MEDIC

THUỐC TƯƠNG PHẢN CT-MRI: ỨNG DỤNG THỰC TẾ TẠI MEDIC

BS CHÂU NGỌC MINH PHƯƠNG
BS NGUYỄN THÀNH ĐĂNG

Các thuốc tương phản tại MEDIC

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CT	MRI	
Non ionic	Ionic	Non ionic
Ultravist Xenetix Omnipaque	Dotarem Primovist	Gadovist

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Những vấn đề chưa thống nhất

1. Xét nghiệm chức năng thận trước khi tiêm thuốc tương phản?
2. Độ lọc cầu thận bao nhiêu thì không được tiêm thuốc tương phản?
3. Tiêm thuốc tương phản ở phụ nữ có thai? Đang cho con bú?
4. Sau khi tiêm chất cản quang thì bao lâu tiêm được chất cản từ? Bệnh nhân chụp CT và MRI có tiêm thuốc tương phản: chụp CT hay MRI trước?
5. Sau khi tiêm thuốc tương phản thì cần theo dõi bệnh nhân trong bao lâu?

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Khuyến cáo

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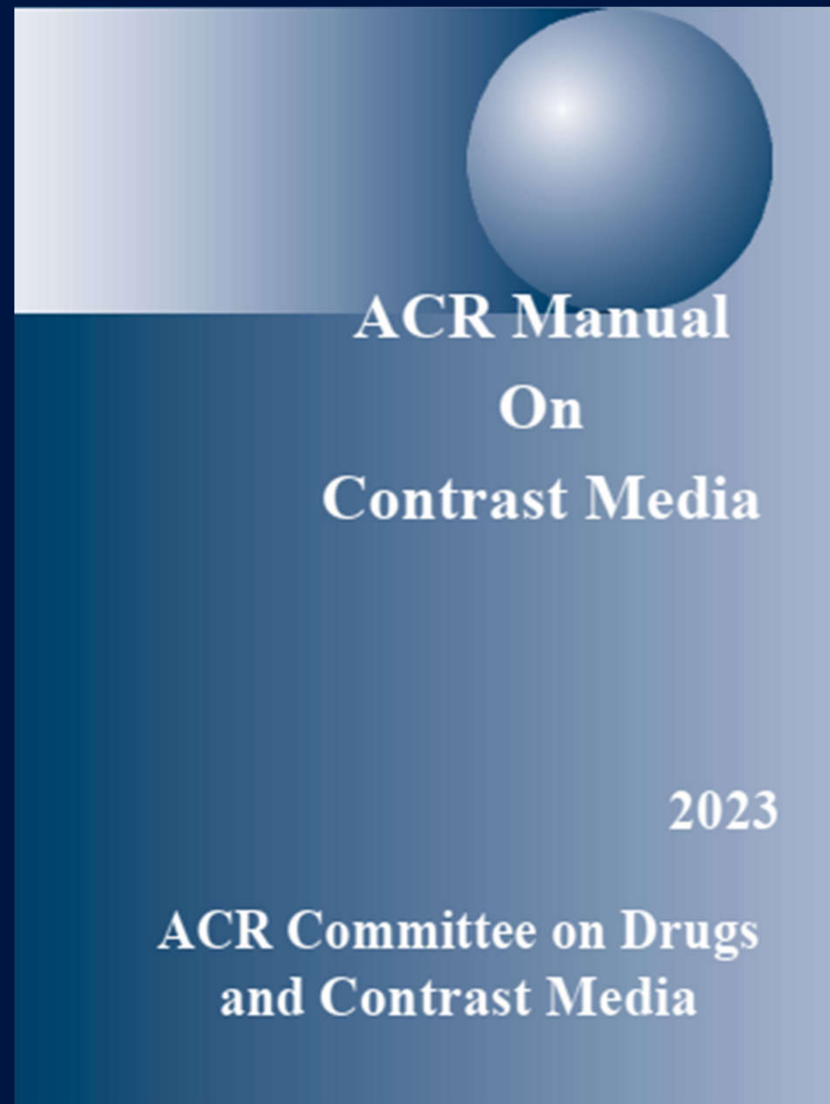
Henrik S. Thomsen, Chairman



1. Xét nghiệm chức năng thận trước khi tiêm thuốc cản quang?

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MEASUREMENT OF RENAL FUNCTION

- **Measure eGFR before administering intravascular iodine-based contrast medium**

Either (a) In all patients

or (b) In patients who have a history of

- Renal disease (eGFR < 60 ml/min/1.73 m^2)
- Kidney surgery
- Proteinuria
- Hypertension
- Hyperuricemia
- Diabetes mellitus

- **Timing of eGFR measurement**

- Within 7 days before contrast medium administration in patients with an acute disease, an acute deterioration of a chronic disease or who are hospital inpatients.
- Within 3 months before contrast medium administration in all other patients.

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1. Xét nghiệm chức năng thận trước khi tiêm thuốc cản quang?

ACR® AMERICAN COLLEGE OF RADIOLOGY

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

The following is a suggested list of risk factors that may warrant renal function assessment (e.g., serum creatinine, eGFR) prior to the administration of intravascular iodinated contrast medium. This list should not be considered definitive and represents a blend of published data [73,74] and expert opinion:

- Personal history of renal disease, including:
  - Known chronic kidney disease (CKD)
  - Remote history of AKI
  - Dialysis
  - Kidney surgery
  - Kidney ablation
  - Albuminuria
- History of diabetes mellitus (optional)
- Metformin or metformin-containing drug combinations[1]

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.

1. Xét nghiệm chức năng thận trước khi tiêm thuốc cản quang?

Category I

In patients with no evidence of AKI and with eGFR ≥30 mL / min/1.73m^2, 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.[1]

Category II

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 48 hours subsequent to the procedure and reinstituted only after renal function has been re-evaluated and found to be normal.

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1. Xét nghiệm chức năng thận trước khi tiêm thuốc tương phản từ?

<table>
<tr><th>ESUR (2018)</th><th>ACR (2023)</th></tr>
<tr><td>The risk of Post Contrast – Acute Kidney Injury is very low when gadolinium-based contrast agents are used in approved doses.</td><td>Gadolinium-based contrast media are not considered nephrotoxic at dosages approved for MR imaging.</td></tr>
<tr><td colspan="2">Increased risk of Nephrogenic Systemic Fibrosis (NSF) when certain gadolinium-based contrast agents used in patients with kidney dysfunction.</td></tr>
<tr><td>- Lowest risk: Gadovist, Dotarem
- Intermediate risk: Primovist
→ Laboratory testing of renal function is not mandatory.</td><td>- Group II (agents with few cases of NSF reported): Gadovist, Dotarem
→ Assessment of renal function is optional prior to IV administration.
- Group III (agents for which data remains limited): Primovist
→ Renal function should be tested (within 2 days) in high risk patients: history of renal diseases and/or diabetes mellitus.</td></tr>
</table>

2. Ngưỡng độ lọc cầu thận an toàn cho thuốc cản quang?

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Statements from ACR and the National Kidney Foundation (2020)
The risk of CI-AKI from intravenous iodinated contrast media is lower than previously thought. Necessary contrast material–enhanced CT without a suitable alternative should not be avoided solely on the basis of CI-AKI risk.
CI-AKI risk should be determined primarily by using CKD stage and AKI. Patients at high risk include those with **recent AKI and those with eGFR less than 30 mL/min/1.73 m2**, including **nonanuric patients undergoing maintenance dialysis.**
Prophylaxis with **intravenous normal saline** is indicated for patients not undergoing dialysis who have eGFR less than 30 mL/min/1.73 m2 or AKI. In individual high-risk circumstances, prophylaxis may be considered in patients with eGFR of 30–44 mL/min/1.73 m2 at the discretion of the ordering clinician.
Kidney replacement therapy should **not be initiated** or have the **schedule adjusted** solely on the basis of contrast media administration.
In patients at high risk of CI-AKI, ad hoc lowering of contrast media dose below a known diagnostic threshold should be avoided. Rather, the **minimum routine clinical diagnostic dose** should be used.

Renal impairment is NOT an absolute contraindication for contrast media

2. Ngưỡng độ lọc cầu thận an toàn cho thuốc tương phản từ?

ESUR (2018)	ACR (2023)
Never deny a patient a clinically well-indicated enhanced MR-examination.	**Group II gadolinium-based agents** are strongly preferred in patients at risk for NSF (**eGFR < 30 ml/min or AKI**).
Gadolinium agents should be used with **caution** in patients with **GFR < 30ml/min.**	In an **anuric patient** with **no residual renal function**, it would be reasonable to consider **iodinated contrast media** and CT rather than MRI, assuming the anticipated diagnostic yield is similar.
In all patients use the smallest amount of contrast medium necessary for a diagnostic result.	In patient already on dialysis, if feasible, elective GBCA-enhanced MRI be performed before regularly schedule dialysis.

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C.5. PREGNANCY AND LACTATION

	Iodine-based contrast media	Gadolinium-based contrast agents
Pregnancy	a)In exceptional circumstances, when radiographic examination is essential, iodine-based contrast media may be given to the pregnant female. b) Following administration of iodine-based contrast media to the mother during pregnancy, thyroid function should be checked in the neonate during the first week.	a) When there is a very strong indication for enhanced MR, the smallest possible dose of a macrocyclic gadolinium contrast agent (see A.3.2. Agents with lowest risk of NSF) may be given to the pregnant female. b) Following administration of gadolinium-based agents to the mother during pregnancy, no neonatal tests are necessary.
Lactation	Breast feeding may be continued normally when iodine-based contrast media is given to the mother.	Breast feeding may be continued normally when macrocyclic gadolinium-based contrast agents are given to the mother.

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CAN IODINE- AND GADOLINIUM-BASED CONTRAST AGENTS SAFELY BE GIVEN ON THE SAME DAY FOR ROUTINE EXAMINATIONS?

Efficient practice may involve giving iodine- and gadolinium-based contrast agents for enhanced CT and MR on the same day. To reduce any potential for nephrotoxicity the following are recommended:

1. **Patients with normal renal function or moderately reduced (GFR > 30 ml/min/1.73 m^2).**
   75 % of both gadolinium- and iodine-based contrast agents are excreted by 4 hours after administration. There should be 4 hours between injections of iodine- and gadolinium-based contrast agents.
2. **Patients with severely reduced renal function (GFR < 30 ml/min/1.73 m^2 or on dialysis).**
   There should be 7 days between injections of iodine- and gadolinium-based contrast agents.

Note: *Gadolinium-based contrast agents attenuate X-rays well and may be misinterpreted on CT when they have been excreted into the urinary tract. For abdominal examinations, enhanced CT should be done before enhanced MR. For chest and brain examinations, either CT or MR may be done first.*

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HOW LONG SHOULD THERE BE BETWEEN TWO IODINE-BASED CONTRAST MEDIUM INJECTIONS FOR ROUTINE EXAMINATIONS?

1. **Patients with normal or moderately reduced renal function (GFR > 30 ml/min/1.73 m²).**
   75 % of iodine-based contrast medium is excreted by 4 hours after administration. There should be 4 hours between injections of iodine-based contrast medium.
2. **Patients with severely reduced renal function (GFR < 30 ml/min/1.73 m²).**
   There should be 48 hours between injections of iodine-based contrast medium.
3. **Patients on dialysis.**
   If there is remnant renal function there should be at least 48 hours between injections of iodine-based contrast medium.

HOW LONG SHOULD THERE BE BETWEEN TWO GADOLINIUM-BASED CONTRAST AGENT INJECTIONS FOR ROUTINE EXAMINATIONS?

1. **Patients with normal or moderately reduced renal function (GFR > 30 ml/min/1.73 m²).**
   75 % of extracellular gadolinium-based contrast agents are excreted by 4 hours after administration.
   There should be 4 hours between injections of gadolinium-based contrast agent.
2. **Patients with severely reduced renal function (GFR < 30 ml/min/1.73 m²) or on dialysis.**
   There should be 7 days between injections of gadolinium-based contrast agent

5. Theo dõi sau tiêm

To reduce the risk of an acute reaction to iodine- and gadolinium-based agents	
For all patients	• Use a non-ionic iodine-based contrast medium.
For patients at increased risk of reaction (see risk factors above)	• Consider an **alternative test** not requiring a contrast agent of similar class. • For previous contrast agent reactors: use a different contrast agent, preferably after consultation with a specialist in drug allergy. • Premedication is not recommended because there is not good evidence of its effectiveness
Be prepared for an acute reaction	
For all patients	• Have the drugs and equipment for resuscitation readily available (see A.1.2.1.). • Keep the patient in a medical environment for 30 minutes after contrast agent injection.

The frequency of allergic-like and physiologic adverse events related to the intravascular administration of iodinated contrast media (ICM) is low and has decreased considerably with changes in usage from ionic high-osmolality contrast media (HOCM) to nonionic low-osmolality contrast media (LOCM) [1-11]. The majority of adverse side effects to LOCM are mild non-life-threatening events that usually require only observation, reassurance, and/or supportive measures [3,12,13]. Severe and potentially life-threatening adverse events continue to occur rarely and unpredictably. Nearly all life-threatening contrast reactions occur within the first 20 minutes after contrast medium injection.

Kết luận

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1. Xét nghiệm chức năng thận trước khi tiêm:

- **Thuốc tương phản từ**: không bắt buộc với nhóm thuốc **Gadovist, Dotarem**.

- **Thuốc cản quang và thuốc tương phản từ Primovist**: trên bệnh nhân có nguy cơ cao bao gồm tiền căn bệnh thận, phẫu thuật thận, đái tháo đường ± metformin, đạm niệu (+), tăng axit uric máu, tăng huyết áp.

2. Độ lọc cầu thận an toàn là **≥ 30 ml/ph/1,73m²**. Tuy nhiên, eGFR < 30 ml/ph/1,73m² không phải là CCĐ tuyệt đối của thuốc tương phản.

3. Tiêm thuốc tương phản trên phụ nữ có thai trong trường hợp hết sức cần thiết.

4. Bệnh nhân có chức năng thận bình thường có thể tiêm hai liều thuốc tương phản cách nhau **≥ 4 giờ**.

5. Theo dõi bệnh nhân ít nhất **30 phút** sau tiêm tương phản.

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CẢM ƠN QUÝ ĐỒNG NGHIỆP