

X-RAY SCRIPT

Narrator: *You are likely familiar with X-rays and the images they can produce from going to the dentist or hospital visits, but you might be surprised at what modern X-ray imaging can look like. X-rays first gave us the power to look inside the body, and their use has continued to evolve since their discovery in 1895 to uses beyond medicine like security, astronomy and industry. Korie is going to go through a special X-ray procedure called fluoroscopy to show us what X-rays can do.*

Korie: I'm Korie, and I'm going to show you what X-rays are all about. I've had x-rays before, but this is going to be a little different. Since X-rays are a form of radiation, they won't actually do the X-ray on me, but I'll show you what happens to a typical patient. I came to the X-ray department and checked in at the desk. Then I waited for someone to come and get me.

A technologist found me in the waiting room and brought me down to get changed...as we walked down the hall, she explained that X-rays go way beyond just taking pictures of broken bones. You might picture X-rays on film, but lots of X-rays are now digital and can even give you real-time images on a screen like a digital camera. While I got changed, the technologist went to set up the machine.

N: *Medical X-ray imaging or "radiography" uses high-energy X-ray radiation to create diagnostic images of the body. X-rays are a high energy form of light, which means they can pass through materials easier than visible light or radio waves, and this property is used for imaging our bodies. An X-ray can easily pass through the soft tissues of the body, but is absorbed by denser tissues like bones or teeth.*

K: They brought me into the machine once I was dressed and explained the procedure. They were going to do something called ES fluoroscopy, which is a way of X-raying the esophagus and stomach. Since these tissues are soft, X-rays would normally pass through them, so they use some tricks to make them appear more dense.

First, I had to have something called 'gas granules'...these are like fizzy candies that fill your stomach up with gas to stretch it out. The technologist had mixed up a special drink while I was changing. She explained that this is what would make my digestive system stand out in the X-ray. They call it a 'barium breakfast'...it's chalky and really thick...it even feels heavy in the container. When you drink it, it will coat your insides so the X-ray machine can 'see' the soft things it passes through.

N: *Barium sulfate is a type of 'contrast agent'. Contrast agents are high-density materials that will provide 'radio contrast'...basically a dense material that can fill up tissues that wouldn't normally show up on an X-ray, such as blood vessels or the tubes of the digestive system or kidneys. Once the contrast material is ingested or injected into the patient, it will absorb the X-rays just like a dense tissue like bone or a tooth might, and create contrast for imaging.*

K: The technologist got me ready and set up the machine for the scan. I then got to meet a radiologist...that's a doctor who specializes in getting and reading medical images. She would actually run the scan with the technologist's help.

N: *The radiologist can control the scan from a lead-shielded control room or from inside the room. Since these doctors and technologists spend their lives around X-rays, shielding and lead gowns are required to minimize the dose of X-rays that they receive over their careers.*

K: Here's where things got interesting...they want to actually take pictures of the esophagus as I swallow. I drank the barium and she moved the machine to follow it as it went down to my stomach. This machine is fully digital, so the images show up on the screen behind me.

N: *Although film radiography is still widely used, digital radiography has many advantages...just like a digital camera, you can see your image instantly and in real time. Whatever X-rays penetrate the body will strike a photosensor which can create an image like a digital camera would.*

K: This machine has an X-ray tube behind me and a sensor in front of me...you can see these as they rotate the machine to get images of my stomach.

Once they had me on my back, they made me do a series of log-rolls and turns. This would coat my stomach in the barium that I had swallowed. You can picture the barium sloshing around as I roll, coating all surfaces of my stomach.

N: *X-rays are created in the X-ray tube and aimed towards the patient. Within the tube, a high energy beam of electrons is produced by a cathode and shot towards a 'target' made of tungsten. As the electrons smash into the tungsten target, they accelerate other electrons, ions and nuclei in the target: some of the energy generated by this collision is released as X-rays. The X-rays are filtered and focused so that they will pass through the patient and expose a film or sensor on the other side of the patient. X-rays that pass through easily expose the screen and create dark spots on the image...this is why lungs, which are not very dense, show up black on a typical chest X-ray. Dense substances, like bone or barium in the stomach, will block X-rays from passing through to the sensor, and these will create white areas on the image.*

K: Once the scan was done, they helped me out of the machine and made sure the data is saved. The radiologist can then view these images on high resolution screens in a different viewing area and then send the results to a patient's doctor.

N: *As the first medical imaging technique, X-ray has come a long way and remains one of the most widely used diagnostic imaging techniques in modern medicine. Techniques like the fluoroscopy procedure seen here and CT scanning continue to expand the use of X-rays well beyond the analysis of broken bones!*