

UC San Diego Health System
Intravenous Contrast Media Guidelines – Adult
Approved by P&T Committee 6/18/2014

Policy Statement

To establish guidelines for the prevention, diagnosis and treatment of contrast media reactions after intravascular injection, and to reduce the chance of inducing contrast media nephrotoxicity.

Responsible Parties

Physicians, Medical Trainees, Radiologic Technologists, Nurses, Students, Technical Assistants

PROCEDURE

I. Intravenous Access

When the power injector is utilized, a 22 G or larger needle/cannula 1.25” to 1.5” length is preferred for IV contrast injection.

It is advisable to obtain a good backflow of blood to test adequate positioning of the needle in the vein. Adequate position of the cannula in the vein is checked again, by flushing IV with 10mL of saline flush into the vein before delivering the injection of contrast.

Use of existing access routes:

1. **Only power-injection rated PICC** or central lines are approved for power injection.
2. Pre-existing IV lines will be flushed with 10 mL of saline flush, to ensure patency, prior to contrast injection.
3. Port-a-cath to be accessed by R.N. or Physician, with training. If no trained staff is available, send patient to the Infusion Center or Cancer Center.
4. Consult Physician/ RN prior to using any central line catheters. If not power rated, the injection must be hand injection.

IIa. Prevention of Nephrotoxicity with Iodinated Contrast Media

Requirements for CREATININE and Glomerular Filtration Rate (GFR) (if available) testing **prior** to contrast media injections (for the purpose of reducing the chance of contrast-induced renal failure)

- A. Patients > 60 years of age are to have a recent (**within 6 weeks**) serum Creatinine prior to contrast injection. If there has been significant interval change in the patient’s condition, a more recent serum Creatinine should be obtained.
- B. Patients \leq 60 years of age do **not** require labs, **UNLESS** the patient has one or more of the following:
 - History of renal disease or surgery on the kidneys: Including dialysis, kidney transplant, single kidney, kidney surgery
 - Diabetes mellitus
 - History of Hypertension
 - Renal Cancer
 - Recently (within 3 months) had chemotherapy

- C. When clinical findings or history raise doubt about the patient's current renal function, a physician will order a STAT Creatinine/eGFR test which should be done prior to injecting contrast media.
- D. **IODINATED CONTRAST AGENTS** (Both ionic and non-ionic contrast agents): If the serum creatinine is > 1.5 mg/dL or GFR is < 50 mL/min/1.73m², the physician will be notified. If the creatinine is > 1.5 in a diabetic patient, > 2 in a non-diabetic patient, or the GFR is < 30 , and the referring physician and physician (e.g., radiologist) have determined that a contrast-enhanced imaging study must be done to obtain critical medical information, the contrast may be given after considering the following precautions:
1. Discuss the risks, benefits, and alternatives with the patient.
 2. Adequate patient hydration must be maintained (See Section E).
 3. Optional treatments include the following:
 - a. Mucomyst (N-acetylcysteine) orally, 600 mg twice daily on the day before and the day of the contrast imaging study,

OR

 - b. Bicarbonate 150 mEq in 1000 ml D5W, IV, 3 mL/kg bolus, then 1 mL/kg/hr x 6 hours.

For patients with end stage renal disease who are on chronic peritoneal dialysis, non contrast should be considered and contrast should only be administered after discussion with the patient's nephrologist. This conversation must be documented.

- E. Adequate patient hydration is important to minimize the risk of nephrotoxicity. **No patient receiving radiographic contrast should have NPO orders unless they are being properly hydrated with IV fluids.** Patients having a CT with oral contrast should have nothing solid 4 hours prior to the exam, but clear liquids are allowed up until the exam. If the patient cannot take adequate oral fluids, consider adequate intravenous hydration.
- F. All patients should be encouraged to drink lots of fluids for several hours after receiving contrast material.
- G. Patients taking **Metformin** (ACTOplusmet, Avandamet, Janumet, Fortamet, Glucovance, Glucophage, Glumetza, Riomet, Metaglip, Jentadueto, Kombiglyze, PrandiMet):
 1. Patients taking **Metformin** should not take the medication following the procedure. The medication should be withheld for 48 hours after the procedure and reinstated only after clearance by the patient's ordering doctor.
- H. No other medications should be stopped for patients received radiographic contrast media. **Important, unless specifically instructed by their physician, patients should continue taking their regular prescribed medications for diabetes (Insulin, etc), cardiac, and other medical conditions.**

IIb. Use of Gadolinium Based Contrast Agents in Patients with Renal Insufficiency or Failure

Gadolinium-based contrast agents using a standard dose (0.2 mL/kg [0.1 mmol/kg]) are very safe in patients with normal renal function. However, Gd-based contrast agents have been implicated in causing Nephrogenic Systemic Fibrosis (NSF). Reported cases were patients with severe

renal dysfunction (on dialysis or eGFR < 30 mL/min), and most patients received double or triple doses of gadodiamide (Omniscan, Amersham/GE). Therefore, we have set the following guidelines for giving Gd-based contrast agents.

Requirements for CREATININE and GFR testing **prior** to contrast media injections:

- A. Patients > 60 years of age are to have a recent (**within 6 weeks**) serum Creatinine and GFR prior to contrast injection. If there has been significant interval change in the patient's condition, a more recent serum Creatinine and GFR should be obtained.
- B. Patients ≤ 60 years of age do **not** require labs, **UNLESS** the patient has one or more of the following:
 - History of renal disease or surgery on the kidneys:
Including dialysis, kidney transplant, single kidney, kidney surgery
 - Diabetes mellitus
 - History of Hypertension
 - Renal Cancer
 - Recently (within 3 months) had chemotherapy
- C. If GFR is > 30 ml/min, then gadolinium can be given. **It is important to avoid the use of Omniscan, Magnevist, and OptiMARK in high risk patients.** If GFR is < 30 mL/min, **DO NOT** give gadolinium unless in the judgment of the radiologist, the anticipated benefits exceed the potential risks. If both the physician and referring physician decide that contrast-enhancement is necessary, the Gd-based contrast agent can be given with the following precautions:
 1. Discuss the risks, benefits, and alternatives with the patient.
 2. Obtain signed consent from the patient. If patient is unable to give consent, follow Medical Center policy regarding informed consent. The physician must write the order for gadolinium, including the specific agent, dose, and reason for taking the risk.
 3. Dose at no more than 0.2 ml/kg (0.1 mmol/kg). Use “half” dose if adequate for the MR study.
- D. **Patients who are on dialysis:** The clinical indications for the study should be assessed. If gadolinium is not necessary, a non-contrast study (e.g., MRI) should be performed, and the referring physician should be informed about the change in the ordered exam. If gadolinium might be helpful, the referring physician should be called to discuss the risks and benefits of giving gadolinium to the patient. If both the physician (e.g., radiologist) and referring physician decide that contrast-enhancement is necessary, the Gd-based contrast agent can be given following the guidelines in section C above. In addition, hemodialysis should be done as soon as possible after the scan (ACR guidelines).
- E. Any patients receiving double or triple doses of Gd-based contrast agent should be screened with serum creatinine and eGFR:
 1. If the GFR is normal, then the double or triple dose of gadolinium can be given.
 2. If the GFR is not normal but > 30 mL/min, no more than single dosage should be given.
 3. If the GFR is < 30 mL/min, **DO NOT** give gadolinium unless absolutely medically necessary, following guidelines in section C above.

III. Allergic Type Contrast Reaction Prevention

- A. For patients receiving iodinated or gadolinium contrast media, obtain a complete history of any prior reactions to dyes or contrast used in X-ray, CT, or MRI.
 1. The patient is to fill in the questionnaire (*Patient Questionnaire- Contrast D322*).
 2. The technologist or licensed staff is to review the questionnaire with the patient prior to injection.
 3. The questionnaire is part of the patient’s medical record. The technologist is to complete the information regarding type and volume of contrast and reactions, then sign questionnaire, post injection

- B. For patients receiving iodinated or gadolinium contrast media, pre-treatment to prevent or lessen reactions should be given under the following guidelines:
 1. Patients with history of
 - Prior moderate or severe contrast reaction
 - Severe asthmatics with active wheezing or acute shortness of breath

- C. For patients requiring pre-treatment, consider calling the referring physician to discuss the following options:
 1. Perform a non-contrast study only,
 2. Perform an alternative imaging study (if available), or
 3. Pre-treat according to the protocol below before giving the contrast agent.

Note: If an asthmatic patient is under the care of a pulmonary physician or if a patient has a history of psychotic reaction to steroids, check with their physician prior to prescribing steroids.

Standard Pre-Medication Dosing:

Medication	Type	Dose	Dose Time
Prednisone	Steroid	50 mg p.o.	13 hrs, 7 hrs, and 1 hr prior to injection
Diphenhydramine	Antihistamine	50 mg p.o.	1 hr prior to injection

- a. If a patient arrives without being pre-treated, it is preferable to reschedule the exam to allow steroid treatment. Alternative options are at the discretion of the physician. If there is a history of moderate to severe contrast reaction, another procedure (e.g., MRI, non-contrast CT, US or Nuclear Medicine) should be considered as an alternative.
- b. Patients will be required to arrange transportation so they do not have to drive after taking premedication.

Alternate IV pre-medication dosing: *(To be used if patient requires pre-medication for contrast allergy, but exam needs to be done urgently.)*

Medication	Type	Dose	Dose Time
Hydrocortisone	Steroid	200 mg IV	6 and 2 hours prior to exam
Diphenhydramine	Antihistamine	50 mg P.O. or IM or IV	1 hour prior to exam

D. Do not remove the I.V. line from the patient until the exam is completed and it is confirmed that the patient is not experiencing any reaction to the contrast injection. If there is an extravasation, refer to the Extravasation Policy.

E. The emergency equipment will be checked daily.

F. Documentation: All injections will be documented in the Radiology Information System (patient notes) and written on the bottom portion of the IV contrast questionnaire and/or in the patient progress notes. The questionnaire and if used, the progress notes are to be included in the patient’s medical records. The documentation must include:

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|-------------------------------|--------------------|
| 1. Date and Time of injection | 4. Volume injected |
| 2. Contrast type utilized | 5. Any reactions |
| 3. Pre-treatment if given | 6. Any Treatments |

G. Any adverse reactions to contrast (including hives) will be documented in the enterprise electronic medical record (i.e., EPIC), in any other medical record used in the area [e.g., the (RIS) Radiology Information System (Patient Notes)], in an incident report (“eQVR” or “iReport”), and in the dictation of the exam/procedure.

IV. Diagnosis and Management

Look for any signs of contrast reaction, no matter how mild they may seem. **The physician must initiate medications, if needed, and must not wait for ED, Rapid Response or Code Blue Team.** The sooner the medications are administered, the greater likelihood that they will have effect. Have a low threshold to give Diphenhydramine.

A. Management of Contrast Reaction:

Severity of Reaction	Symptoms	Treatment
Physiologic Reactions to Contrast (Normal)	Nausea, anxiety, altered taste, headache, dizziness, warmth (heat), pallor, flushing	No treatment or documentation needed
Mild	<ul style="list-style-type: none"> Limited urticaria (hives)/ itching Limited cutaneous edema Limited itchy/scratchy throat nasal congestion/ sneezing/conjunctivitis/ runny nose 	<ul style="list-style-type: none"> Consider Diphenhydramine 25 – 50 mg PO. If needed, consider Diphenhydramine 12.5 – 50 mg IV/IM. If there is no IV access, Diphenhydramine can be given IM. Disposition: <ul style="list-style-type: none"> Home or hospital room if recovers ED or RRT if patient worsens/plateaus
Moderate (Moderate degree of clinically evident signs/symptoms)	<ul style="list-style-type: none"> Diffuse urticaria (hives)/itching Diffuse redness, stable vitals Facial edema w/o SOB Throat tightness or hoarseness w/o SOB Wheezing/bronchospasm, mild or no hypoxia 	<ul style="list-style-type: none"> Diphenhydramine 50 mg IV/IM Consider Epinephrine (EpiPen) 0.3 mg/0.3 mL IM. Consider age & risk of cardiovascular disease before giving. IM route is best but can also give subQ. Disposition: <ul style="list-style-type: none"> Home or hospital room if recovers without Epinephrine ED or RRT if patient worsens/plateaus
Severe (Life-threatening with severe signs/symptoms)	<ul style="list-style-type: none"> Diffuse edema or facial edema w/ SOB Diffuse redness with low BP Laryngeal edema with stridor/hypoxia Wheezing/bronchospasm with hypoxia Anaphylactic shock (low BP, high HR) 	<ul style="list-style-type: none"> Epinephrine (EpiPen) 0.3 mg/0.3 mL IM Diphenhydramine 50 mg IV/IM Code Blue (*Call x6111 for Code Blue)

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	<ul style="list-style-type: none"> Altered mental status from decreased perfusion 	
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- B. Patients experiencing reaction will be monitored according to the severity of the reaction.
- If there are few hives only, the patient may be discharged from the department as soon as the hives begin to fade, and the patient is medically stable (See Table above).
 - If the reaction is more severe, follow the treatment listed above.

C. Management of Vagal Reaction:

Reaction	Treatment (specific)	Comments
Hypotension with Bradycardia (Vagal reaction)	<ul style="list-style-type: none"> Monitor vital signs Legs up 60 degrees or more (preferred) or Trendelenberg position Secure airway; give O₂ 6-10 L/min via mask Secure IV access; push fluid replacement with Ringer's Lactate or NS if necessary Give Atropine 0.6–1 mg IV slowly if patient does not respond quickly to above. Repeat Atropine up to a total dose of 0.04 mg/kg (2-3 mg) in adults. 	Call Code Blue and/or transfer to Emergency Department for further care.

V. Documentation

- A. For mild, requiring medical intervention, to severe contrast reactions:
- Physician** will document the reaction on a Progress Note for the patient's medical record and include it in the dictated report.
 - Technologist** or licensed staff will document the reaction in other medical records used and complete an incident report.
- B. Patient Questionnaire Form insertion into the patient's Medical Records Chart after all information is documented by scanning into the EMR.
- C. Dictated Reports: The Physician must include:
- Contrast type and volume utilized
 - Any reaction and treatment

VI. Giving Contrast to Breast-Feeding Mothers

- A. As stated by the American College of Radiology and the American Academy of Pediatrics, breast feeding is not a contraindication for giving contrast agents.
- B. Less than 1% of contrast agent is secreted in breast milk. Less than 1% ingested by baby is absorbed in the intestine. The final amount of contrast in the baby's blood is less than 1% of dose infant would get for an imaging study.

VII. Pregnant & Potentially Pregnant Patients

- A. Pregnancy is not an absolute contraindication for giving contrast agents. However, caution is advised during pregnancy, especially the 1st trimester.

VIII. Emergencies

If the information from the contrast imaging study is critical for patient care, the contrast agent may be given without consideration of allergy, renal function, or pregnancy.

References:

1. American College of Radiology - Manual on Contrast Media
2. Delaney A, Carter A, Fisher M: The prevention of anaphylactoid reactions to iodinated radiological contrast media: a systematic review. BMC Medical Imaging 2006; 6:2. <http://www.biomedcentral.com/1471-2342/6/2>