

IODINATED CONTRAST GUIDELINES FOR PATIENTS WITH REDUCED RENAL FUNCTION

(Updated by ROI protocol committee on 12.19.2024)

STATEMENT OF PURPOSE: To establish guidelines for utilization of iodinated contrast in Radiology, including use of eGFR to assess renal function. Policy describes recommended hydration protocols and guidelines for management of patients taking metformin.

BACKGROUND: Certain patients are at increased risk for developing contrast induced nephropathy (CIN). A serum creatinine will be performed on these individuals, and an estimated glomerular filtration rate (eGFR) calculated.

Definitions:

Chronic Kidney Disease (CKD) is defined as either kidney damage or GFR less than 60 ml/min/1.73 m² that is present for 3 or more months and can be diagnosed without knowledge of its cause.

Stage	Description	GFR	Clinical Action Plan
1	Kidney damage with normal or GFR	≥90	Diagnosis and treatment, slow progression, CVD risk reduction
2	Kidney damage with mild GFR	60-89	Estimating progression
3	Moderate GFR	30-59	Evaluating and treating complications
4	Severe GFR	15-29	Preparation for kidney replacement therapy
5	Kidney Failure	<15	Kidney replacement therapy (if uremia present and patient desirable)

National Kidney Foundation. K/DOQI Clinical Practice Guidelines for Chronic Kidney Disease: Evaluation, Classification and Stratification.

Acute Kidney Injury (AKI) is made according to the AKIN (Acute Kidney Injury Network) definition if one of the following occurs within 48 hours after a nephrotoxic event, such as intravascular iodinated contrast medium exposure:

- Absolute serum creatinine increase ≥0.3 mg/dL (>26.4 μmol/L).
- A percentage increase in serum creatinine ≥50% (≥1.5-fold above baseline).
- Urine output reduced to ≤0.5 mL/kg/hour for at least 6 hours.

Indications for Renal Function Assessment before the Intravascular Administration of Iodinated Contrast Medium

- Personal history of renal disease, including:
 - Known chronic kidney disease
 - Remote history of AKI
 - Kidney surgery
 - Kidney ablation
 - Albuminuria
 - Dialysis
 - History of diabetes mellitus
 - Metformin or metformin-containing drug combinations (Metformin does not confer an increased risk of CIN. However, patients who develop AKI while taking metformin may be susceptible to the development of lactic acidosis.)

*Patients who are scheduled for a routine intravascular study, but do not have one of the above risk factors do not require a baseline serum creatinine determination before iodinated contrast medium administration.

Renal Function Assessment

- Patients at risk for CIN (see above) require a serum creatinine before the administration of iodinated contrast medium.
 - Outpatients: Serum creatinine must be obtained within the past 30 days.
 - Outpatients without serum creatinine in past 30 days: Serum creatinine should be drawn 48 to 72 hours in advance of the Imaging procedure. If the lab must be drawn on the same day of the procedure, an I-STAT procedure will be performed unless the referring physician has ordered laboratory testing in addition to the creatinine level (CBC, etc.). In that case, in order to avoid duplication of laboratory testing, the patient will be sent to the outpatient lab, and the creatinine results will be ordered to be performed STAT. The turnaround time for a STAT lab is approximately 1 to 1 ½ hours. If the lab results cannot be obtained prior to the patient's scan or in a timely fashion, we will perform an I-STAT point of care creatinine level.
 - Inpatients: Most current serum creatinine will be used (not greater than 30 days).
- Estimated GFR (eGFR) should be assessed in all patients requiring renal function assessment. Calculated eGFR reported from standardized laboratories will be accepted. If calculated eGFR is not available in the laboratory results, eGFR will be calculated using the CKD-EPI equation available at the following link: https://www.kidney.org/professionals/kdoqi/gfr_calculator
- Previous serum creatinine results should be queried, if available. If there has been a significant rise in serum creatinine (corresponding to a decline in eGFR), which may indicate acute kidney injury (AKI), defined above, a radiologist should be contacted prior to proceeding with contrast administration. Patients with known or suspected AKI will be treated as if eGFR <30 ml/min/1.73 m² (see below).

Intravenous Administration of Iodinated Contrast:

- **If eGFR is ≥ 30 ml/min/1.73 m²:** technologist will continue with the scheduled exam using standard protocols and contrast without consulting the radiologist with regard to the patient's lab values/eGFR.
 - IV hydration may be performed at the request of the referring clinician (see "Intravenous Hydration" protocol below).
- **If eGFR < 30 ml/min/1.73 m²:** iodinated contrast will not routinely be administered. A radiologist should be contacted to determine if the examination may be performed without contrast, postponed, or performed utilizing a different modality.
 - Situations may arise in which the use of iodinated contrast is deemed critical in these patients such that the risks of administration are outweighed by the potential benefits. These cases require direct communication and agreement between the radiologist and ordering clinician with appropriate documentation by the clinician in the electronic medical record. These patients will receive a reduced contrast dose and IV hydration per the "Intravenous Hydration" protocol below.
 - Reduced contrast dose: Iopamidol (ISOVUE-370) 76 % injection - 1.43 mL/kg, Intravenous, one dose. Maximum dose 100ml unless patient exam requires more due to emergent need after consultation with radiologist.
 - Patients presently receiving dialysis may receive IV contrast with the understanding that dialysis is continuing. Reduced dose is not required.

Intravenous Hydration:

- Emergency Department Patients:
 - Hydration will be performed in the emergency department according to the orders of the Emergency department clinicians.
- Inpatients already receiving intravenous fluids:
 - Hydration will be performed according to the orders of the inpatient clinicians.
- Inpatients not receiving intravenous fluids:
 - Hydration will be performed according to the orders of the inpatient clinicians.
 - Inpatient orders – clinicians will be referred to the order set: "Prophylaxis for Contrast Induced Nephropathy."
- Outpatients – The radiologist or referring clinician will follow the hydration guidelines as follows.
 - Hydration: Hang 750ml normal saline. Infuse 250ml of 0.9% normal saline at least 1 hour prior to CT, and remaining 500ml 0.9% normal saline infused over 2 hours after CT scan. Document start and end times in MAR and patient record. (If the patient also has severe decompensated heart failure, consult the referring physician to determine if they want to decrease the dose and rate of saline administration.)

Emergency Exception:

- If the patient's condition is considered critical by the referring clinician such that measurement of eGFR and the pre-procedural IV administration of saline would put the patient's life at risk by delaying the CT scan, then IV contrast media may be administered without hydration, regardless of the GFR. The technologist should speak with the radiologist prior to CT whenever possible and provide written documentation.

Post Procedure Recommendation for Oral Hydration:

- All patients are encouraged to increase their oral fluids for several hours after the procedure, unless they have been instructed by their physician to limit or restrict fluids, such as Renal Dialysis patients.

Renal Dialysis Patients:

- Patients should not have acute dialysis, nor continuous renal replacement therapy initiated or alter their schedule solely based on iodinated contrast media administration. Any adjustment to the patient's dialysis schedule is left to the discretion of the referring clinician or nephrologist.

Referring clinician orders:

- The referring physician may elect to do more than required by these guidelines (i.e. hydration, withholding of metformin, etc.) based on their clinical knowledge of the patient. In that case, we will defer to the referring physician orders. If extended hydration is required, the office must work with centralized scheduling so that a pre-op bed can be reserved.

Guidelines for use of iodinated contrast in patients taking Metformin:

(Recommendations from American College of Radiology, ACR Manual on Contrast Media – 2024). The Committee recommends that patients taking metformin be classified into one of two categories based on the patient's renal function (as measured by eGFR.):

- Category I – For patients with no evidence of 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.
- Category II – For 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 48 hours subsequent to the procedure and reinstated only after renal function has been re-evaluated and found to be normal.

References:

- ACR Manual on Contrast Media 2024. American College of Radiology Committee on Drugs and Contrast Media. https://www.acr.org/-/media/acr/files/clinical-resources/contrast_media.pdf
- Davenport MS et al. Use of Intravenous Iodinated Contrast Media in Patients with Kidney Disease: Consensus Statements from the American College of Radiology and the National Kidney Foundation. Radiology 2020; 294(3). <https://pubs.rsna.org/doi/10.1148/radiol.2019192094>