جامعة الملك سعود
King Saud University

RADIOLOGY
TEAM 435



LECTURE 1

VERTEBRAE

Before you study from this team work you should know :

- Radiology in 1st & 2nd med years are only a brief introduction, we well study the real radiology in our 3rd year.
- This team work contains extra information which is for your own knowledge.
- Radiology is based on anatomy, we recommend studying anatomy first.
- For any questions or misunderstanding please contact the team leaders.

Extra information

EXTRA INFORMATION

What is RADIOLOGY ?!

Radiology is the branch or specialty of medicine that deals with the study and application of imaging technology like x-ray and radiation to diagnosing and treating disease.

Radiologists direct an array of imaging technologies (such as ultrasound, computed tomography (CT), nuclear medicine, positron emission tomography (PET) and magnetic resonance imaging (MRI) to diagnose or treat disease. Interventional radiology is the performance of usually minimally invasive medical procedures with the guidance of imaging technologies. The acquisition of medical imaging is usually carried out by the radiographer or radiologic technologist.

Objectives:

- **Anatomy of spin on different imaging modalities.**
- **Understanding the concept of anatomy applied to pathology.**

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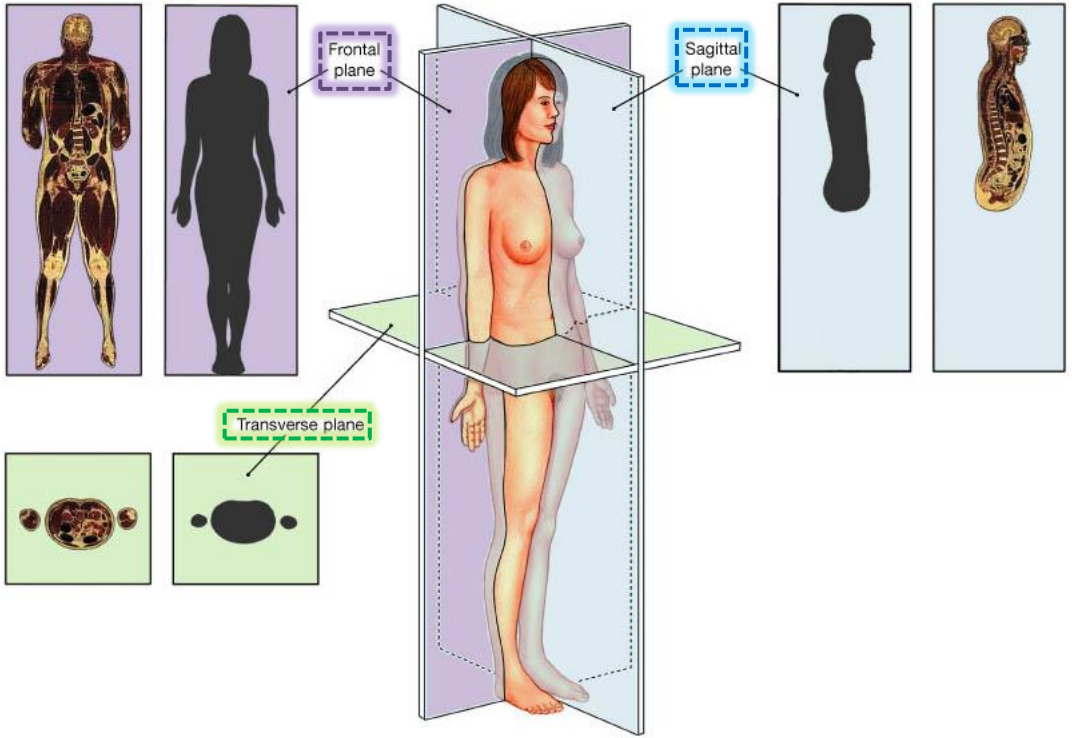
Body planes & sections

- **Coronal plane.** (frontal plane)
- **Sagittal plane.**
- **Transverse plane.** (axial plane)



EXTRA INFORMATION

X-RAY

X-rays (radiographs) are the most common and widely available diagnostic imaging technique. Even if you also need more sophisticated tests, you will probably get an X-ray first.
The part of your body being pictured is positioned between the X-ray machine and photographic film, the machine briefly sends electromagnetic waves (radiation) through your body, exposing the film to reflect your internal structure. The level of radiation exposure from X-rays is not harmful,

X-rays may not show as much detail as an image produced using newer, more powerful techniques.

We usually use the X-ray in minor traumas.

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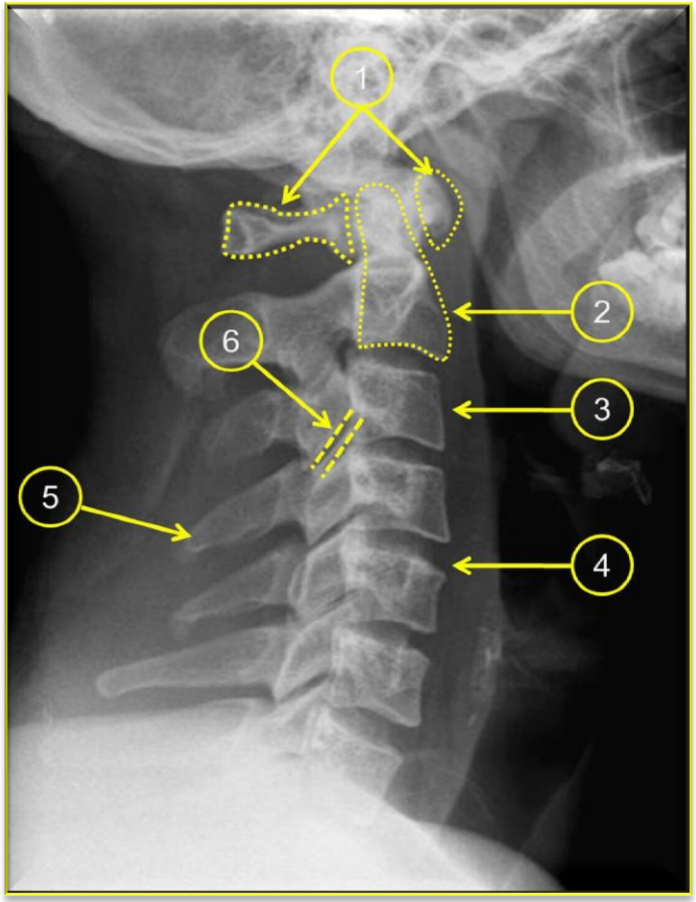
Advantages	Disadvantages
1. Used in Fractures & Dislocation.	1. Doesn't show soft tissue.
2. Used by dentist. (زي بالتقويم)	2. Can't be used for pregnant women.
3. Affordable so it can be found even in small clinics.	3. The patient should remain still during the examination.
4. Short test duration.	



CERVICAL SPINE

1.C1
2.C2
3.C3
4.Intervertebral disc
5.Spinous process of C4
6.Facet joint

If there is any injury of C1, C2 & C3 the whole budy well be paralyzed.

C1 is called Atlas and its fracture is called jefferson fracture.
C2 is called Axis and its fracture is called hangman fracture .

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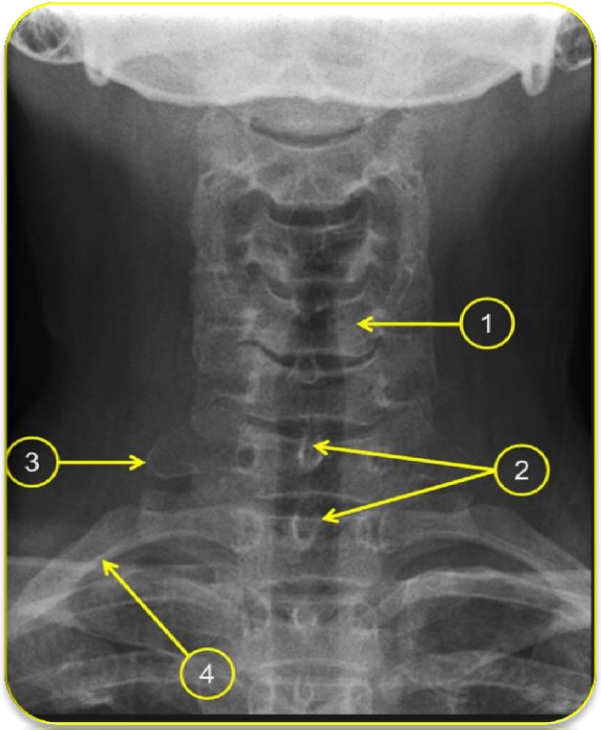
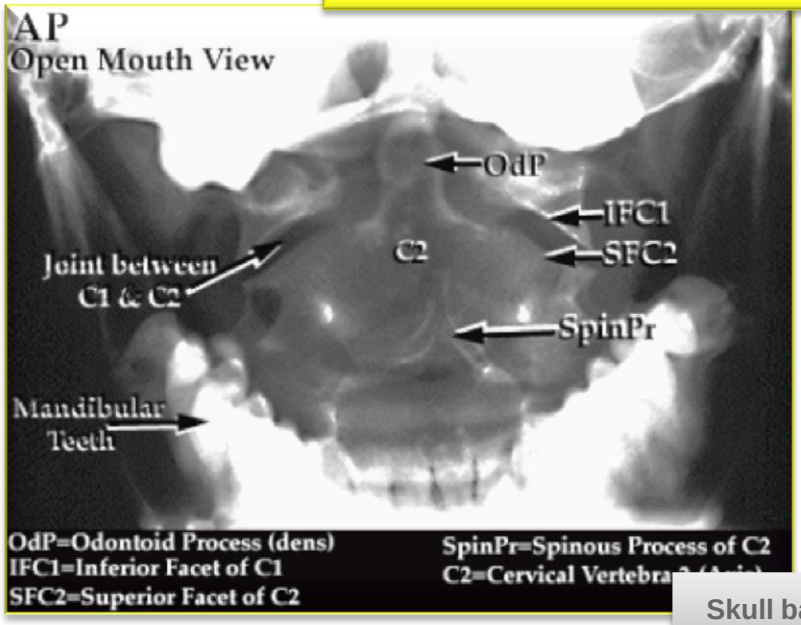
CERVICAL SPINE



1. Vertebral body C5
2. Spinous process
3. Transverse process
4. First rib



Skull base is called CD

We use open mouth view when we want to image the C1 & C2

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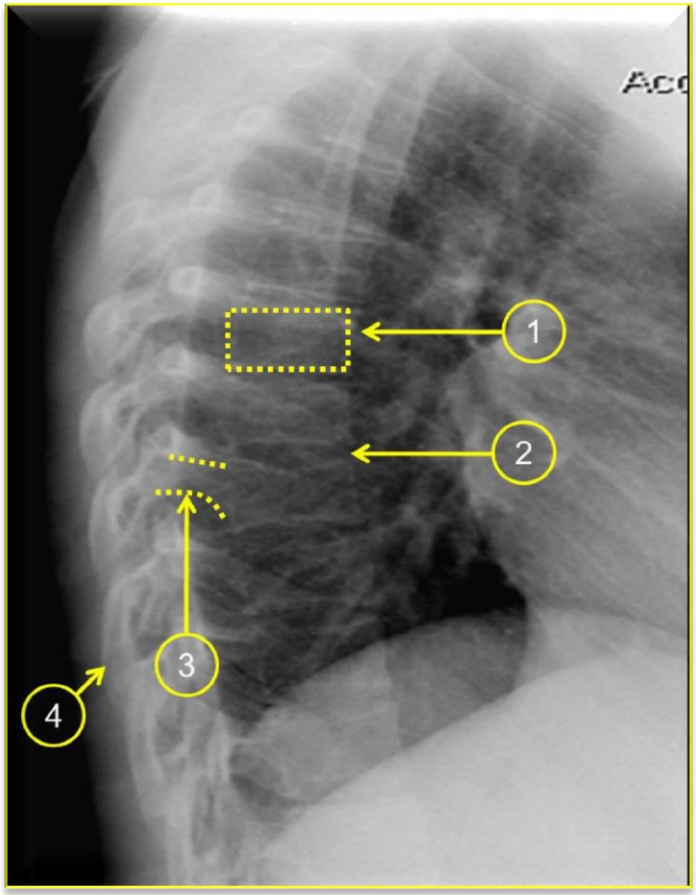

Thoracic Spine

1. Vertebral body
2. Intervertebral disc
3. Pedicle
4. Rib

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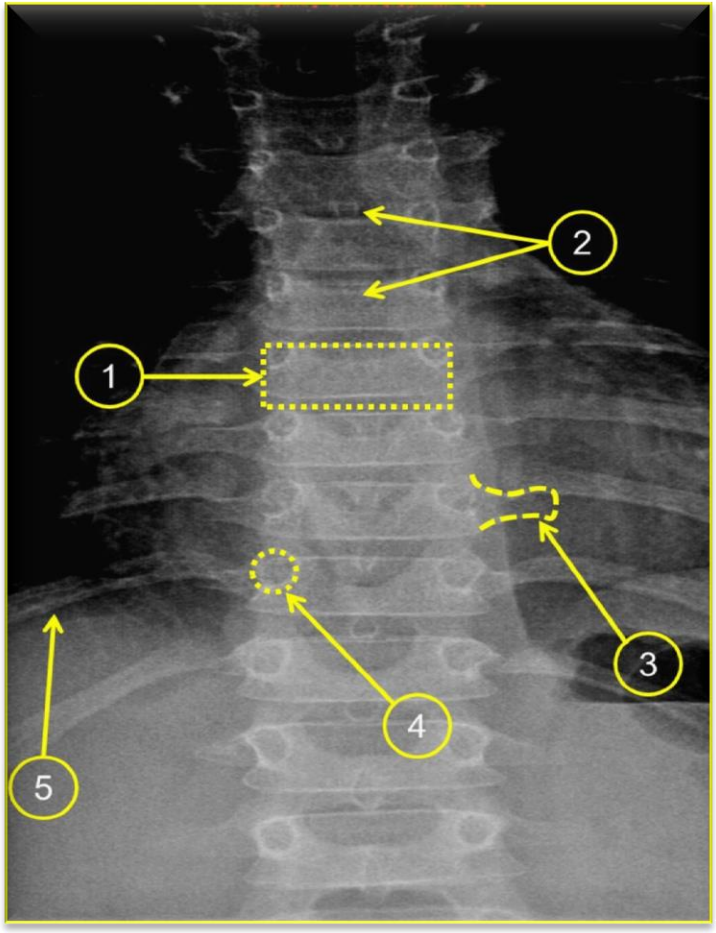

Thoracic Spine

1. Vertebral body
2. Spinous process
3. Transverse process
4. Pedicle
5. Rib

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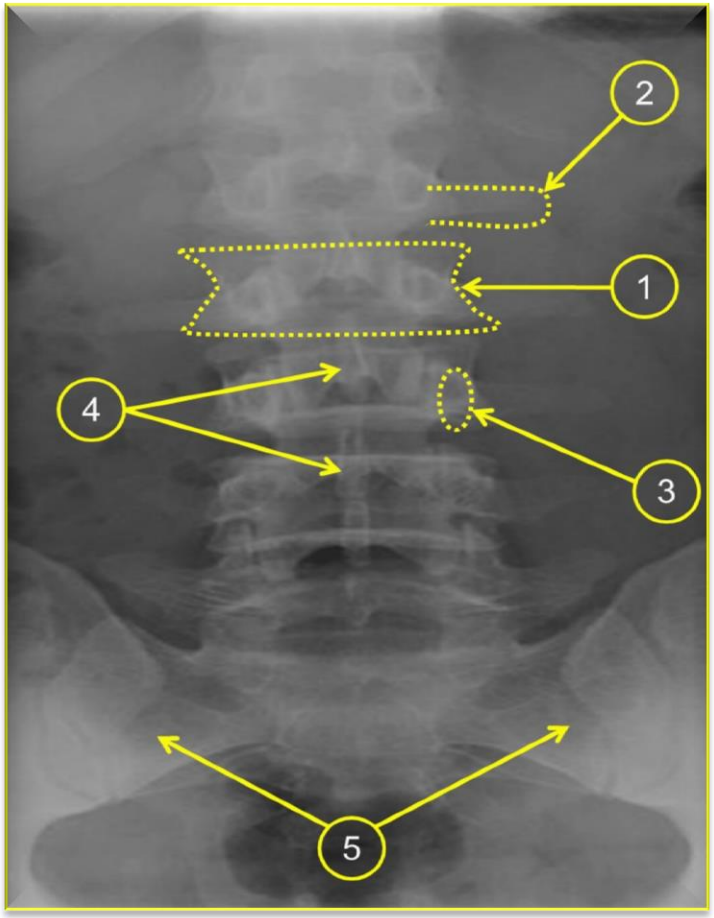

Lumbar Spine

1. Vertebral body
2. Transverse process
3. Pedicle
4. Spinous Process
5. Sacrum

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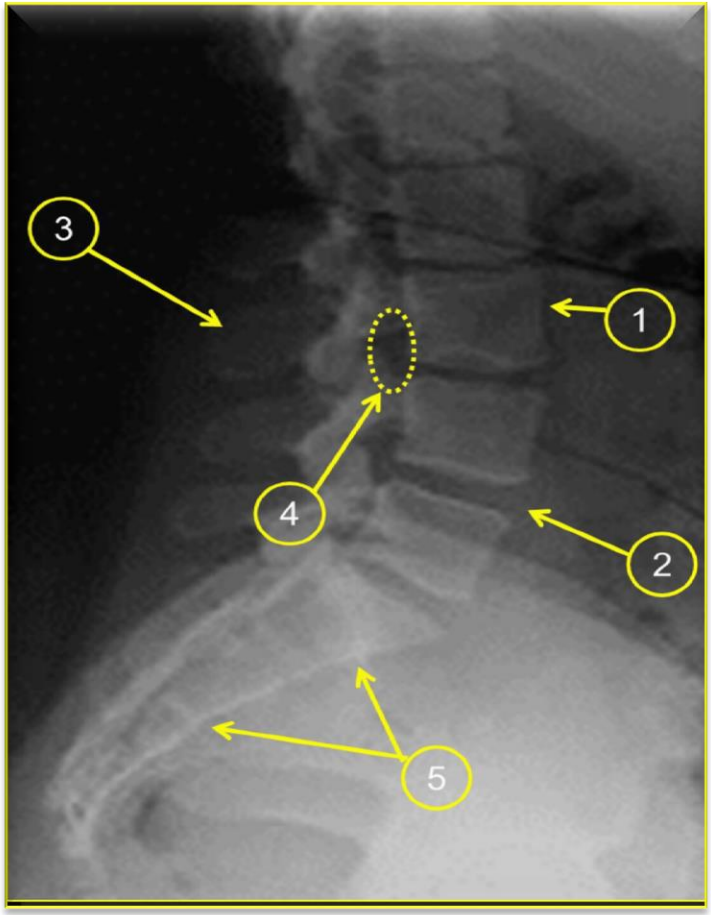
Lumbar Spine



1. Vertebral body L3
2. Intervertebral disc
3. Spinous Process
4. Neural Foramen
5. Sacrum

Lumbar puncture level should be below L2 and preferably at L3-L4 level

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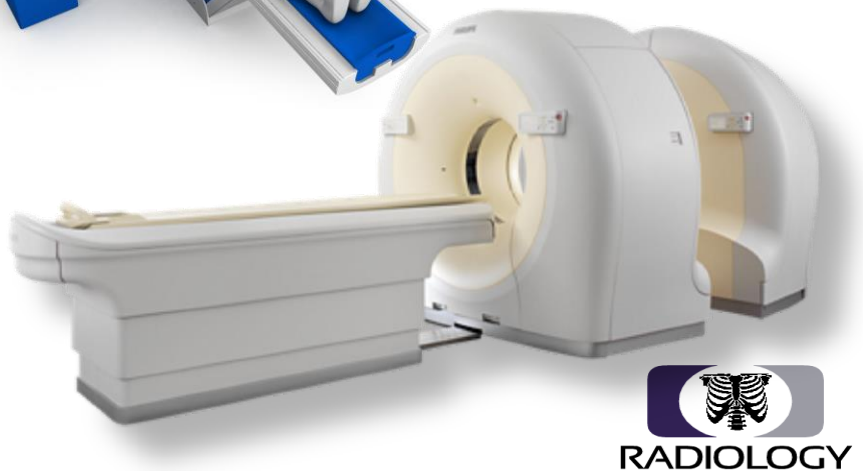
EXTRA INFORMATION

CT SCAN

Computed tomography (CT) is a modern imaging tool that combines X-rays with computer technology to produce a more detailed, cross-sectional image of your body. A CT scan lets your doctor see the size, shape, and position of structures that are deep inside your body, such as organs, tissues, or tumors.

You lie as motionless as possible on a table that slides into the center of the cylinder-like CT scanner. An X-ray tube slowly rotates around you, taking many pictures from all directions. A computer combines the images to produce a clear, two-dimensional view on a screen.

We use CT scan in severe trauma with many fractures and bruises.



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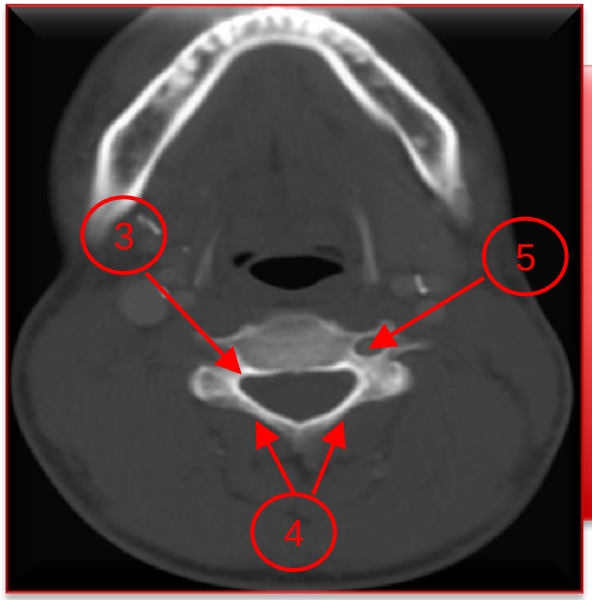
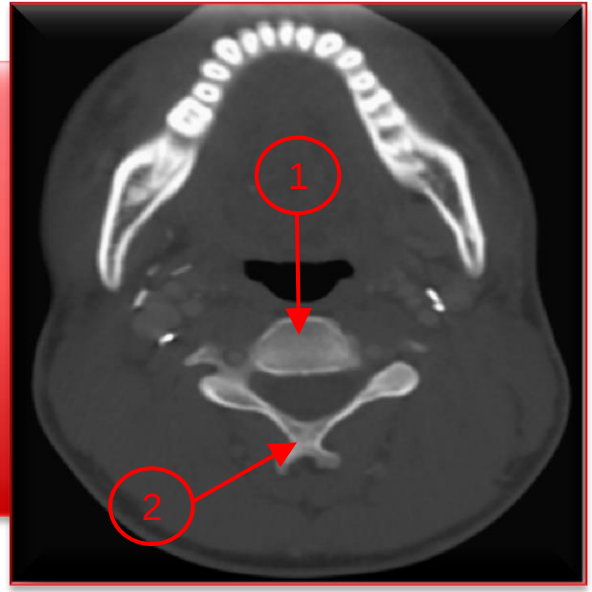
Advantages	Disadvantages
1- painless.	1- Spinal cord is poorly visualized
2- Shows internal body structures.	2- Expensive.
3- View of a large portion of the body.	3- Not available in small hospitals.
4- Rapid acquisition of images.	4- uses more radiation then x-ray.

Cervical Spine



1. vertebral body
2. spinous process
3. pedicle
4. lamina
5. transverse foramen



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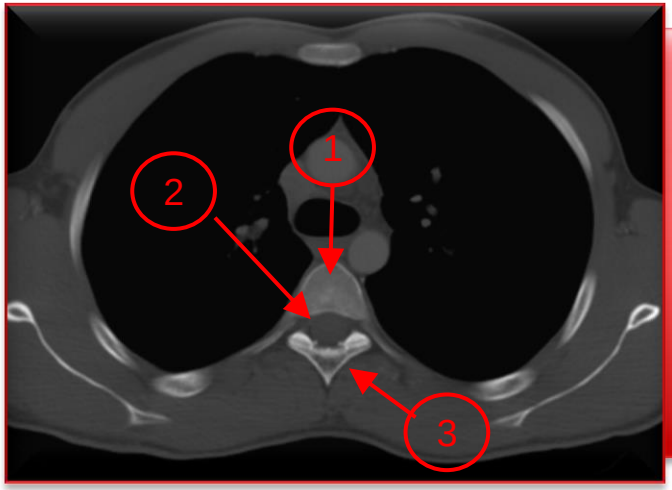
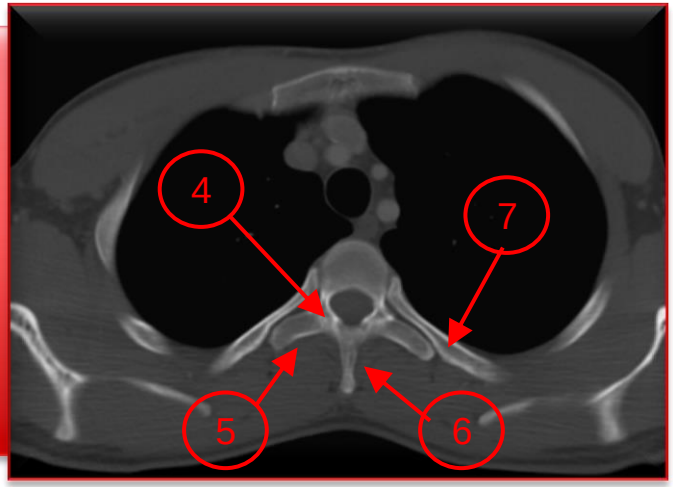
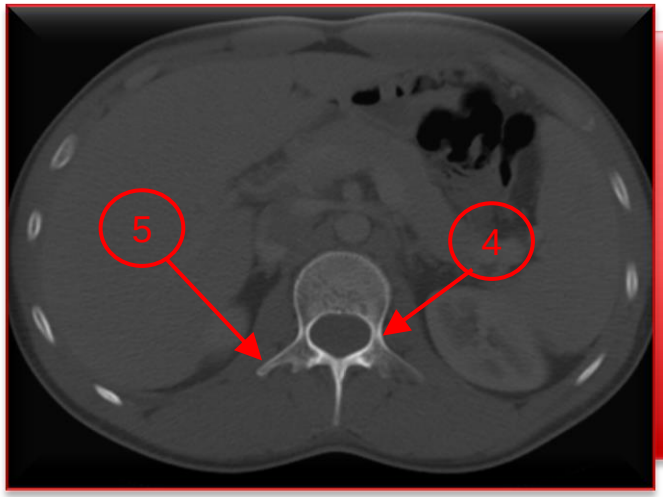
Dorsal Spine



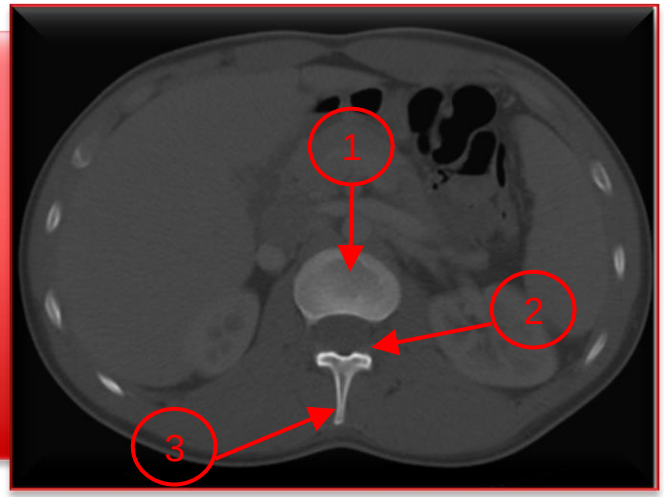
1. vertebral body
2. neural foramen
3. lamina
4. pedicle
5. transverse process
6. spinous process
7. rib



Lumbar Spine



1. vertebral body
2. neural foramen
3. spinous process
4. pedicle
5. transverse process



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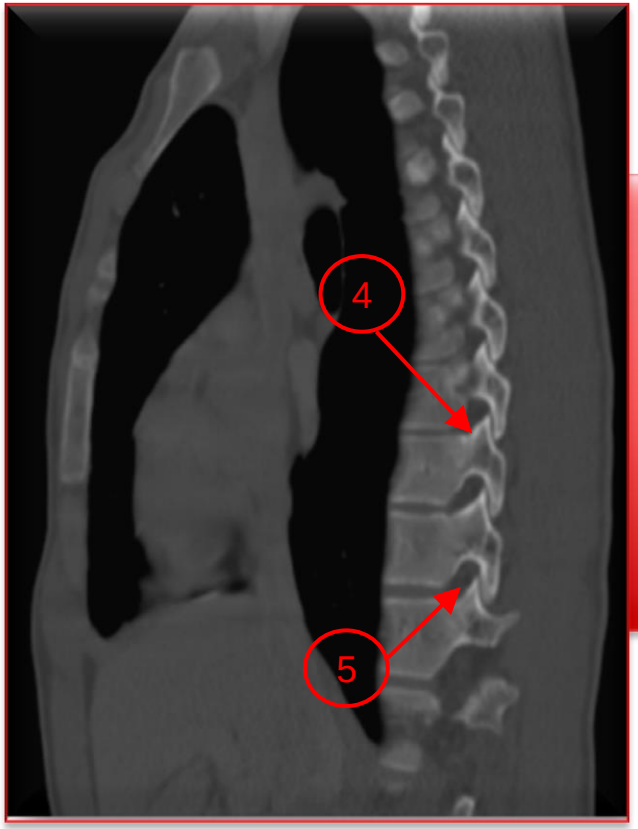
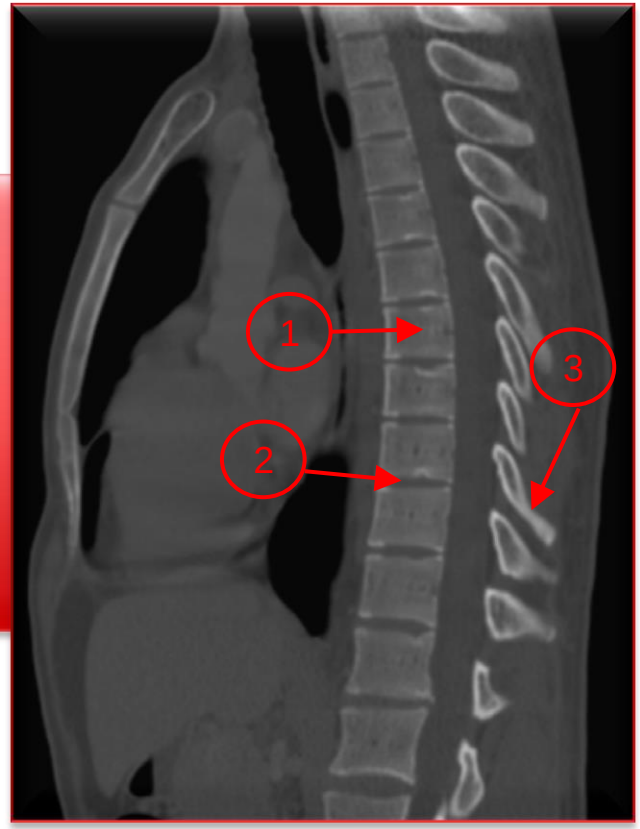
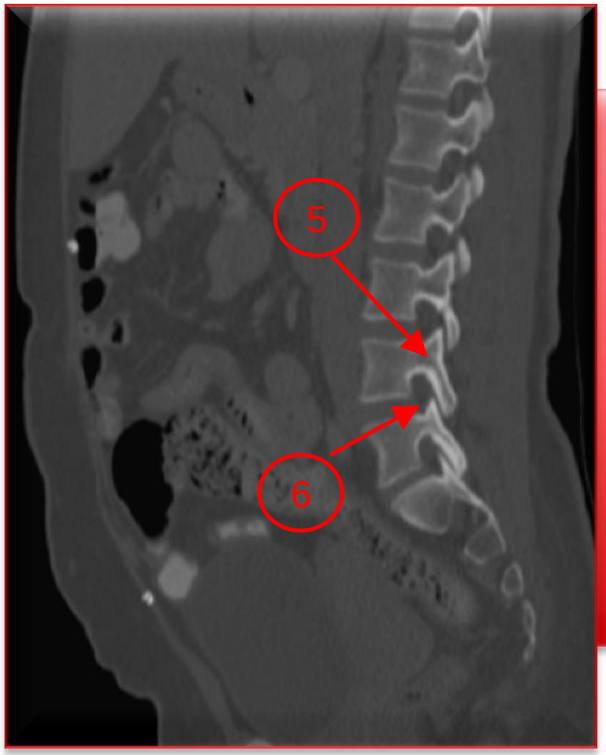
Dorsal Spine



1. vertebral body
2. intervertebral disc
3. spinous process
4. pedicle
5. neural foramen



Lumbosacral Spine



1. vertebral body
2. intervertebral disc
3. spinous process
4. sacrum
5. pedicle
6. neural foramen

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MRI

MRI stands for (Magnetic Resonance Imaging), it is a test that uses a magnetic field and pulses of radio wave energy to make pictures of organs and structures inside the body.

The contrast medium in MRI scans (gadolinium chelate) does not contain iodine and rarely causes allergic reactions.

MRI is a gold standard imaging. Which is the best choice for imaging **soft tissue** like **spinal cord.**

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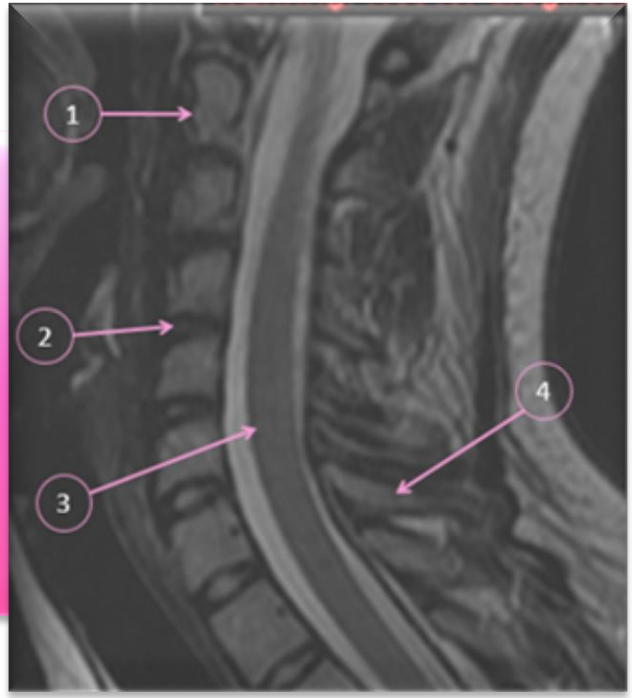
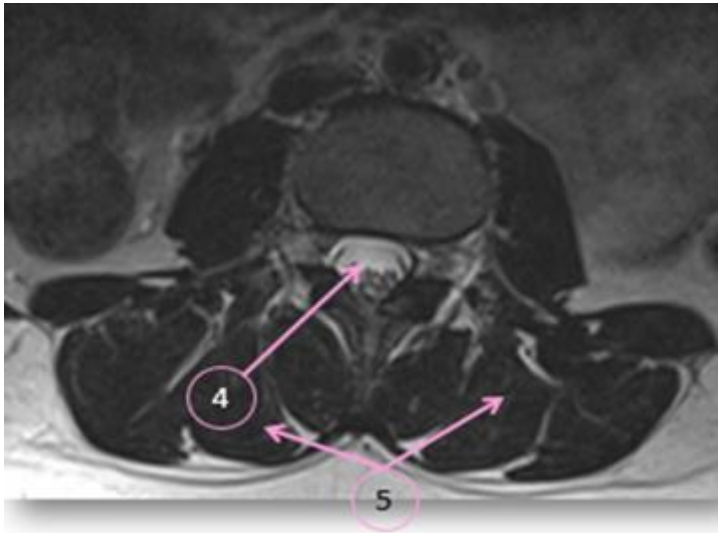
Advantages	Disadvantages
1-has a good visualization of the spinal cord	1-MRI scan is done in an enclosed space, so the people who are claustrophobic, i.e. fearful of being in a closely enclosed surface, are facing problems with MRI to be done.
2-Provide very detailed diagnostic pictures of most of the important organs and tissues in your body.	2-MRI scans involve really loud noises while processing because they involve a really high amount of electric current supply.
3-Sometimes able to show unique information that other tests are unable to show.	3-MRI scanners are usually expensive.
4-Are generally painless.	
5-Do not use radiation and are therefore suitable for use in children and pregnant women.	

Cervical Spine

1. C2
2. Disc
3. Spinal cord
4. Spinous process



Lumbar Spine



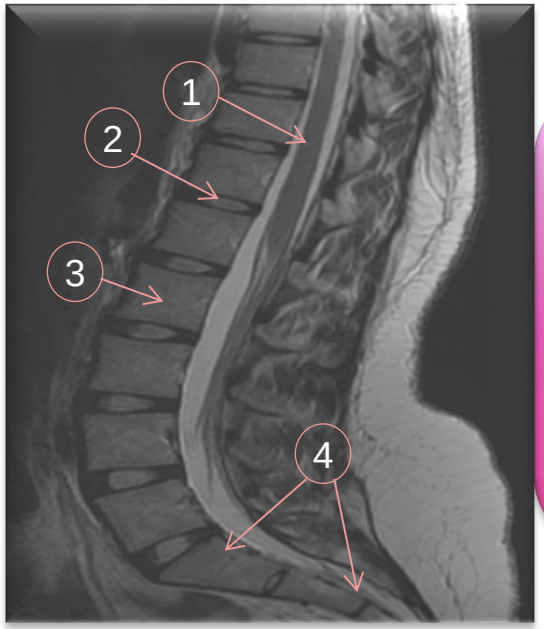
1. Vertebral body
2. Neural foramen
3. Spinous process

4. Thecal sac
5. Para-spinal muscles

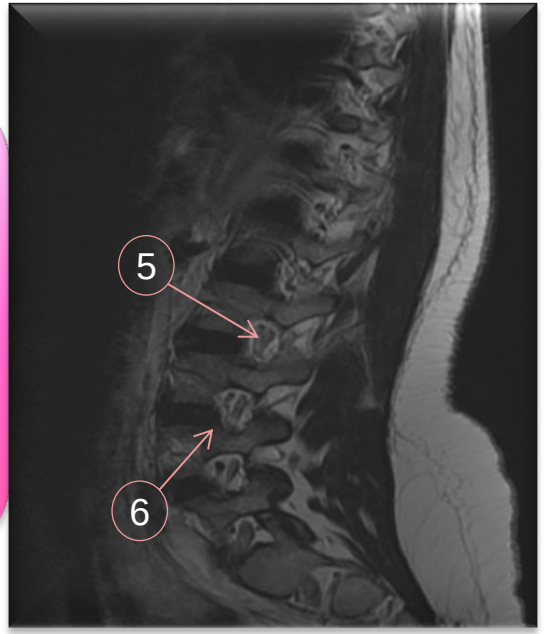
Lumbar Spine

1. Vertebral body
2. Disc

Lumbosacral Spine



1. Spinal cord
2. Disc
3. Vertebral body
4. Sacrum
5. Neural foramen
6. Pedicle



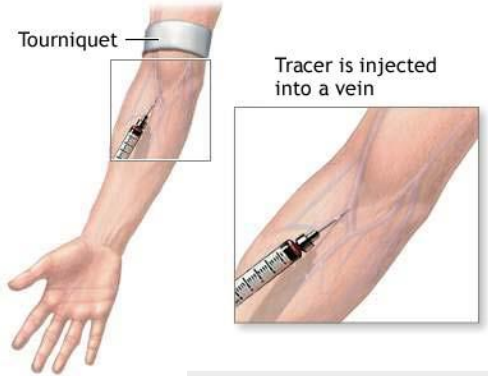
EXTRA INFORMATION

NUCLEAR SCAN

Nuclear scans use a special camera to take pictures of tissues and organs in the body after a radioactive tracer is put in a vein in the arm and is absorbed by the tissues and organs.

The radioactive tracer shows the activity and function of the tissues or organs.

Radioactive tracers give off particles that can be detected and turned into a picture to help find problems in organs or other structures.



radiation in nuclear scan is more the X-ray but less than CT scan

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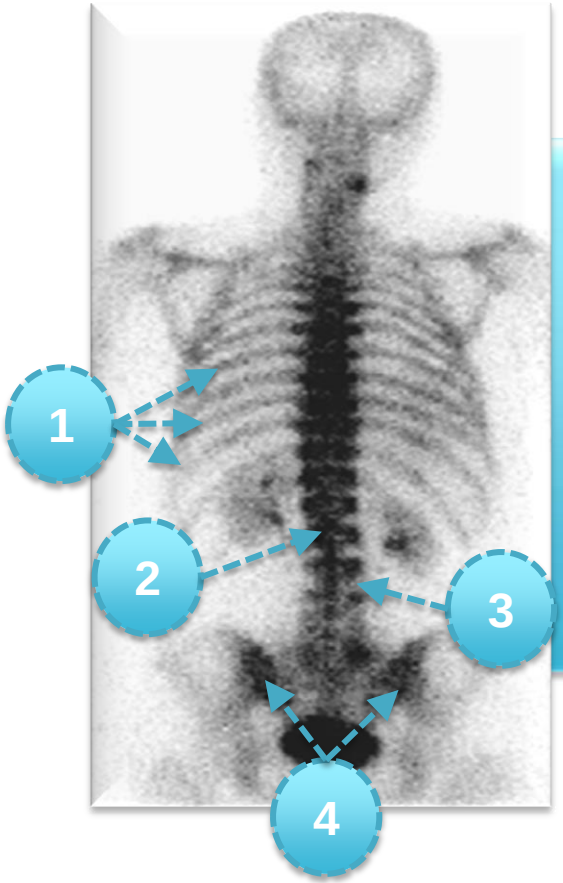
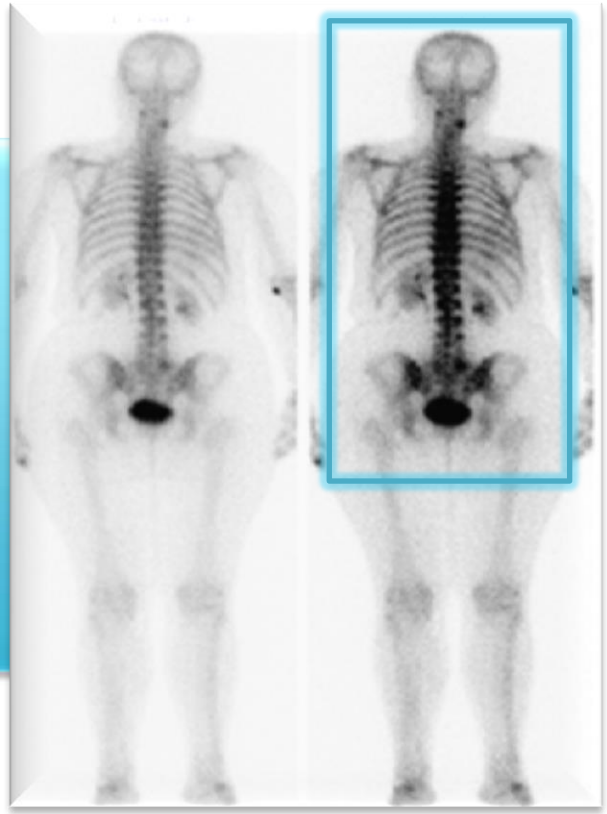
Advantages	Disadvantages
1- Detailed and Accurate. (Shows the most sensitive areas in great detail)	**1- Involves exposure to ionising radiation(gamma-rays).**
2- Increase Methods of Early Detection. (Greater chance of detecting serious illnesses and conditions earlier)	**2- High Costs to Operate.**
3- Can check how far a cancer has spread and how well treatment is working.	**3- Radioactive material may cause allergic or injection-site reactions in some people.**
4- Usually painless.	**4- Doest shows non-specific abnormality.**
	5- Spinal cord is not visualized.



1. Ribs
2. Vertebral body
3. Disc
4. sacrum



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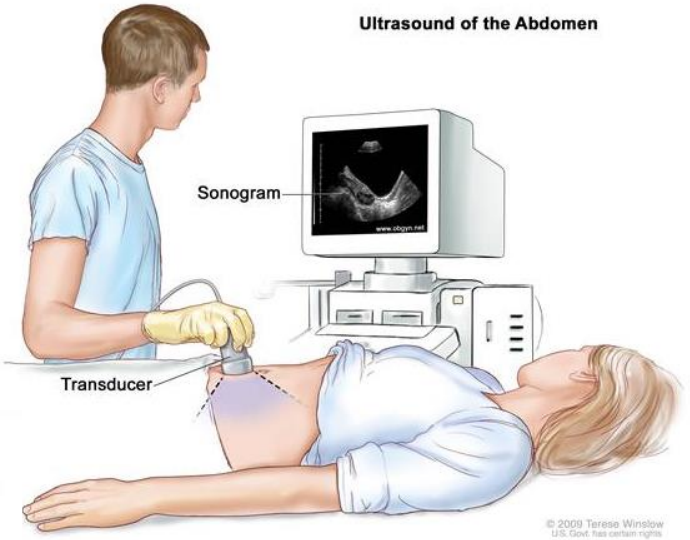
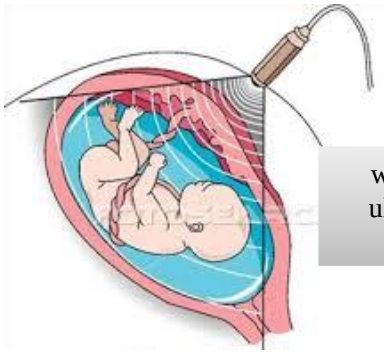
EXTRA INFORMATION

Ultrasound

Ultrasound is a type of imaging. It uses high-frequency sound waves to look at organs and structures inside the body.

Unlike x-rays, ultrasound does not expose you to radiation.





we usually use ultrasounds for babies.

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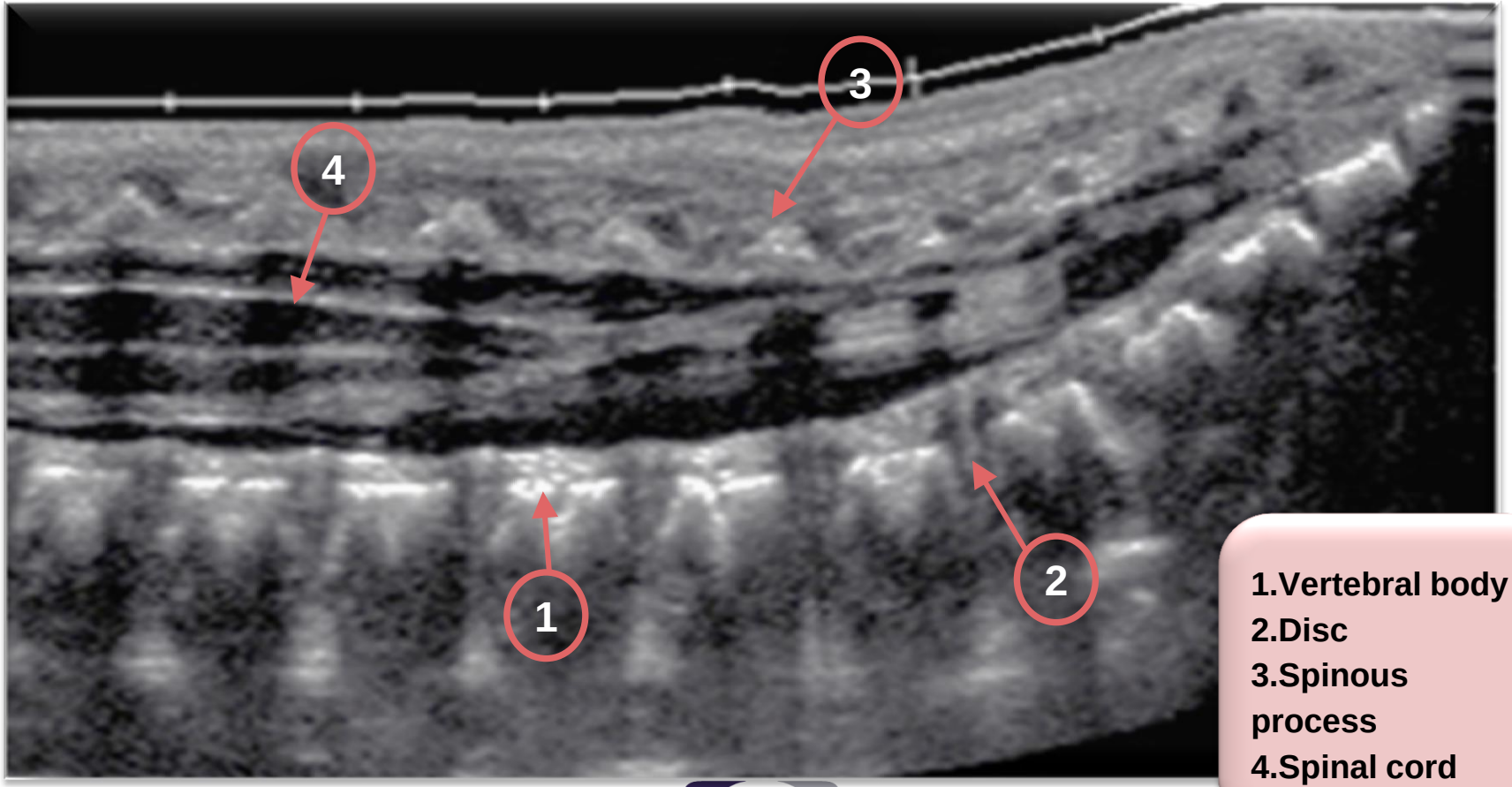
Advantages	Disadvantages
1- Usually non-invasive, safe and relatively painless.	1- Quality and interpretation of the image. (highly depends on the skill of the person doing the scan)
2- No ionising radiation. (good for imaging babies)	2- Other factors can affect image quality, including body size and the presence of air and calcified areas in the body. (e.g. bones, plaques and hardened arteries)
3- Does not usually require injection of a contrast medium (dye).	3- Use of a special probe (e.g. for the oesophagus, rectum or vagina) is required in some ultrasounds.
4- Can help diagnose a range of conditions in different parts of the body, such as the abdomen, pelvis, blood vessels etc.	4- Special preparations may be required before a procedure. (e.g. fasting or a full bladder)
5- Can be used to check on the health of a baby during pregnancy.	5- Can not penetrate bone.
6-Shows tendons, muscles and fluids clearly.	



1.Vertebral body
2.Disc
3.Spinous process
4.Spinal cord

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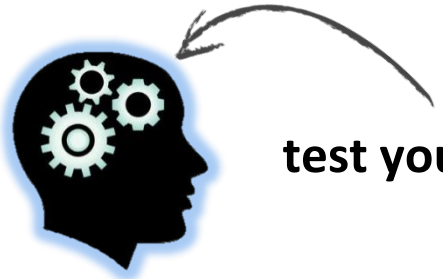
YouTube Useful videos

- How does MRI work.
- X-ray, CT, MRI differences
- What is nuclear scan.



test your self

For more information about radiology types of imaging

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