



## Magnetic Resonance (MR) Defecography

Magnetic resonance (MR) defecography is a noninvasive test that uses magnetic resonance imaging to obtain images at various stages of defecation to evaluate how well the pelvic muscles are working and provide insight into rectal function. It is used to help determine the cause of fecal incontinence, constipation, and other conditions such as pelvic organ prolapse that may interfere with a person's ability to pass stool.



Tell your doctor about any health problems, recent surgeries or allergies and whether there's a possibility you are pregnant. The magnetic field is not harmful, but it may cause some medical devices to malfunction. Most orthopedic implants pose no risk, but you should always tell the technologist if you have any devices or metal in your body. Guidelines about eating and drinking before your exam vary between facilities. Unless you are told otherwise, take your regular medications as usual. Leave jewelry at home and wear comfortable clothing. You may be asked to wear a gown. If you have claustrophobia or anxiety, you may want to ask your doctor for a mild sedative prior to the exam.

## What is magnetic resonance (MR) defecography?

Magnetic resonance imaging (MRI) is a noninvasive medical test that physicians use to diagnose medical conditions.

MRI uses a powerful magnetic field, radio frequency pulses and a computer to produce detailed pictures of organs, soft tissues, bone and virtually all other internal body structures. MRI does not use ionizing radiation (x-rays).

Detailed MR images allow physicians to evaluate various parts of the body and determine the presence of certain diseases. The images can then be examined on a computer monitor, transmitted electronically, printed or copied to a CD or uploaded to a digital cloud server.

Magnetic resonance (MR) defecography is a special type of MR imaging, where images are obtained at various stages of defecation. It produces detailed images during a bowel movement and provides

information about the structure and function of the rectum and the pelvic floor, a network of muscles that stretches between the pubic bone and spine and the abdominal organs it supports.

## What are some common uses of the procedure?

Physicians use MR defecography to:

- obtain information about how well the pelvic muscles are working during a bowel movement.
- provide insight into rectal function.
- determine the cause of fecal incontinence, or the inability to control the passage of waste material from the body.
- determine the cause of constipation, or difficulty passing waste material from the body.
- diagnose and evaluate diseases affecting rectal function and pelvic floor disorders (also called pelvic floor dysfunction), such as hernia, pelvic organ prolapse or rectal prolapse, a condition where part or all of the rectum wall slides out of place.
- provide information for surgical and treatment planning.

## How should I prepare?

You may be asked to wear a gown during the exam or you may be allowed to wear your own clothing if it is loose-fitting and has no metal fasteners.

Guidelines about eating and drinking before an MRI exam vary with the specific exam and with the imaging facility. Unless you are told otherwise, you may follow your regular daily routine and take food and medications as usual.

Some MRI examinations may require you to receive an injection of contrast material into the bloodstream. The radiologist, technologist or a nurse may ask if you have allergies of any kind, such as an allergy to iodine or x-ray contrast material, drugs, food, or the environment, or if you have asthma. The contrast material most commonly used for an MRI exam contains a metal called gadolinium. Gadolinium can be used in patients with iodine contrast allergy. It is far less common for a patient to have an allergy to a gadolinium-based contrast agent used for MRI than the iodine-containing contrast for CT. However, even if it is known that the patient has an allergy to the gadolinium contrast, it may still be possible to use it after appropriate pre-medication. Patient consent will be requested in this instance. For more information on adverse reactions to gadolinium-based contrast agents, please consult the ACR Manual on Contrast Media.

You should also let the radiologist know if you have any serious health problems, or if you have had any recent surgeries. Some conditions, such as severe kidney disease, may prevent you from being given gadolinium contrast for an MRI. If you have a history of kidney disease or liver transplant, it will be necessary to perform a blood test to determine whether the kidneys are functioning adequately.

Women should always inform their physician or technologist if there is any possibility that they are pregnant. MRI has been used for scanning patients since the 1980s with no reports of any ill effects on

pregnant women or their unborn babies. However, because the unborn baby will be in a strong magnetic field, pregnant women should not have this exam in the first three to four months of pregnancy unless the potential benefit from the MRI exam is assumed to outweigh the potential risks. Pregnant women should not receive injections of gadolinium contrast material except when absolutely necessary for medical treatment. See the MRI Safety page for more information about pregnancy and MRI.

If you have claustrophobia (fear of enclosed spaces) or anxiety, you may want to ask your physician for a prescription for a mild sedative prior to your scheduled examination.

Jewelry and other accessories should be left at home, if possible, or removed prior to the MRI scan. Because they can interfere with the magnetic field of the MRI unit, metal and electronic items are not allowed in the exam room. In addition to affecting the MRI images, these objects can become projectiles within the MRI scanner room and may cause you and/or others nearby harm. These items include:

- jewelry, watches, credit cards and hearing aids, all of which can be damaged
- pins, hairpins, metal zippers and similar metallic items, which can distort MRI images
- removable dental work
- pens, pocket knives and eyeglasses
- body piercings

In most cases, an MRI exam is safe for patients with metal implants, except for a few types. People with the following implants cannot be scanned and should not enter the MRI scanning area:

- cochlear (ear) implant
- some types of clips used for brain aneurysms
- some types of metal coils placed within blood vessels
- nearly all cardiac defibrillators and pacemakers

You should tell the technologist if you have medical or electronic devices in your body. These objects may interfere with the exam or potentially pose a risk, depending on their nature and the strength of the MRI magnet. Many implanted devices will have a pamphlet explaining the MRI risks for that particular device. If you have the pamphlet, it is useful to bring that to the attention of the scheduler before the exam and bring it to your exam in case the radiologist or technologist has any questions. Some implanted devices require a short period of time after placement (usually six weeks) before being safe for MRI examinations. Examples include but are not limited to:

- artificial heart valves
- implanted drug infusion ports
- artificial limbs or metallic joint prostheses
- implanted nerve stimulators
- metal pins, screws, plates, stents or surgical staples

If there is any question of their presence, an x-ray may be taken to detect and identify any metal objects. In general, metal objects used in orthopedic surgery pose no risk during MRI. However, a recently placed artificial joint may require the use of another imaging procedure.

Patients who might have metal objects in certain parts of their bodies may also require an x-ray prior to an MRI. You should notify the technologist or radiologist of any shrapnel, bullets, or other pieces of metal that may be present in your body due to prior accidents. Foreign bodies near and especially lodged in the

eyes are particularly important because they may move during the scan, possibly causing blindness. Dyes used in tattoos may contain iron and could heat up during an MRI scan, but this is rare. Tooth fillings and braces usually are not affected by the magnetic field, but they may distort images of the facial area or brain, so you should let the radiologist know about them.

## What does the equipment look like?

The traditional MRI unit is a large cylinder-shaped tube surrounded by a circular magnet. You will lie on a moveable examination table that slides into the center of the magnet.

Some MRI units, called short-bore systems, are designed so that the magnet does not completely surround you. Some newer MRI machines have a larger diameter bore which can be more comfortable for larger size patients or patients with claustrophobia. Other MRI machines are open on the sides (open MRI). Open units are especially helpful for examining larger patients or those with claustrophobia. Newer open MRI units provide very high quality images for many types of exams. Older open MRI units may not provide this same image quality. Certain types of exams cannot be performed using open MRI. For more information, consult your radiologist.

The computer workstation that processes the imaging information is located in a separate room from the scanner.

MR defecography may be performed in either the traditional MRI unit (a large cylinder-shaped tube surrounded by a circular magnet) or in an open unit. In an open MRI unit, two large magnets surround the patient and a removable chair that simulates a toilet is located in the space between the large vertical magnets.

## How does the procedure work?

Unlike conventional x-ray examinations and computed tomography (CT) scans, MRI does not utilize ionizing radiation. Instead, radiofrequency pulses re-align hydrogen atoms that naturally exist within the body. This does not cause any chemical changes in the tissues. As the hydrogen atoms return to their usual alignment, they emit different amounts of energy depending on the type of body tissue they are in. The MR scanner captures this energy and creates a picture of the tissues scanned based on this information.

The magnetic field is produced by passing an electric current through wire coils in most MRI units. Other coils, located in the machine and in some cases, placed around the part of the body being imaged, send and receive radio waves, producing signals that are detected by the coils. The electric current does not come in contact with the patient.

A computer then processes the signals and generates a series of images, each of which shows a thin slice of the body. The images can then be studied from different angles by the interpreting radiologist.

Frequently, the differentiation of abnormal (diseased) tissue from normal tissues is better with MRI than with other imaging modalities such as x-ray, CT and ultrasound.

## How is the procedure performed?

MRI examinations may be performed on outpatients or inpatients.

You will be asked to drink water during a period of 30 minutes prior to the exam. Your rectum will be filled with a soft substance that is similar to the consistency of feces and contains a contrast material. A towel will be placed underneath you to absorb any urine or feces that may leak out during the exam.

If your exam is being performed in a traditional MRI unit, you will be positioned on a moveable examination table lying on your back with your knees bent. Straps and bolsters may be used to help you remain still and maintain the correct position during imaging. If your exam is being performed in an open MRI unit, you will be seated on an adjustable chair within the unit between two large magnets.

A device that contains coils capable of sending and receiving radio waves will be strapped around your pelvis in a traditional MRI unit or placed on the seat beneath you in an open MRI unit.

The examination will be performed by a radiologist working at a computer outside of the room.

Images will be obtained as you contract your muscles as you would during a bowel movement including squeezing, straining and defecating. Images will also be taken while your muscles are relaxed. The technologist will give you instructions during the exam.

The MR defecography exam typically includes two or more sets of images and is usually completed in 30 minutes to an hour.

## What will I experience during and after procedure?

Most MRI exams are painless. However, some patients find it uncomfortable to remain still during MR imaging. Others experience a sense of being closed-in (claustrophobia) while in the MRI scanner. Therefore, sedation can be arranged for those patients who anticipate anxiety, but fewer than one in 20 require medication.

It is normal for the area of your body being imaged to feel slightly warm, but if it bothers you, notify the radiologist or technologist. It is important that you remain perfectly still while the images are being obtained, which is typically only a few seconds to a few minutes at a time. You will know when images are being recorded because you will hear and feel loud tapping or thumping sounds when the coils that generate the radiofrequency pulses are activated. Some centers provide earplugs, while others use headphones to reduce the intensity of the sounds made by the MRI machine. You will be able to relax between imaging sequences, but will be asked to maintain your position without movement as much as possible.

You will usually be alone in the exam room during the MRI procedure. However, the technologist will be able to see, hear and speak with you at all times using a two-way intercom. Many MRI centers allow a friend or parent to stay in the room as long as they are also screened for safety in the magnetic

environment.

Children will be given appropriately sized earplugs or headphones during the exam. MRI scanners are air-conditioned and well-lit. Music may be played through the headphones to help you pass the time.

Some patients feel mild bloating or cramping when the substance and contrast material is inserted into the rectum.

You may resume your usual activities and normal diet immediately after the exam.

## Who interprets the results and how do I get them?

A radiologist, a physician specifically trained to supervise and interpret radiology examinations, will analyze the images and send a signed report to your primary care or referring physician, who will share the results with you.

## What are the benefits vs. risks?

### Benefits

- MR defecography helps assess pelvic floor abnormalities that can be difficult to diagnose through physical examination and other tests such as colonoscopy and sigmoidoscopy.
- MRI is a noninvasive imaging technique that does not involve exposure to ionizing radiation.
- MR images of the soft-tissue structures of the body—such as the heart, liver and many other organs—are clearer and more detailed than with other imaging methods. This detail makes MRI an invaluable tool in early diagnosis and evaluation of cancer.
- MRI has proven valuable in diagnosing a broad range of conditions, including heart and vascular disease, stroke, and joint and musculoskeletal disorders.
- MRI can help physicians evaluate both the structure of an organ and how it is working.
- MRI enables the discovery of abnormalities that might be obscured by bone with other imaging methods.

### Risks

- The MRI examination poses almost no risk to the average patient when appropriate safety guidelines are followed.
- Although the strong magnetic field is not harmful in itself, implanted medical devices that contain metal may malfunction or cause problems during an MRI exam.

## What are the limitations of magnetic resonance imaging (MR) defecography?

High-quality images are assured only if you are able to remain perfectly still and follow breath-holding instructions while the images are being recorded. If you are anxious, confused or in severe pain, you may find it difficult to lie still during imaging.

A person who is very large may not fit into the opening of certain types of MRI machines.

The presence of an implant or other metallic object sometimes makes it difficult to obtain clear images due to streak artifacts from the metallic objects. Patient movement can have the same effect.

A very irregular heartbeat may affect the quality of images obtained using techniques that time the imaging based on the electrical activity of the heart, such as electrocardiography (EKG).

Although there is no reason to believe that magnetic resonance imaging harms the fetus, pregnant women usually are advised not to have an MRI exam during the first trimester unless medically necessary.

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