



DHMC Breast MRI Protocol Book

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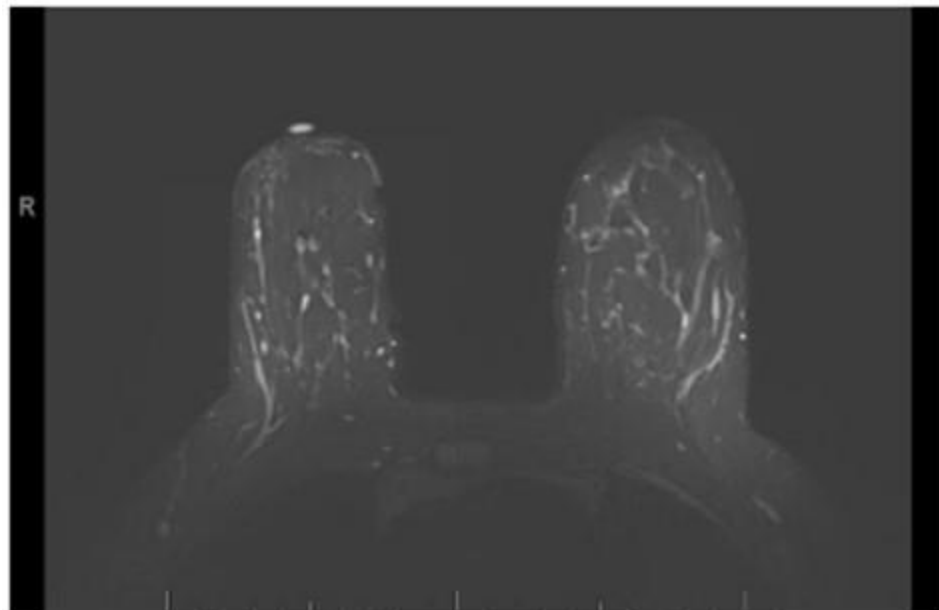
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Key Points on Using this Protocol Book

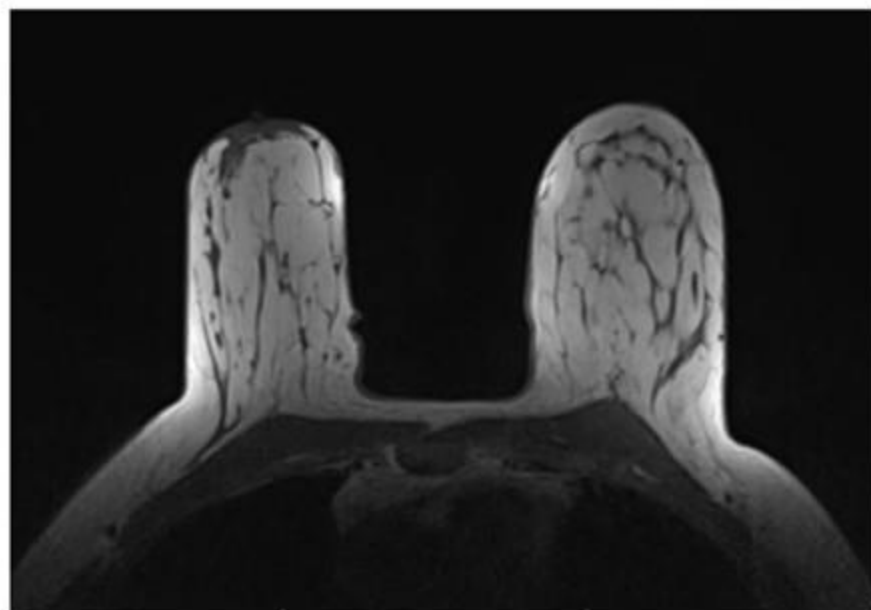
- This protocol book was built using Siemens as the main brand of machine in mind.
- The parameters listed in this book are required parameters from the radiologist. Other parameters such as matrix size, averages, and acceleration are unique and will not work the same on every brand (GE, Siemens, Philips) or strength (1.5T, 3T) of machine. It is recommended that you start with a stock sequence and adjust from this point.

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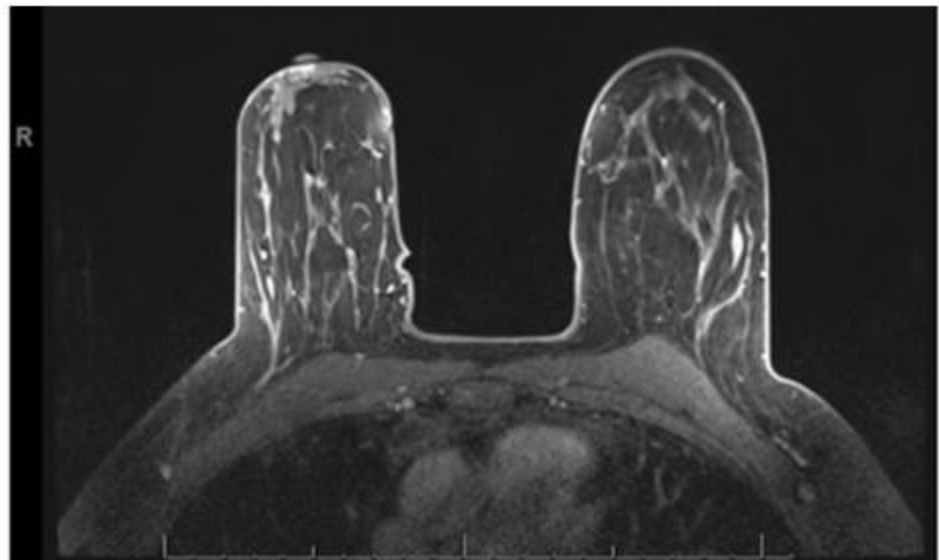
Routine Bilateral W/WO	Silicone Breast Implant WO	Biopsy W/WO
Bilateral Screening W/WO	Saline Breast Implant WO	Post Biopsy Additional View



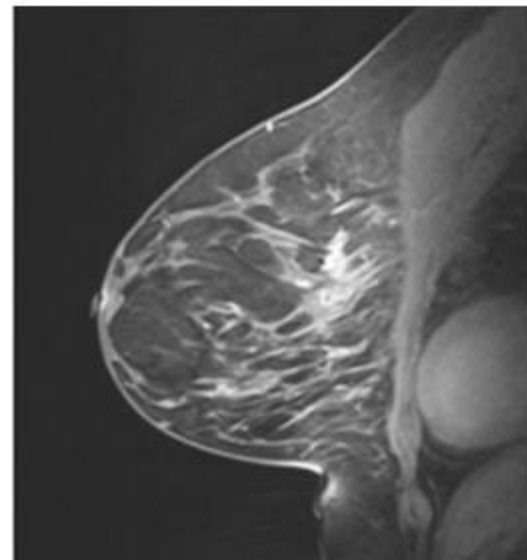
AX STIR



AX VIBE



AX VIBE FS Post



SAG VIBE FS Post

BILATERAL ROUTINE

Position patient head first, prone. Position breasts with nipples in profile. FOV can be adjusted to patient size (280-360 mm).

AX Stir

AX Vibe

AX Vibe FS PRE

- Must be under 2 minutes
- Tech use only, for FS check before Dynamic. Do not send to PACS.

AX Vibe FS POST

- 4 Measurements: 1 measurement pre contrast -> **45 second delay** -> 3 measurements post contrast
- Inject contrast immediately upon completion of the first measurement
- Injection rate: 3mL/second

SAG Vibe FS POST

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
AX STIR	3850	70	300	100%	3	1	80%	448	R/L	3	S-I	
AX Vibe	5.43	2.46	300	100%	1.5	20%	403	448	R/L	1	S-I	
AX Vibe FS Pre	4.20	2.01	300	100%	1.5	20%	384	384	R/L	1	S-I	Under 2 minutes. FS check.
AX Vibe FS Post	4.20	2.01	300	100%	1.5	20%	384	384	R/L	1	S-I	Dynamic 4 Measurements
SAG Vibe FS Post	4.05	1.51	250	100%	1.5	20%	282	352	S/I	1	L-R	

BILATERAL SCREENING (ABBREVIATED)

Position patient head first, prone. Position breasts with nipples in profile. FOV can be adjusted to patient size (280-360 mm).

AX Stir

AX Vibe FS PRE

- Must be under 2 minutes
- Tech use only, for FS check before Dynamic. Do not send to PACS

AX Vibe FS POST

- 3 Measurements: 1 measurement pre contrast -> **60 second delay** -> 2 measurements post contrast
- Inject contrast immediately upon completion of the first measurement
- Injection rate: 3mL/second

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
AX STIR	3850	70	300	100%	3	1	80%	448	R/L	3	S-I	
AX Vibe FS Pre	4.20	2.01	300	100%	1.5	20%	384	384	R/L	1	S-I	Under 2 minutes. FS check.
AX Vibe FS Post	4.20	2.01	300	100%	1.5	20%	384	384	R/L	1	S-I	Dynamic 3 Measurements

Silicone Implant

Position patient head first, prone.

Coverage only needs to include breast implant

BILAT AX STIR

RIGHT SAG STIR Bright Silicone (Water Sat)

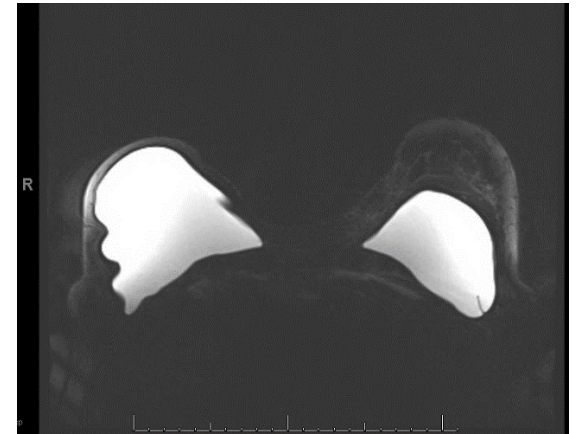
LEFT SAG STIR Bright Silicone (Water Sat)

BILAT AX STIR Bright Silicone (Water Sat)

RIGHT SAG STIR Dark Silicone

LEFT SAG STIR Dark Silicone

BILAT AX STIR Dark Silicone



BILAT AX STIR

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
BILAT AX STIR	3900	64	340	340	4	0.8	326	384	R/L	1	S-I	
RT SAG STIR Bright Silicone	4000	64	200	200	4	0.4	192	256	S/I	1	L-R	WATER SAT: Bright Silicone/ Dark Fat/Dark Water TI: 230 (3T), 150 (1.5T)
LT SAG STIR Bright Silicone	4000	64	200	200	4	0.4	192	256	S/I	1	L-R	
BILAT AX STIR Bright Silicone	4000	64	300	300	4	0.4	192	256	R/L	1	S-I	
RT SAG STIR Dark Silicone	4000	64	200	200	4	0.4	192	256	S/I	1	L-R	Dark (gray) Silicone/ Dark Fat/ Bright Water
LT SAG STIR Dark Silicone	4000	64	200	200	4	0.4	192	256	S/I	1	L-R	
BILAT AX STIR Dark Silicone	4000	64	300	300	4	0.4	192	256	R/L	1	S-I	

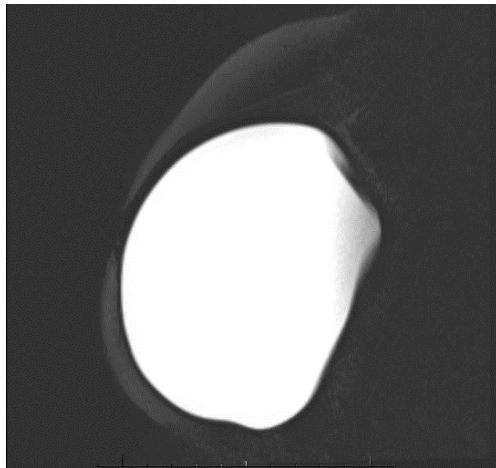
Silicone Implant (Continued)

These techniques are tailored specifically for **3T SIEMENS** scanners.

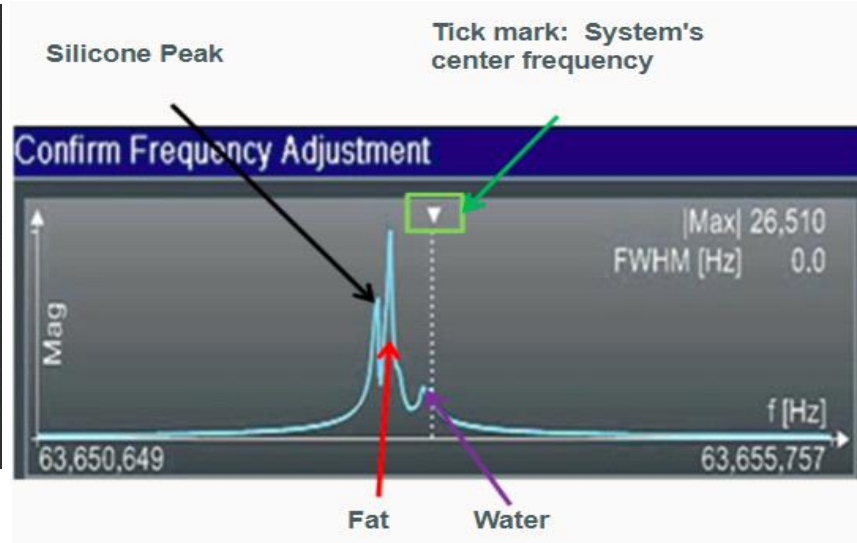
Uses Water Saturation Technique (located under contrast tab) rather than Fat Saturation technique.

Water Saturation is a frequency selected saturation and will saturate the selected peak.

Patients with silicone implants will have 3 frequency peaks: silicone, fat, and water peaks.



Bright Silicone SAG STIR w/ Water SAT



Bright Silicone STIR w/ Water SAT

Confirm Frequency:

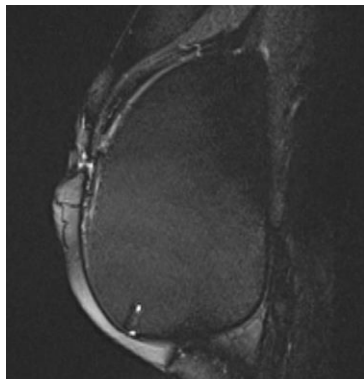
Water and Fat suppressed.

Center frequency on water to suppress the water.

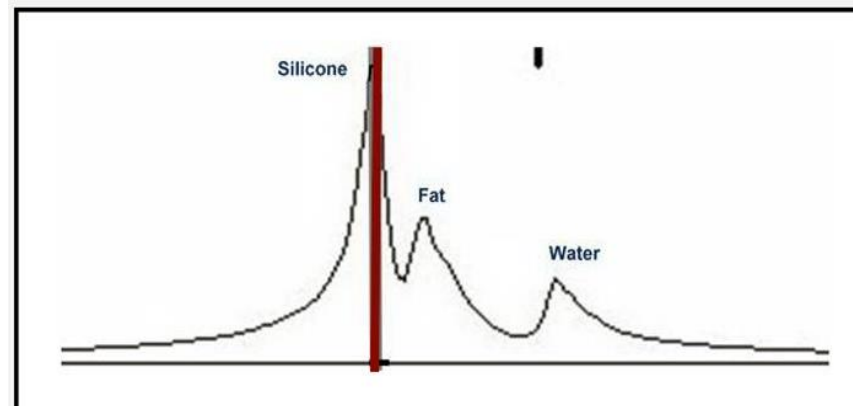
Left click on peak, select "apply"

Only silicone should be bright

TI Time: suppresses the fat.



Dark Silicone SAG STIR



Dark Silicone STIR

Confirm Frequency:

Silicone suppressed.

Center frequency on silicone to suppress the silicone implant.

Left click on peak, select "apply"

TI Time: 230 (3T) to Suppress Fat.

Dark Silicone/Dark Fat

Other Technique: TI 500 (3T) to suppress silicone and adjust peaks to suppress fat

Saline Implant

Position patient head first, prone.

Coverage only needs to include breast implant

Patients with saline implants will have 2 frequency peaks: fat and water peaks.

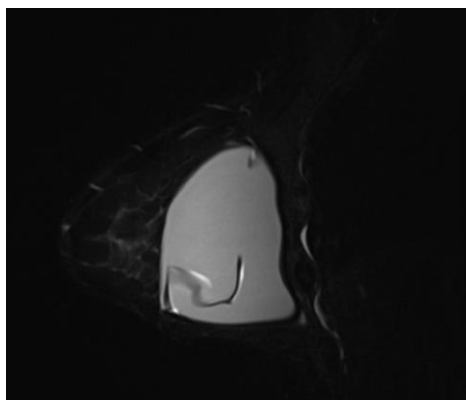
RIGHT SAG STIR

LEFT SAG STIR

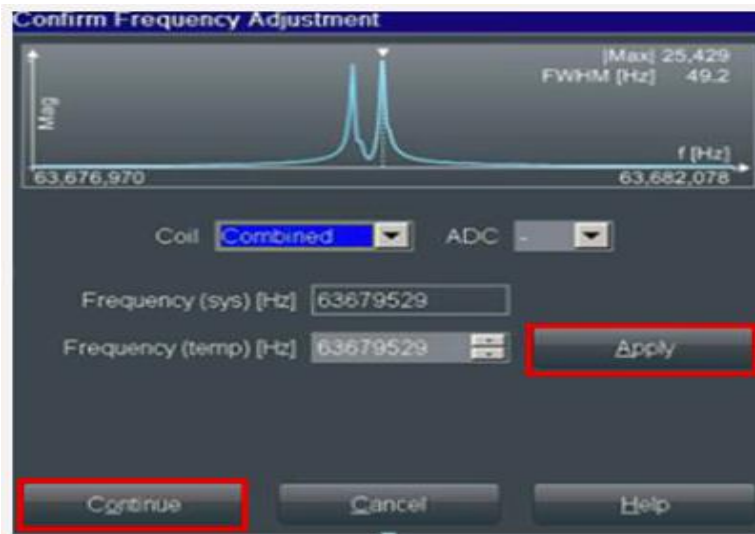
RIGHT AX STIR

LEFT AX STIR

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
RT SAG STIR	4210	82	220	100%	4	0.8	256	320	S/I	2	L-R	Dark Fat/Bright Water/Bright Implant TI: 230 on 3.0T TI: 150 on 1.5T
LT SAG STIR	4210	82	220	100%	4	0.8	256	320	S/I	2	L-R	
RT AX STIR	4210	82	220	100%	4	0.8	256	320	R/L	2	S-I	
LT AX STIR	4210	82	220	100%	4	0.8	256	320	R/L	2	S-I	



SAG STIR with Saline Implant.
Image indicates linguine sign/rupture.



Two peaks – fat and water
Saline Implants

STIR with Saline Implant

Confirm Frequency:

No need to manually adjust peaks with saline implants while running STIR.

TI time: suppresses fat, so water (including saline implant) will be bright.

Biopsy

Position patient head first, prone. Opposite breast positioned up and away from the affected breast. Medial/lateral approach determined by RAD. If pt receives contrast and RAD decides not to biopsy, change order to Breast W/WO of scanned breast only.

SAG Vibe FS Pre

AX Vibe FS Pre

- Do not send to DynaCAD
- FS check before Dynamic

AX Vibe FS Post

- 2 Measurements: 1 measurement pre contrast -> **45 second delay** -> 1 measurement post contrast
- Inject contrast immediately upon completion of the first measurement
- Injection rate: 3mL/second

AX Vibe FS Post

SAG Vibe FS Post (as indicated by the Radiologist)

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG Vibe FS Pre	4.58	1.74	240	100%	1.5	20%	403	448	S/I	1	L-R	Include entire fiducial
AX Vibe FS Pre	4.58	1.74	240	100%	1.5	20%	403	448	R/L	1	S-I	Include entire fiducial
AX Vibe FS Post	4.58	1.74	240	100%	1.5	20%	403	448	R/L	1	S-I	Dynamic 2 measurements
AX Vibe FS Post	4.58	1.74	240	100%	1.5	20%	403	448	R/L	1	S-I	Repeat as needed
SAG Vibe FS Post	4.58	1.74	240	100%	1.5	20%	403	448	S/I	1	L-R	Repeat as needed

Post Biopsy Additional View

*Position patient head first, prone. Opposite breast positioned up and away from the affected breast. Medial/lateral approach determined by RAD.
To be scanned, as indicated, after an ultrasound guided breast biopsy.
To be ordered as MRI Additional View – Breast. No contrast.*

AX Vibe FS

SAG Vibe FS

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
AX Vibe FS	4.20	2.01	300	100%	1.5	20%	384	384	R/L	1	S-I	
SAG Vibe FS	4.05	1.51	250	100%	1.5	20%	282	352	S/I	1	L-R	