Outpatient Imaging Center

St. Joseph Hospital ST. JOSEPH HEALTH SYSTEM

MRI and MRA ORDERING GUIDELINES

St.JosephHealth

Visit https://acsearch.acr.org/ for Quality & Safety Appropriateness Criteria. *The following information is for MRI/MRA ordering guidance only*
Practitioners: Please contact Radiologist for questions regarding a specific patient and/or clinical signs/symptoms not listed: 707-445-8121 ext. 6143

For exams ordered with IV contrast please refer to the MRI Contrast Policy attached

Scheduler: "★" requires Radiologist Review Form unless exam was recommended in prior imaging report or ordered by local specialist.
Specify contrast request on order by stating Wo IV, Wo and W IV, W IV only following this guide. If the requested use of contrast does not match the indication, then referring practitioner must discuss reasoning with Radiologist and a Radiologist Review form must be completed before scheduling.

Region of Concern	Body Part	Indication	WO IV	WO AND W IV	W IV Only	Either WO or WO and W	CPT Code	Specific facility required OIC	SJH	Exam Duration
GENERAL MRI CRANIAL	**Head / Brain**	Headaches (no cancer history) CVA / TIA Stroke Memory Loss Confusion Ataxia Dementia Alzheimer's Altered Mental Status Hydrocephalus	√				70551	OIC	SJH	45
		Mass Neurofibromatosis Tumor Seizures Metastatic Staging Dizziness/Vertigo Trigeminal Neuralgia Vascular lesions Intracranial Infection Bell's palsy Cranial Nerve Lesions		√			70553	OIC	SJH	45
		Multiple Sclerosis (MS) *Call Radiologist to discuss contrast requirements* ★				√	70551 (wo only) **OR** 70553 (wo & w)	OIC	SJH	45
		Additional imaging to previous MRI head without contrast study that was performed within the last 30 days AND no new symptoms. *Also possible for specialty exams when not able to get IV, incomplete exam, etc. ★			√		70552	OIC	SJH	45

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SPECIALTY MRI CRANIAL	**Pre-Surgical / Treatment** ***Specify on order: "Stealth" or "Treatment Planning"**	Neurosurgical planning for navigation system (stealth) [Neurosurgery may order wo and w; specify which pre-contrast sequence(s) needed] Treatment Planning for Rad Oncology (SRS, GBM)		√ specify pre-contrast seq(s) needed	√		70552 (with only) **OR** 70553 (wo and w)	OIC	SJH	45
	Internal Auditory Canal ***Specify on order: "IAC"**	Tinnitus Vertigo Acoustic Neuroma Meniere's Hearing Loss - Sensorineural		√			70553 (same as brain wo/w)	OIC	SJH	45
	Pituitary / Sella ***Specify on order: "Pituitary"**	Adenomas Amenorrhea Elevated Prolactin/Hyperprolactinemia/Galactorrhea Cushing's Syndrome Acromegaly		√			70553 (same as brain wo/w)	OIC	SJH	45
MRI FACIAL Prep: Patient must remove eye makeup.	**Orbit** ***always performed as bilateral; order separate brain if indicated**	Mass Tumor Metastasis Nystagmus Infection Inflammation Exophthalmos Proptosis Visual defect		√			70543	OIC	SJH	45
	TMJ ***always performed as bilateral**	Clicking, Locking, Jaw Pain, Osteoarthritis Dislocation Injury	√				70336	OIC	-	90
	Face ***Specify on order: Region Of Interest***	Mass Tumor Metastasis Cranial nerves Trigeminal Neuralgia (Facial Nerve) Infection		√			70543	OIC	SJH	45

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MRI NECK	**Neck Soft Tissue** *Specify on order: Region Of Interest*	Mass Tumor Infection Cancer Staging Metastasis Cyst Vocal Cord Paralysis Adenopathy		√			70543	OIC	SJH	45
	Salivary Glands: Parotid Submandibular Sublingual *Specify on order: Region Of Interest*	Mass Tumor Infection Metastases Cyst		√			70543	OIC	SJH	45
MRI CHEST	**Brachial Plexus** *Specify on order: "Left" or "Right"*	Mass Tumor Nerve Avulsion		√			73220	OIC	SJH	45
		Brachial Plexopathy Pain Shoulder Injury *Call Radiologist to discuss contrast requirements* ★				√	73218 (wo only) **OR** 73220 (wo and w)	OIC	SJH	45
	Mediastinum ★	Mediastinal Soft Tissue Mass Tumor Infection		√			71552	OIC	SJH	45
	Chest MSK & Muscle *Specify on order: Region Of Interest* ★	Evaluation for pain of: • Sternoclavicular Joint • Clavicle • Sternum • Scapula • Pectoralis Major	√				71550	OIC	SJH	45

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Region of Concern	Body Part	Indication	WO IV	WO AND W IV	W IV Only	Either WO or WO and W	CPT Code	Specific facility required		Exam Duration
								OIC	SJH	
MRI BREAST Prep: Patient must abstain from estrogen/estrogen-like drugs for 2 weeks. Ok if on tamoxifen, "anti-Estrogen" or "Estrogen blocker". Must schedule 7-14 days from first day of menstruation commencement. Does patient have silicone or saline breast implants? Must be scheduled in OIC unless patient has silicone or mixed media implants. If patient has silicone or mixed media implants ONLY schedule at SJH. Patients with saline-only implants should be scheduled at the OIC.	**Breast** ***is always performed as bilateral even if patient has had a mastectomy** ★	Implant Integrity Rupture Leak	√				77047	OIC is required unless patient has silicone or mixed media implant	Only SJH if patient has silicone or mixed media implant (non-saline only implant)	45. 90 if Ca + implant
		Findings on U/S or Mammo Further Evaluation Needed Palpable Mass / Lump with Negative Mammo and US Tumor Dense Breast Pain High Risk Screening BRCA 1 or 2 Gene in patient Follow-up Breast Cancer First-Degree Relative of BRCA Carrier Personal History of Breast Cancer Ductal Carcinoma In Situ (DCIS) Lobular Carcinoma In Situ (LCIS) Atypical Lobular Hyperplasia (ALH) Atypical Ductal Hyperplasia (ADH) Strong Family History of Breast Cancer Li-Fraument Syndrome and First-Degree Relatives Cowden and Bannayan-Riley-Ruvalcaba Syndromes and First-Degree Relatives Heterogeneously or Extremely Dense Breasts on Mammo Radiation to Chest Between Age 10 and 30 Years Axillary Adenopathy of Unknown Etiology Unilateral Nipple Discharge with Negative Mammo and US		√			77049	OIC is required unless patient has silicone or mixed media implant.	Only SJH if patient has silicone or mixed media implant (non-saline only implant)	45. 90 if Ca + implant

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MRI HEART (Only Orderable by a Cardiologist) **NOT PERFORMED AT THIS TIME**	**Cardiac** ★	Cardiac Anomalies Right Ventricular Dysplasia Patient with renal insufficiency	√				75557	Not available	Not available	45
		Cardiomyopathy ARVD Sarcoidosis Mass Viability Pericarditis Myocardial Infarction Myocarditis Perfusion Left Ventricular Scarring		√			75561	Not available	Not available	45
		Valve Disease / Insufficiency / Regurgitation Septal Defect Artrial / Ventricular Intracardiac Shunt Assessment **If Velocity Flow needed, use in conjunction with 75561 or 75557.**	√				75565 (Velocity Flow Mapping)	Not available	Not available	45

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MRI ABDOMEN Prep: Patient must fast (nothing to eat or drink) for 6 hours prior to exam except a very small sip of water with required medications. No Barium studies 3 days prior.	**Renal Spleen Pancreas** ***Specify on order: Region Of Interest***	Indeterminate U/S or CT further evaluation needed of specified organ or; Mass Lesion/Cyst Tumor Cancer Staging Metastasis Abscess Pre-transplantation evaluation Pain		√			74183	OIC	-	45
	Liver ***Specify on order: "Liver"** ★	Indeterminate US/CT; further evaluation needed or: Hemangioma Hepatoma Cirrhosis Increased LFTs Hepatitis Pre embolization Pre-transplantation evaluation		√			74183	OIC	-	45 if Gad. 90 if Eovist
	Adrenal ***Specify on order: "Adrenal"** ★	Mass Lesion Adenomas Pheochromocytoma *Call Radiologist to discuss contrast requirements*				√	74181 (wo only) **OR** 74183 (wo & w)	OIC	-	45
	MRCP Biliary ***Specify on order: "MRCP"** ★	Biliary Obstruction Abnormal enzymes Gall Bladder Stones Abdominal pain	√				74181	OIC	-	45
MRI ABDOMEN & PELVIS Prep: Patient must fast (nothing to eat or drink) for 6 hours prior to exam except a very small sip of water with required medications. No Barium studies 3 days prior.	**General Abdomen & Pelvis** ★	Indeterminate US/CT; further evaluation needed of abdominal & pelvic organs and cavity or: Cancer Staging Metastasis Abscess Pain Abdomen and Pelvic regions		√			74183 **AND** 72197	OIC	-	135
	Non-Contrast Abdomen & Pelvis	Any above indications but with the following state: **PATIENT WITH RENAL INSUFFICIENCY OR PREGNANT**	√				74181 **AND** 72195	OIC	-	90
	Pregnant Abdomen & Pelvis ★	Pregnant patient for: Placenta accreta or previa Appendicitis	√				74181 **AND** 72195	OIC	-	90

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SOFT TISSUE / BODY MRI PELVIS Prep: Patient must fast (nothing to eat or drink) for 6 hours prior to exam except a very small sip of water with required medications. No Barium studies 3 days prior.	**Pelvis Soft Tissue** ***Specify on order:** **"Pelvis Soft Tissue"** ★	Indeterminate US/CT; further evaluation needed of pelvic organs and cavity or: Mass, Lesion/Cyst, Tumor Cancer Staging, Metastasis, Abscess Adenomyosis, Endometrioma, Fibroid		√			72197	OIC	-	90
	Pelvis Non-Contrast Soft Tissue ***Specify on order:** **"Pelvis Soft Tissue"** ★	Uterine anomaly or any above indications but with the following state: **PATIENT WITH RENAL INSUFFICIENCY OR PREGNANT**	√				72195	OIC	-	45
	Pelvic Floor ***Specify on order:** **"Pelvic Floor"**	Pelvic Floor Dysfunction Urinary prolapse Cystocele	√				72195	OIC	-	45
	Urethra	Urethral diverticulum	√				72195	OIC	-	45
	Prostate Testicular Scrotum ***Specify on order:** **Region Of Interest***	Mass, Lesion / Cyst, Tumor Cancer Staging, Metastasis, Abscess ***NO prostate-specific imaging performed. However, orders for metastatic prostate cancer are acceptable when imaging the pelvis and other body regions.**		√			72197	OIC	-	45; 90 if rectum study
MSK / BONE MRI PELVIS Prep: Patient must fast (nothing to eat or drink) for 6 hours prior to exam except a very small sip of water with required medications. No Barium studies 3 days prior.	**Pelvis MSK Bone** ***Specify on order:** **"MSK Pelvis"**	Mass, Lesion / Cyst, Tumor Cancer Staging, Metastasis Abscess Bone Infection, Osteomyelitis Septic Arthritis		√			72197	OIC	SJH	45
		Fracture, Avascular necrosis (AVN) Muscle / Tendon Tear, Pubalgia / Sports Hernia Gluteal / Buttock Ulcers, Pain	√				72195	OIC	SJH	45

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MRI SPINE	Cervical (C1 – T1)	Degenerative Disease; Disc Herniation (HNP); Trauma; Radiculopathy; Weakness upper extremity; Stenosis; Compression Fracture; Pain neck / arm / shoulder	√				72141	OIC	SJH	45
		Mass; Tumor; Abscess; Syrinx; Cancer; Metastasis; Discitis; Osteomyelitis; Bone lesion; Myelopathy; Multiple Sclerosis(MS): May be wo - consult Radiologist if questions		√			72156	OIC	SJH	SJH
	Thoracic (T1 - T12)	Degenerative Disease; Disc Herniation (HNP); Trauma; Radiculopathy; Upper / Mid back pain; Stenosis; Compression Fracture without history malignancy / mets; Distant Post Op history of T-spine surgery	√				72146	OIC	SJH	45
		Mass; Tumor; Abscess; Syrinx; Cancer; Metastasis; Discitis; Osteomyelitis; Bone lesion; Myelopathy; Multiple Sclerosis(MS); Compression Fracture with history malignancy / mets; Recent Post Op history of T-spine surgery for infection or acute process		√			72157	OIC	SJH	45
	Lumbar/ Lumbosacral (T12 –S2)	Degenerative Disease; Disc Herniation (HNP); Trauma; Radiculopathy; Sciatica; Stenosis; Low back pain; Spondylolithesis; Compression Fracture without history malignancy / mets	√				72148	OIC	SJH	45
		Mass; Tumor; Abscess; Osteomyelitis; Cancer; Metastasis; Multiple Sclerosis(MS); Bone lesion; Post Op history of L-Spine surgery; Discitis; Compression Fracture with history malignancy / mets		√			72158	OIC	SJH	45
	Lumbosacral Plexus *Specify on order: "L-Sacral Plexus"	Lumbar Plexopathy	√				72195	OIC	SJH	45
	Sacrum/ Coccyx *Specify on order: Region Of Interest*	Trauma; Injury; Fracture	√				72195	OIC	SJH	45
		Mass; Tumor; Abscess; Metastasis; Cancer; Osteomyelitis		√			72197	OIC	SJH	45

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MRI UPPER EXTREMITY NON-JOINT	**Humerus Forearm Hand Finger** ***Specify on order: Side and Body Part***	Stress Fracture Fracture Pain Muscle / Tendon Tear	√				73218	OIC	SJH: No Humerus or Forearm	45
		Mass Tumor Abscess Metastasis Cancer Ulcer Bone lesion Cellulitis Myositis Osteomyelitis		√			73220	OIC	SJH: No Humerus or Forearm	45
MRI LOWER EXTREMITY NON-JOINT	**Femur (thigh) Tib/Fib (calf) Foot Heel Toe** ***Specify on order: Side and Body Part***	Stress Fracture Fracture Pain Muscle / Tendon Tear	√				73718	OIC	SJH: No Femur or Tib/Fib	45
		Mass Tumor Abscess Metastasis Cancer Ulcer Bone lesion Cellulitis Myositis Osteomyelitis		√			73720	OIC	SJH: No Femur or Tib/Fib	45

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MRI UPPER EXTREMITY JOINT	**Shoulder Elbow Wrist** ***Specify on order: Side and Body Part***	Joint Pain, Arthritis, Injury, Internal Derangement, Cyst, Fracture, Osteochondritis Dessicans (OCD), Stress Fracture, Avascular necrosis (AVN), Impingement, Rotator Cuff / Labral Tear, Muscle / Tendon / Ligament / Cartilage Tear	√				73221	OIC	SJH: No Elbow	45
		Mass, Tumor, Abscess, Metastasis, Cancer, Ulcer, Bone lesion, Cellulitis, Myositis, Osteomyelitis		√			73223	OIC	SJH: No Elbow	45
MRI LOWER EXTREMITY JOINT	**Hip Knee Ankle** ***Specify on order: Side and Body Part***	Joint Pain, Arthritis, Impingement Cyst, Internal Derangement, Injury, Fracture, Osteochondritis Dessicans (OCD), Stress Fracture, Avascular necrosis (AVN), Labral / Meniscus Tear, Muscle / Tendon / Ligament / Cartilage Tear	√				73721	OIC	SJH: No Hips	45
		Mass, Tumor, Abscess, Metastasis, Cancer, Ulcer, Bone lesion, Cellulitis, Myositis, Osteomyelitis		√			73723	OIC	SJH: No Hips	45

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SPECIALTY MSK RHEUMATOID MRI UPPER EXTREMITY	**Shoulder Elbow Wrist Hand** ***Specify on order: Side and Body Part AND "Rheumatoid"** ★	Inflammatory Arthritis Septic Arthritis		√			73223	OIC	SJH: No Elbow or Hand / Wrist RH protocol	45
SPECIALTY MSK RHEUMATOID MRI LOWER EXTREMITY	**Ankle Foot** ***Specify on order: Side and Body Part AND "Rheumatoid"** ★	Inflammatory Arthritis Septic Arthritis		√			73720	OIC	SJH	45

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SPECIALTY MSK ARTHOGRAM MRI UPPER EXTREMITY **(Requires additional order for intra-articular injection performed in Fluoro or Ultrasound)** Prep: No labs needed, but must inquire if patient is allergic to gadolinium contrast agents. If on prescription blood thinners, must get order from prescribing physician saying it is okay to stop prescription.	**Shoulder** **Elbow** **Wrist** ***Specify on order: Side and Body Part AND "Arthrogram performed under (Fluoro or US)"** ★	Specific Assessment and Evaluation of: • Cartilage Defects • Labrum / Ligament Tear • Osteochondral Defect Stability			√ MRI (W intra-articular contrast)		**73222 AND….** **Arthrogram Guidance under Fluoro:** Shoulder: 23350 **AND** 77002 Elbow: 24220 **AND** 77002 Wrist: 25246 **AND** 77002 **OR** **Arthrogram Guidance under US:** Shoulder: 20611	-	SJH	MRI: 45 Fluoro or US: schedule 30 mins prior to MRI Pt must plan for 2 hours and needs a driver

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SPECIALTY MSK ARTHOGRAM MRI LOWER EXTREMITY **(Requires additional order for intra-articular injection performed in Fluoro or Ultrasound)** Prep: No labs needed, but must inquire if patient is allergic to gadolinium contrast agents. If on prescription blood thinners, must get order from prescribing physician saying it is okay to stop prescription.	**Hip** **Knee** **Ankle** ***Specify on order: Side and Body Part AND "Arthrogram performed under (Fluoro or US)"** ★	Specific Assessment and Evaluation of: • Cartilage Defects • Labrum / Ligament Tear • Osteochondral Defect Stability			√ MRI (W intra-articular contrast)		**73722 AND….** **Arthrogram Guidance under Fluoro:** Hip: 27093 **AND** 77002 Knee: 27369 **AND** 77002 Ankle: 27648 **AND** 77002 **OR** **Arthrogram Guidance under US:** Hip: 20611	-	SJH	MRI: 45 Fluoro or US: schedule 30 mins prior to MRI Pt must plan for 2 hours and needs a driver

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MRI ANGIO-GRAPHY (MRA / MRV)	MRA Brain / Circle of Willis (COW)	Intracranial Aneurysm CVA TIA Vertebrobasilar Insufficiency Arteriovenous Malformation (AVM)	√				70544	OIC	SJH	45
	MRV Brain	Venous Sinus Thrombosis Undetermined Vascular Malformation	√				70544	OIC	SJH	45
	MRA Neck (Carotid)	Carotid Stenosis CVA TIA Aneurysm Subclavian Steel Stroke Dissection Vessel Injury Vertebral Vascular Abnormality		√			70549	OIC	SJH	45
	MRA Chest Aortic Arch ★	Aneurysm Subclavian Vessels Vascular Anomalies Dissection Arteriovenous Malformation (AVM) Coarctation ***Only use if CT contraindicated. Radiologist consultation required prior to exam request***		√			71555	OIC	-	45
	MRA ABDOMEN ★	Renal arteries AAA Mesentery artery ***Only use if CT contraindicated. Radiologist consultation required prior to exam request*** **With contrast preferred unless contraindicated.**				√	74185 for all: wo, wo & w, w contrast	OIC	-	45
	MRA ABDOMEN & PELVIS ★	Renal arteries AAA Mesentery artery ***Only use if CT contraindicated. Radiologist consultation required prior to exam request*** **With contrast preferred unless contraindicated.**				√	74185 **AND** 72198 for all: wo, wo & w, w contrast	OIC	-	45
	MRA PELVIS ★	Femoral arteries ***Only use if CT contraindicated. Radiologist consultation required prior to exam request*** **With contrast preferred unless contraindicated.**				√	72198 for all: wo, wo & w, w contrast	OIC	-	45
	MRA UPPER EXTREMETY ★	Runoff Upper Extremity ***Only use if CT contraindicated. Radiologist consultation required prior to exam request*** **With contrast preferred unless contraindicated.**				√	73225 for all: wo, wo & w, w contrast	OIC	-	45
	MRA LOWER EXTREMETY ★	Runoff Lower Extremity DVT ***Only use if CT contraindicated. Radiologist consultation required prior to exam request*** **With contrast preferred unless contraindicated.**				√	73725 for all: wo, wo & w, w contrast	OIC	-	45

Disclaimers:

1. The guidelines indicate the best location for the exam to be performed based on equipment and exam type. In certain circumstances, there may be exceptions to this guide based on the patient condition which supersede any location preferences. Some conditions which may require the exam to be performed at the SJH include: nursing care/monitoring, equipment requirement for implant, lift team requirement, anesthesia required, previous allergy to MRI contrast, among other reasons. If there are specific reasons for the patient to be performed at the SJH over the OIC, the scheduler must notate the details in the scheduler's notes for the exam in Meditech to communicate these reasons to the technologist.
2. In the event an exam is ordered by Neurology and specifies "Neuro to Read" in the comments, the exam will be performed as ordered by the specialist, which may vary from the guidelines above, since the specialist will be interpreting the results.

MRI Preparation: Patient Instructions

Patient Instructions for ALL General MRI exams:

- Patient must remove all jewelry (rings, watches, earrings, body jewelry & piercings) and leave at home.
- Wear comfortable clothing without any metal (buttons, snaps, zippers);
- Technologist may ask patient to change into MRI-safe gown and pants.
- If claustrophobic or unable to hold completely still for length of study, patient will need to discuss alternative imaging and/or medication needs with referring practitioner.
- Be sure required lab work has been completed if notified.
- Bring Insurance cards, photo ID, current medication list, and if applicable any implant card.

Patient Instructions for MRI of any part of the Face & Head (except Brain MRI only):

- Follow all Patient Instructions for General MRI
- Patient must remove eye makeup.

Patient Instructions for MRI of any part of the Abdomen and/or Pelvis:

- Follow all Patient Instructions for General MRI
- Patient must fast (nothing to eat or drink) for 6 hours prior to exam except a very small sip of water with required medications.
- No Barium studies 3 days prior.

Patient Instructions for MRI of the Breast:

- Follow all Patient Instructions for General MRI
- Patient must abstain from estrogen/estrogen-like drugs for 2 weeks.
- Ok if on tamoxifen, “anti-Estrogen” or “Estrogen blocker”.
- Must be scheduled 7-14 days from first day of menstruation commencement.
- Does patient have silicone or saline breast implants?
    - All Breast MRI should be scheduled at OIC except if patient has silicone or mixed media implants
    - Patients with saline-only implants should be scheduled at the OIC
    - Patients with silicone or mixed-media implants must be scheduled at the SJH main campus

Scheduler Instructions for MRI

Scheduler Instructions for ALL General MRI:

- MRI is rarely done with contrast only; it is either without or with/without.
- MRA is rarely done without IV contrast except Brain MRA.
- Brain MRV is usually done without IV contrast, but there are exceptions.
- Arthrograms are contrast only and patient returns may be contrast only.
- Ask a Radiologist or Technologist if you are uncertain of need for order correction.
- Technologist ext. SJH: 6576 OIC: 6712 Radiologist Assistant ext: 6143.
- Verify eGFR labs are done in accordance with contrast policy.
- The order and supporting documents, such as H&P, prior reports, specialized protocols and labs must be copied to Echart.
- Verify patient is scheduled at the correct facility based on their exam type and body habitus.
- Enter prior images/reports requested, with requested date and facility into scheduler notes.
- Enter patient height and weight into scheduler notes.
- Upload “Request for Additional Images”, “Cardiologist Approval Form”, “Radiologist/Specialist Approval Request Form”, and/or “MRI Technologist Device Review Form” and implant verification documents in Echart, if applicable.

Scheduler Instructions for Breast MRI:

- Follow all Scheduler Instructions for General MRI
- Female tech only
- Schedule 0900-1630 in contrast slots only (Radiologist must be available)
- Patient must be off all estrogen medications
- If patient refuses or has contraindication to contrast or discontinuation of estrogen medications, imaging must be approved through rad approval to proceed
- Tamoxifen medication is okay
- If patient still having menstrual cycle, then exam must be scheduled 7-14 days from the first day of their cycle
- Exam only available at OIC unless the patient has silicone or silicone mixed-media breast implants. If breast implants contain any silicone or silicone mixed-media, then it must be performed at the Pavilion scanner only

MRI Bilateral Exam Workflow

Scheduling

- Enter appointment type as bilateral, add right and left orders in addition to the bilateral order for a total of 3 orders

Technologist

- Perform scans individually utilizing separate right and left accession #'s
- Transfer images
- Complete notes, documents, etc. for right and left exam
- In Meditech move left, right and bilateral orders from logged to "taken"
- In Meditech credit left and right Meditech orders
- In PACS change status of left and right exams from sent to "complete" and bilateral exam from scheduled to "dictated"

Clerical Supervisor

- Add template report to bilateral exam
- Change PACS status to finalized

MRI IV CONTRAST QUESTIONNAIRE

If the patient will receive MRI IV contrast, the following form must be completed and faxed with order

Patient Name: _____ Patient DOB: _____Patient Age: _____yrs

Patient Weight: _____lbs Patient Height: _____ft/inches

Allergic to Gadolinium-based MRI contrast agent: yes *□ no □
*__if yes, has premedication been prescribed and/or given: yes □ no □__

Pregnant: yes □ no □ Breastfeeding: yes □ no □

*Exam Requested: _____ Today's Date: _____

*If the exam requested is for a **liver-related indication**, the following section is also required:

Does the patient have a history of renal disease, including:

Prior Dialysis: yes □ no □ Renal Transplant: yes □ no □

Single Kidney: yes □ no □ Kidney Surgery: yes □ no □

Renal Cancer: yes □ no □

Or the following risk factors:

Hypertension Treated with Medication: yes □ no □

Diabetes Mellitus: yes □ no □

If yes to any of the above, and the exam is for a liver-related indication, the patient will need a Creatinine with eGFR performed within 30 days of exam and no later than 48hrs prior to exam.

If scheduled less than 48hrs, order labs as STAT.

eGFR: _____ Creatinine: _____ Date Drawn: _____

INTRAVASCULAR CONTRAST GUIDELINES FOR MRI

If a patient's results fall into more than one criteria, follow the more stringent criteria

General Considerations:

- If MRI and CT contrast procedures are ordered on the same day, it is preferred that the MRI be performed first. Please schedule accordingly.
- Adult and pediatric doses of contrast are calculated based on patient weight and under direct supervision of an attending Radiologist, other attending Independent Licensed Practitioner or Pharmacist.
- Patients should not have contrast exams in the *same modality* within 24 hours of each other if the second exam has a pre-contrast component. Obtain approval from a Radiologist for exceptions in an emergency.

MRI Contrast Protocol:

- **Group II agent: *Gadavist** is used for all contrast enhanced MRI exams except for certain abdominal exams with liver indications. Renal function evaluation with a questionnaire or laboratory testing is NOT required for exams in which Gadavist will be the contrast utilized except in the case of patients on dialysis. If on dialysis, follow the instructions for "Patient on dialysis" on Table 2 of this document below.
- **Group III agent: Eovist** is to be used for certain abdominal exams with liver indications.

*"Based on the most recent scientific and clinical evidence [30-37] the ACR Committee on Drugs and Contrast Media considers the risk of NSF among patients exposed to standard or lower than standard doses of group II GBCAs is sufficiently low or possibly nonexistent such that assessment of renal function with a questionnaire or laboratory testing is optional prior to intravenous administration." (ACR Committee on Drugs and Contrast Media, 2020)

Scheduler: Submit *Radiologist Review* form for ALL abdominal MRI orders with LIVER INDICATIONS for instruction on type of contrast to be used. If Radiologist determines that "**Eovist**" is indicated, follow these guidelines, adapted from the ACR Manual on Contrast Media, 2020:

TABLE 2. eGFR Evaluation of Renal Function to Group I or Group III GBCA Administration	
Patient Condition	**eGFR Requirement**
- Patient on dialysis (any type) - No eGFR required - Patient with risk factors and an eGFR below 30 (if Radiologist has determined that there is no suitable alternative imaging exam).	- Requires Nephrologist consult and Radiologist approval. - Obtain Radiologist approval and patient consent forms. - If approved, coordinate exam to be done directly prior to dialysis or no more than 24 hours preceding the patient's next scheduled dialysis.
- Patient with AKI (acute kidney injury or failure)	- No eGFR required - Requires Nephrologist consult and Radiologist approval. - Obtain Radiologist approval and patient consent forms. - If approved, coordinate exam to be done directly prior to dialysis or no more than 24 hours preceding the patient's next scheduled dialysis (if patient will be dialyzed).
- Inpatient	- Obtain eGFR within 2 days of the MRI study.

- Outpatient/ED with no prior eGFR at the time the MR exam is scheduled	- If NO risk factors (reference [1]), no eGFR required. - WITH risk factors (reference [1]), obtain eGFR.*
- Outpatient/ED with most recent prior eGFR of 45 or above	- If NO risk factor (reference [1]) and eGFR of 60 or above, no new eGFR required. - WITH risk factors (reference [1]) and/or eGFR 45-59, if most recent prior eGFR is **within 6 weeks** of the MRI, no new eGFR is needed; otherwise obtain a new eGFR.*
- Outpatient/ED with most recent prior eGFR of 44 or below	- Obtain eGFR within 2 days preceding the MRI study.
* If the new eGFR is to be obtained expressly for evaluation of suitability for administration of gadolinium-based contrast agent (GBCA), obtaining the eGFR within 2 days of the MRI exam would avoid the situation where the new eGFR might be less than 45 and require another eGFR within two days of the MRI exam, as per the last line in the table.	

[1] Patients with the following risk factors will need to obtain renal function labs - eGFR - prior to administration of Eovist contrast:
1. History of renal disease, including:
   a. Prior dialysis
   b. Renal transplant
   c. Single kidney
   d. Kidney surgery
   e. Renal cancer
2. Hypertension requiring medical therapy
3. Diabetes mellitus (ACR Committee on Drugs and Contrast Media, 2020)

History of allergic reaction to contrast used for MRI: follow “Protocol for Pre-Medication” in “Contrast Management and Administration” policy available on PolicyStat.
Scheduler: Please schedule according to policy and during hours where two technologists, a Radiologist and a Radiology nurse are available on site.

Acute suspected allergic reaction during MRI exam: refer to “Reaction to Contrast Media” portion of “Contrast Management and Administration” policy available on PolicyStat.

Extravasation: In the event of extravasation, refer to "Management of Extravascular Injection" available on PolicyStat.

Pregnant Women & Contrast: All female patients of childbearing age should be questioned about the possibility of pregnancy. If there is a possibility of pregnancy, a blood or urine pregnancy test must be obtained prior to scheduling or performing a contrast enhanced exam. If pregnancy is confirmed, follow below procedure:

Each case should be reviewed carefully by members of the clinical and radiology service groups, and a GBCA should be administered only when there is a potential significant benefit to the patient or fetus that outweighs the possible but unknown risk of fetal exposure to free gadolinium ions.

A. The radiologist should confer with referring practitioner and document the following in the radiology report or the patient’s medical record:
   1. The information requested from the MRI study cannot be acquired without the use of IV contrast or by using other imaging modalities.

2. The information needed affects the care of the patient and/or fetus during the pregnancy.
3. The referring physician is of the opinion that it is not prudent to wait to obtain this information until after the patient is no longer pregnant.

B. Written informed consent must then be obtained from the patient by a Radiologist after discussion with the referring physician to proceed with procedure.

Breastfeeding Women & Contrast: Because of the very small percentage of gadolinium-based contrast medium that is excreted into the breast milk and absorbed by the infant's gut, per ACR Manual on Contrast Media: ACR Committee on Drugs and Contrast Media, 2020 it is believed that the ***available data suggest that it is safe for the mother and infant to continue breast-feeding after receiving such an agent***. The following procedure must be performed to continue with MRI with contrast exam:

- Informed decision to temporarily stop breast-feeding should be left up to the mother after these facts are communicated.
- If the mother remains concerned about any potential ill effects to the infant, she may abstain from breast-feeding from the time of contrast administration for a period of 12 to 24 hours.
- There is no value to stopping breast feeding beyond 24 hours.
- The mother should be told to express and discard breast milk from both breasts after contrast administration until breast feeding resumes.
- In anticipation of this, she may wish to use a breast pump to obtain milk before the contrast-enhanced study to feed the infant during the 24 hour period following the examination.
- The verbal informed consent and decision to proceed, or not proceed, must be documented in the patient's chart.

References: ACR Manual on Contrast Media. ACR Committee on Drugs and Contrast Media, 2020, www.acr.org//media/ACR/files/clinical-resources/contrast_media.pdf.

MRI Contrast Management and Administration

- For full policy see PolicyStat ID: 7803917
  https://stjosepheureka.policystat.com/policy/7803917/latest/

Guidelines for Protecting Pregnant Patients (MRI)

- For full policy see PolicyStat ID: 5928909
  https://stjosepheureka.policystat.com/policy/5928909/latest/

- Consent To Proceed With MRI Procedure During Pregnancy form also attached below

PREGNANCY EDUCATION FORM

CONSENT TO PROCEED WITH MRI PROCEDURE DURING PREGNANCY

Patient Name_____ DOB: _____ Date_____

This consent is to inform you the Magnetic Resonance Imaging (MRI) procedure you are having is a possible risk to your unborn child/fetus. By signing this you are consenting to understanding all of the information below and have asked all questions needed to understanding the risks associated with the procedure.

To date, there are no reports of injury to children who underwent an MRI procedure before birth.

While the numbers of patients scanned during pregnancy is relatively small and with limited follow-up, in the past several years, numerous pregnant patients have undergone MRI with no ill effects. However, as noted by the FDA, the safety of MRI during pregnancy has not been proven. MRI of a pregnant patient is carried out when the patient's physician has decided that the advantages of MRI outweigh potential risks.

I, _____, have read the above warning and understand the potential harmful effects to my unborn child/fetus. I consent to have this MRI procedure as prescribed by my physician. I acknowledge that I have been given ample opportunity to ask questions and that all questions have been answered to my satisfaction. Furthermore, I fully understand that I may refuse to have this MRI procedure conducted on me without any obligation to St. Joseph Hospital or St. Joseph Health System. Also, I understand that I may stop this MRI procedure at any time during its process.

Furthermore, I fully agree that the risks described herein are risks that I am willing to accept.

Also, I agree that I will hold harmless St. Joseph Hospital, St. Joseph Health System and it's employees should I, or my child/fetus, experience any negative effects from this MRI procedure.

_____ Date _____ Time_____
Signature of Person Giving Consent

_____
Printed Name of Person Giving Consent

_____ _____
Signature of Witness to Person Giving Consent Relationship

PATIENT IDENTIFICATION

Eureka, CA 95501

Pregnancy Consent Form
Diagnostic Imaging
Form #CS-905 (2/12)

MRI Contact Information

Hospital MRI/CT Pavilion (NKM location)
2700 Dolbeer St.
Eureka, Ca. 95501
(833)789-6802 Scheduling
(707) 269-4265 Registration
(707) 269-3880 Registration Fax

Reception…… ext. 6567 or 6574
Tech Control Room…..……ext. 6576
Lead Tech……...ext. 6570

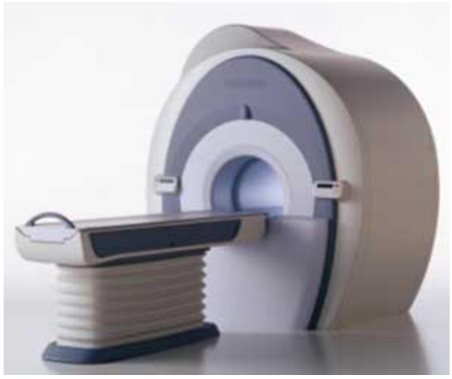
Outpatient Imaging Center (NKX location)
2330 Buhne St.
Eureka, Ca. 95501
(833)789-6802 Scheduling
(707) 269-4240 Registration
(707) 442-1641 Registration Fax

Reception……ext. 6701
Tech Control Room.....ext. 6712

Equipment Description

Notify patients over 275 lbs they may not be able to have an MRI even if their weight is under listed weight limit due to body habitus, potentially exceeding bore circumference or maximum scan FOV after exam setup. Unfortunately, it is impossible to predict this until the patient arrives.

To minimize patient inconvenience please schedule at appropriate site by weight, height and type of exam.



NKM – Hospital MRI Pavilion
Unit: 1.5T Toshiba Vantage
Max. Table weight 440lbs (200kg)
Bore Size Center 60cm (without accessory coil)
Maximum FOV 50cm.
Patients under 5'8" and over 275 lbs. rarely fit at NKM and should be scheduled at NKX whenever possible. Exceptions are the following exams: foot, ankle, knee.

Outpatient Imaging Center (NKX)
Unit: 1.5T GE Optima 450W
Max. Table weight 500lbs (227kg)
Bore Size Center 70cm (without accessory coil)
Maximum FOV 50 cm
****Patients under 5'8" and over 275 lbs. should be scheduled in NKX if possible***

The guidelines indicate the best location for the exam to be performed based on equipment and exam type. In certain circumstances, there may be exceptions to this guide based on the patient condition which supersede any location preferences. Some conditions which may require the exam to be performed at the SJH include: nursing care/monitoring, equipment requirement for implant, lift team requirement, anesthesia required, previous allergy to MRI contrast, among other reasons.
If there are specific reasons for the patient to be performed at the SJH over the OIC, the scheduler must notate the details in the scheduler's notes for the exam in Meditech to communicate these reasons to the technologist.

MRI Patient with Pacemaker or Defibrillator System (Biotronik or Medtronic) Guidelines

Prior to Scheduling Exam

Imaging Schedulers

- Obtain documentation of complete pacemaker system (the device – lead combination) with make, model and manufacturer of pacemaker system (i.e. patient implant card or operative record). Verbal written documentation **is not** acceptable. Scan into patient's Order Manager chart.
- Verify pacemaker has been implanted for more than 6 weeks, if not, MRI **cannot** be performed and ordering physician needs to be notified.
- Send completed MRI Technologist Outpatient Device Review Form along with all device documentation to the MRI Caregivers Outlook distribution list for approval of exam ordered and patient's device including lead combination.
- Obtain Radiologist Approval form for "appropriateness of exam for MR conditional pacemaker patient"

MR Trained Technologist

- Review physician order and any other patient history for appropriateness of ordered exam. If any questions consult Radiologists.
- Review the device documentation and patient history and confirm the system, including the lead combination, is a FDA approved MR conditional system, by utilizing the manufacturer's (Biotronik or Medtronic) MR conditional Cardiac Device-Lead charts and technical manuals.
- Complete the MRI Technologist Device Review Form and reply all to the email from the scheduler, including the MRI Caregivers Outlook distribution list. Link the completed MRI Technologist Device Review Form to the email to signal the approval for scheduling the MRI exam.

Scheduling Exam

Imaging Schedulers

- Schedule patient only at Main Hospital MRI Pavilion on Monday between the hours of 9:00 am to 10:30 am (this is so Radiologist is on-site and appropriate staffing is available). Patient to arrive 30mins prior to scan time. Note in Meditech Schedule notes, "Pacemaker Patient".
- Place a copy of the request in the Imaging Nurses' Order Manager folder and place it on the Nurses Meditech schedule by blocking off time in the RAD Nurse Resource Group NKMRADNUR and note "MRI Pacemaker".
- Notify Vendor Clinical Specialist (Biotronik or *Medtronic) with patient's name and DOB and pacing system information provided above for:
    - Verification MR conditional pacemaker system is correct and up to date.
    - Confirm availability with the date and time the MRI is scheduled. Have Clinical Specialist arrive onsite 30 minutes prior to scan time. Place note in schedulers Meditech notes.

  Medtronic & Biotronik Clinical Specialist - Tom Thomas cell 707-599-5174
  best days are; *Monday as specialist in this area.*
- Notify the patient's Cardiologist with date and time MRI is scheduled to allow contact with referring physician if desired and for patient follow-up post scan for re-check of pacemaker data if needed.
- Document in Meditech Scheduler notes every action performed.

Day of Exam

The Manufacturer Clinical Specialist and ACLS trained Imaging RN must be present before, during and after the exam to validate the performance integrity of the pacemaker prior to the MRI exam, monitor the patient during the exam, and check pacemaker performance after. If either is not available, MRI will not be performed.

MR Registration

- Patient will arrive to the MRI Pavilion 30 minutes before the scheduled scan time and register.
- Copy patient pacemaker device ID card if available and scan into Meditech and PACS if not already done.

MR Trained Technologist

- Setup MRI area with MR conditional monitoring equipment including pulse oximeter, blood pressure and ECG monitor. Verify crash cart and external defibrillator have been checked and are immediately available for use before, during and after the MR scan.
- Review all pacemaker documentation (i.e. patient implant card or operative record) to verify the patient's complete device and lead combination is an FDA approved MR conditional system utilizing the manufacturer's (Biotronik or Medtronic) MR conditional Pacemaker-Lead charts.
- Follow standard outpatient MRI workflow process for changing/gowning patient and screening for MRI.
- If patient has other active or passive MR conditional implanted devices notify pacemaker Clinical Specialist and follow all Manufacturer MR Conditions for use. If any concerns discuss with Radiologist.
- Provide appropriate Biotronik or Medtronic Cardiology Order form to the Clinical Specialist to complete.
- Review, verify and follow all Manufacturer MR Conditions for use when scanning a patient with a pacemaker system.
- Keep frequent communication with patient during scan.
- Adjust and modify MR sequences as needed to meet Manufacturer MR Conditions for use. Consult Radiologist if needed.
- Upon completion of exam escort patient from MRI suite to holding area for Clinical Specialist device reprogramming and completion of Cardiology Order form post scan portion.
- Scan into PACS completed Biotronik or Medtronic Cardiology order form and manufacturer's printed device report for documentation.
- After final vital sign check from Imaging RN escort patient back to dressing room and give patient instructions to contact Cardiologist notifying MRI has been completed.
- Allow patient the opportunity for any questions before discharge and give clear answers.

Manufacturer Trained Clinical Specialist (Biotronik or Medtronic)

- Arrive 30 mins prior to scan time.
- Follow pre scan programing as specified by manufacturer/Cardiologist.
- Print report from device programmer for documentation for MR technologist.
- Complete pre scan portion of Biotronik or Medtronic Cardiology Order form.
- Notify MR technologist immediately if any issues or concerns.

- Communicate pacemaker programming parameters to the attending Imaging RN monitoring patient.
- Post scan: follow post scan programing as specified by manufacturer/Cardiologist.
- Complete post scan portion of Biotronik or Medtronic Cardiology Order form and give completed signed form with printed programming device report to MR technologist for documentation.
- Hand over patient to Imaging RN for post exam vital sign check.

Imaging ACLS trained RN

- Setup patient with MR conditional monitoring equipment using at least one of the following parameters: blood oxygen saturation, blood pressure or ECG
- Take baseline vitals on patient and record
- Verify crash cart and external defibrillator have been checked and are immediately available for use before, during and after the MR scan
- Receive pacemaker programming parameters from Clinical Specialist prior to scan
- Discuss any concerns with appropriate resource; Radiologist, MR technologist, Manufacturer Clinical Specialist
- Continuously monitor and document patient's vitals throughout the scan. NIBP should be performed minimum of every 10 minutes
- Post scan, once original pacemaker settings have been restored, take one post exam vital sign check assessment before discharge
- Hand over patient to MRI technologist

MRI Biotronik MR Conditional Pacemaker Lead Chart

ProMRI® system check

Pacemakers

Leads	Bradycardia Devices		
	Eluna DR-T Entovis DR-T Eluna SR-T Entovis SR-T	Edora 8 DR-T Edora 8 DR Evity 8 DR-T Enitra 8 DR-T Evity 6 DR-T Enitra 6 DR-T Enitra 6 DR	Edora 8 SR-T Edora 8 SR Evity 8 SR-T Enitra 8 SR-T Evity 6 SR-T Enitra 6 SR-T Enitra 6 SR
Setrox 53			
Setrox 60			
Siello S 45			
Siello S 53	ProMRI®	ProMRI®	ProMRI®
Siello S 60			
Solia S 45			
Solia S 53			
Solia S 60			

* Detailed information about ProMRI® can be found in the BIOTRONIK ProMRI® System Technical Manual. You can download this document as a PDF file from the website: www.biotronikusa.com/manuals. Alternatively, contact your local BIOTRONIK representative or visit the website www.biotronikusa.com/promri.

Cardiology Order Form Biotronik ProMRI™ Pacemaker

Patient Name:_____DOB: _____

Ordering Physician Name:_____Contact #:_____

All fields MUST be completed to clear patient for MRI

To be completed by a Biotronik Clinical Specialist prior to MR exam

1. The above patient has an MRI ordered. Please confirm the patient has a complete **Biotronik ProMRI™ Pacing System**, which consist of a ProMRI™ device with ProMRI™ lead(s).

   Device Name and Model: _____

   Leads Name and Model: _____

   ☐ YES, the patient has a complete Biotronik ProMRI™ Pacing System and it has been implanted longer than 6 weeks in the pectoral region.

   ☐ NO, patient does not have a complete ProMRI™ Pacing System.

   Patient presenting rhythm: _____

2. Pacing percentages: AP_____% VP _____%
3. Before the scan, the patient's pacemaker will be placed in an MRI mode. The patient's device will be programmed as follows during scan mode:

   ☐DOO Pacing rate:_____bpm ☐AOO Pacing rate:_____bpm

   ☐VOO Pacing rate:_____bpm ☐ODO Pacing rate: OFF
4. The above patient was reviewed and meets the following conditions:

   ☐ MR conditional Pacing System has been implanted a minimum of 6 weeks in the pectoral region

   ☐ No lead extenders, lead adaptors or abandoned leads or wires present

   ☐ No broken leads or leads with intermittent electrical contact confirmed by lead impedance history

   ☐ Pacing capture thresholds of <2.0 volts (v) at a pulse width of 0.4 milliseconds (ms)

   ☐ The battery status is neither ERI nor EOS

   ☐ The device is operating normally and within the projected service life

   ☐ For patients who have multiple MR-Conditional devices present, the MR labeling conditions for all implants are satisfied and metal implantable devices longer than 5cm are 4cm or greater distance from the Biotronik ProMRI™ lead
5. ☐ Programming parameters communicated to the attending nurse monitoring patient

To be completed by a Biotronik Clinical Specialist Post MR exam, then given to MRI Technologist

6. ☐ Post-Scan, MRI mode turned OFF. Pre-scan pacemaker setting restored and checked for pacing capture threshold to ensure there is a proper safety margin.

Clinical Specialist Signature: _____Date: _____

Specialist Name: _____

Cardiology Order Form Medtronic SureScan™ Pacemaker

Patient Name:_____DOB: _____

Ordering Physician Name:_____Contact #:_____

All fields MUST be completed to clear patient for MRI

To be completed by a Medtronic Clinical Specialist prior to MR exam

1. The above patient has an MRI ordered. Please confirm the patient has a complete **Medtronic SureScan™ Pacing System**, which consist of an MRI Surescan device with two SureScan™ lead(s).

   Device Name and Model_____

   Leads Name and Model: _____

   ☐ YES, the patient has a complete Medtronic SureScan™ Pacing System and it has been implanted longer than 6 weeks in the pectoral region.

   ☐ NO, patient does not have a complete SureScan™ Pacing System.

2. Patient presenting rhythm: _____

3. Pacing percentages: AP_____% VP _____%

4. Before the scan, the patient's pacemaker will be placed in a SureScan mode. The patient's device will be programmed as follows during scan mode:

   ☐DOO Pacing rate:_____bpm ☐AOO Pacing rate:_____bpm

   ☐VOO Pacing rate:_____bpm ☐ODO Pacing rate: OFF

5. The above patient was reviewed and meets the following conditions:

   ☐ MR conditional Pacing System has been implanted a minimum of 6 weeks in the pectoral region

   ☐ No lead extenders, lead adaptors or abandoned leads or wires present

   ☐ No broken leads or leads with intermittent electrical contact confirmed by lead impedance history

   ☐ Pace polarity parameters set to Bipolar for programming MRI SureScan to On

   ☐ Pacing capture thresholds of <2.0 volts (v) at a pulse width of 0.4 milliseconds (ms)

   ☐ A lead impedance value of ≥ 200 ohms and ≤ 1500 ohms

   ☐ No diaphragmatic stimulation at a pacing output of 5.0 v and at a pulse width of 1.0ms in patients whose device will be programmed to an asynchronous pacing mode when MRI SureScan is on

   ☐ The SureScan device is operating within the projected service life

   ☐ For patients who have multiple MR-Conditional devices present, the MR labeling conditions for all implants are satisfied

6. ☐ Programming parameters communicated to the attending nurse monitoring patient

To be completed by a Medtronic Clinical Specialist Post MR exam, then given to MRI Technologist

7. ☐ Post-Scan, SureScan mode turned OFF. Pre-scan pacemaker setting restored and checked for pacing capture threshold to ensure there is a proper safety margin.

Clinical Specialist Signature: _____Date: _____

Specialist Name: _____

MRI Patient with Implanted Cardiac Monitor (ICM) Guidelines

Prior to Scheduling Exam

Imaging Schedulers

- Obtain documentation of implanted cardiac monitor (ICM) with make, model and manufacturer of ICM (i.e. patient implant card or operative record). Verbal written documentation **is not** acceptable. Scan into patient's Order Manager chart.
- Verify patient has no additional implanted devices, if they do obtain documentation on the item(s) and submit with MRI Technologist Outpatient Device Review Form.
- Send completed MRI Technologist Outpatient Device Review Form along with all device documentation to the MRI Caregivers Outlook distribution list for approval of exam ordered and patient's device.
- Complete all sections on the correct Cardiology Approval Form for MR Conditional Inserted Cardiac Monitor (ICM), including device information in the ICM section and submit form to patient's Cardiologist for approval.

MR Trained Technologist

- Review physician order and any other patient history for appropriateness of ordered exam.
- All ICM patients are to be performed on the SJH MRI system as long as it meets the conditions for use.
- Confirm implanted cardiac monitor (ICM) is a FDA approved MR conditional or MR safe and MRI exam can be performed safely, by utilizing the manufacturer's conditions of use for MRI or by directly contacting the manufacturer. Some ICMs have restrictions to coils and body parts. Confirm the MRI exam ordered can be performed safely.
- Consult Radiologist with any questions or concerns.
- Complete the MRI Technologist Outpatient Device Review Form and reply all to the email from the scheduler, including the MRI Caregivers Outlook distribution list. Link the completed MRI Technologist Outpatient Device Review Form to the email to signal the approval for scheduling the MRI exam.

Scheduling Exam

Imaging Schedulers

- Once the MRI Technologist Outpatient Device Review Form is returned, schedule patient only at Main Hospital MRI Pavilion on Monday-Friday between the hours of 9:00 am to 3:45 pm (this is so Radiologist is on-site and appropriate staffing is available). Patient to arrive 30mins prior to scan time. Note in Meditech Schedule notes, "Implanted Cardiac Monitor patient".
- Notify the patients Cardiologist with date and time the MRI is scheduled, which will allow them to obtain updated device data prior to MRI, schedule a follow up with patient after MRI to recheck data for any inappropriately collected episodes that may have occurred during the MRI scan and to contact the referring physician if desired.
- **Exam cannot be performed until the Cardiology Approval Form for MR Conditional Inserted Cardiac Monitor (ICM) is completed and returned by the patient's Cardiology office. If this is not returned by the scheduled date of the exam, the patient will need to be rescheduled.**
- Document in Meditech Scheduler notes every action performed.

Day of Exam

MR Registration

- Patient will arrive to the MRI Pavilion 30 minutes before the scheduled scan time and register.
- Copy patients Implanted Cardiac Monitor device ID card if available and scan into Meditech and PACS if not already done.

MR Trained Technologist

- Review PDF and ICM documentation (i.e. patient implant card, operative record, MRI Technologist Outpatient Device Review Form) to re-verify the patient's ICM device is an FDA approved MR conditional system utilizing the manufacturer's conditions of use for MRI. Some ICMs have restrictions to coils and body parts, confirm the MRI exam ordered can be performed safely.
- Follow standard outpatient MRI workflow process for changing/gowning patient and screening for MRI.
- If patient has other active or passive MR conditional implanted devices follow all Manufacturer MR Conditions for use. If any concerns discuss with Radiologist.
- Confirm with patient they have been contacted by their Cardiologist to allow them to obtain updated device data prior to MRI.
- Review and follow all Manufacturer MR Conditions for use for MRI when scanning a patient with an implanted cardiac monitor (ICM).
- Keep frequent communication with patient during scan.
- Adjust and modify MR sequences as needed to meet Manufacturer MR Conditions for use. Consult Radiologist if needed.
- Upon completion of exam escort patient from MRI suite confirm they have a follow up appointment or have been contacted by their Cardiologist for a post MRI recheck of data for any inappropriately collected episodes that may have occurred during the MRI scan.
- Allow patient the opportunity for any questions before discharge and give clear answers.

Cardiology Approval Form for MR Conditional Inserted Cardiac Monitor (ICM)

MEDTRONIC LINQ MODELS

Dear Dr. _____,

Patient: _____ DOB: ___/___/_____ is scheduled to have an MRI exam performed on: ____/____/_____ at our imaging facility at: _____am/pm. Per the manufacturer's MRI Conditions For Use and the exam(s) ordered, this patient's LINQ ICM device does not pose a significant risk of hazard to the patient in our MRI environment. However, this device has not been tested for interaction with other implants. Please list all other known implants (stents, pacing wires, etc.) and verify that the patient's device matches the attached name and model, has not been revised, and provide the implant date.

Device name: _____ Model: _____
Date Implanted: ___/___/_____ Other known implants: _____

Attached Device Information Verified: Yes ☐ No ☐ ***If no, please provide updated implant documentation for MRI staff to review.***

Though it is safe to perform the MRI exam(s), please be aware that per the device manufacturer, "the MRI scan may impact the sensing circuitry of the Reveal LINQ device which may corrupt the recorded data in the device or could cause false event detection and recording of inappropriate data."

Please take into consideration the need for the data on the patient's device to be obtained by the Cardiology office prior to the patient's MRI exam(s).

After the patient's appointment, the following is recommended by the device manufacturer:

Cardiology Responsibilities after the MRI Scan:

After a radiologist performs the MRI scan, Medtronic recommends that a clinician review the patient's data for inappropriately collected episodes that may have occurred during the MRI scan. The data can be collected at the clinician's convenience through a programmer interrogation or by the patient through manual interrogation with the patient's home monitor (for example, the MyCareLink patient monitor).

MRI Procedure approved: Yes ☐ No☐ **If no, please specify reason:* _____

Cardiologist Signature: _____ Date: ___/___/_____

Printed Cardiologist Name: _____

Please fax completed form(s) to MRI Scheduling at (833) 233-4655
For questions please call (707) 269-4265

Form Faxed: ___/___/_____ Scheduler's Name: _____

Cardiology Approval Form for MR Conditional Inserted Cardiac Monitor (ICM)

MEDTRONIC DX AND XT MODELS

Dear Dr. _____,

Patient: _____ DOB: ___/___/_____ is scheduled to have an MRI exam performed on: ____/____/_____ at our imaging facility at: _____am/pm. Per the manufacturer's MRI Conditions For Use and the exam(s) ordered, this patient's Reveal ICM device does not pose a significant risk of hazard to the patient in our MRI environment. However, this device has not been tested for interaction with other implants. Please list all other known implants (stents, pacing wires, etc.) and verify that the patient's device matches the attached name and model, has not been revised, and provide the implant date.

Device name: _____ Model: _____
Date Implanted: ___/___/_____ Other known implants: _____

Attached Device Information Verified: Yes ☐ No ☐ ***If no, please provide updated implant documentation for MRI staff to review.***

Though it is safe to perform the MRI exam(s), please be aware that per the device manufacturer, "the MRI environment may interfere with the device's capability to detect irregular heart rhythms, and therefore, diagnostic information collected during the MRI procedure may be corrupted."

Prior to and after the patient's appointment, the following is recommended by the device manufacturer:

Cardiology Responsibilities Before and After the MRI Scan:

Before the exam(s), check that the data in the Reveal DX/XT has been saved. Before the MRI procedure is started, the data stored in the Reveal DX/XT must be read out and saved to a diskette using the programmer. The MRI procedure might corrupt the recorded data in the Reveal DX/XT.

After the MRI procedure is complete, check the programmed parameters of the Reveal DX/XT using the programmer. Clear the data collected during the MRI procedure because the MRI procedure might temporarily have affected the event detection and recording of the Reveal DX/XT. *Note: The Cardiac Compass trend data cannot be cleared and might show irregularities at the time of the MRI operation.*

MRI Procedure approved: Yes ☐ No ☐ **If no, please specify reason:* _____

Cardiologist Signature: _____ Date: ___/___/_____

Printed Cardiologist Name: _____

Please fax completed form(s) to MRI Scheduling at (833) 233-4655
For questions please call (707) 269-4265

Form Faxed: ___/___/_____ Scheduler's Name: _____

STEALTH PROTOCOL

- Pre-Surgery Dr. Aryanpur
- Office will call and set up MRI request; if same day as surgery, schedule at SJH. Otherwise may be performed at OIC
- Office will provide time for patient's surgery
- MRI is generally done immediately prior to surgery on the same day as surgery; sometimes it is done days ahead of surgery
- MRI Stealth protocol has preference; if another patient is schedule in the requested time slot, then the patient will need to be rescheduled to another time to allow the Stealth patient to proceed
- If patient has a SA# already for that day, then use that SA# to schedule the MRI for the patient
- When scheduling patient, use (IN) not (CLI) if patient does not yet have a SA# (IN) yet
- Inform the techs ahead of time (preferably 24 hours prior) of the Stealth exam

CARDIAC PROTOCOL (MRI)
THIS IS CURRENTLY NOT OFFERED AT SJE

MRI Cardiac

- Scheduling will contact Melanie at the office (269-1506) prior to scheduling a MRI Cardiac to assure Dr. Kabbani is available
- Dr. Kabbani will be in imaging department for each MR Cardiac study performed per his request
- MR Cardiac studies may be scheduled Thursday between 900 - 1500
- If two patients scheduled, there should be a 45 min gap between them to allow for ER/Inpts with a maximum 2 cardiac patients per day
- Resources needed per MR patient:
    - Cardiologist 2.25 hours
    - Radiologist may need 30 mins at start of scan
    - MR Tech 135 mins
    - Imaging Nurse 135 mins
- Patient instructions will be given to patient by the Cardiology office

Pellets, Bullets, and Shrapnel

The majority of pellets and bullets tested in the MR environment were found to be composed of nonferromagnetic materials, however, these Items are often "contaminated" by ferromagnetic metal. Ammunition that proved to be ferromagnetic tended to be manufactured in foreign countries and/or used for military applications. Shrapnel typically contains steel and, therefore, presents a potential hazard for patients undergoing MR procedures.

Because pellets, bullets, and shrapnel are frequently contaminated with ferromagnetic materials, the risk versus benefit of performing an MR procedure should be carefully considered. Additional consideration must be given to whether the metallic object is located near or in a vital anatomic structure, with the assumption that the object is likely to be ferromagnetic and can potentially move.

In an effort to reduce lead poisoning in "'puddling" type ducks, the federal government requires many of the eastern United States to use steel shotgun pellets instead of lead. The presence of steel shotgun pellets presents a potential hazard to patients undergoing MR procedures and causes substantial imaging artifacts at the immediate position of these metallic objects.

In one case, a small metallic BB located in a subcutaneous site caused painful symptoms in a patient exposed to an MR system, although no serious injury occurred. Accordingly, MR healthcare professionals should exercise caution when deciding to perform MR procedures in patients with pellets, bullets, shrapnel or other similar ballistic objects.

Smugar, et al. (1999) conducted an investigation to determine whether neurological problems developed in patients with intraspinal bullets or bullet fragments In association with MR imaging performed at 1.5-Tesla. Patients were queried during scanning for symptoms of discomfort, pain, or changes in neurological status. Additionally, detailed neurological examinations were performed prior to MRI, post MRI, and at the patients' discharge. Based on these findings, Smugar, et al. concluded that a patient with a complete spinal cord injury may undergo MR imaging with an intraspinal bullet or fragment without concern for affects on the physical or neurological status. Thus, metallic fragments in the spinal canals of paralyzed patients are believed to represent only a relative contraindication to MR procedures,

Eshed, et al. (2010) conducted a retrospective investigation of the potential hazards for patients undergoing MRI at 1.5-Tesla with retained metal fragments from combat and terrorist attacks. Metallic fragments in 17 patients were in ranged in size between one and 10mm. One patient reported a superficial migration of a 10mm fragment after MRI. No other adverse reaction was reported. The authors concluded that 1.5-Tesla MRI examinations are safe in patients with retained metallic fragments from combat and terrorist attacks not in the vicinity of vital organs. However, caution is advised as well as an assessment of risk versus benefit for the patient.

Dedini, et al. (2013) studied bullets and shotgun pellets that were a representative sample of ballistic objects commonly encountered in association with criminal trauma using 1.s-1 3- and 7-Tesla MR systems. The findings indicated that non-steel containing bullets and pellets did not exhibit substantial magnetic field interactions at 1.5-, 3-, and 7-Tesla, and that both steel-containing and non-steel-containing bullets did not significantly heat, even under extreme MRI conditions at 3-Tesla. Steel-containing bullets were potentially unsafe for patients referred for MRI due to their potential to move in vivo, although this recommendation must be interpreted on a case-by-case basis with respect to the restraining effect of the specific tissue environment, time In situ, proximity of vital or delicate structures, and with careful consideration given to the risk versus benefit for the patient.
http://www.mrisafety.com/SafetyInfov.asp?SafetyInfoID=192

MRI TECHNOLOGIST OUTPATIENT DEVICE REVIEW FORM

Section to be <u>completed</u> by Scheduler:

PATIENTS NAME: _____ **DOB:** _____

PROCEDURE: _____ **IV:** ☐ **WITH** ☐ **WITHOUT**

HISTORY/DIAG: _____

REFERRING MD: _____ **PH#** _____

DEVICE INFO: _____

Scheduler's initials: _____ **Ext.** _____ **Date:** _____

Attached Documents for Review: check all appropriate boxes
Order ☐ **OP Reports** ☐ **Implant Records** ☐ **H&P** ☐ **Chart notes** ☐ **Other** ☐

Section to be <u>completed</u> by MRI Technologist:

A. DEVICE LABELING by manufacturer defined by ASTM MR Safety Standards (Check one**)**

☐ MR SAFE 

☐ MR CONDITIONAL 

☐ MR UNSAFE **<u>Do not schedule</u>!** 

B. FOR MR CONDITIONAL DEVICES ONLY

☐ Verified manufacturer's MRI conditions for use meet ***<u>ALL</u>*** requirements for requirements for MRI(s) ordered

<u>OIC GE 1.5T</u>: Max. Spatial Gradient 1240 G/cm (12.4 T/m)
<u>SJH Toshiba 1.5T</u>: Max. Spatial Gradient 523 G/cm (5.23 T/m)

C. APPROVED FOR MRI YES ☐ **NO** ☐

If no, reason: _____
☐ **OIC GE 1.5T** ☐ **SJH TOSHIBA 1.5T** ☐ **BOTH 1.5T UNITS**

SPECIAL INSTRUCTIONS: _____

_____

_____

MRI Tech Name: _____ **Date:** _____

St. Joseph Health
St. Joseph Redwood Memorial

RADIOLOGIST / SPECIALIST APPROVAL REQUEST FORM

Section to be completed by Scheduler:

PATIENT'S NAME:_____ **DOB:** _____

PROCEDURE: _____

HISTORY/DIAGNOSIS: _____

REFERRING PROVIDER:_____ **PH:** _____

COMMENTS: _____

_____

Scheduler's Initials:_____ **Date:**_____ **Extension:** _____

Attached Documents for Review: check all appropriate boxes

Order ☐ **OP Reports** ☐ **Labs** ☐ **Implant Records** ☐ **H&P** ☐ **Chart notes** ☐ **Other** ☐

☐ ****FOR THIS INSURANCE, AUTHORIZED EXAM IS THE *ONLY* EXAM PAID****

Section to be completed by Radiologist / Specialist:

EXAM APPROVED AS ORDERED? YES ☐ NO ☐

- ☐ **Modified as below (complete "Special Instructions")**
- ☐ **Without IV Contrast**
- ☐ **With IV Contrast Only (specify reason if MRI: _____)**
- ☐ **With & Without Contrast**
- ☐ **Intra-Articular Contrast**

If CT Abdomen/Pelvis Exam use Oral Contrast? YES ☐ NO ☐

If MRI Abdominal IV, which Contrast to use? Gadavist ☐ Eovist ☐

If NOT approved as ordered, specify reason: _____

_____

_____

Referring Provider Notified **YES** ☐ **NO** ☐

Special Instructions: _____

_____

_____

RAD/SPECIALIST INITIALS:_____ **DATE:**_____

FAX COMPLETED FORM TO OUTPATIENT SCHEDULING/PREAUTH @ 707-445-3200

SCHEDULER'S MRI ORDER READINESS CHECKLIST

Patient Name: _____ DOB: _____ Exam(s): _____

Pt Height: _____in/ft Pt Weight: _____lbs *Record patient height & weight in Meditech scheduler notes

The following elements are required for a valid order: Please include only the most recent/corrected order for review* To check off completed tasks, double click check box and change "default value" to "checked."

- Patient's first and last name and date of birth match the name & DOB in hospital electronic medical records.
- Name and title/certification of the ordering Licensed Independent Practitioner (LIP), LIP signature (may be electronic), and date of order (orders are valid from one year of date).
- Name of test. Signs/symptoms/diagnosis. Anatomical location of study: side and body part (i.e. right hand is adequate vs right upper extremity is too vague).
- Symptoms/indications are appropriate to exam ordered per the "Ordering Guidelines". Review and incorporate and/or seek clarification of the order comments. i.e.: only one test is ordered but the comments specify that they actually want two, or extended anatomical coverage requiring an updated clarified order and additional timeslot, comments may specify one facility is more appropriate than the other (metal suppression techniques, patient needs propeller, patient is claustrophobic), etc.

Order has all elements required for to be valid? Yes ☐ NO ☐

General Considerations:

Does pt. have prior images/reports? **YES ☐ NO ☐** Requested date: _____ Facility: _____

☐ Order and supporting documents (**prior reports & images**, specialized protocol requests, labs, H&P) labeled in Echart

☐ Patient is scheduled at the correct facility based on their exam type and body habitus.

☐ Pts. over 250 lbs., with mobility issues, seizure hx, or other risk conditions are not scheduled during one tech timeslots.

☐ Exam scheduled into appropriate number of timeslots with appropriate MRI staff (i.e. breast) based on exam type.

☐ *"Radiologist/Specialist Approval Request Form"* or *"Request for Additional Images"* in Echart. **YES ☐ NO ☐ N/A ☐**

☐ "*MRI Technologist Device Review Form*" and implant verification documents in Echart. **YES ☐ NO ☐ N/A ☐**

☐ *"Cardiologist Approval Form"* in Echart. **YES ☐ NO ☐ N/A ☐**

☐ All parties (Radiologist, Radiology Nurse, Cardiology Representative, Lift Team, Surgery, etc.) scheduled for exams that require coordination between departments (Arthrogram, pacemaker, anesthesia case, port-a-cath access, etc.). Scheduler notes verifying this is done and tech notified. **YES ☐ NO ☐ N/A ☐**

☐ Patient given prep instructions (fasting, dress without metal, no jewelry, meds for claustrophobia if needed, etc.).

Additional Considerations for Contrast orders: MRI is rarely done with contrast only. Some specific circumstances where this would be appropriate would be: Patient recently had non-contrast exam of same body part and the Radiologist has requested they return for contrast, Arthrogram, certain angiograms, or surgical/treatment planning. Ask a Radiologist or Technologist if uncertain of need for correction. Technologist ext. SJH: 6576; Radiologist Assistant ext. 6143

☐ eGFR per *"Intravascular Contrast Guidelines for MRI" in Echart* **YES ☐ NO ☐ N/A ☐**Date: _____ eGFR: _____

☐ Patient has not had MRI contrast in at least the last 24 hours preceding their MRI exam.

☐ Patient is not allergic to MRI contrast. *"Radiologist/Specialist Approval Request Form"* completed if hx of Gadolinium allergy and exam scheduled in appropriate two-tech slot. **YES ☐ NO ☐ N/A ☐**

☐ Contrast exams are only scheduled when a Radiologist is on-site if at OIC (not applicable at SJH).

☐ *"Specialist Approval For use of Contrast Form"* for pregnant or patients with renal insufficiency, as per the *"Intravascular Contrast Guidelines for MRI"* obtained after approval of exam by Radiologist. Both documents in Echart if applicable. **YES ☐ NO ☐ N/A ☐**

*All above forms and document should be in Echart and appropriately labeled prior to completion of this checklist.

Scheduler initials: _____ Date checklist completed & placed in Echart: _____ Revised on: _____

Approval Signatures

Approver:	Reviewed Date:
Dr. Donald Wheeler, MD: Medical Director of Diagnostic Imaging	
Laurie Watson-Stone: VP of RMH Operations & Area Patient Experience	
Jason Gildersleeve: Area Director of Imaging Services	2/24/2021
Jonathan Adams: Area Manager of Imaging Services	2/24/2021