UAB MEDICINE

Location(s) of protocol or standing order use:
Location(s) of protocol use: UAB Medicine Clinical Facilities as defined by the UAB Medicine Medical & Dental Staff Bylaws

Contrast Media Protocol

Implementation Criteria: The referring physician order for the exam/procedure serves as the order to Initiate protocol.

Locations of Protocol Use: UAB Medicine and Clinical Facilities administering contrast media for testing performed as ordered by the Department of Radiology.

Personnel Authorized to Implement: Radiologic Technologists and all Registered Nurses who have been trained in the use of this protocol.

Prior to the Start of the Procedure:

1. Check and verify the patient's allergies. If the patient's prior reaction(s) was/were mild and have received the appropriate premedication, the technologist can proceed with exam without consulting the Radiologist. All prior moderate, severe, indeterminate reactions, or deviations from the routine premedication protocol should be consulted with a Radiologist.
2. If the procedure requires intravenous (IV) access and the patient does not have IV access, place an IV.
3. If the patient is of child bearing age (12-50) and there is a possibility of pregnancy, a pregnancy test should be obtained for exams requiring/assessing pregnancy status and consent.
4. Ambulatory Locations:
   - If no lab value is available upon arrival to the Radiology department, a serum creatinine and eGFR will be performed in the department with the use of I-stat equipment provided by UAB Bedside Testing. The referring physician order for the exam/procedure serves as the order to initiate necessary labs to perform the requested exam/procedure.
5. MRI
   - Obtaining the eGFR is no longer required prior to contrast administration.
6. CT:
   - Estimated glomerular filtration rate (eGFR)
     - If the patient's eGFR is <30 mL/minute or if there is an increase in serum creatinine of 0.2 mg/dL or greater with the previous 48 hours, notify the radiologist. The radiologist will determine how to proceed.
   - Review the patient's medication history to determine if they are currently taking metformin.
     - In patients with no evidence of AKI (acute kidney injury) and with eGFR ≥30 mL / min/1.73m2, there is no need to discontinue metformin either prior to or following the intravenous administration of iodinated contrast media, nor is there an obligatory need to reassess the patient's renal function following the test or procedure.
     - In patients taking metformin who are known to have acute kidney injury or severe chronic kidney disease (stage IV or stage V; i.e., eGFR< 30), or are undergoing arterial catheter studies that might result in emboli (atheromatous or other) to the renal arteries, metformin should be temporarily discontinued at the time of or prior to the procedure, and withheld for

Author: Terri Franklin, Jeff McGough, Ashley Thomas Medical Director: Adam Beck, MD 1/8/25 Medical Director: Mason Frazier, MD 9/5/24 Medical Director Endocrinology: Alexandra Dodd, MD 1/14/25 Vice Chair of Quality and Patient Experience: Samuel Galgano, MD 9/5/24 MRI Modality Chief: Manoj Tanwar, MD 9/11/24 CT Modality Chief: David Summerlin, MD 9/13/24 US Modality Chief: Constantine Burgan, MD 12/17/24 Pharmacy & Therapeutics Endorsement: 1/1/25 Radiology Subcommittee 12/17/24 CNO Endorsement: Terri Poe 1/9/25 Medical Executive Committee Endorsement: 1/21/25 PO#6r2	Cross Reference: Generation of Orders Policy

48 hours subsequent to the procedure and reinstituted only after renal function has been re-evaluated and found to be normal.
- If multiple CT exams with different doses are performed with a single IV contrast dose, the higher approved contrast dose will be given.

7. Refer to the Iodinated Contrast Media Management Policy for guidelines on the safe use and management of iodinated contrast agents.

8. For anything outside the above parameters, contact a radiologist for guidelines.

PROCEDURE: CT ARTHROGRAM

- Shoulder or Hip
  Mix 5 mL of Omnipaque® (Iohexhol) 240, 10 mL of 0.9% sodium chloride, and 5 mL of lidocaine 1% (preservative-free) in a 20 mL syringe. Inject intra-articularly into the joint being imaged.

- Wrist or Ankle
  Mix 5 mL of Omnipaque® (Iohexhol) 240, 10 mL of 0.9% sodium chloride, and 5 mL of lidocaine 1% (preservative-free) in 20 mL syringe. Inject intra-articularly into the joint being imaged.

- Knee
  Mix 5 mL of Omnipaque® (Iohexhol) 240, 10 mL of 0.9% sodium chloride, and 5 mL of lidocaine 1% (preservative-free) in 20 mL syringe. Inject intra-articularly into the joint being imaged.

PROCEDURE: CT CYSTOGRAM

- Dilute 10 mL Omnipaque® (Iohexhol) 350 or Isovue 370 in 500 mL of 0.9% sodium chloride and infuse via Foley catheter prior to imaging.

PROCEDURE: MSK CT

- Administer 100 mL of Omnipaque® (Iohexhol) 350 or Isovue 370 for all MSK indications

PROCEDURE: NEURO CT

EXAM	Omnipaque® (Iohexhol) OR ISOVUE 370
Routine Neuro (Head, Sinus, Orbits, Face)	100 mL
Neck Soft Tissue	100mL • If a soft tissue neck is performed in addition to another IV contrast exam, add 25 mL to the IV dose.
CTA Neck	100 mL • Injection into IV in right arm is possible
CTA Head	100 mL
CTA Head/Neck	100 mL
CTA Perfusion	40 mL

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- For routine exams administer Omnipaque® (Iohexhol) 350 or Isovue 370 prior to imaging as an IV bolus using a mechanical injector or hand injection if patient doesn't have adequate IV access.
- For CTA exams, administer Omnipaque® (Iohexhol) 350 or Isovue 370 prior to imaging as an IV bolus using a mechanical injector.

ENTERIC CONTRAST PROTOCOL

POSITIVE ORAL CONTRAST

Background: Positive enteric contrast for CT imaging improves diagnostic accuracy for some clinical indications. However, use of positive enteric contrast is not needed for all abdominal indications and delays turn-around-time.

Positive Enteric Contrast: Pre-mixed 500 mL (i.e., 16.9 oz.) bottle of Omnipaque® (Iohexhol) 350 oral solution (9 mg iodine/mL).

Route	Indication	Dosage
Oral	Routine	Administer 250 mL 60 min prior to scan and 250 mL 30 min prior to scan.
Oral	Bariatric Post Op	Administer 150 mL on the table, immediately prior to scan.
Oral	Esophageal Leak	Administer 100 mL on the table, immediately prior to scan.
G-tube	Routine	Administer 500 mL 60 min prior to scan/
G-tube	Check placement	Administer 150 mL on table, immediately prior to scan.
J-tube	Routine	Administer 250 mL 60 min prior to scan.

NOTE

- ✓ **Protocoling:** Speak with the patient, patient's nurse, and utilize the electronic medical record (including prior imaging reports) to guide CT protocoling.
- ✓ **NO** positive oral contrast agent is to be given for CTA studies, (Pre or Post Stent), renal studies, liver imaging, pancreatic imaging, acute flank pain, acute trauma patients, CT Urograms, CT Cystograms, or GI bleeding studies. Water or Breeza can be used if requested.
- ✓ The CT imaging exam should be performed 1 hour after the patient starts drinking, even if they cannot finish the bottle. Do NOT delay inpatient or ED scans.
- ✓ If the ordering team request no oral contrast or orders the exam STAT and the indication is one of the listed, consult the Radiologist.

NEUTRAL ORAL CONTRAST (BREEZA FOR CT ENTEROGRAPHY (CTE)

Technique: Three bottles of Breeza (each contains 500 ML) separated by 20 minutes a piece i.e., 1 bottle at 60, 40, and 20 minutes prior to scan, and 8 oz. (240 mL i.e., a cup) of water on the exam table.

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RECTAL CONTRAST

Technique: Mix 100 mL Omnipaque® (Iohexhol) 350 (i.e. one bottle) in one gallon of water. Shake well and pour 1500-1800 mL into enema bag (discard any leftover), then administer the mixture rectally per patient tolerance.

NOTE

- ✓ Oral contrast is preferred over rectal contrast due to patient comfort; although, both are likely equally diagnostic if post administration duration is long enough to allow for passage into the rectum (~ 2 hours is a safe estimate assuming normal bowel motility).

PROCEDURE: ROUTINE BODY CT

- For routine exams administer Omnipaque® (Iohexhol) 350 or Isovue 370 prior to imaging as an IV bolus using a mechanical injector or hand injection if patient doesn't have adequate IV access.
- For CTA exams, administer Omnipaque® (Iohexhol) 350 or Isovue 370 prior to imaging as an IV bolus using a mechanical injector.
- Refer to the enteric contrast policy (page 3) for administering oral contrast.

TABLE 1: ***Based on 25 gm Iodine for average sized patient.***

TYPE OF EXAM	Omnipaque® (Iohexhol) OR ISOVUE 370	
• Routine CTA Chest, Abdomen, Pelvis or Abdomen + Pelvis	≤ 110 kg (<240 lbs)	80 mL
• Routine CTA Abdomen, Pelvis or Abdomen + Pelvis	≥ 111 kg (241 lbs)	100 mL

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TABLE 2: *Based on 42 gm Iodine for average sized patient.*

TYPE OF EXAM	Omnipaque® (Iohexhol) OR ISOVUE 370	
• Routine Abdomen, Pelvis or Abdomen + Pelvis • Enterography ○ Refer to neutral oral contrast policy for administering Breeza • Suspected GI Ischemia • Suspected GI Bleed • Runoff Lower and Upper Extremity CTA • Adrenal Mass • Liver 2 & 3 Phase • Renal 3 Phase • Urogram • Renal Donor	< 36 kg (<80 lbs)	1 mL per lb of body weight
	37-60 kg (81-130 lbs)	80 mL
	61-90 kg (131-200 lbs)	100 mL
	>91 (201 lbs)	150 mL

TABLE 3: *Based on 52 gm Iodine for average sized patient.*

TYPE OF EXAM	Omnipaque® (Iohexhol) OR ISOVUE 370	
• 4 Phase CT Liver • 2 Phase Pancreas • CTA A/P DIEP/FIX Protocol	< 36 kg (<80 lbs)	1 mL per lb of body weight
	37-60 kg (81-130 lbs)	100 mL
	61-90 kg (131-200 lbs)	140 mL
	>91 (201 lbs)	180 mL

PROCEDURE: CHEST CT

- For routine exams administer Omnipaque® (Iohexhol) 350 or Isovue 370 prior to imaging as an IV bolus using a mechanical injector or hand injection if patient doesn't have adequate IV access.

TABLE 4: *Routine Chest*

Patient Weight	Omnipaque® (Iohexhol) OR ISOVUE 370
< 45 kg (<100 lbs)	50 mL
46-90 kg (101-200 lbs)	60 mL
91-158 kg (201-350 lbs)	80 mL
>158 (>350 lbs)	100 mL

PROCEDURE: CTA CHEST

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- For CTA exams, administer Omnipaque® (Iohexhol) 350 or Isovue 370 prior to imaging as an IV bolus using a mechanical injector followed by 0.9 % sodium chloride flush.

TABLE 5: *Routine CTA Chest*

Indications	Patient Weight	Omnipaque® (Iohexhol) OR ISOVUE 370	% Sodium Chloride
Routine CTA Chest	All weight sizes	60 mL	50 mL
CTA Chest for PE Only CTA Chest for Dissection Only CTA Chest PE vs. Dissection CTA Turbo Flash (TF) Chest	< 45 kg (<100 lbs)	50 mL	50 mL
	46-90 kg (101-200 lbs)	60 mL	50 mL
	91-158 kg (201-350 lbs)	80 mL	50 mL
	>159 kg (> 351 lbs	100 mL	50 mL

PROCEDURE: CARDIAC (CORONARY)- RETROSPECTIVE OR PROSPECTIVE GATED

- For CTA exams, administer Omnipaque® (Iohexhol) 350 or Isovue 370 prior to imaging as an IV bolus using a mechanical injector followed by 0.9 % sodium chloride flush.

TABLE 6: *Retrospective or Prospective Gated Bolus Tracked*

Patient Weight	Omnipaque® (Iohexhol) OR ISOVUE 370	% Sodium Chloride
< 45 kg (<100 lbs)	60 mL	50 mL
46-90 kg (101-200 lbs)	70 mL	60 mL
91-158 kg (201-350 lbs)	80 mL	70 mL
>159 kg (> 351 lbs	100 mL	70 mL

PROCEDURE: CARDIAC CTA (TAVR)

- For CTA exams, administer Omnipaque® (Iohexhol) 350 or Isovue 370 prior to imaging as an IV bolus using a mechanical injector followed by 0.9 % sodium chloride flush.
- If GFR is <30, notify the Radiologist. The radiologist will determine how to proceed.
- Only add an additional 20 mL for CTA Neck when performing with a TAVR.

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TABLE 7: TAVR or TF Gated CAP

Patient Weight	Omnipaque® (Iohexhol) OR ISOVUE 370	% Sodium Chloride
< 45 kg (<100 lbs)	60 mL • *Additional 20 mL is performed with CTA Neck (TAVR Only)*	50 mL
46-90 kg (101-200 lbs)	70 mL • *Additional 20 mL is performed with CTA Neck (TAVR Only)*	60 mL
91-158 kg (201-350 lbs)	80 mL • *Additional 20 mL is performed with CTA Neck (TAVR Only)*	70 mL
>159 kg (> 351 lbs	100 mL • *Additional 20 mL is performed with CTA Neck (TAVR Only)*	70 mL

PEDIATRIC PATIENTS

- Administer Omnipaque® (Iohexhol) 300 or Omnipaque® (Iohexhol) 350 for pediatric exams.

Patient Weight	Omnipaque® (Iohexhol) OR ISOVUE 370
<62 kg (<137 lbs)	1 mL per pound of Iohexhol (Omnipaque®) 300
>63 kg (> 138 lbs)	1 mL per pound of Iohexhol (Omnipaque®) 350
Age 17 and older	***Reference the Adult Dosing Guidelines***

PROCEDURE: BREAST IMAGING

Procedure: Breast Imaging-Mammogram with contrast

- Administer 1.5 mL/kg of Omnipaque® (Iohexhol) 350. Maximum dose is 150 mL.

PROCEDURE: MRI 1.5 TESLA MAGNET

- All MR Procedures done on 1.5 Tesla Magnet, unless noted specifically in separate section.
- Consult the Attending Radiologist if procedures are ordered in which the gadolinium dose would exceed 20 mL in 24 hours.
- Administer gadolinium IV

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Patient Weight/Age	Gadolinium
<90 kg (200 lbs)	1. Administer gadolinium IV 2. To derive the patient's dose, round the patient weight in pounds to the nearest ten, then divide by 10 and subtract by 1. a. Example: 78 kg (173 lbs patient). Round to 170/10= 17, then 17-1= 16 mL of gadolinium.
Pediatrics (12-15) years of age	1. Use the formula based on the weight dosing for all MR procedures. a. Example 45 kg (100 lbs), 15 years old, 100/10-1= 9 mL of gadolinium.
Pediatrics less than 12 years of age	Consult Attending Radiologist
Patients less than 18 years of age having a MRA • Renal arteries • Aorta • Lower Extremities	Consult Attending Radiologist

PROCEDURE: MRI 3 TESLA MAGNET

- All MR Procedures done on 3 Tesla Magnet, unless noted specifically in separate section.
- Consult the Attending Radiologist if procedures are ordered in which the gadolinium dose would exceed 20 mL in 24 hours.
- Administer gadolinium IV

Patient Weight/Age	Gadolinium
<90 kg (200 lbs)	1. Administer gadolinium IV 2. To derive the patient's dose, calculate the Tesla dose for 1.5 Tesla Magnet (above) and half the dose. a. Example: 78 kg (173 lbs patient) 1.5 Tesla magnet dose is 16 mL then divide by 2 for 3 Tesla magnet dose. (16/2=8 mL)
≥ 91 kg (201 lbs)	10 mL
Pediatrics (12-15) years of age	Use the formula based on weight for dosing all MR procedures • Example: 45 kg (100 lbs), 15 years old, 100/10-1= 9 mL gadolinium contrast.
• Pediatrics less than 12 years of age	Consult Attending Radiologist
Patients less than 18 years of age having a MRA • Renal arteries • Aorta • Lower Extremities	Consult Attending Radiologist
Patients with the following indication/reasons for exams: • Neuro Perfusion • Mets	• A full dose of gadolinium IV is required for these exams • Use the formula based on weight for dosing. b. Example: 78 kg (173 lbs patient). Round to 170/10= 17, then 17-1= 16 mL of gadolinium.

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PROCEDURE: MRI ARTHROGRAMS

- Prior to start of procedure, add 4 mL of gadoteriodol (Prohance ®), to 250 mL bag sterile 0.9% sodium chloride, mix well. This bag is not for administration to the patient. It is to be utilized for further dilution (see below).

- Shoulder or Hip Arthrogram
  Mix 5 mL of gadoteridol (Prohance®) mixture, 10 mL of Iohexol (Omnipaque®) 240 and 5 mL of lidocaine 1% (preservative-free) in 20 mL syringe. Inject intra-articularly into the joint being imaged.

- Wrist or Ankle Arthrogram
  Mix 2.5 mL of gadoteridol (Prohance®) mixture, 5 mL of Iohexol (Omnipaque®)) 240 and 2.5 mL of lidocaine 1% (preservative-free) in 10 mL syringe. Inject intra-articularly into the joint being imaged.

- Knee Arthrogram
  Mix 5 mL of gadoteridol (Prohance®) mixture, 10 mL of Iohexol (Omnipaque®) 240 and 5 mL of lidocaine 1% (preservative-free) in 20 mL syringe. Make two syringes. Inject intra- articularly into the joint being imaged.

PROCEDURE: MRA STUDIES FOR ADULT PATIENTS ≥ 18 YEARS OLD

- Consult the Attending Radiologist if procedures are ordered in which the gadolinium dose would exceed 20 mL in 24 hours.

MRA Studies	GADOLINIUM

≥ 18 years old
• Carotid arteries
• Renal arteries
• Aorta
• Lower Extremities
• Dynamic studies of the abdominal organs
	• Administer gadolinium IV
	• To derive the patient's dose, calculate the Tesla dose
	• To derive the patient's dose for 1.5 Tesla, round the patient weight in pounds to the nearest ten, then divide by 10 and subtract by 1.
	  ○ Example: 78 kg (173 lbs patient). Round to 170/10= 17, then 17-1= 16 mL of gadolinium.
	• For 3 Tesla Magnet, take the 1.5Tesla dose (above) and half the dose.
	  ○ Example: 78 kg (173 lbs patient) 1.5 Tesla magnet dose is 16 mL then divide by 2 for 3 Tesla magnet dose. (16/2=8 mL)

PROCEDURE: LIVER IMAGING

- For MR procedures requiring a hepatobiliary phase, use 10 mL gadoxetate diodium (Eovist)

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PROCEDURE MRE

Technique: Three bottles of Breeza (each contains 500 ML) separated by 20 minutes i.e., 1 bottle at 60, 40, and 20 minutes prior to scan.

PROCEDURE: ULTRASOUND

- Ultrasound Contrast Agents (UCAs)
  - Lumason UE
  - Definity
- Pregnancy and breastfeeding
  - For patients of childbearing age, they will be asked about pregnancy status and/or possibility. If unsure, a pregnancy test will be required. While there is no documented harm in pregnancy, this should prompt a risk-benefit discussion with the patient and referring clinician.
  - There is no known information about UCA presence in breastmilk and can be pumped and discarded within 24 hours as a precaution.
- Allergies
  - Patients should be questioned for any prior history of allergic reaction to UCAs or polyethylene glycol (PEG).
- Lumanson UE
  - Reconstituted with 5mL sodium chloride 0.9% into the Lumason vial.
  - Shake vigorously for 20 sec (should appear milky white liquid) and use immediately
  - If there is a delay up to 3 hours, additional vigorous shaking can be performed to reconstitute.

Dose should be discussed with the radiologist on duty. A maximum dosage of 2.4mL should be used per injection with lower doses based on radiologist preference and the results of the first contrast imaging run.

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