

Intravenous Pyelogram (IVP)

This information is reviewed by a physician with expertise in the area presented and is further reviewed by committees from the American College of Radiology (ACR) and the Radiological Society of North America (RSNA), comprising physicians with expertise in several radiologic areas.

What is an Intravenous Pyelogram (IVP)?

An intravenous pyelogram (IVP) is an x-ray examination of the kidneys, ureters and urinary bladder that uses iodinated contrast material injected into veins.

An x-ray (radiograph) is a noninvasive medical test that helps physicians diagnose and treat medical conditions. Imaging with x-rays involves exposing a part of the body to a small dose of ionizing radiation to produce pictures of the inside of the body. X-rays are the oldest and most frequently used form of medical imaging.

When a contrast material is injected into a vein in the patient's arm, it travels through the blood stream and collects in the kidneys and urinary tract, turning these areas bright white. An IVP allows the radiologist to view and assess the anatomy and function of the kidneys, ureters and the bladder.

What are some common uses of the procedure?

An intravenous pyelogram examination helps the physician assess abnormalities in the urinary system, as well as how quickly and efficiently the patient's system is able to handle waste.

The exam is used to help diagnose symptoms such as blood in the urine or pain in the side or lower back.

The IVP exam can enable the radiologist to detect problems within the urinary tract resulting from:

- kidney stones
- enlarged prostate
- tumors in the kidney, ureters or urinary bladder

How should I prepare?

Your doctor will give you detailed instructions on how to prepare for your IVP study.

You will likely be instructed not to eat or drink after midnight on the night before your exam. You may also be asked to take a mild laxative (in either pill or liquid form) the evening before the procedure.

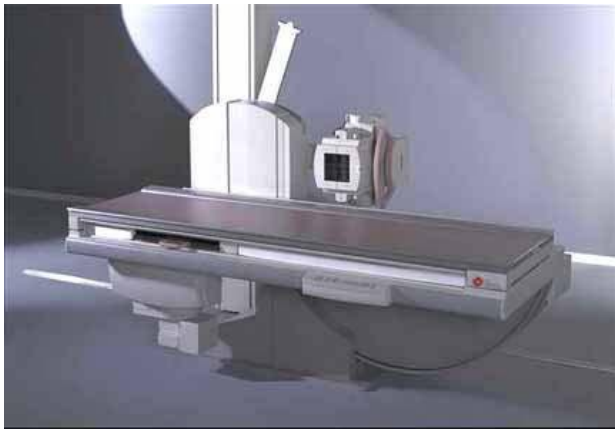
You should inform your physician of any medications you are taking and if you have any allergies, especially to barium or iodinated contrast materials. Also inform your doctor about recent illnesses or other medical conditions.

You may be asked to remove some or all of your clothes and to wear a gown during the exam. You may also be asked to remove jewelry, eye glasses and any metal objects or clothing that might interfere with the x-ray images.

Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant. Many imaging tests are not performed during pregnancy so as not to expose the fetus to radiation. If an x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby.

What does the equipment look like?

The equipment typically used for this examination consists of a radiographic table, an x-ray tube and a television-like monitor that is located in the examining room or in a nearby room. When used for viewing images in real time, the image intensifier (which converts x-rays into a video image) is suspended over a table on which the patient lies. When used for taking still pictures, the image is captured either electronically or on film.



How does the procedure work?

X-rays are a form of radiation like light or radio waves. X-rays pass through most objects, including the body. Once it is carefully aimed at the part of the body being examined, an x-ray machine produces a small burst of radiation that passes through the body, recording an image on photographic film or a special digital image recording plate.

In the IVP exam, an iodine-containing contrast material is injected through a vein in the arm collects in the kidneys, ureters and bladder, giving these areas a bright white and sharply defined appearance on the x-ray images.

X-ray images are maintained as hard film copy (much like a photographic negative) or, more likely, as a digital image that is stored electronically. These stored images are easily accessible and are sometimes compared to current x-ray images for diagnosis and disease management.

How is the procedure performed?

This examination is usually done on an outpatient basis.

The patient is positioned on the table and still x-ray images are taken. The contrast material is then injected, usually in a vein in the patient's arm, followed by additional still images.

You must hold very still and may be asked to keep from breathing for a few seconds while the x-ray picture is taken to reduce the possibility of a blurred image. The technologist will walk behind a wall or into the next room to activate the x-ray machine.

As the contrast material is processed by the kidneys a series of images is taken to determine the actual size of the kidneys and to capture the urinary tract in action as it begins to empty.

The technologist may apply a compression band around the body to better visualize the urinary structures leading from the kidney.

When the examination is completed, you will be asked to wait until the radiologist determines that all the necessary images have been obtained.

An IVP study is usually completed within an hour. However, because some kidneys empty at a slower rate the exam may last up to four hours.

What will I experience during and after the procedure?

The IVP is usually a relatively comfortable procedure.

You will feel a minor sting as the contrast material is injected into your arm through a small needle. Some patients experience a flush of warmth, a mild itching sensation and a metallic taste in their mouth as it begins to circulate throughout their body. These common side effects usually disappear within a minute or two and are harmless. Rarely, some patients will experience an allergic reaction. Itching that persists or is accompanied by hives, can be easily treated with medication. In very rare cases, a patient may become short of breath or experience swelling in the throat or other parts of the body. These can be indications of a more serious reaction to the contrast material that should be treated promptly. Tell the radiologist immediately if you experience these symptoms.

During the imaging process, you may be asked to turn from side to side and to hold several different positions to enable the radiologist to capture views from several angles. Near the end of the exam, you may be asked to empty your bladder so that an additional x-ray can be taken of your urinary bladder after it empties.

The contrast material used for IVP studies will not discolor your urine or cause any discomfort when you urinate. If you experience such symptoms after your IVP exam, you should let your doctor know immediately.

Who interprets the results and how will 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 discuss the results with you.

What are the benefits vs. risks?

Benefits

- Imaging of the urinary tract with IVP is a minimally invasive procedure.
- IVP images provide valuable, detailed information to assist physicians in diagnosing and treating urinary tract conditions from kidney stones to cancer.
- An IVP can often provide enough information about kidney stones and obstructions to direct treatment with medication and avoid more invasive surgical procedures.
- No radiation remains in a patient's body after an x-ray examination.
- X-rays usually have no side effects in the diagnostic range.

Risks

- There is always a slight chance of cancer from exposure to radiation. However, the benefit of an accurate diagnosis far outweighs the risk.
- The effective radiation dose from this procedure is about 3 mSv, which is about the same as the average person receives from background radiation in one year.
- Contrast materials used in IVP studies can cause adverse allergic reactions in some people, sometimes requiring medical treatment.
- Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant.

A Word About Minimizing Radiation Exposure

Special care is taken during x-ray examinations to use the lowest radiation dose possible while producing the best images for evaluation. National and international radiology protection councils continually review and update the technique standards used by radiology professionals.

State-of-the-art x-ray systems have tightly controlled x-ray beams with significant filtration and dose control methods to minimize stray or scatter radiation. This ensures that those parts of a patient's body not being imaged receive minimal radiation exposure.

What are the limitations of IVP studies?

An IVP shows details of the inside of the urinary tract including the kidneys, ureters and bladder. Computed tomography (CT) or magnetic resonance imaging (MRI) may add valuable information about the functioning tissue of the kidneys and surrounding structures nearby the kidneys, ureters and bladder.

IVP studies are not usually indicated for pregnant women.



An x-ray image of the upper abdomen 10 minutes after the injection of contrast material shows normal kidneys, collecting systems and upper ureters.



An x-ray image of the whole abdomen taken 15 minutes after injection of contrast material shows further excretion into the lower ureters and bladder.

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