



# LEHIGH ATHLETICS

Department of Athletics  
Sports Medicine  
Lehigh University  
641 Taylor Street  
Bethlehem, PA 18015-3187  
Tel. (610) 758-4311  
Fax: (610) 758-6629

## Diagnostic Tests

### X-rays

- Radiation is emitted by a machine that pass through the body's soft tissue and only skeletal images are detected and created on photographic film
- Uses a very short wavelength and has the ability to pass through many materials (soft body tissues) and are blocked by hard material like bones
- Structures that are dense (such as bone) will show up distinctly and appear white on developed film. Other structures will appear black or shades of gray
- Limited to the detection of lesions in bone and do not detect pathology in soft tissue such as brain and muscle. Exceptions include chest x-rays that identify lung disease and an abdominal film which can detect the blockage of the intestine

### Uses

- Detects fractures, tumors, or degenerative conditions of the bone

### Process

- Test is performed in a hospital radiology department or in a health care provider's office by an X-ray technologist
- Remove all metal objects (jewelry)
- Make sure clothing is removed from the body part that will be examined
- Will be asked to position the bone to be x-rayed on the table
- Pictures are then taken, repositioning the bone for different views
  
- Images are available instantly and processed on film under 30 minutes

### Magnetic Resonance Imaging (MRI)

- Radiology technique that uses magnetism, radio waves, and a computer to produce images of body structures.
- The images produced by the MRI are very detailed and can detect very small tears and injuries to tendons, ligaments, muscles, and some fractures.

### Uses

- Head injury/trauma. Can detect bleeding or swelling and other abnormalities in the brain
- Intervertebral disks and spinal cord. Can detect deterioration of joint surfaces or a herniated disk.
- Organs and glands. Can detect tumors or other damage.
- Accurate information and clear pictures of soft tissue structures near and around the bones

- Physicians can use the images to locate and identify the cause of pain, swelling, or bleeding in and around the joints and bones

### Process

- Remove metal objects before the MRI Scan
  - Patient is on a movable bed which is inserted into the magnetic machine
  - You may verbally communicate with the MRI technologist throughout the test
  - No movement during the image sequence but some movement is allowed between sequences
  - Some patients may get an injection of a contrast material to enhance the images
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- Length of test depends on the area of the body being studied (usually half an hour to an hour and a half)
  - Usually consists of two to six imaging sequences, each lasting 2 to 15 minutes.
  - After all images are taken the computer generates visual images and is transferred to a film. A radiologist interprets the films and sends a report to the individual's physician

### **Bone Scan**

- Usually done in the medical physics department or "Nuclear Medicine" department of a hospital
- A radioactive substance is injected into the bloodstream and collects in bone and images are taken by a gamma camera. Information from the camera is recorded in a computer which processes the data and creates an image
- The bone scan can detect areas of increased or decreased bone metabolism and can indicate hidden bone fractures, bone infections, arthritis, or cancer. Abnormal metabolism shows up as either darker, w/ greater tracer uptake or lighter w/ little or no tracer uptake

### Uses

- They can detect subtle changes in bone before they are visible by x-ray
- Looks for abnormalities in a particular bone or joint

### Process

- Small amount of radioactive materials called tracers are injected
  - Drink plenty of fluid
  - Return 2-4 hours later to allow injected tracers to circulate
  - X-ray taken lasts approx. 1 hour
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- Results take approx. 1-3 weeks

## **CT/CAT Scan (Computed Tomography Imaging)**

- Combines a digital computer with a rotating x-ray to create detailed cross sectional images or “slices” of different organs and body parts
- Provides detailed cross sectional images and diagnostic information for any body part. Shows even very small bones, as well as the surrounding tissues (muscle and blood cells)
- Unique ability to image a combination of soft tissue, bone, and blood vessels

### Uses

- Used in diagnosing and treating spinal problems and injuries to the hands, feet, and other skeletal structures
- Allows radiologists to more easily diagnose problems such as cardiovascular disease, infectious disease, trauma, and musculoskeletal disorders

### Process

- Remove jewelry & glasses
- Wear loose fitting clothing. May be asked to wear a hospital gown.
- May get an injection or ingest a contrast agent which enhances the images of the organs and/or blood vessels.
- Patient is positioned on a specialized CT table
- Patient must remain still while the images are being taken
- Specialized rotating x-ray tubes that rotate 350 degrees
- Usually takes between 10-45 minutes

## **Arthrogram**

- Contrast study done in of the joints in the body, such as, shoulders, knees, ankles, wrists, etc, using x-rays and fluoroscopy. Fluoroscopy is a type of x-ray that shows moving pictures

### Uses

- Used to determine if you have tears in various connective tissue (tendons, bursa, cartilage, etc) and overall damage to the joint

### Process

- Radiologist will sterilize the skin over the area to be tested with alcohol or betadine
- Lidocane or a similar medicine will be applied to numb the skin over the area
- A needle will then be placed into the joint using fluoroscopy as a guide
- A contrast dye is injected into the joint
- Series of films are taken of the joint using both fluoroscopy and plain x-rays
- You will be asked to move into many different positions while the pictures are being taken
- Radiologist will review the x-rays to see if additional x-rays need to be taken
- Test takes about 1-2 hours

## Laser Therapy

- Low powered lasers that non-thermally and destructively alter cellular function.
- Conservative procedure uses infrared light over injuries to improve soft tissue healing and relieve acute and chronic injuries.
- Provides injured cells with additional energy to heal themselves.
- Used to treat neural and soft tissue conditions (muscle pain, tendonitis)
- Similar to the ultrasound modality

### Biological effects of Laser Therapy

- Increased cell metabolism
- Stimulated cell growth
- Cell regeneration
- Anti-inflammatory
- Reduced fibrous tissue formation
- Collagen deposition
- Helps relieve chronic and acute pain

### Procedure

- Lasers head is applied directly to the skin, and the clinician conducts a trigger point grid, radiating every half centimeter. Laser is the size of a flashlight
- Treatment takes approximately 15 minutes
- Usually less than 12 total treatments (3 treatments/week)