

## FACTS ABOUT CONTRAST MATERIALS IN RADIOLOGY PRACTICE

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- Contrast agent is a substance that is administered to a patient during imaging examination to improve its diagnostic performance; most commonly administered through intravenous or oral routes.
- Iodinated contrast agents are used in all studies where x-rays are utilized such as CT scans and all fluoroscopic studies, and they are classified based on their osmolality (low, iso, or high) and on ionicity (ionic, non-ionic). The most commonly used contrast materials are the low or iso-osmolality nonionic as they cause less discomfort during IV administration and fewer adverse reactions.
- The usual recommended dose of contrast agent for clinical use is 0.1 mmol/kg.
- Gadolinium based contrast agents are used in MRI studies and there is no difference between ionized and non-ionized agents in term of adverse reactions.
- Adverse reactions to iodinated contrast media are classified based on their onset into early, late and very late.
- Another classification is used based on the manifestations of adverse reactions into two main categories renal and non-renal reactions.
- Mild non-renal adverse reactions occur in up to 3% of patients after non-ionic low osmolality contrast agents and 15% of high osmolality contrast agents and include nausea, vomiting, urticarial and itching (also called allergic like reactions as it does not involve the release of IGE antibodies).
- The incidence of severe non-renal adverse reactions reaches 0.22% after IV high osmolality agents and 0.04% after low osmolality agents and includes hypotensive shock, cardiorespiratory arrest and convulsions.
- The incidence of acute non-renal reactions after gadolinium based agents is 2-3 times lower than after non-ionic iodine based contrast agents.
- Risk factors that predispose individuals for contrast agent reactions include the presence of severe allergies to foods or medications, history of asthma or atopy and the presence of cardiac or renal disease.
- Immediate assessment of possible adverse non renal reactions should include airway patency, breathing and circulation.
- Premedications with steroids and sometimes antihistamines can be used in individuals at risk of allergic like reactions.
- Contrast induced nephropathy (CIN) is defined as deterioration in renal function after intravascular administration of iodinated contrast agent and includes absolute rise of 0.5 mg/dl or increase of more than 25% of baseline serum creatinin within 48 to 72 hours of iodinated contrast agent administration.
- Serum creatinin usually increase within 24 hours, peaks after 4 days and often return to baseline within 7-10 days.
- Risk factors for CIN includes estimated GFR of less than 45 ml/min/1.73m, dehydration, diabetic nephropathy, congestive heart failure, age over 70, current administration of nephrotoxic drugs, recent myocardial infarctions (less than 24h) and the use of high osmolality agents or high doses of contrast agents.
- In patients at risk of CIN we should consider doing another imaging modality without contrast agent or starting volume expansion strategy using 1-1.5 ml/kg of normal saline 6 hours before and after contrast agent administration to reduce the risk of CIN.
- Metformin does not increase the risk of CIN but it is advisable to withhold it in at risk patients 48 hours before the examination to prevent the occurrence of metformin related lactic acidosis in case of CIN and reintroduced after assessment of renal function.

### REFERENCES

1. Henrik S. Thomsen PR. Intravascular contrast media for radiography, CT, MRI and ultrasound. In: Grainger & Allison's diagnostic radiology a textbook of medical imaging Volume 1 Volume 1 [Internet]. 2015 [cited 2018 Jul 16]. p. 26–51. Available from: <http://site.ebrary.com/id/11045403>
2. Drew A. Torigian, PR. Introduction to contrast agents. In: Radiology secrets plus [Internet]. 2017 [cited 2018 Dec 31]. p. 32–6. Available from: <http://ezproxy.usherbrooke.ca/login?url=http://www.clinicalkey.com/dura/browse/bookChapter/3-s2.0-C20120061571>

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