

Intravenous Pyelogram (IVP)

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What is an Intravenous Pyelogram (IVP)?

An Intravenous Pyelogram (IVP) is an x-ray examination of the kidneys, ureters and urinary bladder. Most people are familiar with x-ray images, which produce a still picture of the body's interior by passing small, highly controlled amounts of radiation through the body and capturing the resulting shadows and reflections on film. An IVP study uses a contrast material (iodine) to enhance the x-ray images. The contrast material is injected into the patient's system and its progress through the urinary tract is then recorded on a series of quickly captured images. The exam enables the radiologist to review the anatomy and the function of the kidneys and urinary tract.

What are some common uses of IVP studies?

A radiologist can use an IVP study to find the cause of a wide variety of disorders, including frequent urination, blood in the urine, or pain in the side or lower back. The IVP exam can enable the radiologist to detect problems within your urinary tract resulting from kidney stones; enlarged prostate; tumors in the kidney, ureters or urinary bladder; and other changes.



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

How should I prepare for my IVP procedure?

You should tell your doctor about any allergies you have to foods or medications, as well as any recent illnesses or other medical conditions. If you are diabetic make sure your doctor is aware of your condition and the medications you take. Women should always inform their doctor or x-ray technologist if there is any possibility that they are pregnant.

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 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. Follow your doctor's instructions.

Once you arrive at the imaging center you will be asked to change into a gown before your examination. You will also be asked to remove jewelry, eyeglasses or any metal objects that could obscure the images. Underwear with metallic components should also be removed.

How does the IVP procedure work?

Different tissues such as bone, blood vessels, and muscles and other soft tissues absorb x-ray radiation at different rates. When a special film plate is exposed to the absorbed x-rays an image of the inside of the body is captured.

An IVP study requires the use of a contrast material injected intravenously to help tissues show more clearly on the x-ray film. As the contrast material moves into and through the kidneys, ureters and urinary bladder, the technologist captures a series of images that track its progress. The technologist may apply a compression band around the body to better visualize the urinary structures leading from the kidney. By reviewing these images a radiologist can assess abnormalities in the urinary system, as well as how quickly and efficiently the patient's system is able to handle waste.

How is IVP performed?

Before introducing the contrast material, the radiologist or technologist will ask whether the patient has any allergies and whether the patient has a history of diabetes, asthma, a heart condition, kidney problems or thyroid conditions. These conditions may indicate a higher risk of reaction to the contrast material or potential problems eliminating the material from the patient's system after the exam. You may also be asked if you have had any prior surgery on the urinary system.

An IVP examination is usually done on an outpatient basis. The patient is positioned on the table and a contrast material is injected, usually in a vein in the patient's arm. Contrast (iodine) excreted in the urine shows outlines of the kidneys and demonstrates the inner "collecting system" and ureters as well. The inner structures appear white in the image. Images are taken before and after the injection of the contrast material. As the contrast material is processed by the kidneys a series of images is captured to determine the actual size of the kidneys and to show the collecting system as it begins to empty. Some kidneys don't empty at the same rate and delayed films from 30 minutes to three or four hours may be requested. However, a typical IVP study usually takes about an hour.

What will I experience during my IVP?

Aside from a minor sting from the injection of contrast material an IVP causes no pain. When the contrast material is injected, some people report feeling a flush of heat and sometimes a metallic taste in their mouth. These common side effects usually disappear within a minute or two and are no cause for alarm. Some people experience a mild itching sensation. If it persists or is accompanied by hives, the itch can be treated easily with medication. In 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, so 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 film 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, they are likely to indicate some other problem. Let your doctor know right away.

What are the benefits vs. risks of IVP?

Benefits

- IVP images provide valuable, detailed information to assist physicians in diagnosing and treating urinary tract conditions from stones to cancer.

- Imaging of the urinary tract with IVP is a minimally invasive procedure with rare complications.
- An IVP can often provide enough information about stones and obstructions to direct treatment with medication and avoid more invasive surgical procedures.
- The imaging process is fast, painless and less expensive than alternatives such as computed tomography (CT) and magnetic resonance imaging (MRI).

Risks

- Contrast materials used in IVP studies can cause adverse reactions in some people.
- Women should always inform their doctor or x-ray technologist if there is any possibility that they are pregnant. See the Safety page for more information about pregnancy and x-rays.
- The effective radiation dose from this procedure is about 1.6 mSv, which is about the same as the average person receives from background radiation in six months. See the Safety page for more information about radiation dose.

Radiation risks are further minimized by:

- The use of high-speed x-ray film that does not require much radiation to produce an optimal image.
- Technique standards established by national and international guidelines that have been designed and are continually reviewed by national and international radiology protection councils.
- Modern, state-of-the-art x-ray systems that have very tightly controlled x-ray beams with significant filtration and x-ray dose control methods. Thus, scatter or stray radiation is minimized and those parts of a patient's body not being imaged receive minimal 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. CT or MRI may add valuable information about the functioning tissue of the kidneys and the surface and surrounding structures nearby the kidneys, ureters and bladder. IVP studies are not usually indicated for pregnant women.