

UT Southwestern Department of Radiology

MRI Thorax Protocols - Last Updated: 1/20/2017

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> | <u>Sagittal</u> |
|----------------------|---|---|---|----------------|---------------------|
| Anterior Mediastinum | Thymoma Myasthenia Gravis Anterior Mediastinal Mass | Breath Holds and Cardiac Gating When Possible Phase Encoding Direction Right to Left Will Help Limit Cardiac Motion Over the Anterior Mediastinum | Dual Phase T1 GRE In/Opposed Phase T2 sTSE / HASTE non-fat sat T2 sTSE / HASTE fat sat bFFE / TRU-FISP Pre eTHRIVE / VIBE Post eTHRIVE / VIBE | | Post eTHRIVE / VIBE |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>** Coronal or Sagittal</u> |
|----------------------|-------------------------------------|--|---|--------------------------------|
| Chest Wall - General | Chest Wall Mass, Cyst, Other Lesion | Do Not Make Phase Encoding Gradient AP Prone Positioning if Possible (Decreases Motion) - Otherwise will Require Good Breath Hold ** Radiologist to designate 2nd plane based on location of the lesion. | T1 non-fat sat T1 fat-sat T2 ssFSE fat sat DWIBS (b=800) Post T1 FS | STIR Post T1 FS |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> | <u>Sagittal</u> |
|-----------------|-------------------------------|---|---|----------------|------------------------------|
| Breast | Breast Abscess Breast Mass | Do Not Make Phase Encoding Gradient AP Prone Positioning if Possible (Decreases Motion) - Otherwise will Require Good Breath Hold | STIR T1 FSE T1 SPIR Post T1 SPIR | | STIR Post T1 SPIR |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> | <u>Sagittal</u> |
|-----------------|--|--------------|---|----------------|-----------------|
| Paraspinal | Paraspinal Neuroblastic Tumors Paraspinal Infection | Spine Coil | Standard Thoracic Spine Protocol Change Order To Spine MRI | | |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> | <u>Sagittal</u> |
|-----------------|--------------------|---------------------------------------|----------------|----------------|-----------------|
| Pectus | Pectus Excavatum | FoV = Top of Heart through Lung Bases | bTFE / TRUFISP | | |

MRI Abdomen Protocols - Last Updated: 03/29/2018

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|-----------------|---|--------------|---|---|
| Liver - General | General Liver Applications Initial Liver Lesion Characterization Cirrhosis / LIRADS | | Dual T1 FFE In/Opposed T2 FS (not single shot) bFFE DWIBS (b=800) Dynamic eTHRIVE Continuous Through 3 Minutes Post T1 FS 5 min | T1 FS T2 ssFSE non-fat sat Post T1 FS 5 min |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|-----------------|--|---|--|--|
| Liver - Eovist | Liver Lesion Problem Solving FNH, Adenoma, Metastases Biliary Disease Duct Injury/Leak, PSC, Biliary Mass | If MRCP done for Biliary Indications then MRCP is done prior to contrast | Dual T1 FFE In/Opposed bFFE Dynamic eTHRIVE Continuous Through 3 Minutes Post T1 FS 5 min T2 FS (not single shot) DWIBS (b=800) Post T1 FS 20 min Post T1 FFE In Phase | 3D/Radial MRCP (Optional) T2 ssFSE non-fat sat Post T1 FS 25 min |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|-----------------|--------------------|---------------------------|--|--|
| MRCP | Biliary Disease | NPO 4 hours prior to exam | Dual T1 FFE In/Opposed T1 FS T2 FS (not single shot) | T2 ssFSE fat sat bFFE 3D MRCP Radial MRCP |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|-----------------|--|--|--|---|
| MRCP - Secretin | Pancreatic Ductal Anomalies Pancreatic Ductal Injury Pancreatic Ductal Fistula Chronic Pancreatitis | NPO 4 hours prior to exam Secretin = 0.2 ug/kg, Inject over 1 min | Dual T1 FFE In/Opposed T1 FS T2 FS (not single shot) | T2 ssFSE fat sat bFFE Dynamic Secretin MRCP (Pre, every 30 secs for 10 mins) Radial and 3D MRCP (After Dynamics) |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|-----------------|--|--|---|--|
| Pancreas | Pancreatic Mass Pancreatitis / Necrosis Pseudocyst | On Axial, FoV just through Pancreas Need Good Breath Holds ≤ 3 mm slice thickness, 10% gap | Dual T1 FFE In/Opposed T2 FS (not single shot) DWIBS (b=800) Dynamic eTHRIVE Continuous Through 3 Minutes | T1 SPIR T2 ssFSE non-fat sat Delayed eTHRIVE |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|-----------------|----------------------------------|---|---|---|
| Adrenal | Adrenal Mass Adrenal Hematoma | Small FoV, Localized to Adrenals As small a voxel size as possible | Dual T1 FFE In/Opposed T1 SPIR T2 FS (not single shot) DWIBS (b=800) Post T1 FS | T1 FFE In Phase T2 ssFSE non-fat sat Post T1 FS |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|-----------------|--|--|---|--|
| Renal | Renal Mass / Wilm's Renal Cyst Renal Abscess | Optional: If concern for RV Thrombus | Dual T1 FFE In/Opposed T2 FS (not single shot) bFFE DWIBS (b=800) Post T1 FS - 2 min Delayed eTHRIVE 5 min | T1 FS T2 ssFSE non-fat sat Post T1 FS - 5 min Dynamic eTHRIVE Continuous Through 3 Minutes |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|-----------------|--|--------------|--|---|
| Body - General | Known Mass, Unknown Origin Screening / Potential Mass Neuroblastoma follow up Desmoid Tumor Mesenteric Tumor General Use / Survey | | Dual T1 FFE In/Opposed T2 FS (not single shot) bFFE DWIBS (b=800) Post T1 FS | T1 FS T2 ssFSE non-fat sat Post T1 FS |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|-----------------|------------------------|-------------------------------------|---|---|
| Appendix | Suspected Appendicitis | FoV = Top of Kidneys Through Pelvis | T2-W ssFSE (No Fat Sat) T2-W ssFSE Dixon Fat Sat | T2-W ssFSE (No Fat Sat) T2-W ssFSE Dixon Fat Sat |

MRI Pelvis Protocols - Last Updated: 9/2/2015

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> | <u>Sagittal</u> |
|-----------------|--------------------|----------------|--|---|----------------------|
| Pelvis - Adnexa | Adnexal Lesion | Do not oblique | T1 FSE T2 SPIR DWIBS Post T1 SPIR | T1 SPIR T2 ssFSE non-fat sat Post T1 SPIR | T2 ssFSE non-fat sat |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> | <u>Sagittal</u> |
|----------------------|---------------------|---|------------------------------------|--|----------------------|
| Pelvis - Gynecologic | Mullerian Anomalies | Survey FoV = Top of Kidneys to Perineum FoV = Top of Uterus to Perineum Cor Obl = Along Axis of Uterus (Not Vagina) Ax Obl = Perpendicular to Axis of Uterus | T1 FSE Obl T2 ssFSE non-fat sat | Survey T2 ssFSE fat sat T1 SPIR Obl T2 ssFSE non-fat sat | T2 ssFSE non-fat sat |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> | <u>Sagittal</u> |
|--------------------------|--|----------------------------|---|----------------|-------------------------------------|
| Sacroccygeal Teratoma | Teratoma - Pre-Surgery Teratoma - Follow-Up | Small FoV, High Resolution | T2 FSE T2 SPIR T1 SPIR DWIBS Post T1 SPIR | | T2 SPIR Post T1 SPIR |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> | <u>Sagittal</u> |
|------------------|--------------------|---|------------------------------------|--------------------------|----------------------|
| Anal Musculature | Anatomy | ≤ 2 mm slice thickness Cor Obl = Along Axis of Rectum Ax Obl = Perpendicular to Axis of Rectum Small Caliber Foley Catheter containing Water Placed within the Rectum | T1 FSE Obl T2 ssFSE non-fat sat | Obl T2 ssFSE non-fat sat | T2 ssFSE non-fat sat |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> | <u>Sagittal</u> |
|----------------------|--------------------|--------------|--------------------------------|----------------------|----------------------|
| Cloacal Malformation | Anatomy | | T1 FSE T2 ssFSE non-fat sat | T2 ssFSE non-fat sat | T2 ssFSE non-fat sat |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> | <u>Sagittal</u> |
|-----------------|---------------------------------|--|---|----------------------------|----------------------------|
| Bladder | Bladder Anatomy Bladder Mass | Bladder Should Be Moderately Full - Empty Bladder Often Causes Non-Diagnostic Study Foley (No Balloon) for Sedated Cases (Clamp Foley Prior to Imaging. Foley allows control of bladder volume. Can drain urine or add saline as necessary) | T1 SPIR T2 SPIR DWIBS Post T1 SPIR | T2 FSE Post T1 SPIR | T2 FSE Post T1 SPIR |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> | <u>Sagittal</u> |
|---------------------|--------------------|---|---|--|-----------------|
| Perianal / Perineal | Abscess / Fistula | FoV - Between Medial Walls of Acetabula *** Orientation of Axial / Coronal Obliques (See Figures Below) | Obl T2 FSE Obl T2 SPIR Obl Ax T1 FSE Obl DWIBS Obl Post T1 SPIR | Obl T2 ssFSE non-fat sat Obl Post T1 SPIR | T2 SPIR |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> | <u>Sagittal</u> |
|--------------------|-------------------------|---|---|---|----------------------|
| Scrotal / Perineal | Scrotal / Perineal Mass | Full Abd/Pelvis FoV, ≤ 3 mm slice thickness Perineal FoV for rest of the exam | T2 ssFSE fat sat Ax T1 SPIR DWIBS Post T1 SPIR | T1 FFE In Phase (Large FoV) T2 ssFSE non-fat sat Post T1 SPIR | T2 ssFSE non-fat sat |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> | <u>Sagittal</u> |
|-----------------|--|--------------|--|---|-----------------|
| Body - General | Known Mass, Unknown Origin Screening / Potential Mass Neuroblastoma follow up Desmoid Tumor Mesenteric Tumor General Use / Survey | | Dual T1 FFE In/Opposed T2 FS (not single shot) bFFE DWIBS (b=800) Post T1 FS | T1 FS T2 ssFSE non-fat sat Post T1 FS | |

Axial and Coronal Oblique Orientations for Perianal Fistula Protocol

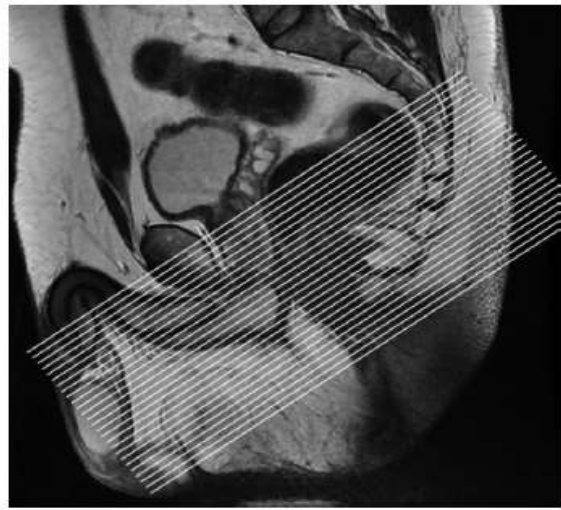


Figure 4. Suggested orientation for axial MR imaging of the anal canal. Sagittal T2-weighted image through the midline is used to obtain images that are truly axial relative to the anal canal.

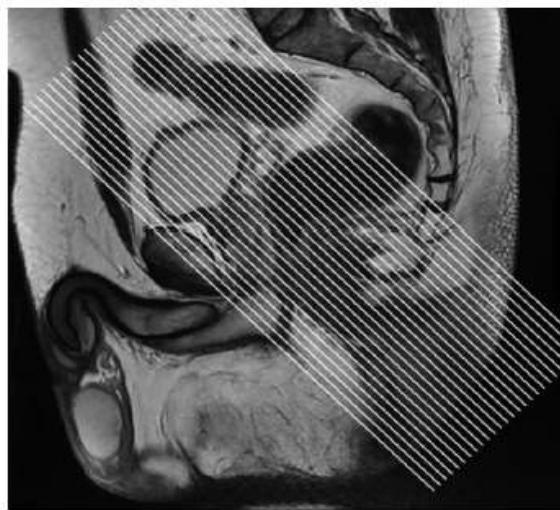


Figure 5. Suggested orientation for coronal MR imaging of the anal canal. Coronal MR imaging is performed at 90° relative to the axial plane to obtain images parallel to the long axis of the anal canal.

MRI Enterography Protocol - Last Updated: 1/23/2019

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|------------------------|----------------------------|--|---|--|
| MR Enterography | IBD Small Bowel Disease | <p>Metoclopramide IV X1, Administered Prior to Drinking</p> <p>10-14 kg = 1 mg 15-19 kg = 2 mg 20-29 kg = 3 mg 30-60 kg = 5 mg > 60 kg = 10 mg</p> <p>Oral Contrast: Dose = 20 ml/kg up to 1000 ml</p> <p>Non-Sedate: Prefer dose is drank steadily over 1 hour Sedate: Administer dose steadily over 1 hour</p> <p>Glucagon: Split dose, 1 prior to start of imaging, 1 prior to IV contrast imaging. Give slowly over 3-5 minutes. Optimally, administer into slow IVF line. Start imaging during administration. < 20 kg: 0.25 mg both doses > 20 kg: 0.50 mg both doses</p> | <p>Call MD to Check for Adequacy of Small Bowel Contrast</p> <p>T2 HASTE fat sat TRUFISP DWIBS (b=800)</p> <p>Delayed Post T1 Dixon Only Send In-Phase and Water Selective (Fat Sat) Images</p> <p>Please compose all "upper" and "lower" axial images into 1 series.</p> | <p>T2 HASTE fat sat</p> <p>TRUFISP</p> <p>Dynamic VIBE Pre, 20, 50, 90, 120 sec</p> <p>Delayed Post T1 Dixon</p> |

MRI Urography Protocol - Last Updated: 4/3/2018

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Sequences</u> |
|------------------------------|---------------------------|--|---|
| MR Urography w/o Contrast | | <p>Foley</p> <ul style="list-style-type: none">- All Patients Need A Foley Catheter- Balloon Not or Minimally Inflated- Secure Well To Avoid Dislodging During Patient Transfers- Open (Bag Lower than Patient) During Hydration- Clamp Foley During Transfer To MRI- Bladder Should Be Partially Filled, But Not Fully Distended For 1st MRI Sequence <p>Hydration</p> <ul style="list-style-type: none">- Bolus<ul style="list-style-type: none">- 10 ml/kg NS IV Bolus Over 30-40 minutes- Maintenance<ul style="list-style-type: none">- 4 ml / kg NS IV Per Hour for 1st 10 kg- 2 ml / kg NS IV Per Hour for next 10 kg- 1 ml / kg NS IV Per Hour For Each kg Above 20 <p>Furosemide (Lasix)</p> <ul style="list-style-type: none">- 1 mg/kg IV Up To A Maximum Dose Of 20 mg <p>Positioning</p> <ul style="list-style-type: none">- Supine, Hands Above Head If Possible <p>Craniocaudal FoV = Diaphragms through Perineum</p> <p>Coronal Images:</p> <ul style="list-style-type: none">- Obliqued To Plane Of Kidneys (From Sagittals)- Anterior FoV Must Include The Aorta- Posterior FoV Must Include The Anterior Rectum | <p>Axial T2 FSE fat-sat, 3 mm slice</p> <p>UNCLAMP FOLEY CATHETER ADMINISTER LASIX</p> <p>Sagittal T2 ssFSE fat-sat, 3 mm slice</p> <p>Coronal T2 ssFSE fat-sat, 3 mm slice</p> <p>Coronal Obl 3D Heavily Weighted T2 Urogram high resolution, isometric voxels</p> <p>Axial T2 FSE fat-sat, 1 mm slice (bladder dome through perineum)</p> |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Sequences</u> |
|-----------------------------|--------------------|---|---|
| MR Urography w/ Contrast | | <p>Foley</p> <ul style="list-style-type: none"> - All Patients Need A Foley Catheter - Balloon Not or Minimally Inflated - Secure Well To Avoid Dislodging During Patient Transfers - Open (Bag Lower than Patient) During Hydration - Clamp Foley During Transfer To MRI - Bladder Should Be Partially Filled, But Not Fully Distended For 1st MRI Sequence <p>Hydration</p> <ul style="list-style-type: none"> - Bolus <ul style="list-style-type: none"> - 10 ml/kg NS IV Bolus Over 30-40 minutes - Maintenance <ul style="list-style-type: none"> - 4 ml / kg NS IV Per Hour for 1st 10 kg - 2 ml / kg NS IV Per Hour for next 10 kg - 1 ml / kg NS IV Per Hour For Each kg Above 20 <p>Furosemide (Lasix)</p> <ul style="list-style-type: none"> - 1 mg/kg IV Up To A Maximum Dose Of 20 mg - Administered IV 15 Minutes Prior To Contrast Administration and Dynamic Imaging <ul style="list-style-type: none"> - This Will Be During T2 Weighted Image Acquisition <p>Positioning</p> <ul style="list-style-type: none"> - Supine, Hands Above Head If Possible <p>Contrast</p> <ul style="list-style-type: none"> - 0.1 mmol/kg With A Maximum Of 20 ml - Power Injector With Infusion Rate Of 0.1 ml/sec - 12 ml Saline Flush <p>Craniocaudal FoV = Diaphragms through Perineum</p> <p>Coronal Images:</p> <ul style="list-style-type: none"> - Obliques To Plane Of Kidneys (From Sagittals) - Anterior FoV Must Include The Aorta - Posterior FoV Must Include The Anterior Rectum | <p>Axial T2 FSE fat-sat, 3 mm slice</p> <p>UNCLAMP FOLEY CATHETER</p> <p>Sagittal T2 ssFSE fat-sat, 3 mm slice</p> <p>ADMINISTER LASIX</p> <p>Coronal T2 ssFSE fat-sat, 3 mm slice</p> <p>Coronal Obl 3D Heavily Weighted T2 Urogram high resolution, isometric voxels</p> <p>Pre/Post Dynamic eTHRIVE (2-3 mm slice) —Include 5 Pre-Contrast Phases (Approximately 1 minute) —Acquire Continuous Dynamic Volumes For 10 Minutes —Should Be >60 Volumes —Each Volume Should Take 8-10 Seconds —Process MIP For Each Volume And Join The MIPs Into 1 Series</p> <p>Delayed Axial, Sagittal, Coronal eTHRIVE (after 12 minutes)</p> <p>Dynamic Coronal VIBE images (3 sets of dynamics over 20 min) Acquire every 30 seconds for 5 minutes Acquire every 60 seconds for the next 5 minutes Acquire every 120 seconds for the next 10 minutes (Last set can be omitted if contrast has filled both renal collecting systems by 10 minutes)</p> <p>Delayed Axial, Sagittal, Coronal T1-W fat sat</p> |

MRI Vascular Protocols - Last Updated: 10/24/2017

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|--------------------------------|--------------------|---|----------------|---|
| Vascular Access w/ Contrast | Venous Patency | Same Protocol for Upper and Lower Extremities Breath hold for Upper Extremity 3 second temporal resolution | bTFE / TRUFISP | bTFE / TRUFISP Dynamic Post-Contrast TWIST |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|---------------------------------|---|---------------------------------|--|---------------------|
| Vascular Access w/o Contrast | Venous Patency Only use if there is a contraindication to contrast | Upper Extremity Breath Holds | bTFE / TRUFISP (BH) 2D ToF MRV Lower Neck to Heart | bTFE / TRUFISP (BH) |
| | | Lower Extremity | bTFE / TRUFISP 2D ToF MRV Bifurcation to Proximal Thighs | bTFE / TRUFISP |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|-----------------|---|--------------------------|---------------------------------|---|
| Vascular Ring | Known or Suspected Vascular Ring Posterior Esophageal Impression | ** Use Cardiac Sequences | White Blood Cine Black Blood | White Blood Cine Dynamic Post-Contrast TWIST |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|-----------------|--|---|----------------------------------|--|
| Hypertension | Renal / Aortic Vascular Hypertension Renal Artery Stenosis | FoV = Aortic Arch Through Iliac Vessels Coronal bTFE: ≤ 3 mm slice thickness and 50% Overcontiguous Ablavar Contrast | bTFE Delayed Post eTHRIVE | bTFE Dynamic Post eTHRIVE Pre, 15, 30, 60, 90, 120 sec Delayed Post eTHRIVE |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|------------------------|-------------------------------|--|----------------------------------|--|
| Portal Vein Thrombosis | Assess Portal Vein Patency | Ablavar Contrast Axial FoV = Liver Dome through Liver Tip | bTFE Delayed Post eTHRIVE | bTFE Dynamic Post eTHRIVE Pre, 15, 30, 60, 90, 120 sec Delayed Post eTHRIVE |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|----------------------------|--------------------|--------------------|--------------------------|----------------------|
| Vasculitis (incomplete) | | Must designate FoV | T1 (non-fat sat) STIR | Dynamic Post eTHRIVE |
| | | | Post T1 fat sat | Post T1 fat sat |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|----------------------------------|--|--|-----------------|-----------------|
| Pre-Renal Transplant Vascular | Assessment of Vascular Anatomy Prior To Renal Transplant | FoV = Base of the Heart through Common Femoral Vessels NO CONTRAST TO BE GIVEN | bTFE (TRU-FISP) | bTFE (TRU-FISP) |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal or Sagittal (2nd Plane)</u> |
|--------------------------|-------------------------------------|---|--|---|
| Vascular Malformation | Vascular malformation Hemangioma | ** 2nd planes required when the lesion involves the following areas: ** Coronal = Chest / Abd / Pelvic Wall , Intra-thoracic / abdominal / pelvic , Involves the Hip Joints ** Sagittal = Involves the Axilla, Shoulder, Knee, or Ankle | STIR T1-W (no FS) Post T1-W FS | ** STIR <u>All Lesions Get Coronal or Sagittal Dynamic Images</u> Dynamic TWIST (Siemens) Dynamic THRIVE (Phillips) <u>Coronal or Sagittal (2nd Plane)</u> ** Post T1-W FS |

| <u>Protocol</u> | <u>Indications</u> | <u>Notes</u> | <u>Axial</u> | <u>Coronal</u> |
|-----------------|--|---|--------------|----------------|
| Thoracic Duct | Thoracic Duct Anomaly Chylous Effusions | FoV = Base of Neck Through Iliac Vessels As high resolution as possible Can use multiple imaging stations | | MRCP |

Sagittal

Sagittal
2D ToF MRV
Bilateral Subclav

Sagittal

Sagittal

Sagittal

Sagittal

Sagittal

Sagittal