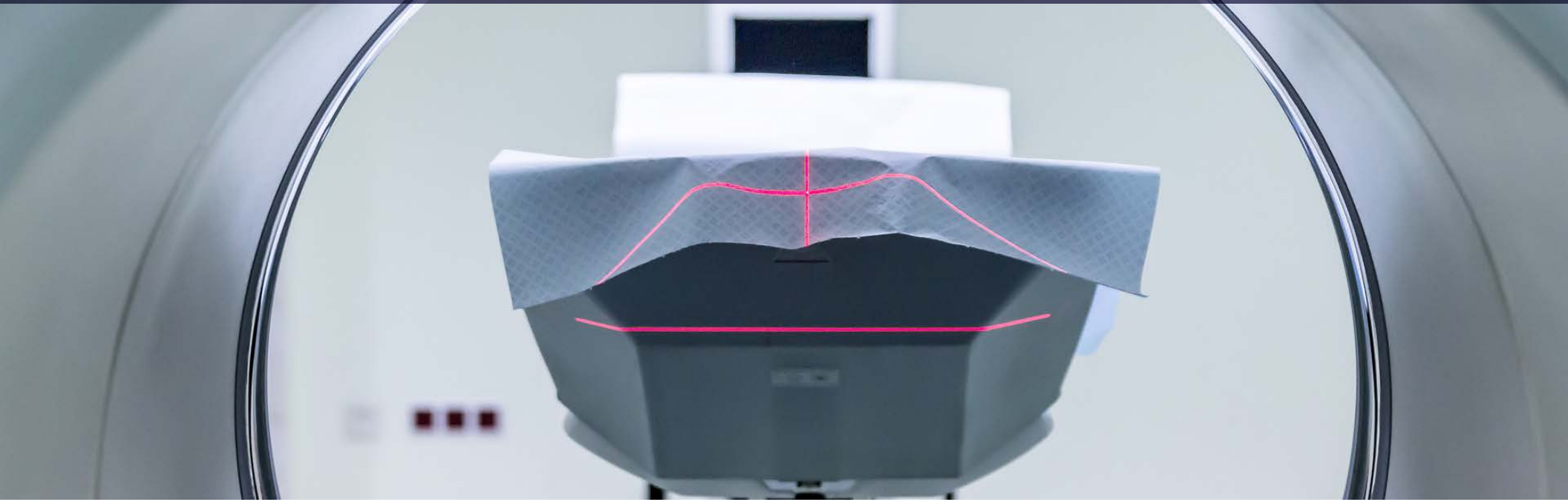
WHAT SHOULD YOU KNOW ABOUT

MRI Contrast Agents

Iowa Radiology

Understanding MRI Contrast Agents



MRI is capable of producing detailed images of the body's internal structures without the use of ionizing radiation. Some MRI procedures use contrast agents to enhance the clarity of the images captured. The key ingredient in these agents is gadolinium, which works by altering the magnetic properties of water molecules in the body.

If you are planning to undergo an MRI with contrast, it's important to understand both the risks and the benefits of the procedure. For general information about MRI procedures, see our Guide to MRI. This guide will deal specifically with gadolinium contrast agents and their potential health effects.

What Risks Are Associated With MRI Contrast Agents?

ALLERGIC REACTION & MORE COMMON SIDE EFFECTS

While gadolinium-based contrast is less likely to produce allergic reaction than the iodine-based contrast used in X-ray and CT exams, rare cases of allergic reaction to gadolinium-based contrast agents (GCBAs) have been reported.[1] Allergic reaction can result in mild symptoms such as hives, wheezing, and itchiness or, very rarely, severe respiratory or cardiac symptoms. More commonly reported side effects include nausea and vomiting, but these also appear to affect only a small percentage of patients.[2]

NEPHROGENIC SYSTEMIC FIBROSIS

A primary concern in administering these agents is the possibility of triggering nephrogenic systemic fibrosis (NSF) in patients with decreased kidney function.[3] NSF is a very rare condition that causes the thickening of skin, organs, and other tissues.[4]

GADOLINIUM RETENTION

Recently, researchers discovered that gadolinium can be retained in the brain and other body tissues for months or even years following contrast use. Different gadolinium-containing contrast agents have been associated with different retention rates. While specific risks associated with this retention have not yet been identified in patients with normal kidney function,[5] the FDA continues to investigate this question.[6]

How Can The Risk Be Minimized?

COMMUNICATION

First, when your referring physician orders an MRI with contrast, ask your doctor if contrast is necessary to determine the proper diagnosis. After you and your doctor have agreed on the best procedure to use, it's important that you give complete and thorough answers to the health questions asked prior to your MRI exam. Be sure to let the imaging facility know if you've ever had an adverse reaction to a contrast agent so that particular agent can be avoided. Because of the risk of NSF, it's also critical to disclose any possible kidney problems. As with most imaging procedures, you should let the facility know if there is any chance you may be pregnant.

Sometimes, because of the symptoms presented or the specific structures that need to be visualized, contrast may be necessary. If this is the case and your doctor has ordered an MRI without contrast, Iowa Radiology will consult with your referring physician prior to proceeding with the exam using contrast.

KIDNEY SCREENING

At Iowa Radiology, patients who are on dialysis or who have certain health conditions and will be receiving Eovist (used only for Liver MRI) are given blood tests to check for kidney disease. If the test indicates a glomerular filtration rate (GFR) of below 60, kidney disease may be present. The Radiological Society of North America advises that most gadolinium-containing agents are contraindicated for patients with a GFR below 30.[7] In these cases, MRI without contrast may be indicated.

The risk of NSF has been found to be greater with the use of some gadolinium-based agents than others. Recent research suggests that “group II” agents such as Gadavist carry a minimal NSF risk,[8] and the American College of Radiology now considers renal screening for patients receiving standard or lower than standard doses of these agents to be optional.[9]

MINDFUL SELECTION OF GADOLINIUM AGENTS

In response to the discovery that body tissues, including the brain, can retain gadolinium for months or years, the FDA issued guidelines to minimize risk to patients. The agency advises health care professionals to consider the different retention rates of various GCBAs, particularly when choosing agents for patients at higher risk for gadolinium retention. These include pregnant women, children, patients with inflammatory conditions, and those who require multiple doses of gadolinium over their lifetimes.[10]

Gadolinium-based agents can be described by their molecular structure as either **linear** or **macrocyclic**. The FDA reports that macrocyclic GCBAs such as Gadavist result in the lowest levels of gadolinium retention. Some types of MRI exams, however, require the contrast agent to be in the body longer than others and, therefore, necessitate the use of a linear agent. Even among linear GCBAs, some (Omniscan and OptiMARK) are retained longer than others (Eovist, Magnevist, MultiHance), so radiologists are able to select a product that provides the image clarity needed for accurate diagnosis while minimizing retention. The FDA is also careful to advise that while these factors should be considered, doctors should not avoid ordering or performing necessary MRI exams.[11]

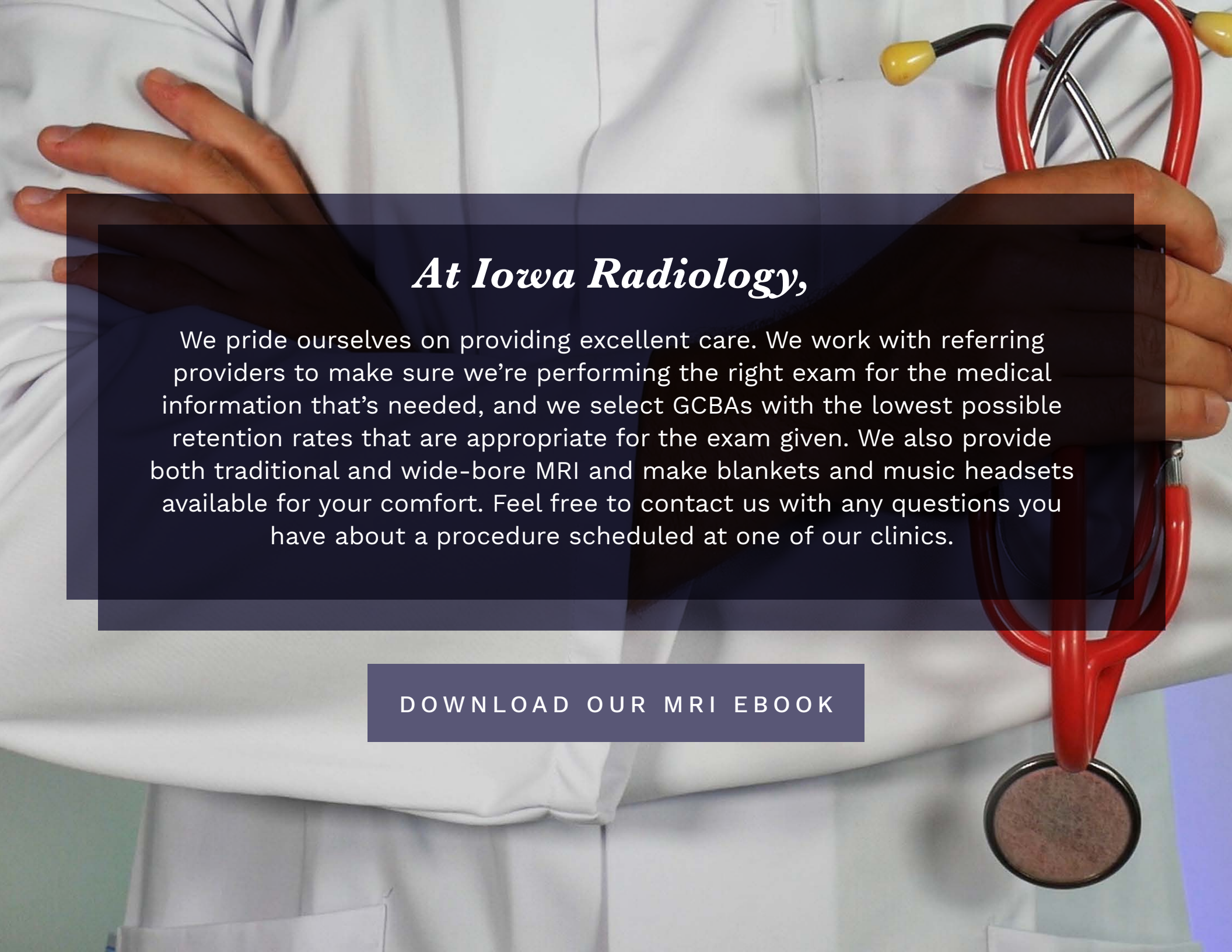
At Iowa Radiology, we use only Gadavist, Eovist, and Magnevist MRI contrast agents. With the exception of shoulder arthrograms, which require a linear agent, all MRI exams with contrast at our clinics are performed using only macrocyclic contrast agents.

What Questions Should You Ask Your Doctor?

Before you schedule an MRI with contrast, it's helpful to know the answers to the following questions. This information will help you to understand the risks and benefits of undergoing the exam as well as how those risks will be minimized.

- What information do we hope to gain from the MRI, and how would this information affect my treatment plan? What additional information will use of contrast provide?
- What type of contrast will be used, and why was it chosen?
- What are the potential side effects and particular risks of this type of contrast?
- What types of conditions or activities may increase these risks?

Don't hesitate to ask all the questions you need to fully understand why the MRI and contrast are necessary, how your health will be protected, and what you can do to help keep your health risks as low as possible.



At Iowa Radiology,

We pride ourselves on providing excellent care. We work with referring providers to make sure we're performing the right exam for the medical information that's needed, and we select GCBAs with the lowest possible retention rates that are appropriate for the exam given. We also provide both traditional and wide-bore MRI and make blankets and music headsets available for your comfort. Feel free to contact us with any questions you have about a procedure scheduled at one of our clinics.

DOWNLOAD OUR MRI EBOOK

Sources

[1] "Contrast Materials." Radiologyinfo.org. Radiological Society of North America, 21 Feb 2017. Accessed 15 May 2018.

[2] "Immediate Adverse Reactions to Gadolinium-Based MR Contrast Media: A Retrospective Analysis on 10,608 Examinations." BioMed Research International. National Center for Biotechnology Information, U.S. National Library of Medicine. 29 Aug 2016. Accessed 8 June 2018.

[3] NEJM JW Gen Med Nov 15 2007 and Radiology 2007; 245:168

[4] "Contrast Materials." Radiologyinfo.org. Radiological Society of North America, 21 Feb 2017. Accessed 15 May 2018.

[5] "Gadolinium-based Contrast Agents (GBCAs): Drug Safety Communication - Retained in Body; New Class Warnings." FDA.gov. U.S. Food and Drug Administration, 19 Dec 2017. Accessed 16 May 2018.

[6] "FDA Drug Safety Communication: FDA identifies no harmful effects to date with brain retention of gadolinium-based contrast agents for MRIs; review to continue." FDA.gov. U.S. Department of Health and Human Services, 22 May 2017. Accessed 8 June 2018.

[7] "RSNA Statement on Gadolinium-Based MR Contrast Agents." Radiological Society of North America, 15 April 2018. Accessed 27 June 2018.

[8] Brett, Martin. "Is Nephrogenic Systemic Fibrosis Following Gadolinium-Enhanced Imaging Still a Problem?" NEJM Journal Watch, NEJM Group, 25 Jan 2018.)

[9] "ACR Manual on Contrast Media." ACR.org. American College of Radiology Committee on Drugs and Contrast Media, 2017. Accessed 8 June 2018.

[10] "Gadolinium-based Contrast Agents (GBCAs): Drug Safety Communication - Retained in Body; New Class Warnings." FDA.gov. U.S. Food and Drug Administration, 19 Dec 2017.

[11] Ibid.