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| **Name of Policy:** | **Intravenous use of iodinated contrast agents** |
| **Policy Number:** | 3364-134-117 |
| **Department:** | Radiation Oncology |
| **Approving Officer:** | Chief Executive Officer-UTMC<br>Chair-Radiation Oncology-UTMC |
| **Responsible Agent:** | Chair-Radiation Oncology and Technical Manager |
| **Scope:** | Radiation Oncology |

THE UNIVERSITY OF TOLEDO MEDICAL CENTER

**Effective Date: 7/1/2023**

Initial Effective Date: 1/5/2009

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| _____ | New policy proposal | _____ | Minor/technical revision of existing policy |
| X | Major revision of existing policy | _____ | Reaffirmation of existing policy |

## (A) Policy Statement

The following guidelines and policies are derived, many times verbatim, from the ACR Manual on Contrast Media 2021. Additional references will be provided as needed or requested.

The major purpose of these guidelines and policies is to assist attending and resident radiologists, technologists, and referring clinicians in recognizing and managing the small but real risks inherent in the use of intravenous iodinated contrast media utilized at the University of Toledo Medical Center. The following applies to patients >14 years of age unless indicated. Please see separate section regarding patients ≤ 14 years of age.

As would be appropriate with any diagnostic procedure, preliminary considerations for the referring physician and the radiologist include:

1. Assessment of patient risk versus potential benefit of the contrast assisted examination.
2. Imaging alternatives that would provide the same or better diagnostic information.
3. Assurance of a valid clinical indication for each contrast medium administration.

## (B) Purpose

Improve patient safety by identifying at risk patients for intravenous contrast administration.

## (C) Scope

All health care professionals involved in caring for patients in whom intravenous iodinated contrast is administered.

## (D) Procedure

### 1. Intravenous Iodinated Contrast Guidelines - CT or IVP

- Trauma , Stroke, and Aortic Dissection patients - proceed with IV contrast according to protocol for the given scan without obtaining GFR or concern for any previously obtained GFR. Benefit of contrast greatly outweighs the risk in these clinical scenarios.

- Calculate a Glomerular Filtration Rate (GFR) on patients with any of the following criteria:
  - Personal history of kidney disease including the following:
    - Known chronic kidney disease
    - Remote history of renal failure/acute kidney injury (AKI)
    - Dialysis
    - Kidney surgery or ablation

- Albuminuria

- History of diabetes mellitus
- Use of metformin or metformin-containing drug combinations

- GFR timing:
  - A GRFR within 30 days is acceptable for outpatients.
  - A GFR within 48 hours is recommended for ER/inpatients

- Proceeding with IV contrast after GFR values obtained:
  - GFR 30 or greater - proceed with dose and rate of contrast as defined by CT protocols
  - GFR less than 30 or acute kidney injury (AKI) - consult the radiologist prior to contrast injection to discuss possible alternative modalities and the decision to proceed.

- If a patient is receiving acute dialysis or has acute kidney injury (AKI) - consult the radiologist prior to contrast injection to discuss possible alternative modalities and the decision to proceed. *GFR is unreliable to assess renal function in AKI.*

- Patients undergoing dialysis who make more than 1-2 cups of urine/day (100 mL) should be considered nonanuric and treated as high-risk patients similar to patients with AKI or eGFR less than 30 as detailed above.

- Anuric, end stage chronic kidney disease patients, who do not have a functioning transplant proceed with IV contrast according to protocols for the given scan regardless of GFR since their kidneys are no longer functioning.

## 2. Concurrent use of Metformin and Iodinated Intravenous Contrast

*Category I*

In patients with no evidence of acute kidney injury and with ***eGFR 30 or greater,*** 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.

*Category/II*

In patients taking metformin who are known to have acute kidney injury or with ***eGFR less than 30,*** metformin should be temporarily discontinued at the time of or prior to the procedure, and withheld for 48 hours subsequent to the procedure and reinstituted only after renal function has been re-evaluated and found to be normal.

**3. <u>Premedication Guidelines for prior allergic like reactions to Iodinated and Gadolinium based contrast agents.</u>**

*Life Threatening Situations:*

In clinical situations, the urgency of a contrast-enhanced examination may outweigh the benefits of prophylaxis, regardless of duration, necessitating that contrast medium be administered to a high-risk patient in the absence of premedication. This determination is best made jointly by the radiology team, the referring service, and potentially the patient (if feasible).

If a contrast enhanced study is ordered and it is to be done without the premedication regimen below, *the ordering provider is responsible and it is at their discretion to proceed.* The name of the provider taking responsibility for the possible allergic-like reaction must be documented in the tech notes. In such cases, a team of individuals skilled in resuscitation should be available during the injection to monitor for and appropriately manage any developing reaction.

If there is a request to deviate from the recommended protocol consider consulting the radiologist prior to contrast injection to discuss possible alternative modalities.

*Inpatient/Emergency Room Protocol for Non-Life Threatening Situations:*

- At 5 hours before the contrasted exam give 40 mg Methylprednisolone sodium succinate (e.g., Solu-Medrol®) intravenous (IV).
- At 1 hour before the contrasted exam give 40 mg Methylprednisolone sodium succinate (e.g., Solu-Medrol®) I V and 50 mg diphenhydramine IV.

    - One can substitute 200 mg hydrocortisone sodium succinate (e.g., Solu-Cortef@) IV for 5 hour and 1 hour doses of methylprednisolone.

***If there is a reported allergy to methylprednisolone:***

- At 5 hours before the contrasted exam give 7.5 mg Dexamethasone sodium sulfate (e.g., Decadron®) IV.
- At 1 hour before the contrasted exam give 7.5 mg Dexamethasone sodium sulfate (e.g., Decadron@} IV and 50 mg diphenhydramine IV.

*Outpatient Protocol:*

- 50 mg prednisone by mouth at 13 hours, 7 hours, and 1 hour before contrast medium administration, PLUS 50 mg diphenhydramine by mouth 1 hour before contrast medium administration.

**OR**

- 32 mg methylprednisolone by mouth 12 hours and 2 hours before contrast medium administration, PLUS 50 mg diphenhydramine by mouth 1 hour before contrast medium administration.

*Referenced from the American College of Radiology Contrast Manual 2020.*

**4. Intraosseous Iodinated Contrast Guidelines**

High pressures are needed to infuse through IO lines because of high intramedullary compartmental pressures. Power injection is possible for CT; however, the rates for injection and pressure settings are not well studied. While no large studies looking at IO access for administration of contrast media exist, several case reports document successful acquisition of contrast-enhanced CT with no reported complications using injection rates up to 5 ml/sec (max PSI of 300). -*ACR contrast Manual May 2021*

- Flush IO line with saline. If the IO line does not flush easily, do not use it.
- If Patient is unconscious, no analgesia is required. If patient is conscious and responsive to pain, IO 2% *epinephrine free* lidocaine is recommended at the discretion of the ordering providers just prior to contrast. **CT technologists cannot be responsible for analgesia as it falls outside their scope of practice.**
- Hook power injector tubing directly to the IO line hub.
- Inject contrast through the IO line according to standard injection rate protocols.
- Disconnect power injector tubing from the IO line hub and flush the IO line with saline.

*Referenced from the American College of Radiology Contrast Manual May, 2021.*

**5. Guidelines for Large Intravenous Doses**

Sometimes the question arises of how much total iodinated contrast media can be safely administered intravenous in a short time frame. (An example might be a patient who received a CT scan at another institution or a cardiac catheterization and a repeat CT is desired, all within the same day.) Unfortunately, there is very little evidence available to answer this question.

As the volume of contrast administered goes up, the risk of nephrotoxicity probably increases. (Allergic-like reactions are independent of dose.) It is believed that a total dose of 200 ml or less of any of the department's iodinated contrast agents is well within the safety zone for patients without specific risk factors for nephrotoxicity.

It is suggested that the approximate maximum volumes of iodinated contrast should be as follows:

- 300ml of Omnipaque 300 or Omnipaque 350 within a 24-hour period.
  This volume is not rigid and may be adjusted as warranted by the clinical situation and patient condition, included risk factors for nephrotoxicity. Any deviation from the suggested maximum volumes should be discussed with and approved by a Radiologist prior to administration.

## 6. Pregnant or Potentially Pregnant Patients

- Diagnostic iodinated contrast has been to cross the placenta and enter the fetus. No mutagenic or teratogenic effects have been demonstrated during in-vivo animal testing.
- Intravenous iodinated contrast does not affect short-term neonatal TSH, likely because it is transient and a low dose. To date there is no report of neonatal hypothyroidism from maternal administration of iodinated contrast.
- Recognize that the examination's radiation is a greater risk than the contrast material.
- The least attractive clinic decision is when the fetus or neonate is exposed to radiation yet the diagnostic information is substantially compromised by lack of contrast material.
- If a patient is found to be pregnant an attending or resident radiologist should confer with the requesting physician and document the indications for iodinated contrast in the report.

## 7. Intravenous Iodinated Contrast Media in Children

- Pediatric patient is defined as ≤ 14 years of age.
- Principles regarding contrast media in children and their adverse events are similar to the above adult recommendations as it relates to allergic-like reactions, extravasations, and CIN.
- Given the limited number of neonatal and pediatric cases performed at the University of Toledo Medical Center, all patients 14 years or younger that a contrast (iodinated or GBCA) study is requested will need approval by the attending or resident radiologist prior to intravenous contrast administration.
- Standard dosing of intravenous contrast agents will follow recommended dosage guidelines.
- Premedication regimens for prior allergic-like reactions will require weight based dosing.

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| /s/<br>Mersiha Hadziahmetovic, MD<br>Associate Professor & Chair, Radiation Oncology | 07/03/2023<br>Date | 8/13/1999<br>9/9/1995<br>5/22/2008<br>5/1/2011<br>7/11/2012<br>8/11/2015<br>8/1/2018<br>10/1/2021<br>3/1/2022<br>7/1/2022 |
| /s/<br>Richard P Swaine<br>Chief Executive Officer | Date | |
| | | **Next Review Date:** 7/1/2025 |
| **Policies Superseded by This Policy**: 38-17 | | |