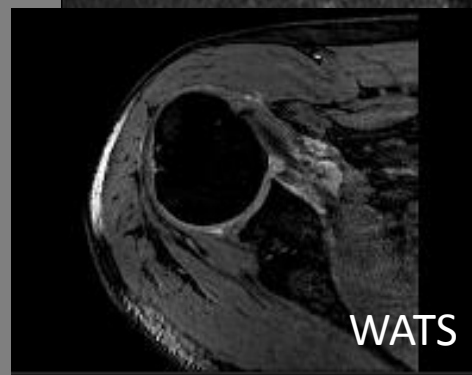
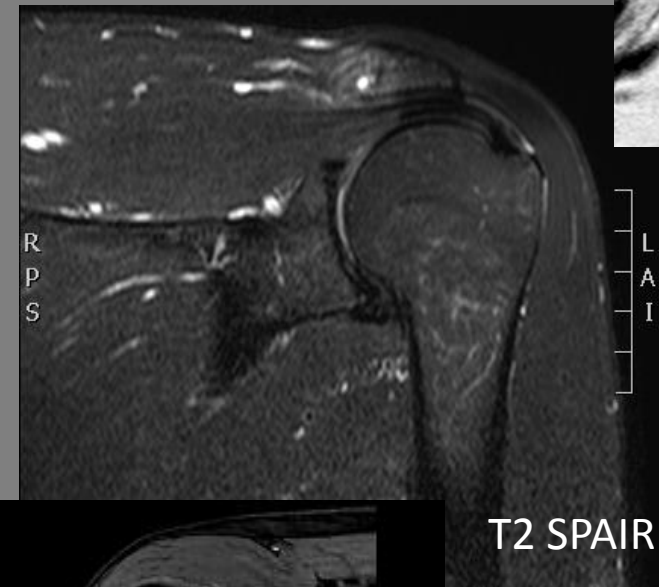
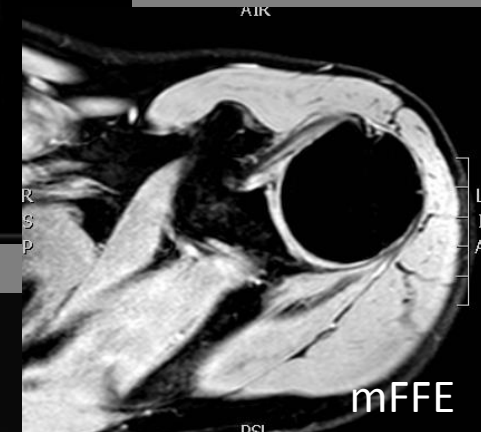
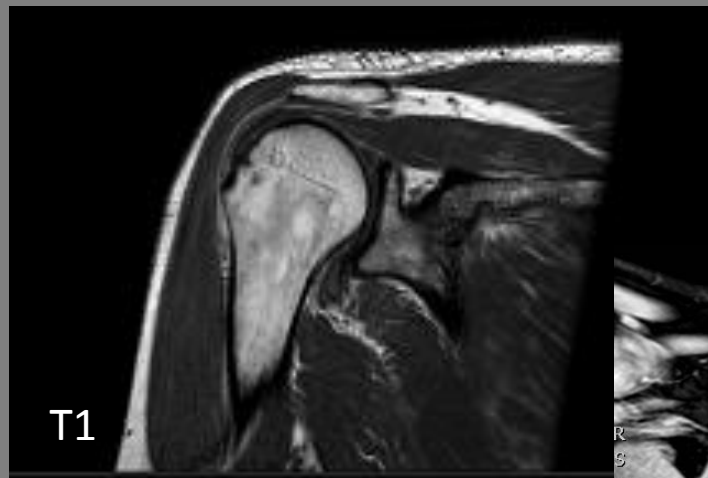
Achieva 1,5 T

RAMENO 1,5T std
Coil: Sense Shoulder 8ch

Sekvence	Rovina	Čas
T2 SPAIR	cor	4:20
T1	cor	3:28
T2	sag	4:03
PD	cor	7:05
3D mFFE	tra	6:16
3D WATSf	tra	5:14

Celkem 19:08

SPAIR, ProSet – fat suppression
 WATSf – Water Selective fluid scan



RAMENO 1,5T artrografie
Coil: Sense Shoulder 8ch

Sekvence **Rovina** **Čas**

T2 SPAIR **cor** **5:27**

T1 SPIR **cor** **4:41**

T1 **sag** **3:28**

T1 **tra** **5:37**

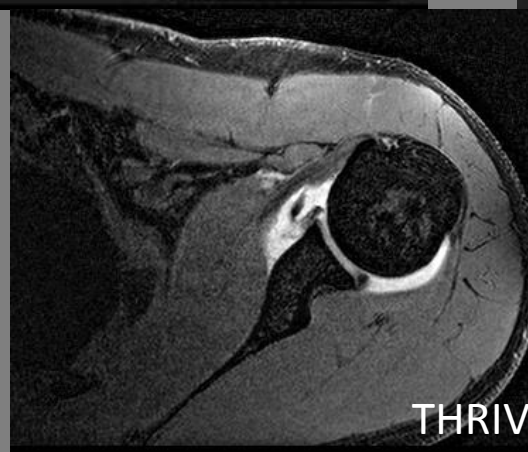
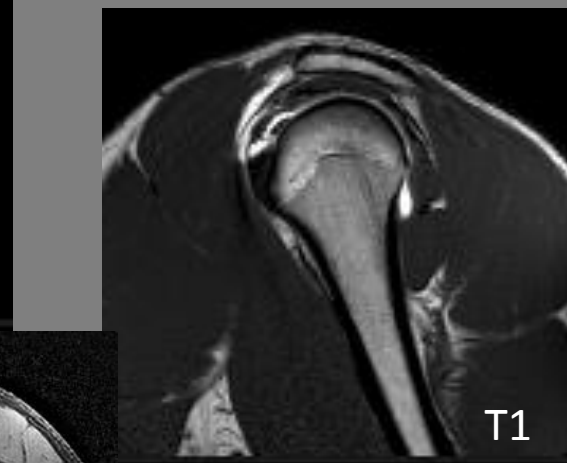
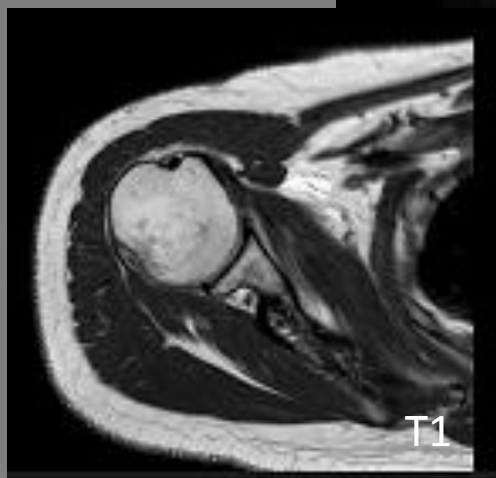
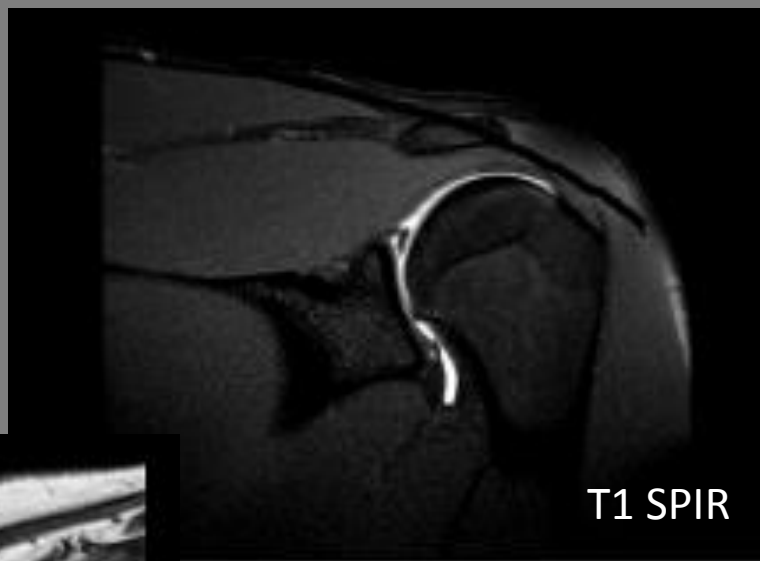
THRIVE **tra** **5:58**

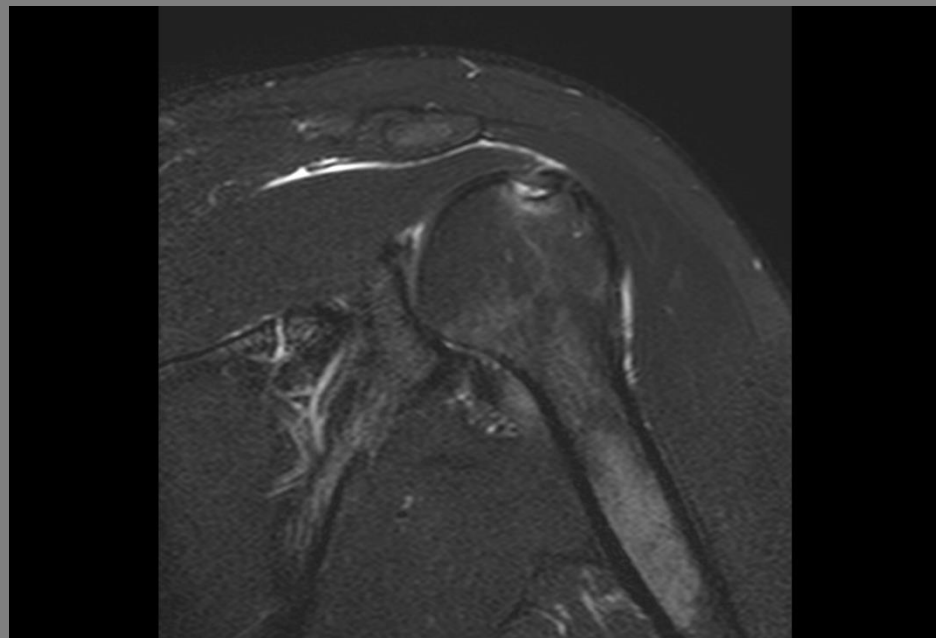
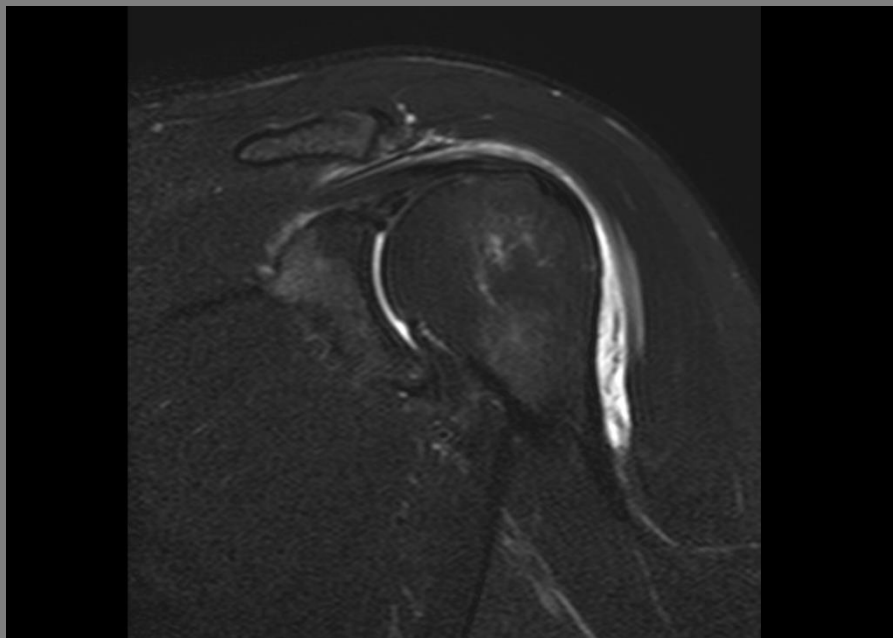
Celkem

25:11

SPAIR , SPIR – fat suppression

THRIVE – VIBE (SI), LAVA (GE)



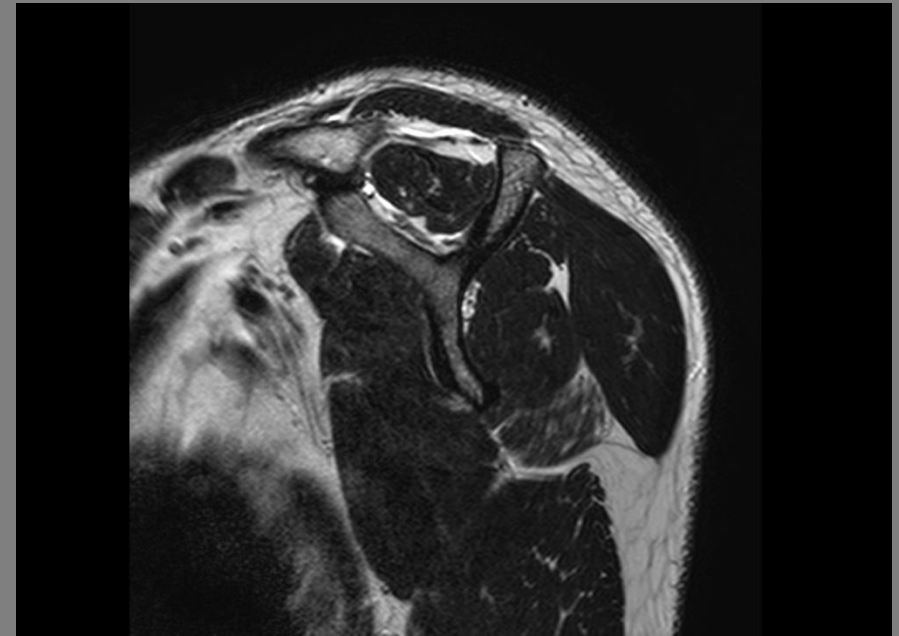


Typ:	T2	Matrix ACQ:	212 x 147	TR ms:	4492
Sekvence:	TSE	Voxel ACQ mm:	0,75 x 1,08 x 3	TE ms:	60
Rovina:	Cor	Matrix REC:	512	Fáze:	FH
Vrstva mm:	3	Voxel REC mm:	0,31 x 0,31 x 3	PAT - SENSE:	1,3
FoV mm:	160 x 160	TSE factor:	12	Čas:	4:20
Různé:	BW(Hz): 269,5 SPAIR				

T2

sag

RAMENO 1,5T std

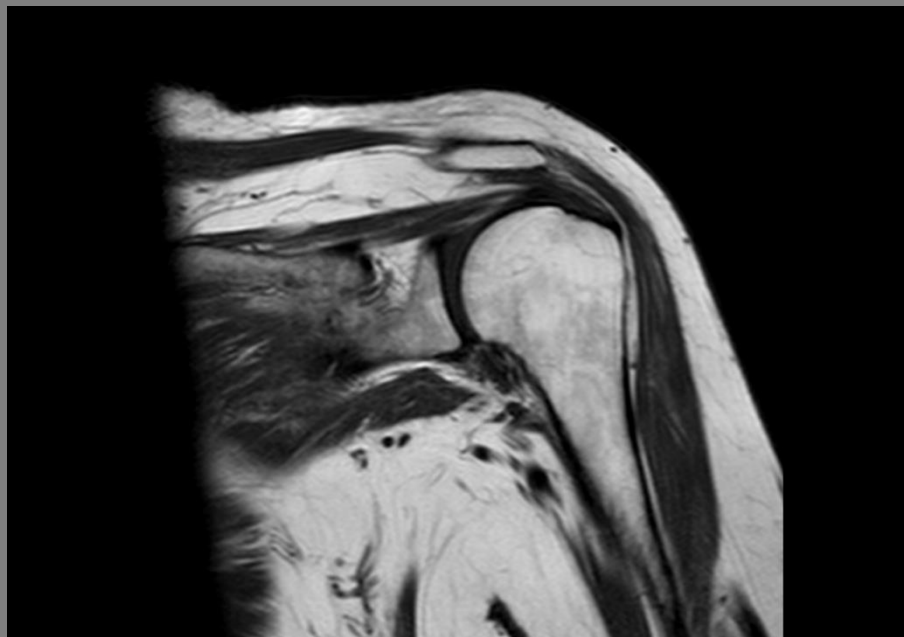


Typ:	T2	Matrix ACQ:	256 x 203	TR ms:	4126
Sekvence:	TSE	Voxel ACQ mm:	0,70 x 0,89 x 3	TE ms:	100
Rovina:	Sag	Matrix REC:	512	Fáze:	AP
Vrstva mm:	3	Voxel REC mm:	0,35 x 0,35 x 3	PAT - SENSE:	-
FoV mm:	180 x 180	TSE factor:	14	Čas:	4:03
Různé:	BW(Hz): 136,7				

 **T1**

cor/sag

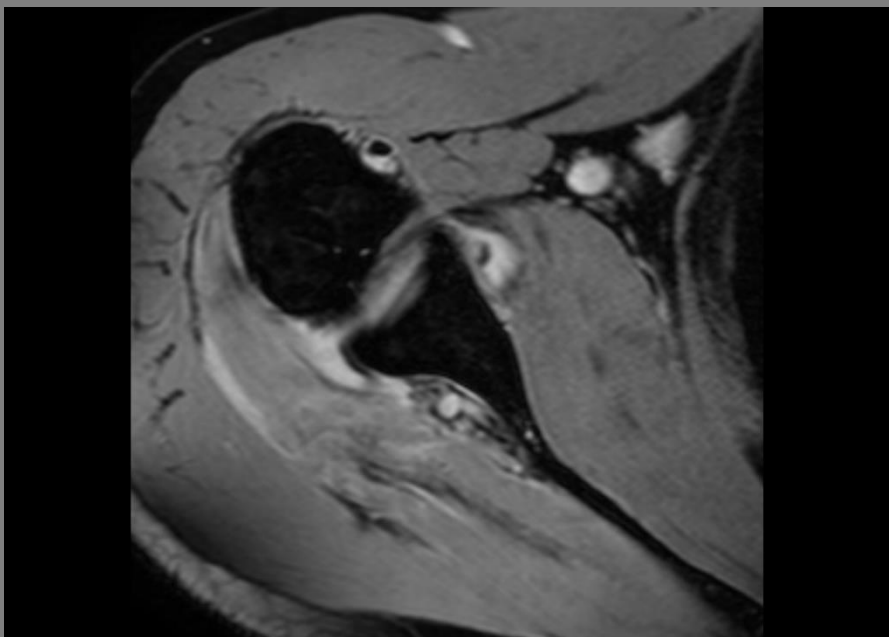
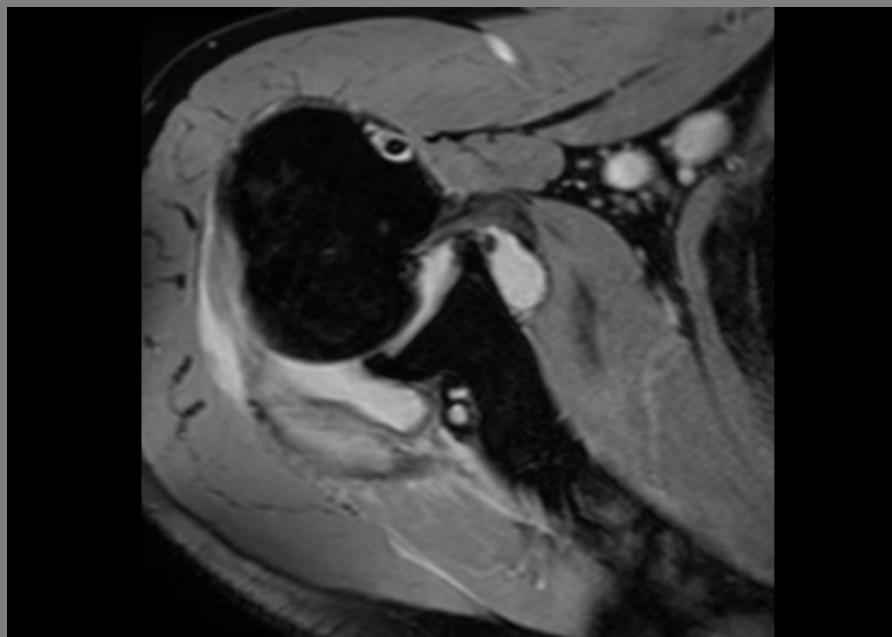
RAMENO 1,5T std + artro



Typ:	T1	Matrix ACQ:	256 x 192	TR ms:	535
Sekvence:	TSE	Voxel ACQ mm:	0,70 x 0,94 x 3	TE ms:	15
Rovina:	Cor/Sag	Matrix REC:	512	Fáze:	FH
Vrstva mm:	3	Voxel REC mm:	0,35 x 0,35 x 3	PAT - SENSE:	-
FoV mm:	180 x 180	TSE factor:	4	Čas:	3:28
Různé:	BW(Hz): 218,8				



Typ:	3D FFE	Matrix ACQ:	288 x 275	TR ms:	24
Sekvence:	GE	Voxel ACQ mm:	0,59 x 0,61 x 1,5	TE ms:	9,7
Rovina:	Tra	Matrix REC:	576	Fáze:	AP
Vrstva mm:	1,5	Voxel REC mm:	0,29 x 0,29 x 0,75	PAT - SENSE:	1,7
FoV mm:	150 x 150	TSE factor:	-	Čas:	5:14
Různé:	BW(Hz): 112,1 ProSet				



Typ:	3D FFE	Matrix ACQ:	212 x 160	TR ms:	29
Sekvence:	GE	Voxel ACQ mm:	0,76 x 1,00 x 3	TE1/ Δ TE ms:	14/5
Rovina:	Tra	Matrix REC:	336	Fáze:	RL
Vrstva mm:	3	Voxel REC mm:	0,48 x 0,48 x 1,5	PAT - SENSE:	1,5
FoV mm:	160 x 160	TSE factor:	-	Čas:	6:16
Různé:	BW(Hz): 361,5		Počet ech: 3		

**T1 SPIR**

cor

RAMENO 1,5T artro

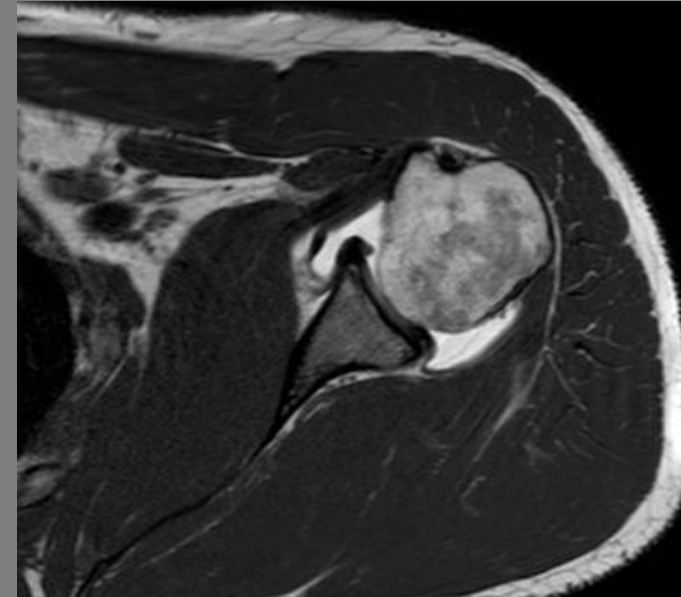
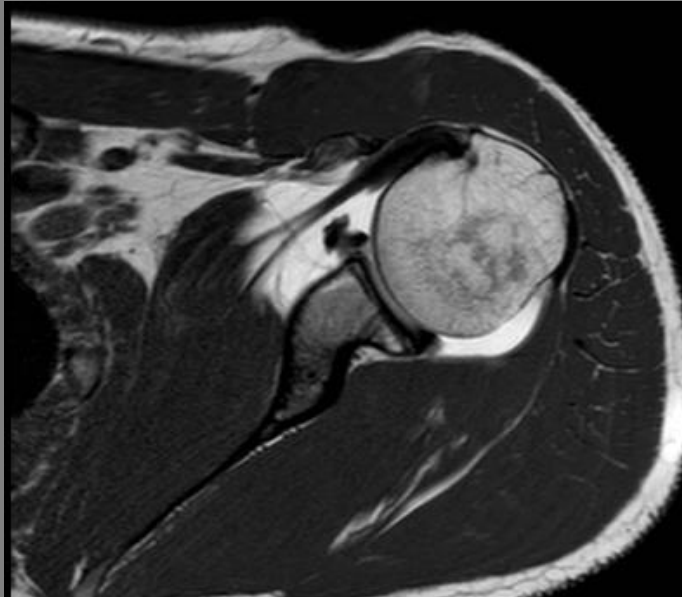


Typ:	T1	Matrix ACQ:	256 x 204	TR ms:	680
Sekvence:	TSE	Voxel ACQ mm:	0,63 x 0,78 x 3	TE ms:	15
Rovina:	Cor	Matrix REC:	256	Fáze:	RL
Vrstva mm:	3	Voxel REC mm:	0,63 x 0,63 x 3	PAT - SENSE:	-
FoV mm:	160 x 160	TSE factor:	4	Čas:	4:41
Různé:	BW(Hz): 230,5 SPIR				

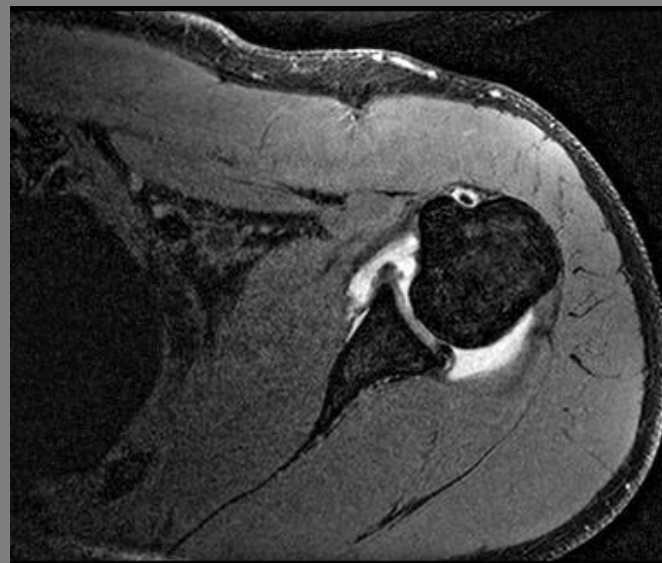
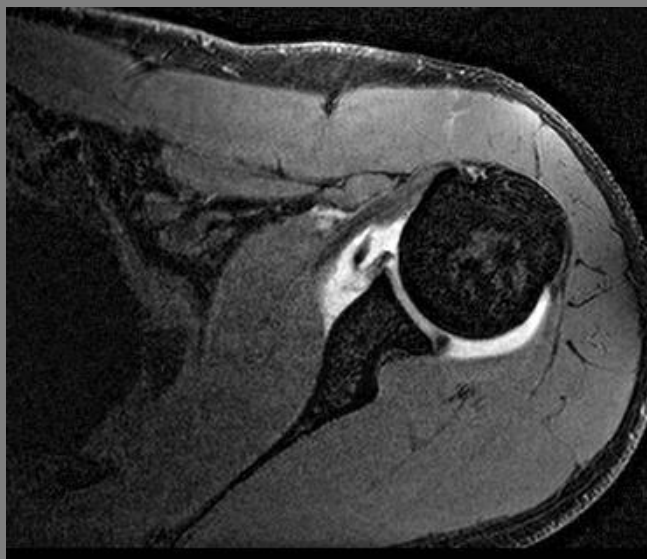
 **T1**

tra

RAMENO 1,5T artro



Typ:	T1	Matrix ACQ:	256 x 213	TR ms:	510
Sekvence:	TSE	Voxel ACQ mm:	0,70 x 0,84 x 2	TE ms:	15
Rovina:	Tra	Matrix REC:	512	Fáze:	AP
Vrstva mm:	2	Voxel REC mm:	0,35 x 0,35 x 2	PAT - SENSE:	1,3
FoV mm:	180 x 180	TSE factor:	4	Čas:	5:37
Různé:	BW(Hz): 213,5				



Typ:	3D FFE	Matrix ACQ:	284 x 227	TR ms:	10
Sekvence:	GE	Voxel ACQ mm:	0,75 x 0,75 x 0,75	TE ms:	4,8
Rovina:	Tra	Matrix REC:	640	Fáze:	AP
Vrstva mm:	0,75	Voxel REC mm:	0,33 x 0,33 x 0,75	PAT - SENSE:	-
FoV mm:	212 x 170	TFE factor:	30	Čas:	5:58
Různé:	BW(Hz): 142,8 SPAIR				



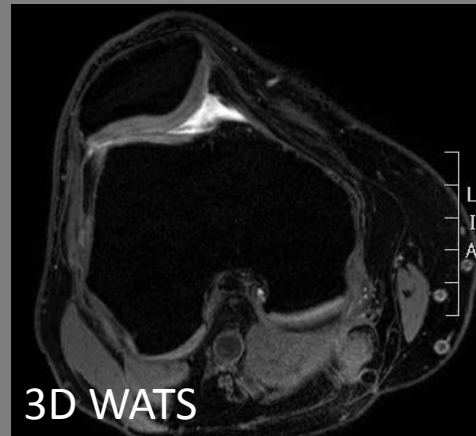
Typ:	PD	Matrix ACQ:	432 x 300	TR ms:	5000
Sekvence:	TSE	Voxel ACQ mm:	0,42 x 0,60 x 2	TE ms:	30
Rovina:	Cor	Matrix REC:	576	Fáze:	RL
Vrstva mm:	2	Voxel REC mm:	0,31 x 0,31 x 2	PAT - SENSE:	1,3
FoV mm:	180 x 180	TSE factor:	11	Čas:	7:05
Různé:	BW(Hz): 251,6				

KOLENO 1,5T std
Coil: Sense Flex M

Sekvence	Rovina	Čas
PD	sag	3:05
PD	cor	4:25
T1	sag	4:06
PD SPIR	sag	2:59
3D WATSf	tra	5:51

Celkem

20:26





Typ:	PD	Matrix ACQ:	384 x 252	TR ms:	5000
Sekvence:	TSE	Voxel ACQ mm:	0,42 x 0,63 x 3	TE ms:	30
Rovina:	Sag	Matrix REC:	512	Fáze:	AP
Vrstva mm:	3	Voxel REC mm:	0,31 x 0,31 x 3	PAT - SENSE:	1,3
FoV mm:	160 x 160	TSE factor:	11	Čas:	3:05
Různé:	BW(Hz): 232,5				



Typ:	PD	Matrix ACQ:	384 x 286	TR ms:	5000
Sekvence:	TSE	Voxel ACQ mm:	0,42 x 0,63 x 3	TE ms:	30
Rovina:	Cor	Matrix REC:	720	Fáze:	RL
Vrstva mm:	3	Voxel REC mm:	0,25 x 0,25 x 3	PAT - SENSE:	-
FoV mm:	160 x 180	TSE factor:	11	Čas:	4:25
Různé:	BW(Hz): 234,6				

T1

sag

KOLENO 1,5T std



Typ:	T1	Matrix ACQ:	304 x 243	TR ms:	500
Sekvence:	TSE	Voxel ACQ mm:	0,49 x 0,62 x 3	TE ms:	18
Rovina:	Sag	Matrix REC:	512	Fáze:	AP
Vrstva mm:	3	Voxel REC mm:	0,29 x 0,29 x 3	PAT - SENSE:	-
FoV mm:	150 x 150	TSE factor:	3	Čas:	4:06
Různé:	BW(Hz): 187,4				



Typ:	PD	Matrix ACQ:	280 x 221	TR ms:	2716
Sekvence:	TSE	Voxel ACQ mm:	0,55 x 0,70 x 3	TE ms:	30
Rovina:	Sag	Matrix REC:	560	Fáze:	FH
Vrstva mm:	3	Voxel REC mm:	0,28 x 0,28 x 3	PAT - SENSE:	1,3
FoV mm:	155 x 155	TSE factor:	16	Čas:	2:59
Různé:	BW(Hz): 476,2 SPIR				



Typ:	3D FFE	Matrix ACQ:	304 x 304	TR ms:	20
Sekvence:	GE	Voxel ACQ mm:	0,53 x 0,53 x 3	TE ms:	7,8
Rovina:	Tra	Matrix REC:	512	Fáze:	AP
Vrstva mm:	3	Voxel REC mm:	0,31 x 0,31 x 1,5	PAT - SENSE:	1,3
FoV mm:	160 x 160	TSE factor:	-	Čas:	5:51
Různé:	BW(Hz): 217,1 ProSet				

HLEZNO 1,5T vazy + chrupavka

Coil: Sense Flex M

Sekvence	Rovina	Čas
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T1	tra	4:06
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T1	cor	4:06
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PD DR SPAIR	cor	3:48
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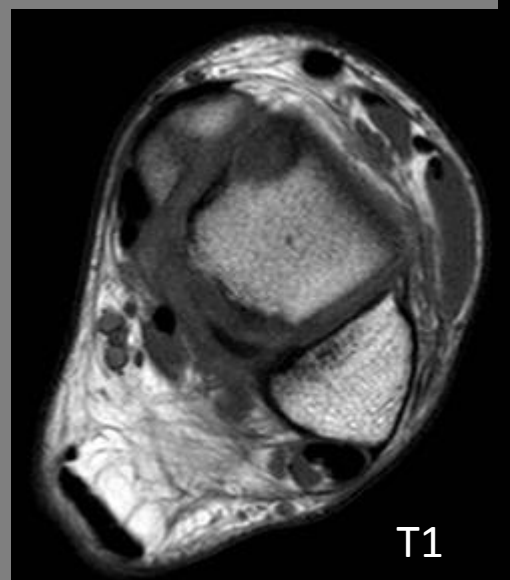
3D WATSf	sag	3:48
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T1	sag	4:06 x
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3D WATSf	cor	4:23
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Celkem vazy 19:54

Celkem chrupavka 20:11





PD DR SPAIR

cor

HLEZNO 1,5T vazy + ch

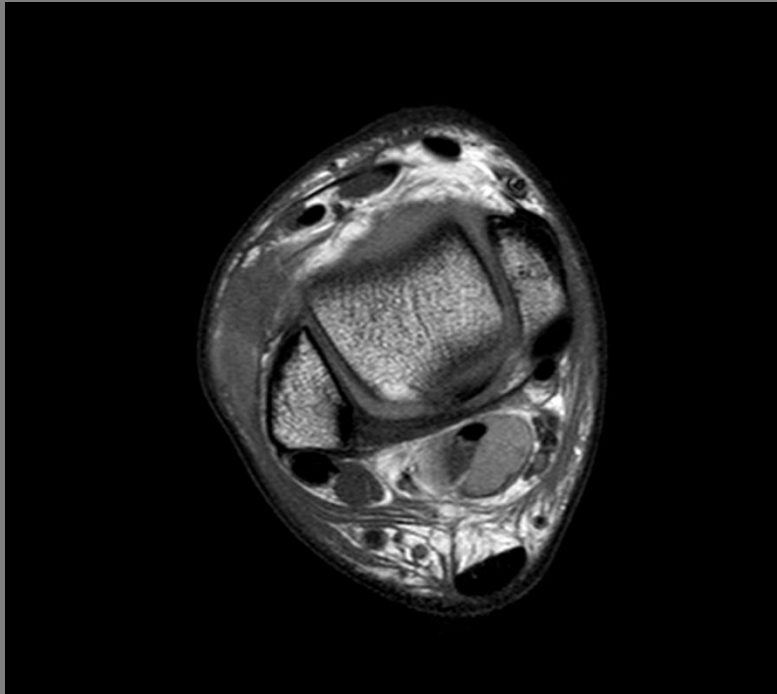


Typ:	PD	Matrix ACQ:	212 x 167	TR ms:	4666
Sekvence:	TSE	Voxel ACQ mm:	0,62 x 0,79 x 3	TE ms:	25
Rovina:	Cor	Matrix REC:	432	Fáze:	FH
Vrstva mm:	3	Voxel REC mm:	0,31 x 0,31 x 3	PAT - SENSE:	1,4
FoV mm:	132 x 132	TSE factor:	5	Čas:	3:48
Různé:	BW(Hz): 154,9 DRIVE, SPAIR				

T1

tra/cor

HLEZNO 1,5T vazy + ch



Typ:	T1	Matrix ACQ:	304 x 241	TR ms:	500
Sekvence:	TSE	Voxel ACQ mm:	0,49 x 0,62 x 3	TE ms:	20
Rovina:	Tra/Cor	Matrix REC:	512	Fáze:	RL/FH
Vrstva mm:	3	Voxel REC mm:	0,29 x 0,29 x 3	PAT - SENSE:	1,5
FoV mm:	150 x 150	TSE factor:	3	Čas:	4:06
Různé:	BW(Hz): 257				



Typ:	3D FFE	Matrix ACQ:	304 x 343	TR ms:	20
Sekvence:	GE	Voxel ACQ mm:	0,53 x 0,53 x 2,5	TE ms:	7,9
Rovina:	Sag	Matrix REC:	640	Fáze:	AP
Vrstva mm:	2,5	Voxel REC mm:	0,28 x 0,28 x 1,25	PAT - SENSE:	1,5
FoV mm:	160 x 181	TSE factor:	-	Čas:	3:48
Různé:	BW(Hz): 217,1 ProSet				

T1

sag

HLEZNO 1,5T vazy



Typ:	T1	Matrix ACQ:	304 x 242	TR ms:	500
Sekvence:	TSE	Voxel ACQ mm:	0,49 x 0,62 x 3	TE ms:	20
Rovina:	Sag	Matrix REC:	512	Fáze:	AP
Vrstva mm:	3	Voxel REC mm:	0,29 x 0,29 x 3	PAT - SENSE:	-
FoV mm:	150 x 150	TSE factor:	3	Čas:	4:06
Různé:	BW(Hz): 378,1				



Typ:	3D FFE	Matrix ACQ:	304 x 304	TR ms:	20
Sekvence:	GE	Voxel ACQ mm:	0,53 x 0,53 x 2,5	TE ms:	7,8
Rovina:	Cor	Matrix REC:	512	Fáze:	RL
Vrstva mm:	2,5	Voxel REC mm:	0,31 x 0,31 x 1,25	PAT - SENSE:	1,3
FoV mm:	160 x 160	TSE factor:	-	Čas:	4:23
Různé:	BW(Hz): 217,1 ProSet				

ZÁPĚSTÍ 1,5T std
Coil: Wrist 8ch

Sekvence	Rovina	Čas
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T1	cor	3:59
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T1	sag	4:02
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PD	cor	4:15
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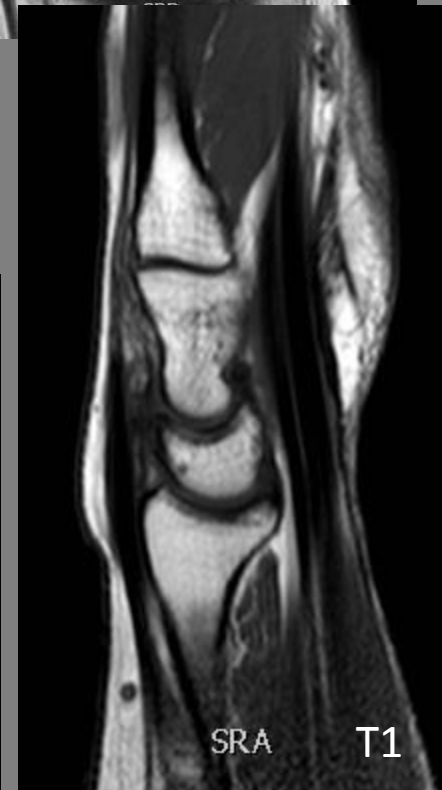
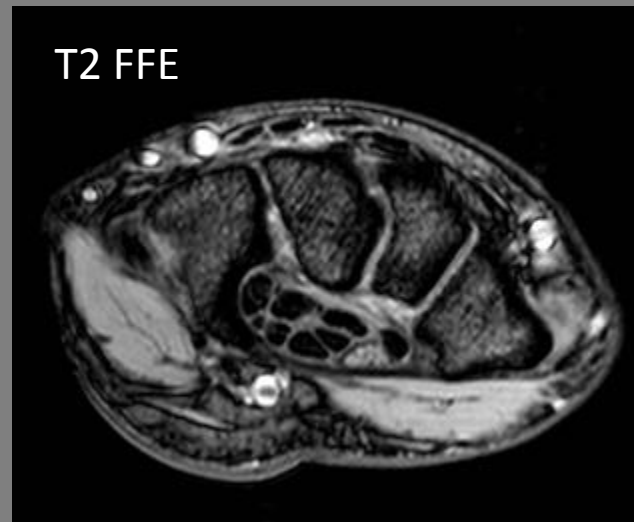
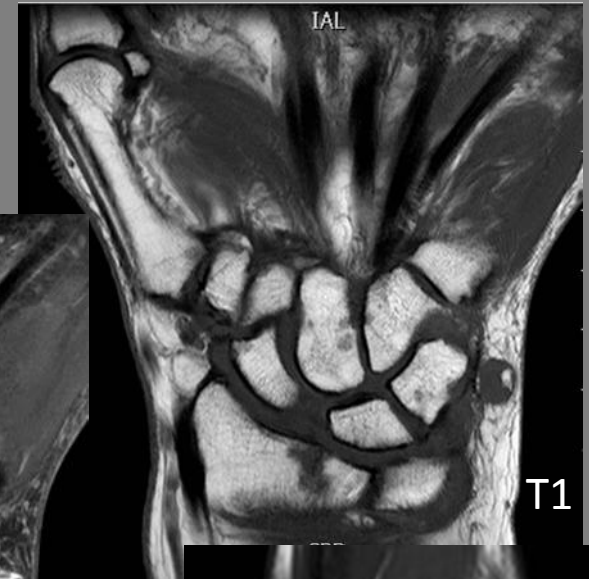
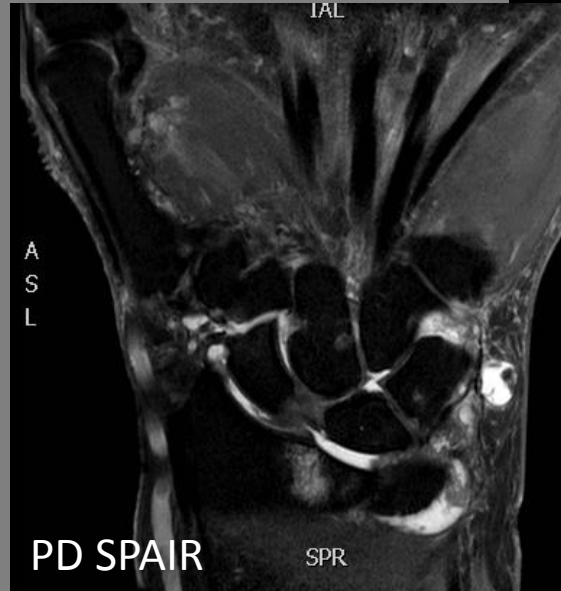
PD DR SPAIR	cor	5:52
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T2 FFE	tra	5:48
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3D FFE WATS	tra	5:58
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Celkem

29:54



ZÁPĚSTÍ 1,5T artrografie

Coil: Wrist 8ch

Sekvence	Rovina	Čas
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T1	cor	3:59
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T1	sag	4:02
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PD	cor	4:15
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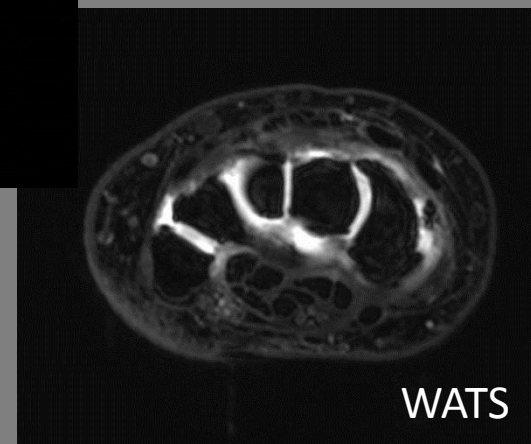
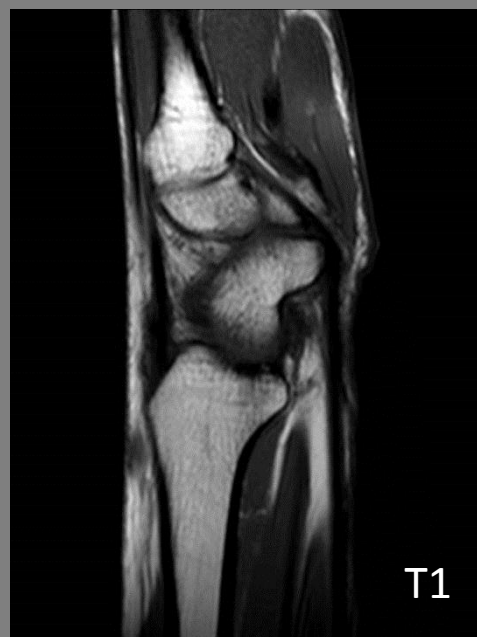
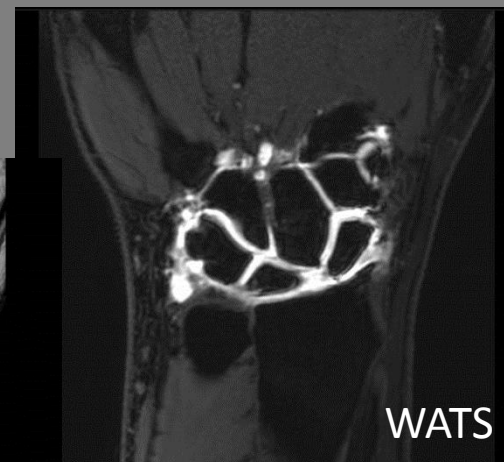
T1 SPIR	cor	3:59
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3D WATSf	cor	3:46
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3D WATSf	tra	4:33
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Celkem

24:34



T1

cor

ZÁPĚSTÍ 1,5T std + artro



Typ:	T1	Matrix ACQ:	340 x 272	TR ms:	650
Sekvence:	TSE	Voxel ACQ mm:	0,29 x 0,37 x 2,5	TE ms:	22
Rovina:	Cor	Matrix REC:	640	Fáze:	FH
Vrstva mm:	2,5	Voxel REC mm:	0,16 x 0,16 x 2,5	PAT - SENSE:	1,5
FoV mm:	100 x 100	TSE factor:	3	Čas:	3:59
Různé:	BW(Hz): 166,2				

**PD DR SPAIR**

cor

ZÁPĚSTÍ 1,5T std

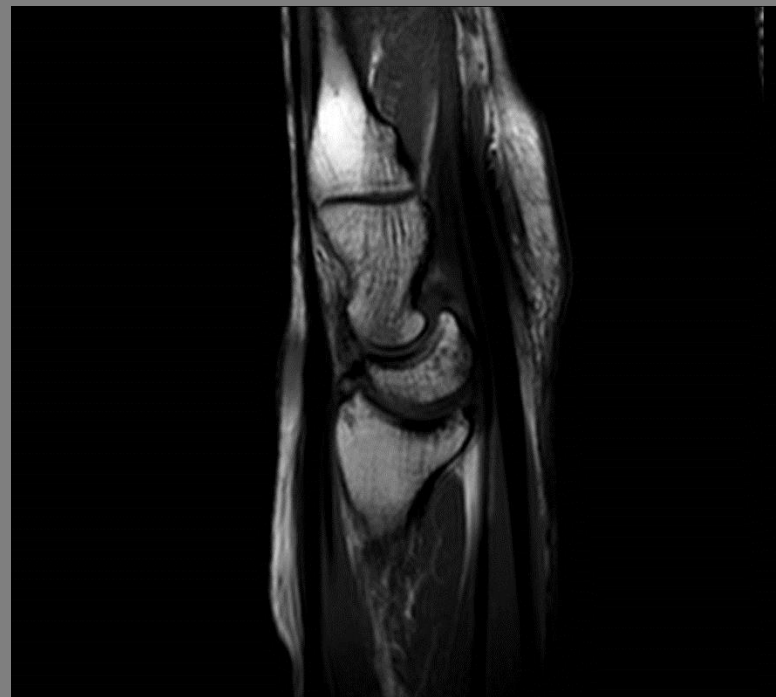


Typ:	PD	Matrix ACQ:	320 x 255	TR ms:	3423
Sekvence:	TSE	Voxel ACQ mm:	0,31 x 0,31 x 2,5	TE ms:	25
Rovina:	Cor	Matrix REC:	640	Fáze:	FH
Vrstva mm:	2,5	Voxel REC mm:	0,16 x 0,16 x 2,5	PAT - SENSE:	-
FoV mm:	100 x 100	TSE factor:	5	Čas:	5:52
Různé:	BW(Hz): 192,9 DRIVE, SPAIR				

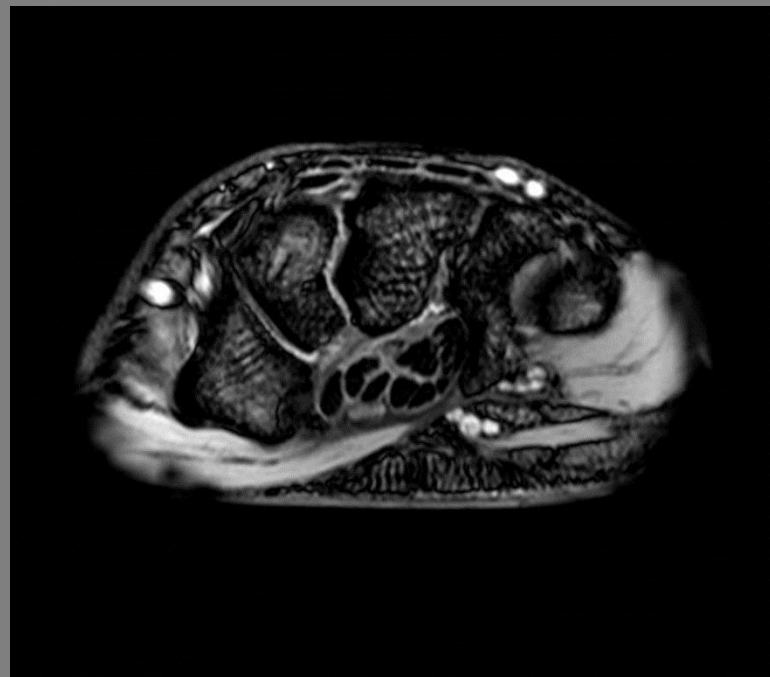
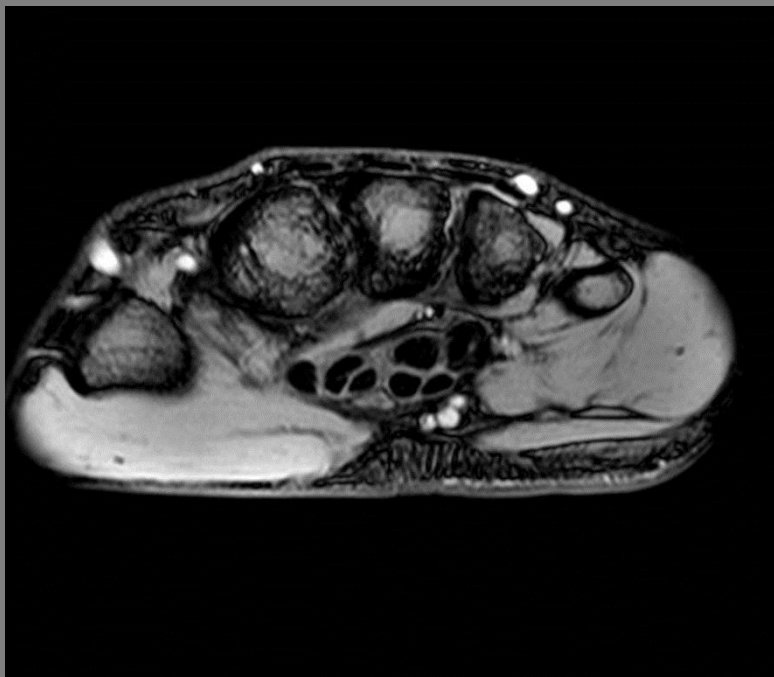
T1

sag

ZÁPĚSTÍ 1,5T std + artro



Typ:	T1	Matrix ACQ:	224 x 178	TR ms:	500
Sekvence:	TSE	Voxel ACQ mm:	0,54 x 0,67 x 3	TE ms:	15
Rovina:	Sag	Matrix REC:	512	Fáze:	FH
Vrstva mm:	3	Voxel REC mm:	0,23 x 0,23 x 3	PAT - SENSE:	-
FoV mm:	120 x 120	TSE factor:	3	Čas:	4:02
Různé:	BW(Hz): 240,7				

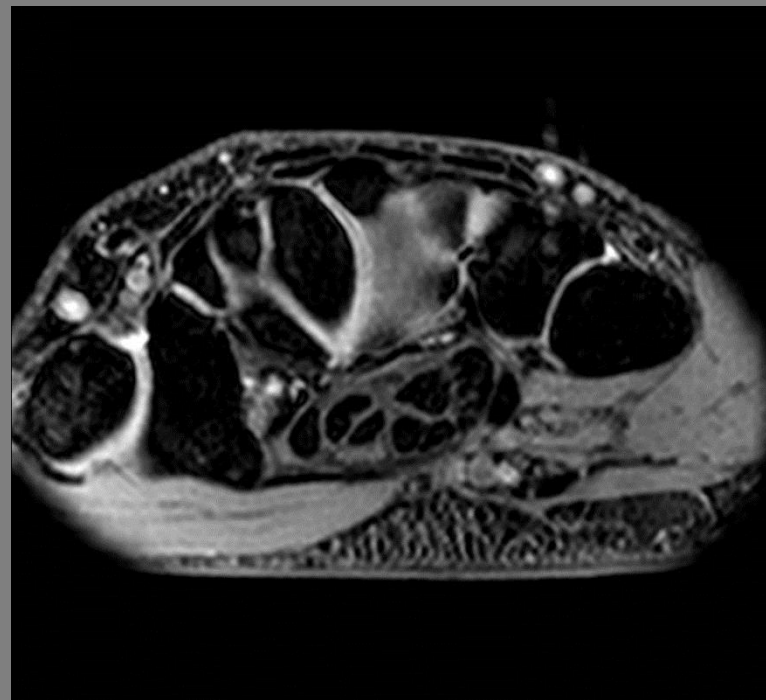
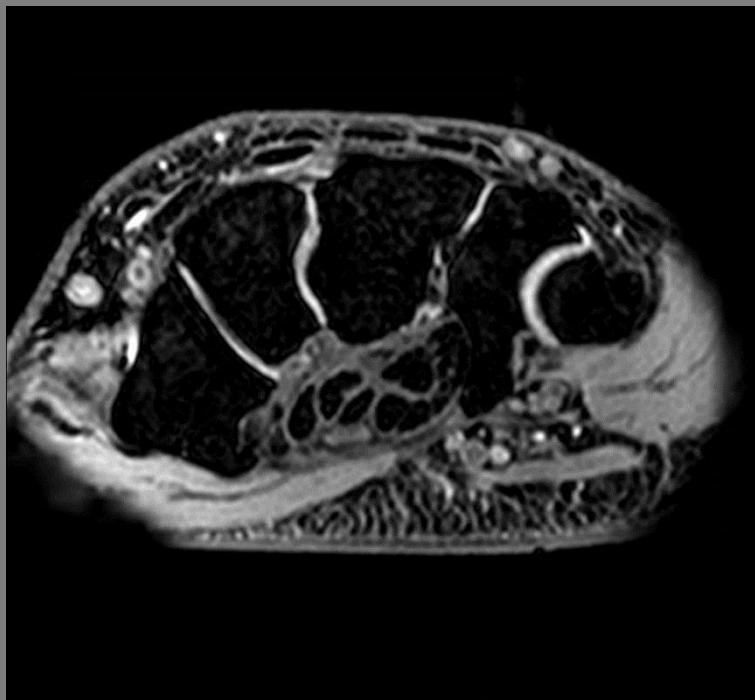


Typ:	T2 FFE	Matrix ACQ:	240 x 192	TR ms:	450
Sekvence:	GE	Voxel ACQ mm:	0,42 x 0,52 x 3	TE ms:	11
Rovina:	Tra	Matrix REC:	512	Fáze:	RL
Vrstva mm:	3	Voxel REC mm:	0,20 x 0,20 x 3	PAT - SENSE:	-
FoV mm:	100 x 100	TSE factor:	-	Čas:	5:48
Různé:	BW(Hz): 73,5				


**3D mFFE WATS**

tra

ZÁPĚSTÍ 1,5T std



Typ:	3D FFE	Matrix ACQ:	200 x 172	TR ms:	26
Sekvence:	GE	Voxel ACQ mm:	0,50 x 0,50 x 1	TE1/ Δ TE ms:	9,2/5,1
Rovina:	Tra	Matrix REC:	640	Fáze:	RL
Vrstva mm:	1	Voxel REC mm:	0,16 x 0,16 x 0,5	PAT - SENSE:	-
FoV mm:	100 x 86	TSE factor:	-	Čas:	5:48
Různé:	BW(Hz): 73,5		Počet ech: 3		

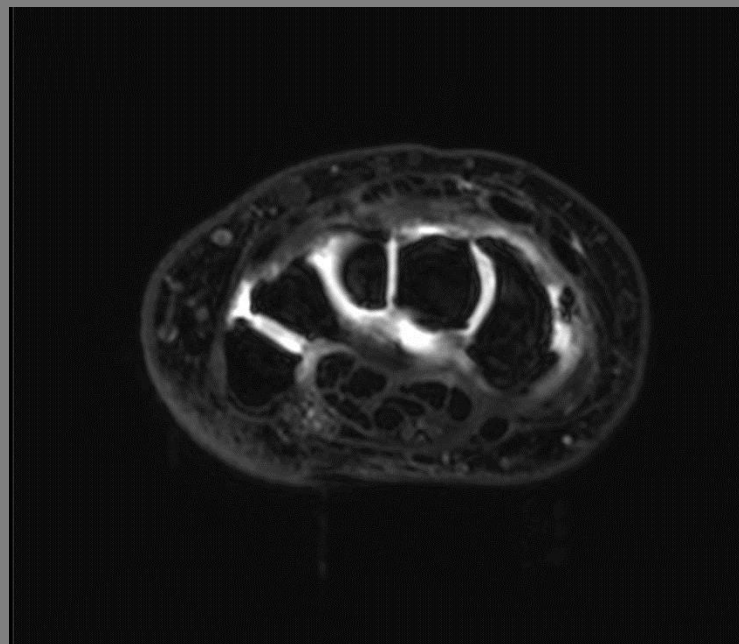
 **T1 SPIR**

cor

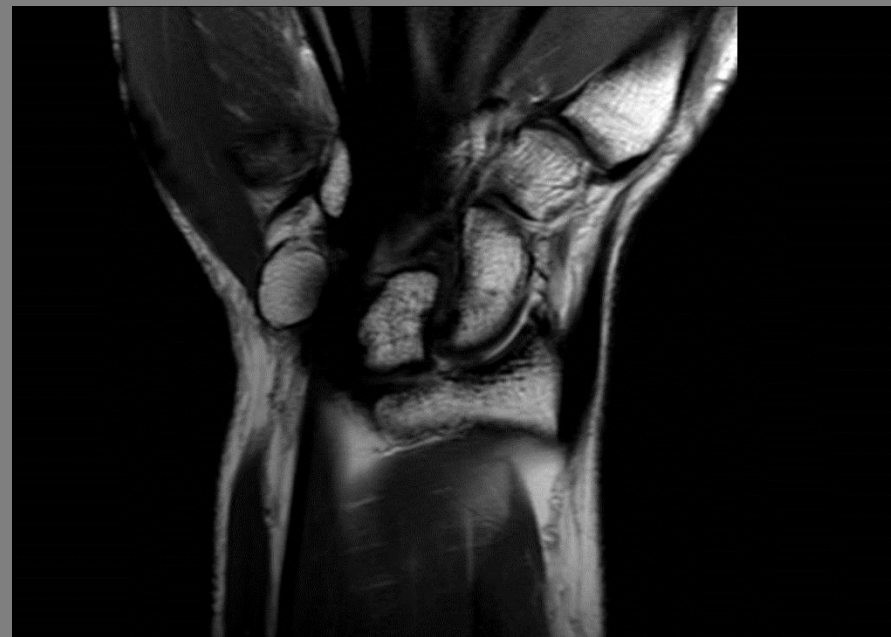
ZÁPĚSTÍ 1,5T artrografie



Typ:	T1	Matrix ACQ:	340 x 271	TR ms:	650
Sekvence:	TSE	Voxel ACQ mm:	0,29 x 0,37 x 2,5	TE ms:	22
Rovina:	Cor	Matrix REC:	640	Fáze:	FH
Vrstva mm:	2,5	Voxel REC mm:	0,16 x 0,16 x 2,5	PAT - SENSE:	1,5
FoV mm:	100 x 100	TSE factor:	3	Čas:	3.59
Různé:	BW(Hz): 166,2 SPIR				



Typ:	3D FFE	Matrix ACQ:	192 x 191	TR ms:	20
Sekvence:	GE	Voxel ACQ mm:	0,57 x 0,58 x 1,6	TE ms:	7,7
Rovina:	Cor/Tra	Matrix REC:	480	Fáze:	AP/RL
Vrstva mm:	1,6	Voxel REC mm:	0,23 x 0,23 x 0,8	PAT - SENSE:	-
FoV mm:	110 x 110	TSE factor:	-	Čas:	3:46/4:33
Různé:	BW(Hz): 217				



Typ:	PD	Matrix ACQ:	248 x 198	TR ms:	3500
Sekvence:	TSE	Voxel ACQ mm:	0,40 x 0,51 x 3	TE ms:	30
Rovina:	Cor	Matrix REC:	400	Fáze:	FH
Vrstva mm:	3	Voxel REC mm:	0,25 x 0,25 x 3	PAT - SENSE:	-
FoV mm:	100 x 100	TSE factor:	11	Čas:	4:15
Různé:	BW(Hz): 213,9				

TMJ 1,5T oba
Coil: Sense Flex M

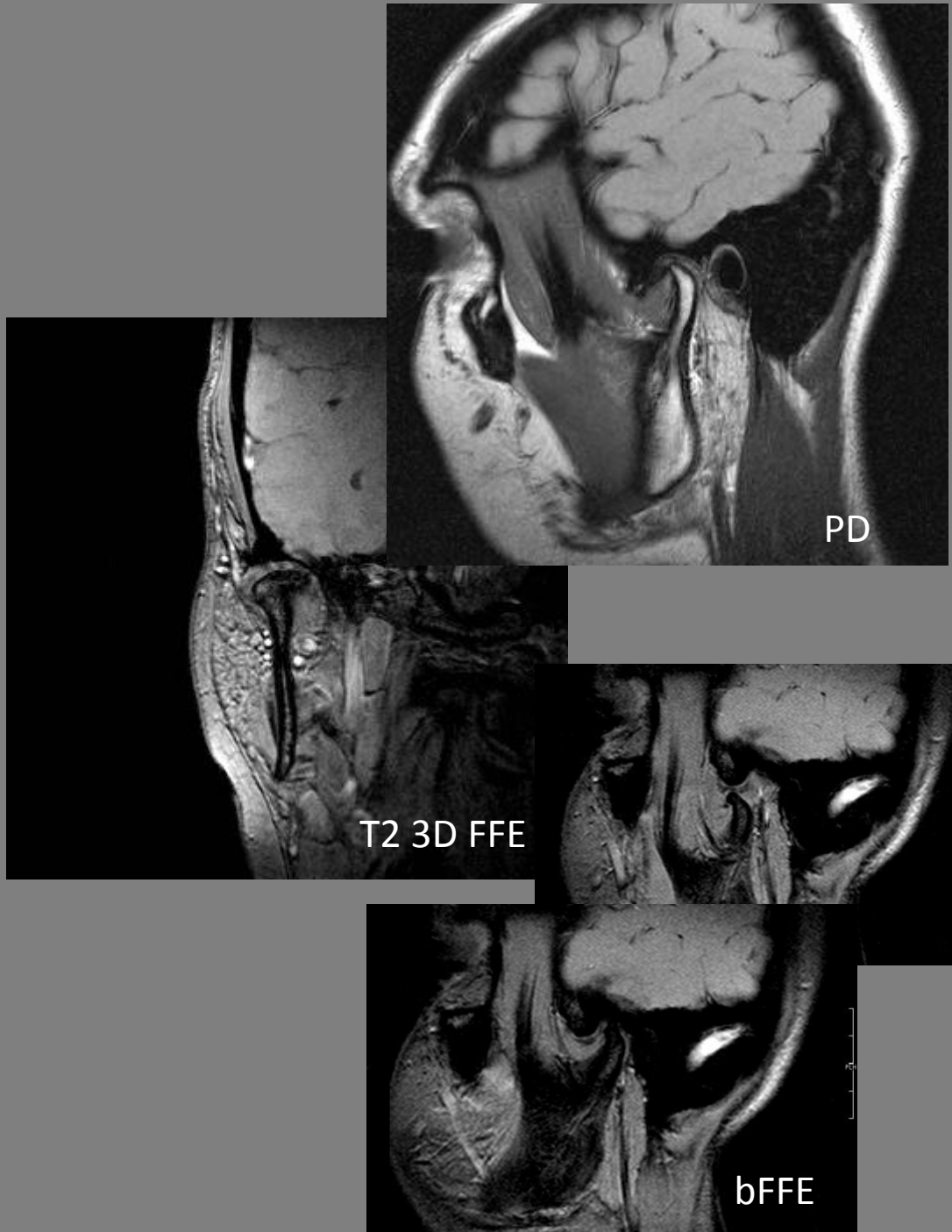
Sekvence	Rovina	Čas
PD	sag	9:22
T1 FFE	sag	6:49
T2 3D FFE	cor	5:34
FFE kinetika	sag	3:26

Celkem 25:11

TMJ 1,5T jeden
Coil: Microscopy

Sekvence	Rovina	Čas
PD	sag/cor/tra	7:24
FFE kinetika	sag	2:06

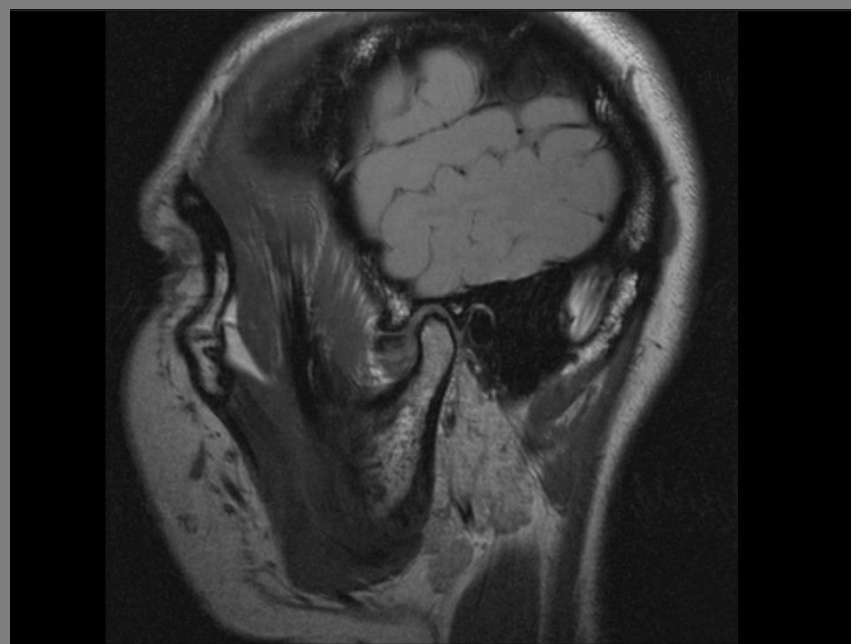
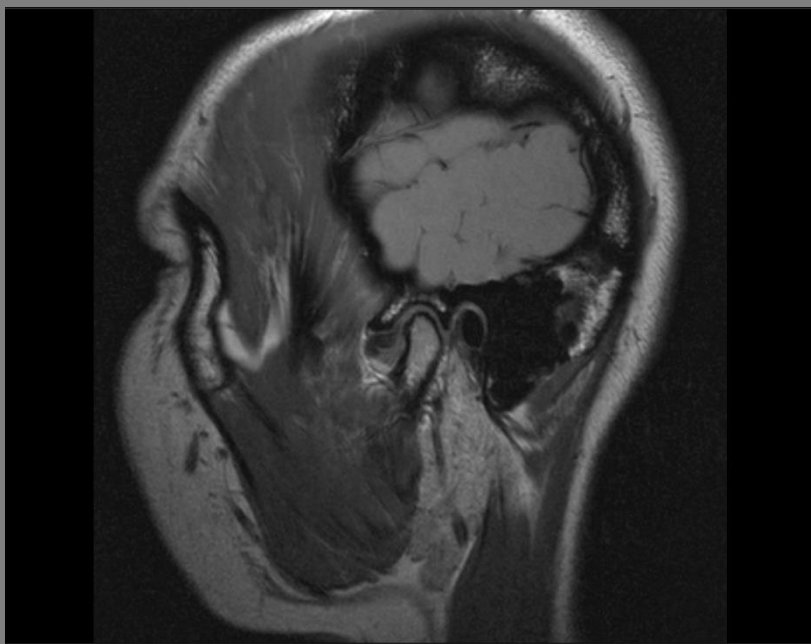
Celkem 24:18



 **PD**

sag

TMJ 1,5T oba

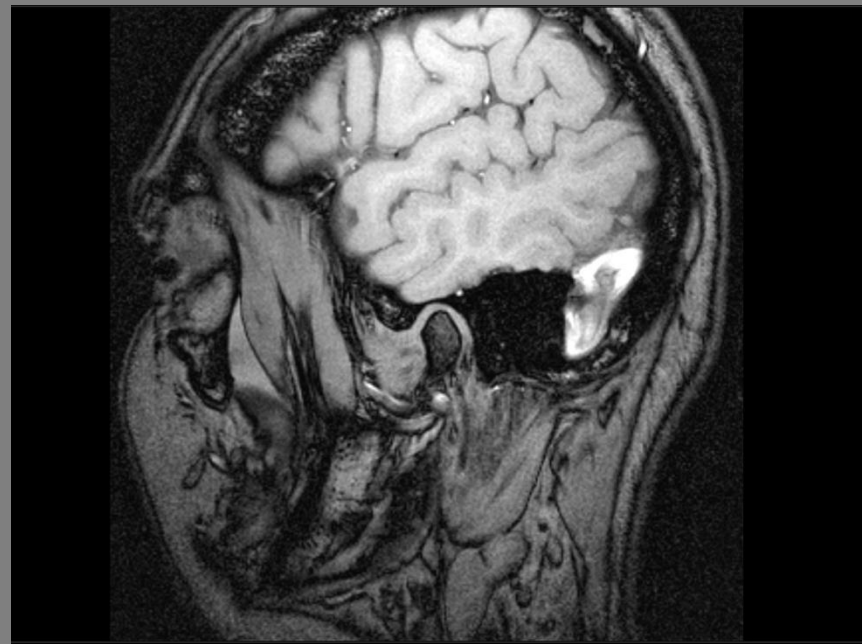
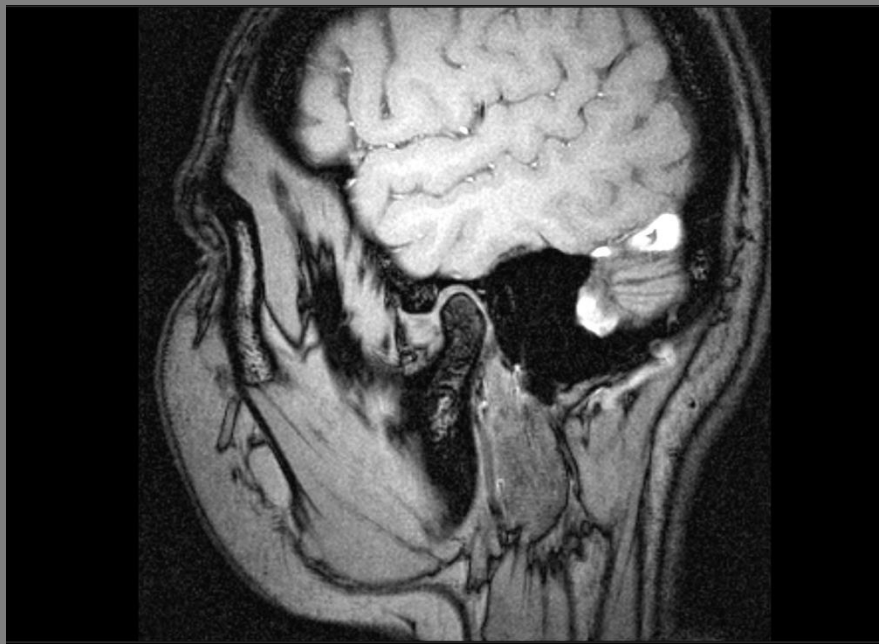


Typ:	PD	Matrix ACQ:	300 x 300	TR ms:	1400
Sekvence:	TSE	Voxel ACQ mm:	0,50 x 0,50 x 2	TE ms:	30
Rovina:	Sag (stacks 2)	Matrix REC:	320	Fáze:	AP
Vrstva mm:	2	Voxel REC mm:	0,47 x 0,47 x 2	PAT - SENSE:	-
FoV mm:	150 x 150	TSE factor:	3	Čas:	9:22
Různé:	BW(Hz): 125,8				

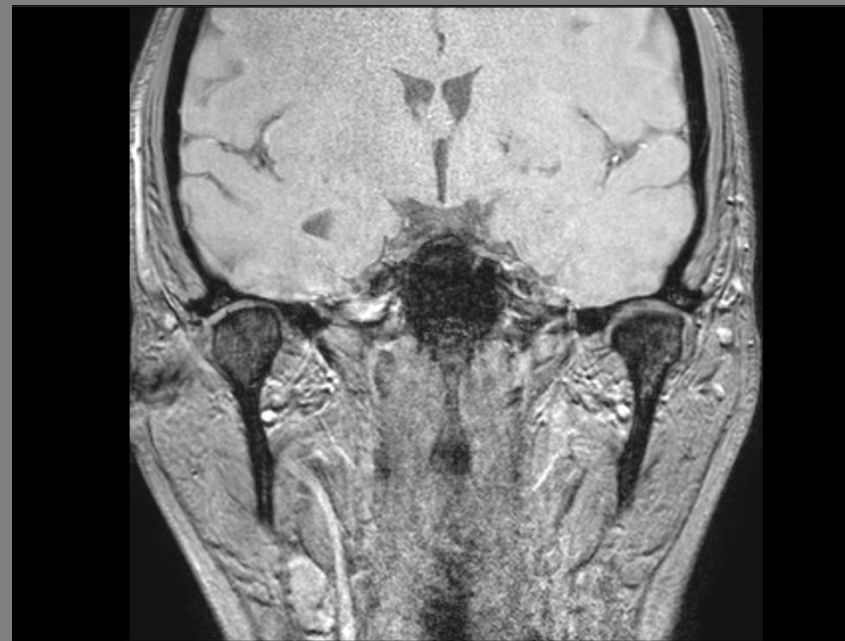
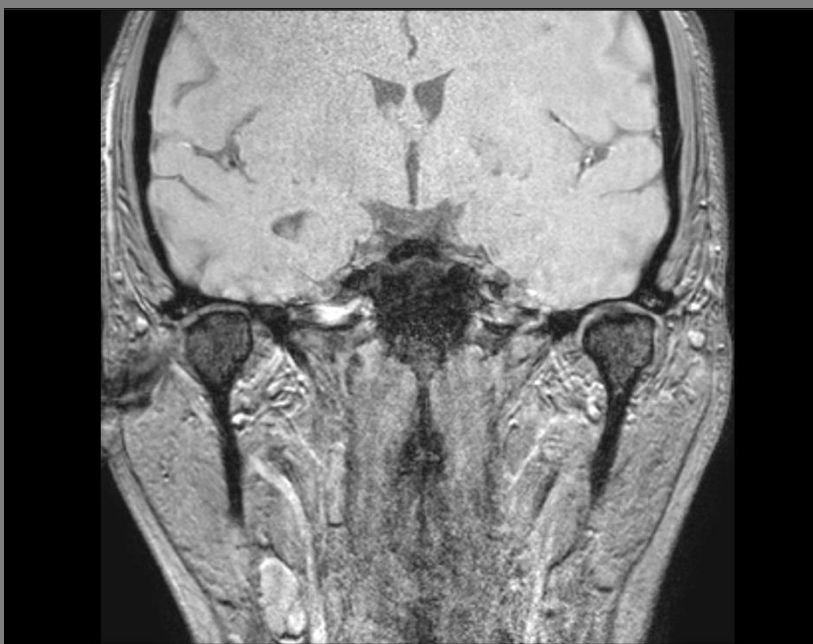
 **T1 FFE**

sag

TMJ 1,5T oba



Typ:	T1 FFE	Matrix ACQ:	300 x 300	TR ms:	170
Sekvence:	GE	Voxel ACQ mm:	0,50 x 0,50 x 2	TE ms:	7,5
Rovina:	Sag (stacks 2)	Matrix REC:	320	Fáze:	AP
Vrstva mm:	2	Voxel REC mm:	0,47 x 0,47 x 2	PAT - SENSE:	-
FoV mm:	150 x 150	TSE factor:	-	Čas:	6:49
Různé:	BW(Hz): 95,8				



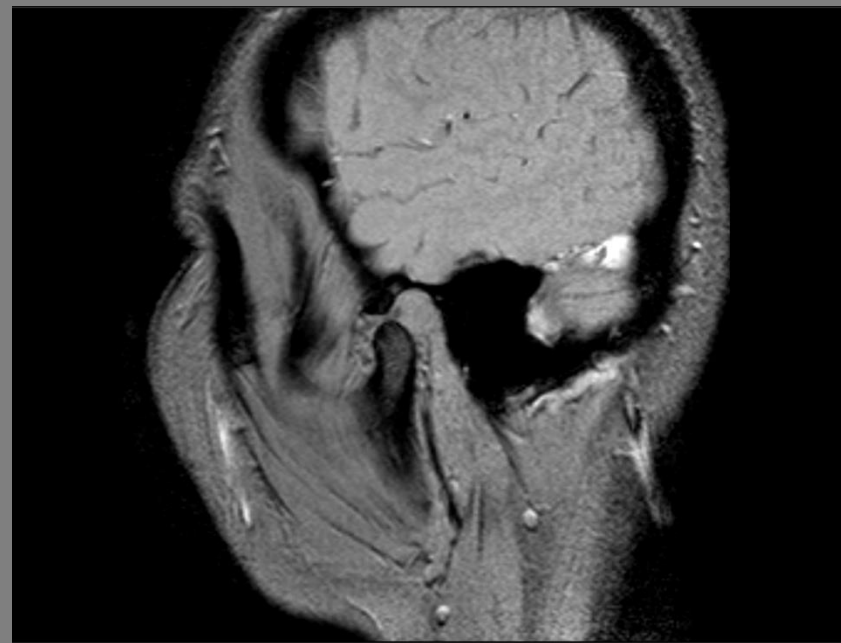
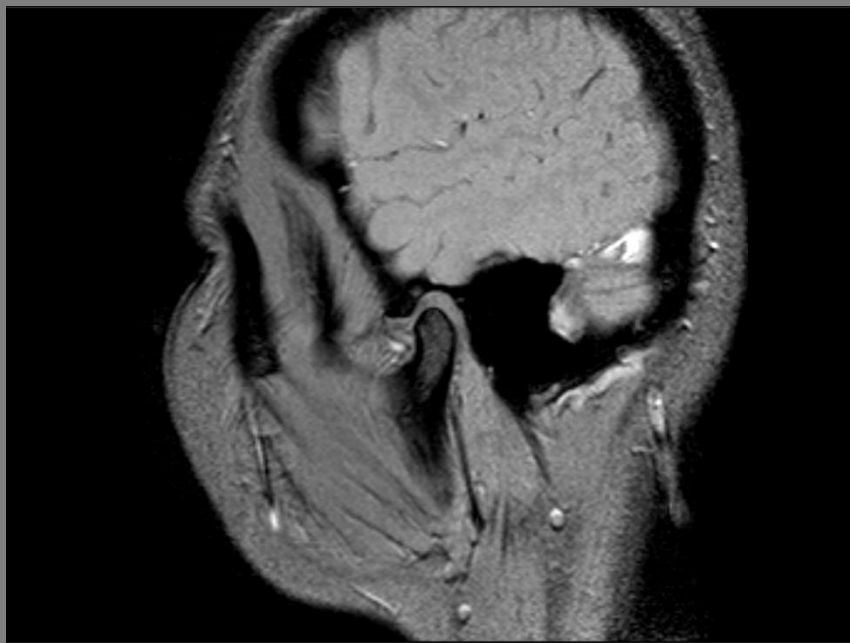
Typ:	T2 FFE	Matrix ACQ:	300 x 300	TR ms:	40
Sekvence:	GE	Voxel ACQ mm:	0,50 x 0,50 x 2	TE ms:	14
Rovina:	Cor	Matrix REC:	320	Fáze:	RL
Vrstva mm:	2	Voxel REC mm:	0,47 x 0,47 x 1	PAT - SENSE:	-
FoV mm:	150 x 150	TSE factor:	-	Čas:	5:34
Různé:	BW(Hz): 108,4				



FFE kinetika

sag

TMJ 1,5T oba

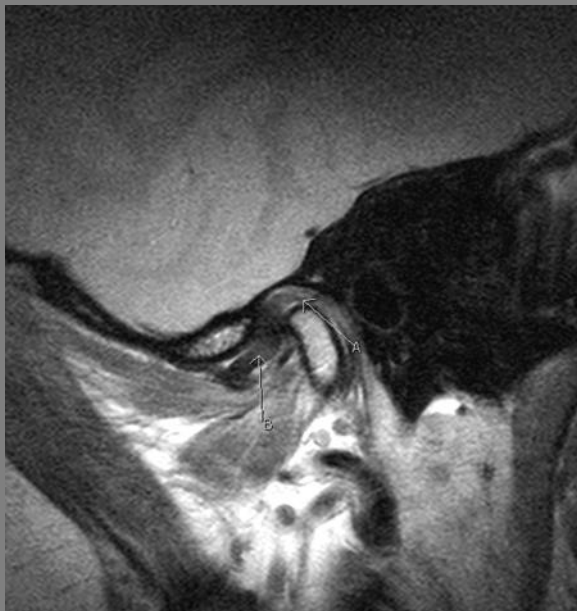


Typ:	FFE	Matrix ACQ:	240 x 192	TR ms:	108
Sekvence:	GE	Voxel ACQ mm:	0,67 x 0,83 x 3	TE ms:	9,2
Rovina:	Sag (Stacks2)	Matrix REC:	256	Fáze:	AP
Vrstva mm:	3	Voxel REC mm:	0,63 x 0,63 x 3	PAT - SENSE:	-
FoV mm:	160 x 160	TSE factor:	-	Čas:	3:26
Různé:	BW(Hz): 108,6 Dynamic scan time: 39 s - 5x				

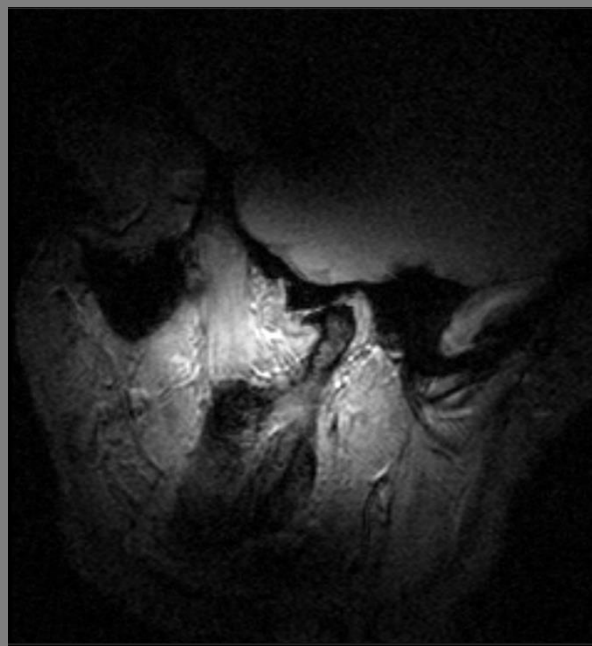
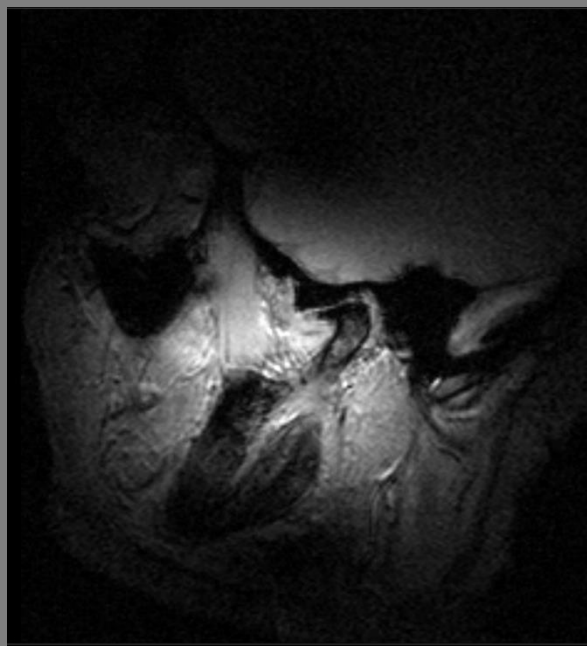
📁 PD

sag/cor/tra

TMJ 1,5T jeden



Typ:	PD	Matrix ACQ:	248 x 210	TR ms:	3500
Sekvence:	TSE	Voxel ACQ mm:	0,28 x 0,33 x 2	TE ms:	25
Rovina:	Sag/Cor/Tra	Matrix REC:	640	Fáze:	AP/RL/AP
Vrstva mm:	2	Voxel REC mm:	0,11 x 0,11 x 2	PAT - SENSE:	-
FoV mm:	70 x 70	TSE factor:	10	Čas:	7:24
Různé:	BW(Hz): 232,7				



Typ:	FFE	Matrix ACQ:	240 x 192	TR ms:	65
Sekvence:	GE	Voxel ACQ mm:	0,67 x 0,83 x 3	TE ms:	14
Rovina:	Sag	Matrix REC:	256	Fáze:	AP
Vrstva mm:	3	Voxel REC mm:	0,63 x 0,63 x 3	PAT - SENSE:	-
FoV mm:	160 x 160	TSE factor:	-	Čas:	2:06
Různé:	BW(Hz): 108,6 Dynamic scan time: 25s - 5x				