

# ***MEDICAL DIAGNOSTIC IMAGING***



## About UHS

University Hospital Sharjah (UHS) is a tertiary care multispecialty hospital located in the University City area of Sharjah.

It brings together a multidisciplinary team of physicians, nurses and health-care professionals to address the most complex and challenging medical problems for the residence of Sharjah and Northern Emirates. UHS is also an academic institution and enjoys a robust educational affiliation with the Medical College at University of Sharjah.

With the unlimited support of His Highness Sheikh Dr. Sultan bin Mohammed Al Qassimi, University Hospital Sharjah will always endeavor to be the leading healthcare provider in the region.

## Our Service Strength

325 beds spread across multiple specialties including 210 In-patient beds, 40 Specialty outpatient beds, 34 Emergency beds, 16 ICU beds, 20 Neonatal ICU, 12 Hemodialysis beds, Physiotherapy department, Cardiac Catheterization Laboratory.

Advanced breast cancer treatment and surgical solutions in collaboration with Gustave Roussy Centre.

Regional center of excellence for maternity care with dedicated theatre suite, fetal assessment unit, ultrasound department and neonatal intensive care unit.

First-of-its-kind children's diabetes clinic specialised in providing check-up, follow-up and treatment.

Level 3 NICU equipped to care for babies born at 23 weeks gestation and above as well as babies born with critical illnesses at all gestational ages.

24/7 Emergency Services.

24 hours pharmacy.

***“DELIVERING EXCEPTIONAL HEALTHCARE”***





# Introduction

The Medical Diagnostic Imaging department at the University Hospital Sharjah offers a wide variety of diagnostic radiology examinations for both inpatients and outpatients. All imaging procedures are performed using state-of-the-art equipment that is subject to stringent regulatory standards. Our team of specialized radiologists and expert technologists provides the best service possible with the latest advances available within the field.

Radiologic examinations offer safe and noninvasive methods of gaining information for improved diagnosis and treatment.





## Computed Tomography (CT)

Computed tomography (CT) is a specialized, sophisticated x-ray technology that obtains data from different angles of the human body. Multiple images are taken during a CT scan, and a computer compiles them into complete, cross-sectional pictures ("slices"). A CT scan obtains images of parts of the body that cannot be seen on a standard x-ray. Therefore, these scans often result in earlier diagnosis and more successful treatment of many diseases.

A CT scan is considered to be a safe examination. While CT imaging does involve x-rays, the diagnostic benefits generally outweigh the risks of x-ray (radiation) exposure. Among all available imaging techniques, it is one of the best tools for studying the lungs and abdomen. It is also invaluable in cancer diagnosis, and is the preferred method for diagnosing lung, liver, and pancreatic cancer.

For many CT examinations, a contrast agent may be administered. Depending on the type of examination, the contrast may be given orally, intravenously, or as an enema. If certain types of contrast will be used during an examination, the patient may be required to fast for several hours or use an enema to cleanse the colon prior to the appointment.

A major advantage of an advanced CT scan machine is its potential to produce state of the art diagnostic images of the coronary arteries of the heart without any invasive procedure. The patient just lies on a table and with minutes, a study of the coronary arteries would be acquired and the patient can go home almost immediately. These studies are done at UHS by a highly specialized team.



## How should I prepare for the procedure?

On the day of the exam, avoid wearing clothing with zippers and snaps. You should wear comfortable, loose-fitting clothing to your exam. You may be given a gown to wear during the procedure. Metal objects including jewelry, eyeglasses and hairpins may affect the CT images and should be removed prior to your exam.

You may be asked not to eat or drink anything for several hours beforehand and to do kidney function test especially if a contrast material will be used in your exam. You should inform your physician of any medications you are taking and if you have any allergic history.

Also inform your doctor if you have a history of heart disease, asthma, diabetes, or kidney disease. Any of these conditions may increase the risk of side effects.

**Women should always inform their physician and the CT technologist if there is any possibility that they are pregnant.**



## How is the procedure performed?

If your exam for your abdomen or pelvis, you may be given a liquid contrast solution to drink about one hour before having your test. It is very important to drink all of this solution. It will help to show your stomach and intestines on the CT scan. The technologist will help you onto the CT table and position you for the test. It is important not to move until the test is complete. You will be asked to hold your breath when the scan is start. In most cases, an intra venous contrast medicine will be given to highlight the vessels and structures on the scan. You may get a warm feeling or a metallic taste in your mouth when the contrast medicine is injected. Please tell the technologist if you are allergic to iodine or if you have any other unusual sensations or feelings.

The scan time will take 5 to 15 minutes. For patients who are having their abdomen or pelvis to be scanned we may require them to drink a special drink up to one and half hour prior to the scan time so, you must allow for this drinking time when scheduling for the procedure.

## What are the benefits vs. risks?

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CT scans, like other X-ray imaging exams, involve a brief, targeted exposure to a small amount of ionizing radiation which is used to create an image of your internal structures. Although CT scans expose you to more radiation than traditional X-ray exams do, they also provide much more detailed images, which allows your doctor to detect and precisely locate a vast array of medical conditions. In emergency cases, they can reveal internal injuries and bleeding quickly enough to help save lives.





## Ultrasound

In many instances, a quick and painless exam can be performed without ionizing radiation. The exam is called a sonogram, or ultrasound scan. Ultrasound is defined as sound with a frequency greater than 20,000 cycles/sec (Hertz, or Hz), which is the upper limit of audible sound. Sonography for diagnostic imaging purposes employs frequencies of one million to twenty million cycles per second.

These are produced by a device known as a transducer, which is placed directly on, and occasionally within, the patient. The device contains a material that vibrates upon receiving a voltage charge. Sound waves are then created and either transmitted, refracted, or reflected back to a receiver. The degree of reflection is based on applied frequency, the sound velocity, and the acoustic impedance of the tissue. In other words, different tissues will have different responses to the sound waves.

Various transducers have been optimized for specific body parts. Major applications of ultrasound include obstetrical imaging, abdominal imaging, and Doppler imaging, a variant technique used in heart and vascular diagnosis. In some instances, biopsies are performed under the guidance of ultrasound, permitting more accurate and less invasive tissue sampling.

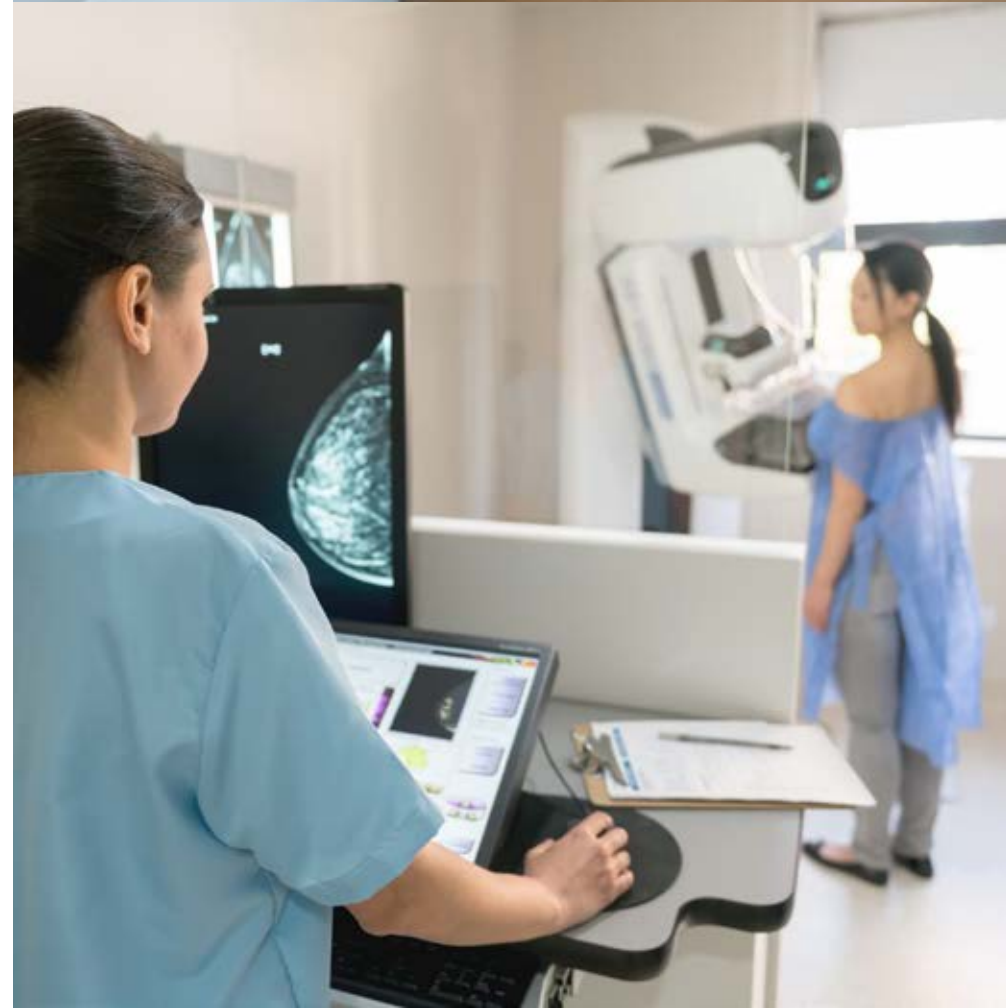


## Mammography

Mammography (mammogram) is an X-ray technique used to study the breasts. The breast is placed on x-ray plate and gentle pressure is applied to it. The compression, although uncomfortable, greatly improves the visibility of abnormalities. Mammography, as a screening tool, has been found to be of great diagnostic value.

Mammography plays a central part in early detection of breast cancers because it can show changes in the breast up to two years before a patient or physician can feel them.

Digital mammography is a new type of breast cancer screening. It is done the same way as a regular mammogram. But instead of storing the images on film, a digital mammogram records and stores the images on a computer. Digital mammography may be better than film mammography at finding cancer in women younger than 50 and women with dense breast tissue.



## What is a screening mammogram?

A screening mammogram is done if you have no symptoms of breast disease. It is the best way to find breast cancer early. You do not need a prescription or referral if you meet the age guidelines.

The age guidelines for a screening mammogram are:

- Between ages 35 and 40: Have a screening mammogram. This will set a “baseline” to compare with for future tests.
- Starting at age 40: Have a screening mammogram every year.

## What does the equipment look like?

A mammography unit is a specialized equipment that houses the tube in which x-rays are produced. The unit is used exclusively for x-ray exams of the breast, with special accessories that allow only the breast to be exposed to the x-rays. Attached to the unit is a device that holds and compresses the breast and positions it so images can be obtained at different angles.

## How should I prepare for the procedure?

Take a shower or bath before the mammogram. Do not put deodorant, powder, lotion, or perfume on your breasts or under your arms. Doing this may cause the mammogram images to turn out wrong and appear on the mammogram as calcium spots.

Wear a two-piece outfit like a shirt and pants or a skirt. For the mammogram, you will be asked to take off all your clothes from the waist up.

Do not schedule your mammogram for the week before your period if your breasts are usually tender during this time. The best time for a mammogram is one week following your period. Always inform your doctor or x-ray technologist if there is any possibility that you are or might be pregnant.





## How is the procedure performed?

Two x-rays are usually done for each breast, one top view and one side view. If you have breast implants or breast problems, more x-rays may need to be done. A regular mammogram usually takes about 20 minutes.

You will be given a hospital gown to change your clothes from the waist up. Wear the gown so that it opens in the front.

Tell the technologist doing the mammogram if you have breast implants. Tell them about any breast problems or changes before you have the mammogram. The technologist may ask if you take hormone medicine, have family history with breast cancer, and other questions.

You will sit or stand next to a small x-ray table. The technologist doing the test will help you place one of your breasts on the x-ray plate. Your breast will be moved until the correct position.

Your breast will be gently flattened between two plastic plates for a few seconds. Having your breasts spread flat and wide helps your technologist get the best mammogram image. This makes it easier for them to see if there are any problems in your breasts. You may feel uncomfortable while your breasts are flattened.

You will be asked to hold your breath while the x-ray is taken. Another x-ray will be taken of the same breast after the position of the x-ray machine has been changed. Your other breast will be examined in the same way.

Your breasts may feel tender for a short while after the mammogram. You may do all your regular activities right after the mammogram. Ask the technologist when you should have another mammogram.

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

A radiologist, a physician specifically trained to supervise and interpret radiology examinations, will review the images and report the findings to your physician, who will then discuss the results with you on your next appointment.



## Angiography & Interventional Radiography

Angiographic and interventional radiologic techniques are also performed with injection of contrast material. In this instance, catheter insertion or needle placement is performed under fluoroscopic guidance, so that a particular vessel or organ can be seen and, in some instances, repaired via the catheter.



A classic example is angioplasty, for which a catheter is threaded into an obstructed vessel. An attached balloon is inflated to increase the opening of the vessel—thus improving blood supply to the tissues. This procedure is commonly performed on vessels in the heart, abdomen, and legs. As one might expect, these interventional techniques are complex procedures, involving teams of nurses, doctors, and radiographers working together.

The great advantage is that angioplasty and other image-guided interventional procedures replace the need and risks of surgery and general anesthesia for many patients. The interventional service offers more specific information and advice for patients undergoing these procedures.



## Contrast Radiography

A major improvement to the diagnostic accuracy of radiography has been the addition of contrast agents, which can be administered in a vein or instilled in a duct or hollow organ, such as barium sulfate in the alimentary tract.

A contrast medium contains relatively dense material of a high atomic number that absorbs more of the x-rays than the surrounding tissues, hence making the stomach, colon, or vessel appear white on the x-ray image. One can then look for structural changes such as polyps, stones, or ulcerations.



## Upper Gastrointestinal Series (UGI)

An upper gastrointestinal (UGI) series looks at the upper and middle sections of the gastrointestinal tract. The test uses barium contrast material, fluoroscopy, and X-ray. Before the test, you drink a mix of barium (barium contrast material) and water. The barium is often combined with gas-making crystals. The Radiologist watches the movement of the barium through your esophagus, stomach, and the first part of the small intestine (duodenum) on a video screen. Several X-ray images are taken at different times and from different views

Barium is a dry, white, chalky, metallic powder that is mixed with water to make a thick milkshake-like drink. Barium is an x-ray absorber and appears white on x-ray film. When swallowed, a barium drink coats the inside walls of the upper GI tract organs so that the swallowing motion, inside wall lining, function, size, and shape of these organs are visible on x-ray. This process shows differences that might not be seen on standard x-rays. Barium is used only for diagnostic studies of the GI tract.

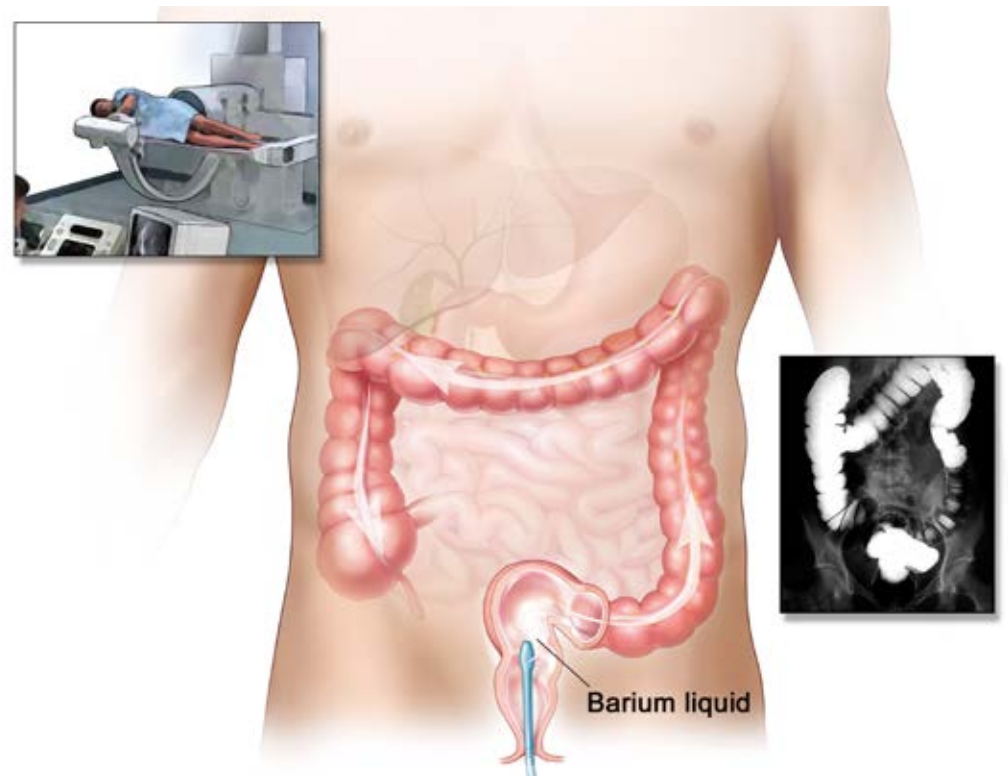
The exam will take approximately half an hour. Additional images of the barium moving through the small intestine may be taken when requested by the referring physician. This can add anywhere from 45 minutes to several hours. Throughout these procedures, the patient usually feels no discomfort or pain.

## Barium Enema

The lower GI tract, including the colon and rectum, are also important areas to examine. The x-ray procedure for that area is called the barium enema. In addition to not eating breakfast, a bowel-cleansing preparation must be administered the day before the procedure to permit clearer images of the large bowel and surrounding tissues.

At the time of examination, a barium mixture is instilled through an enema tip placed in the rectum by the radiologist. This procedure may cause some discomfort but is not painful. As it is instilled, the radiologist will examine and film the flow of barium. Sometimes, air is added to the barium mixture. The patient will be asked to move to several different positions. Patients should try to relax and hold their breath when instructed in order to avoid blurred images.

When the radiologist has completed his or her portion of the exam, the technologist will take several more images to demonstrate various portions of the large bowel. Once the film sequence is finished, the technologist will assist the patient to the toilet. Afterward one or more images will be taken to demonstrate the emptied bowel.



## Digital Radiography (X-Ray)

Digital X-Ray is a type of energy that can penetrate the body, which allows a Technologist to produce images of internal organs. Radiology exams are used to diagnose sources of pain due to injury or disease, evaluate organs such as the Skull, intestine, urinary system and bones and monitor medical and surgical procedures such as central line placements and orthopedic work. Some radiology examinations can be performed on a walk-in basis while others require a scheduled appointment and preparation for the test.

The amount and type of x-rays are selected by the technologist depends on the patient thickness, the tissue being imaged, and the desired image contrast. The radiographic images will be reported and saved in your electronic file by the radiologist, a physician specially trained to interpret X-Ray images.





Digital X-ray is safe, noninvasive, and quickly performed. The average exam takes no more than 5-10 minutes per part (skull, chest x-ray, knee, or cervical spine). It is important for females to notify the technologist, prior to any x-ray procedure, if there is any possibility that you might be pregnant.

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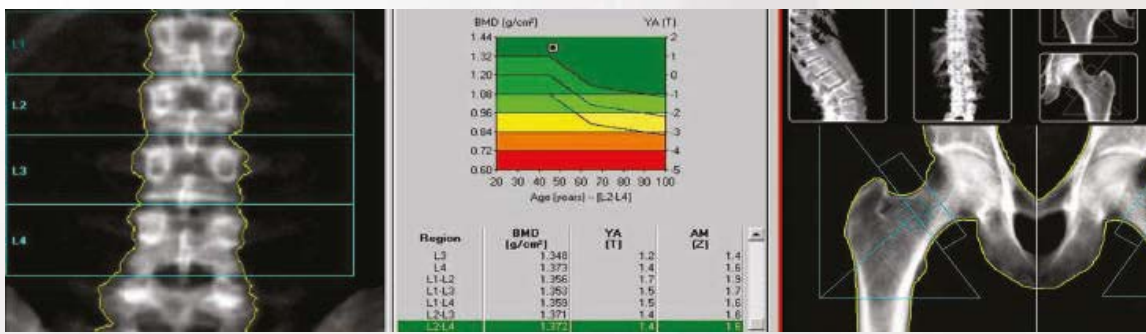


## Intravenous Urography

Intravenous Urography is a procedure to examine the urinary tract where a contrast medium containing iodine is injected intravenously (into a vein, usually in the arm). The iodine improves the contrast on the x-ray image. Some people are allergic to iodine and must be pre-medicated. Prior to the procedure, all patients should be sure to fill out the contrast screening form and to notify the technologist of any prior reaction.

Intravenous urography (IVU) and pyelography (IVP) are different names for x-ray examination of the kidneys, ureters, and bladder. This test yields information about the function of the kidneys, the presence of stones in the urinary tract, and the passage of urine from the kidneys to ureters and bladder.





## Bone Densitometry (BMD) or (DEXA Scan)

Dexa stands for 'Dual Energy X-ray Absorptiometry'. It is the most commonly used test for measuring bone mineral density. It is one of the most accurate ways to diagnosis Osteopenia or Osteoporosis. The DEXA scan is typically used to diagnose and follow osteoporosis. It is not to be confused with the nuclear bone scan, which is sensitive to certain metabolic diseases of bones in which bones are attempting to heal from infections, fractures, or tumors. This test is so accurate that your follow up Dexa scan can be used to monitor your treatment to learn if your plan is working.

DEXA uses a small amount of radiation. However, the amount of radiation used in a DEXA scan is very low, less than the amount of radiation you get in one day just living on Earth.

Osteoporosis is a common bone disease that causes bone to become weak. This weakness can lead to fractures of the spine, hip, ankle, and wrist from simple falls which might not have resulted in a fracture in someone with normal bones.

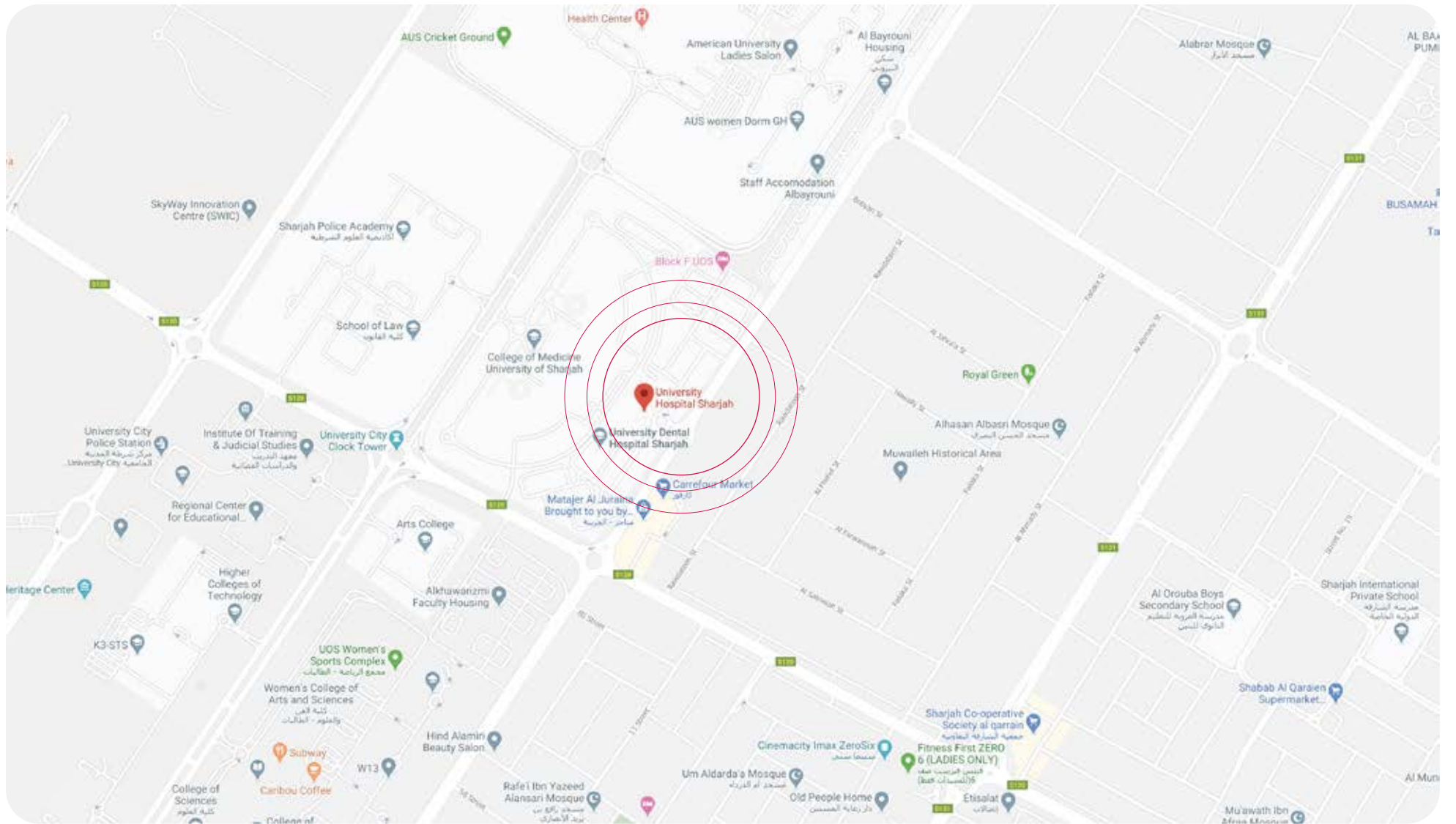
### What are some common uses of the procedure?

A DEXA scan may be advised if you are at increased risk of osteoporosis. Osteoporosis usually causes no symptoms at first. However, if you have osteoporosis, you have an increased risk of breaking a bone. If a DEXA scan shows that you have osteoporosis, then you may be given advice & treatment to help strengthen your bones. Therefore, a DEXA scan may be advised if you have:



- A family history of hip fracture on your mother's side.
- Taken steroid tablets for three months or more.
- Other disorders associated with osteoporosis such as rheumatoid arthritis disease.
- A fracture following a minor fall or injury.
- Loss of height greater than 1 inch.
- A body mass index of less than 19. (That is, if you are very underweight.)
- An early menopause (aged less than 45).
- A history of periods stopping for more than one year before the menopause.
- Asian and Caucasian ethnic group.
- Lifestyle factors:
  - Diets low in calcium and vitamin D.
  - Smoking and/or excessive use of alcohol.
  - Drinking caffeinated or carbonated beverages.
  - Lack of exercise.





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