

Understanding Cancer

**A SERIES OF SIMPLE EDUCATIONAL VIDEOS
FOR THE GENERAL PUBLIC**



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Understanding Cancer

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Part 9: Diagnosis - X-ray

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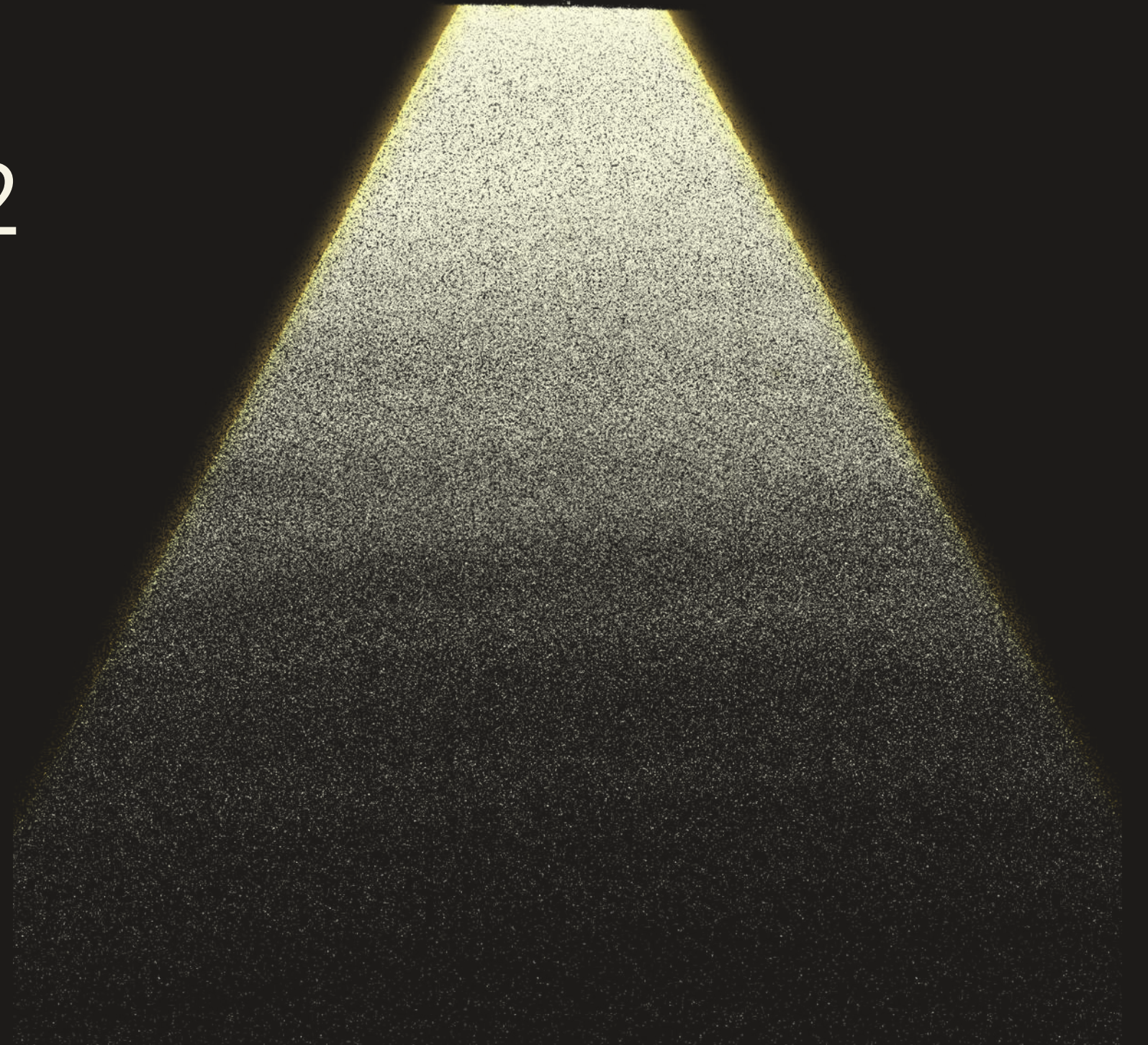
What is an X-ray?



What is an X-ray?

It is a test that uses small doses of radiation to take 2 dimensional (2D) pictures inside the body.

It has high energy which allows it to pass through.



This helps to look at the specific area and its surroundings to look at the effect of the disease and changes to organs.



Where does an x-ray take place?



In the imaging department of a hospital.

It is taken by a radiographer.

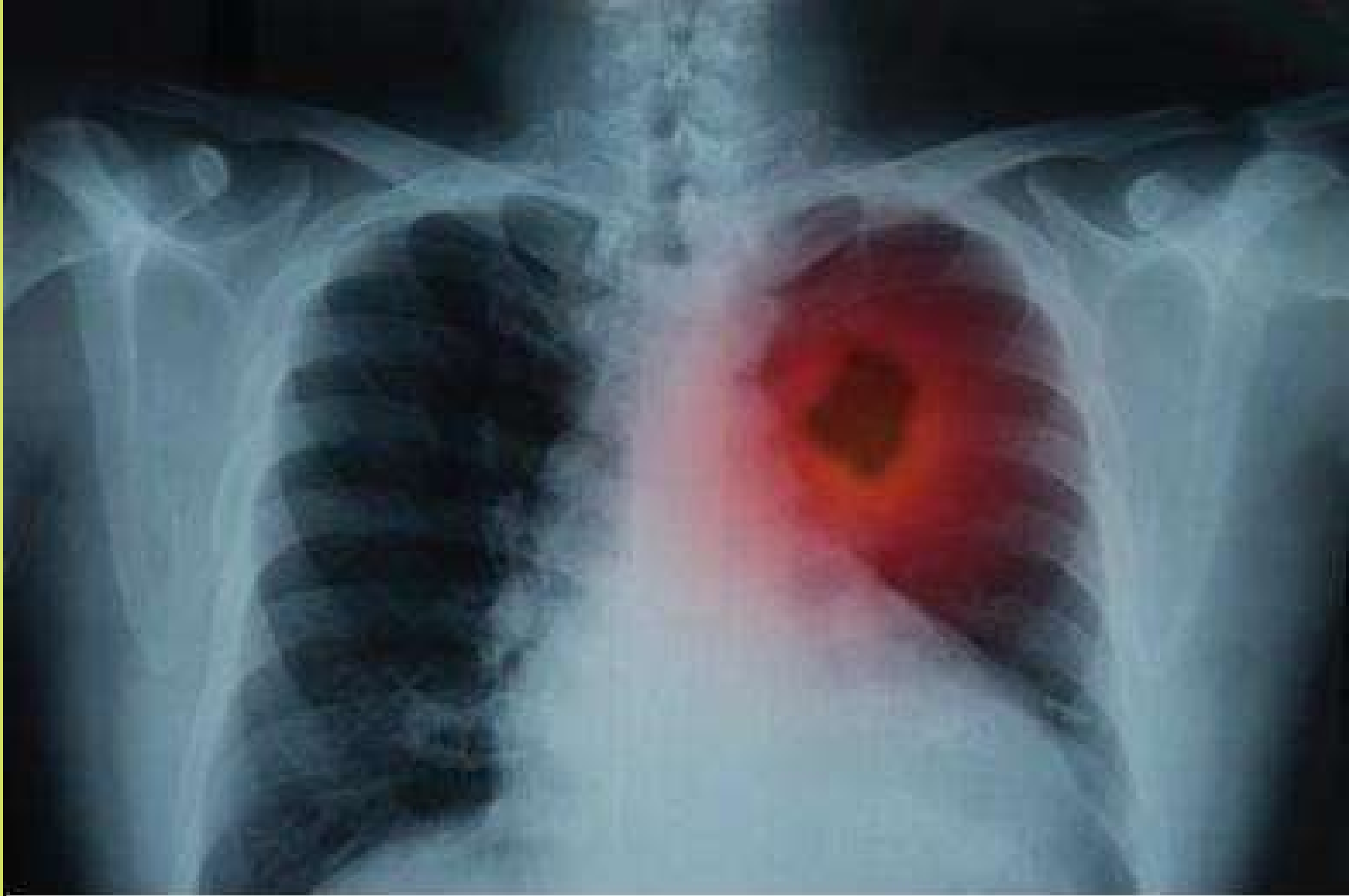
A doctor called a radiologist examines the image and creates a report.

Types of X-ray

Chest X-ray

You are able to see tumours, enlarged heart, signs of infections and fluid.

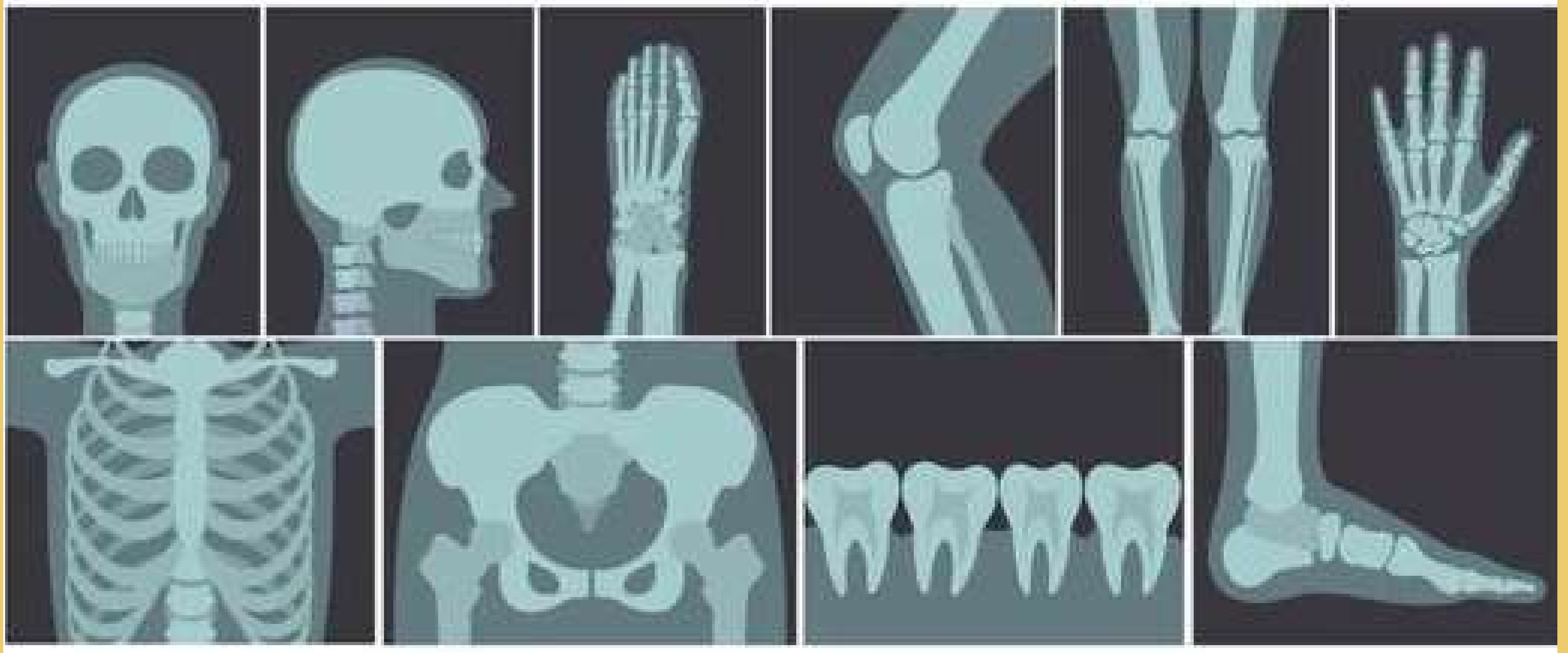




Types of X-ray

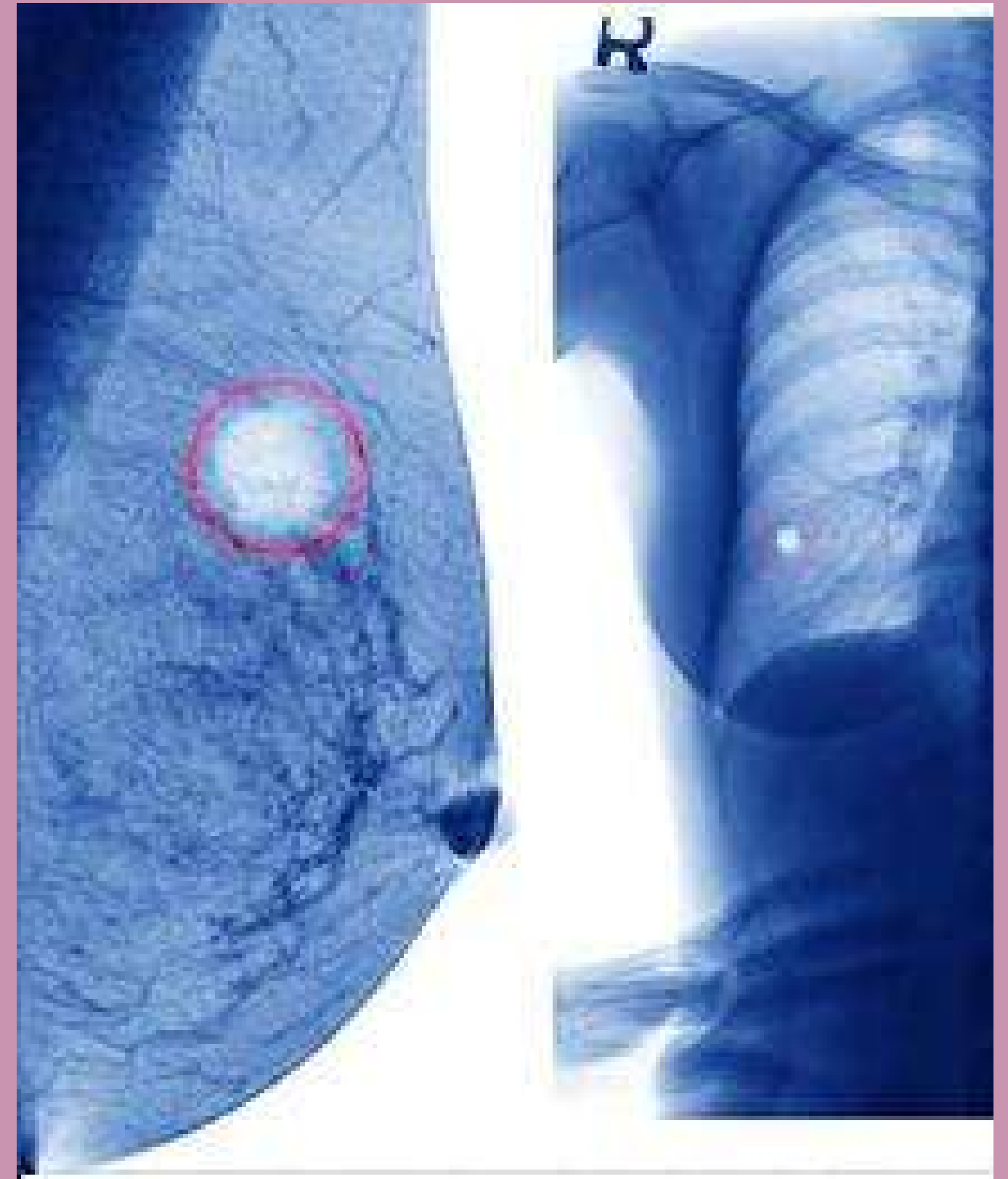
Bones

You are able to see breaks (fractures), infections, tumours, degenerative features (age).



Types of X-ray

X-ray of the breasts
(mammogram)



Types of X-ray

Dental X-ray

Teeth and jaw



Types of X-ray

Flouroscopy

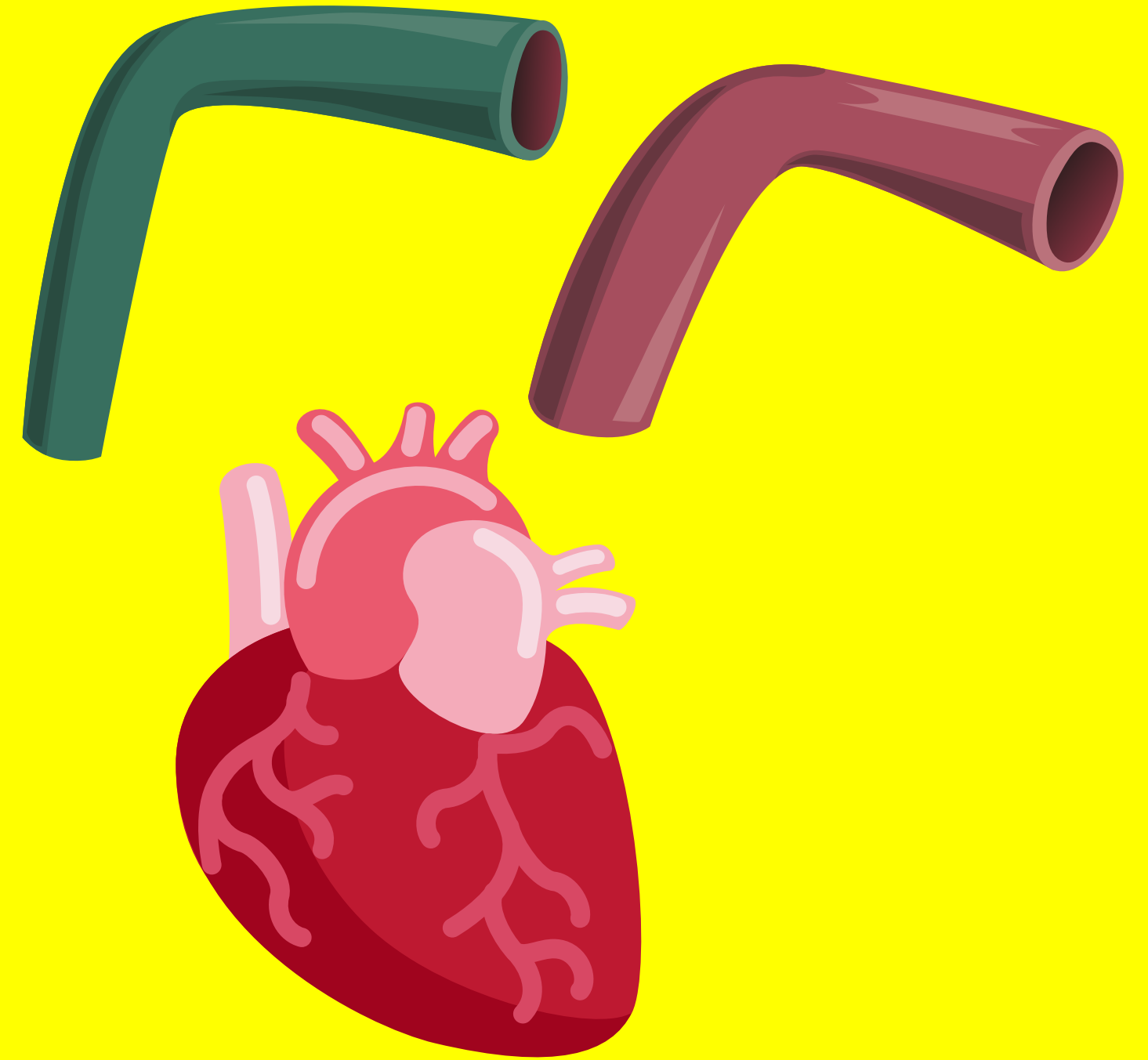
Real-time x-ray screening to help doctors put stents and wires.



Types of X-ray

Angiography

To look at blood vessels



Types of X-ray

Barium X-rays

Outline of body structures.



Types of X-ray

CT scans

Computer tomography

It is a series of x-rays that creates a 3D dimensional image.



X-ray as therapy

**Radiation therapy used to
kill cancer cells.**

**The radiation dose is higher
than the dose used for
imaging.**



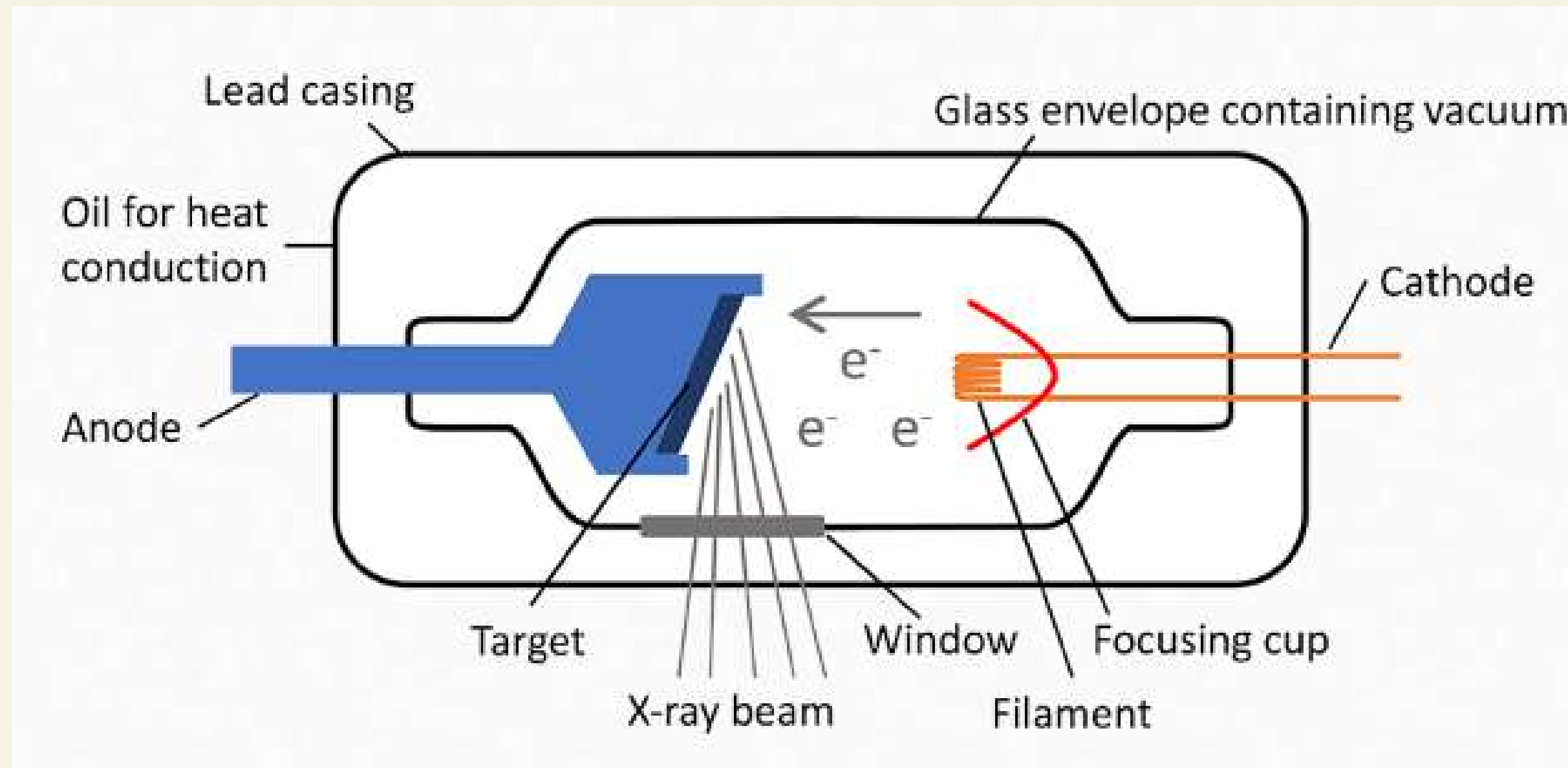
X-ray as therapy

This can be given from a machine outside the body or radioactive material is added/injected inside the body near tumour cells and the blood.



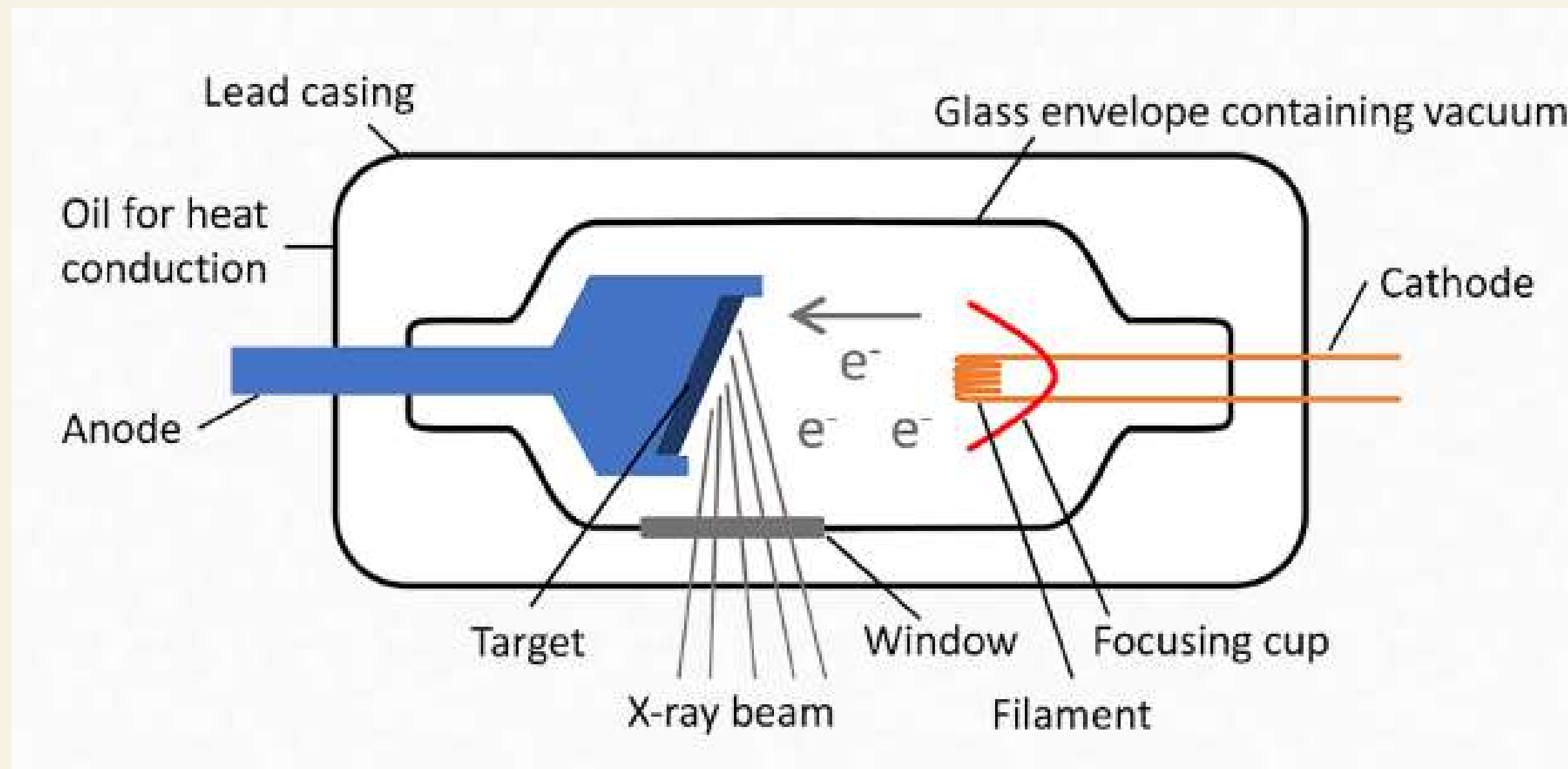
How do X-rays work?

1) A substance called a filament is made up of a metal called tungsten.



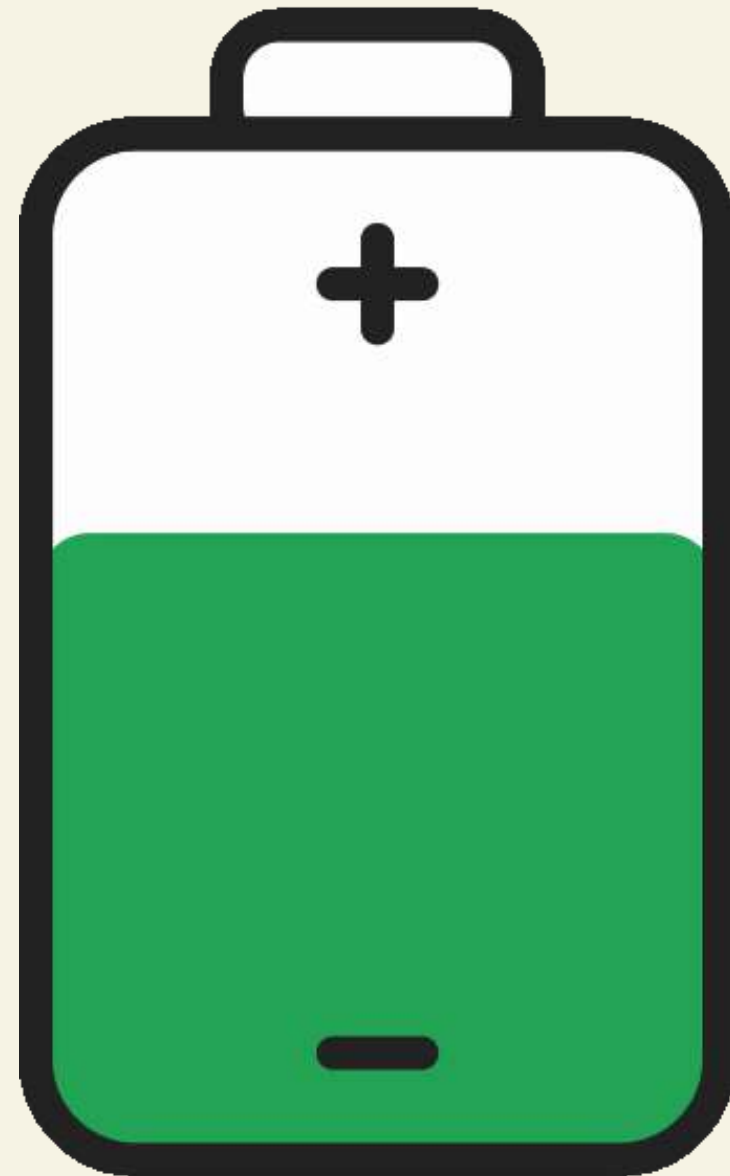
How do X-rays work?

2) To start the process, it needs to heat up as current passes through.



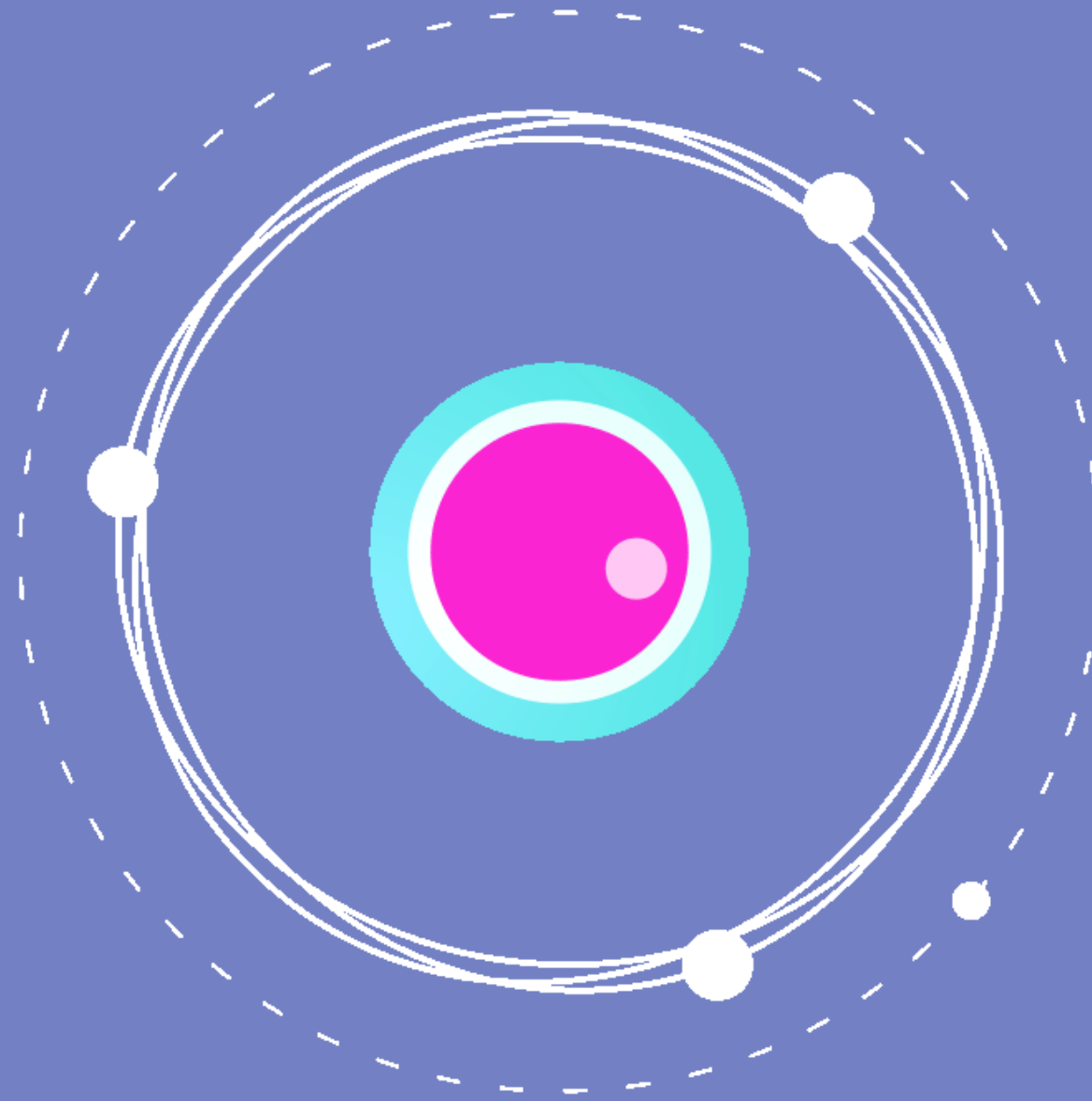
How do X-rays work?

3) A battery has a plus side for positive and minus side for negative.



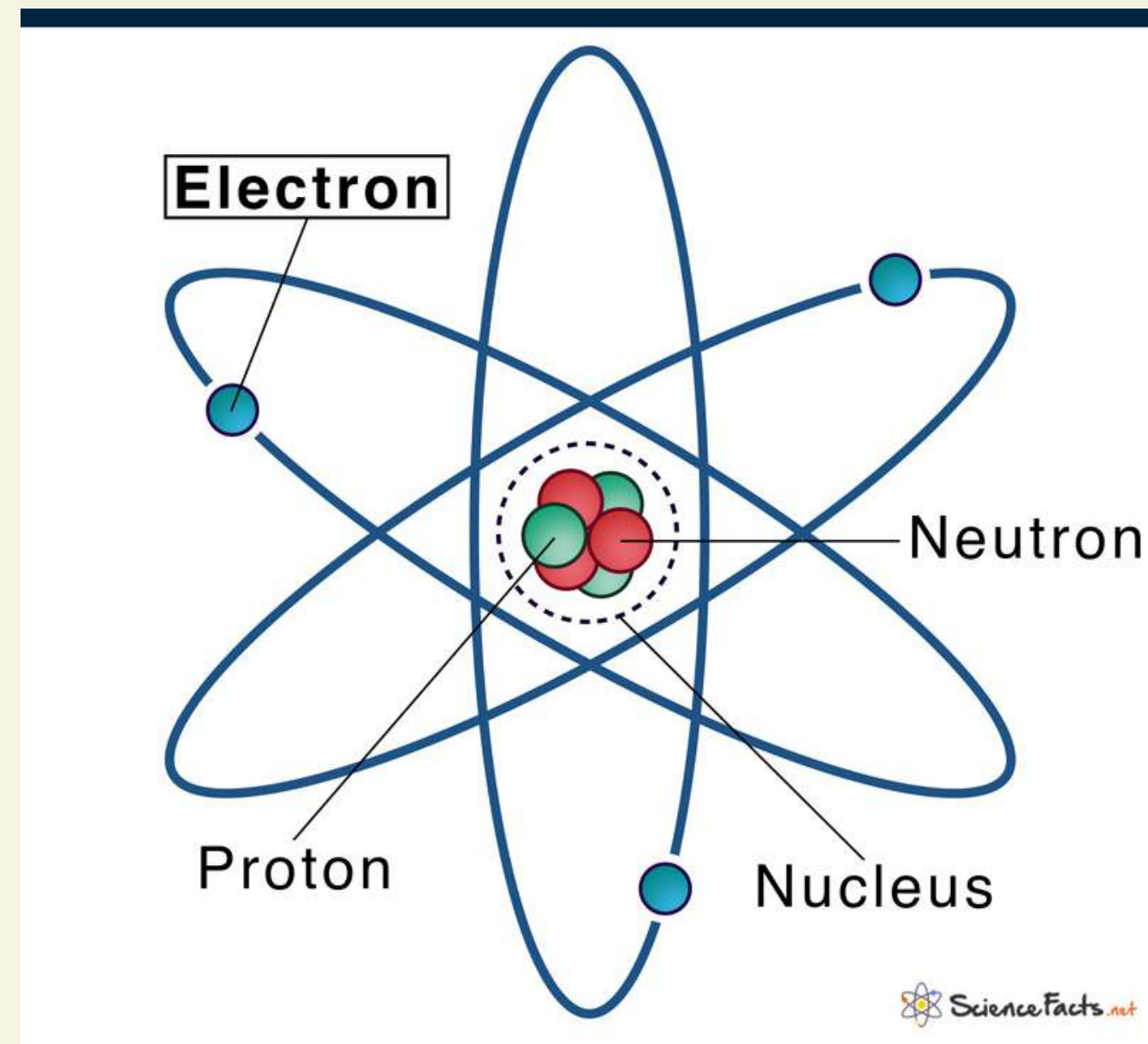
How do X-rays work?

4) There are very small substances called particles.



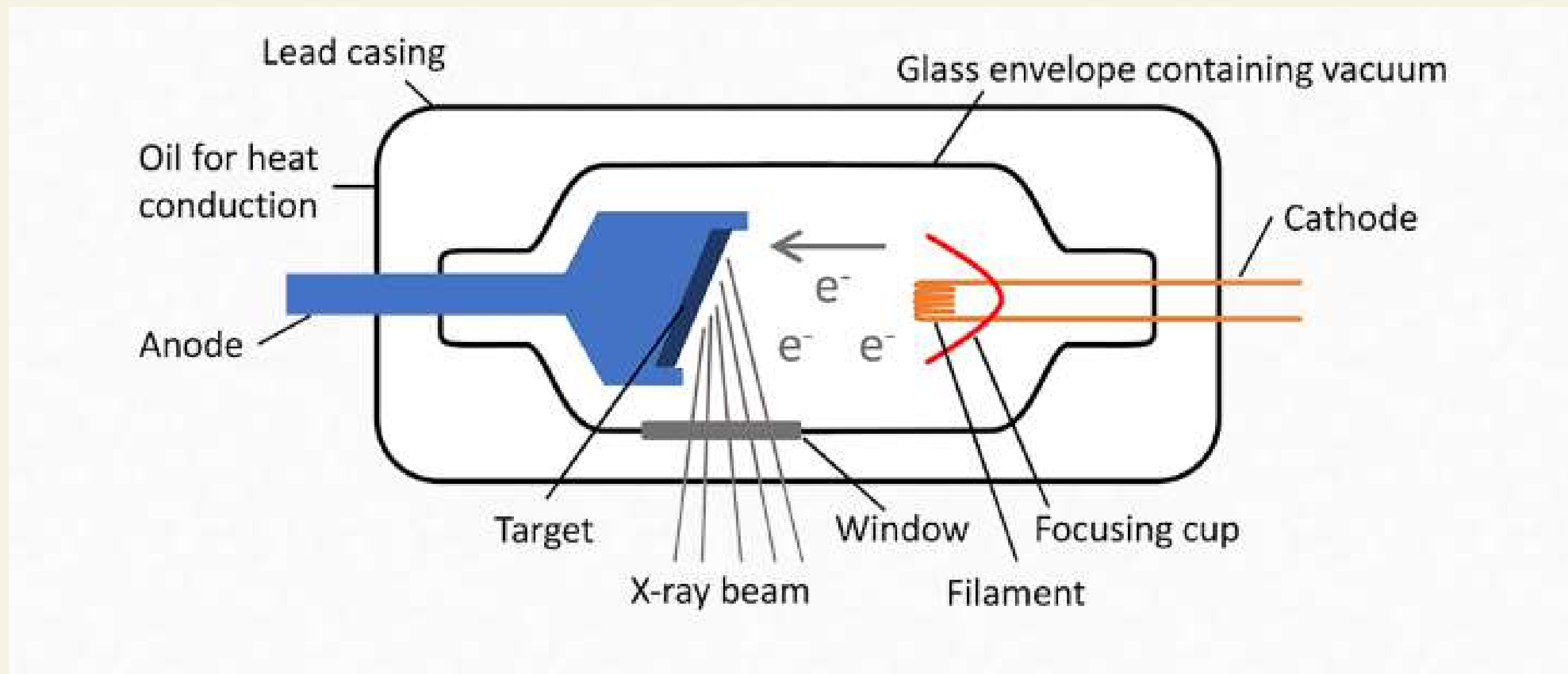
How do X-rays work?

5) One of these type of particles, electrons have a negative charge.



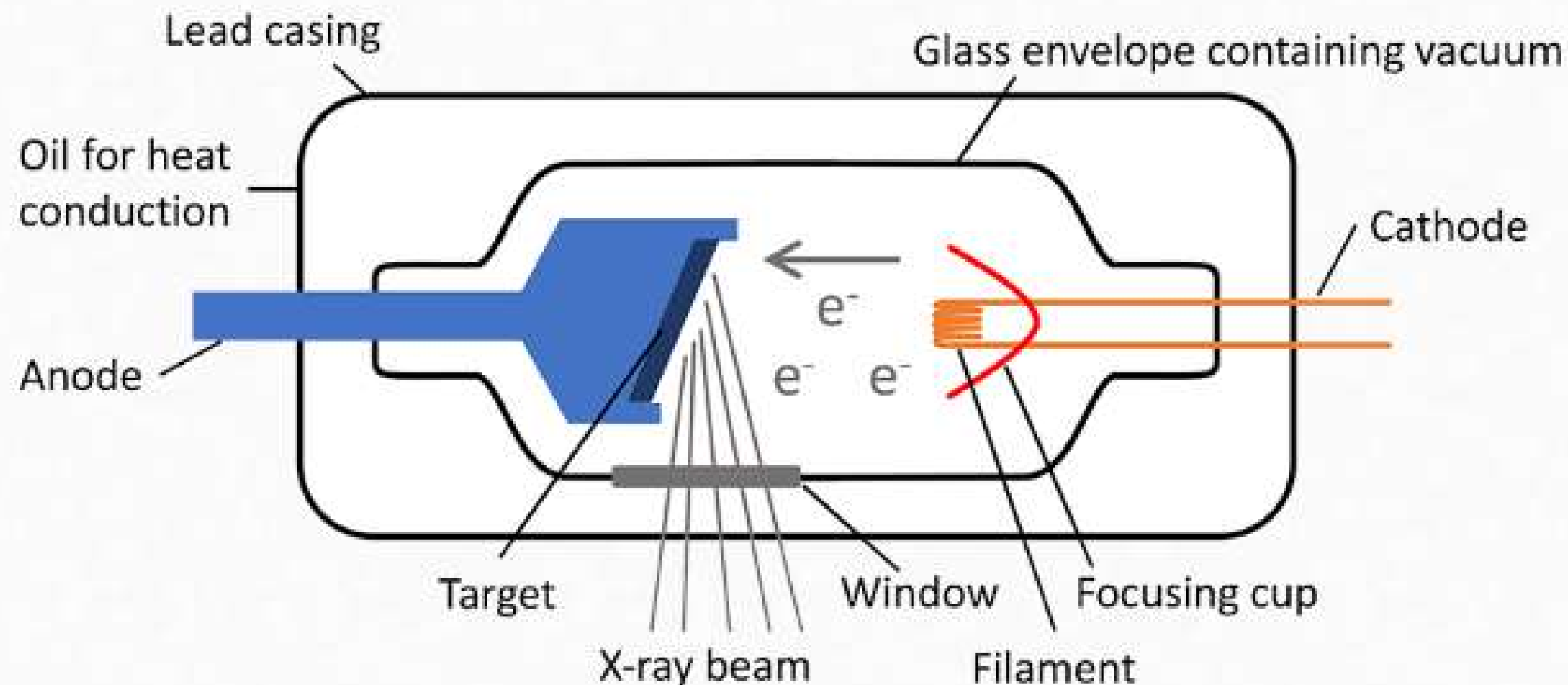
How do X-rays work?

6) The increased heat causes electrons to be released from the metal filament.



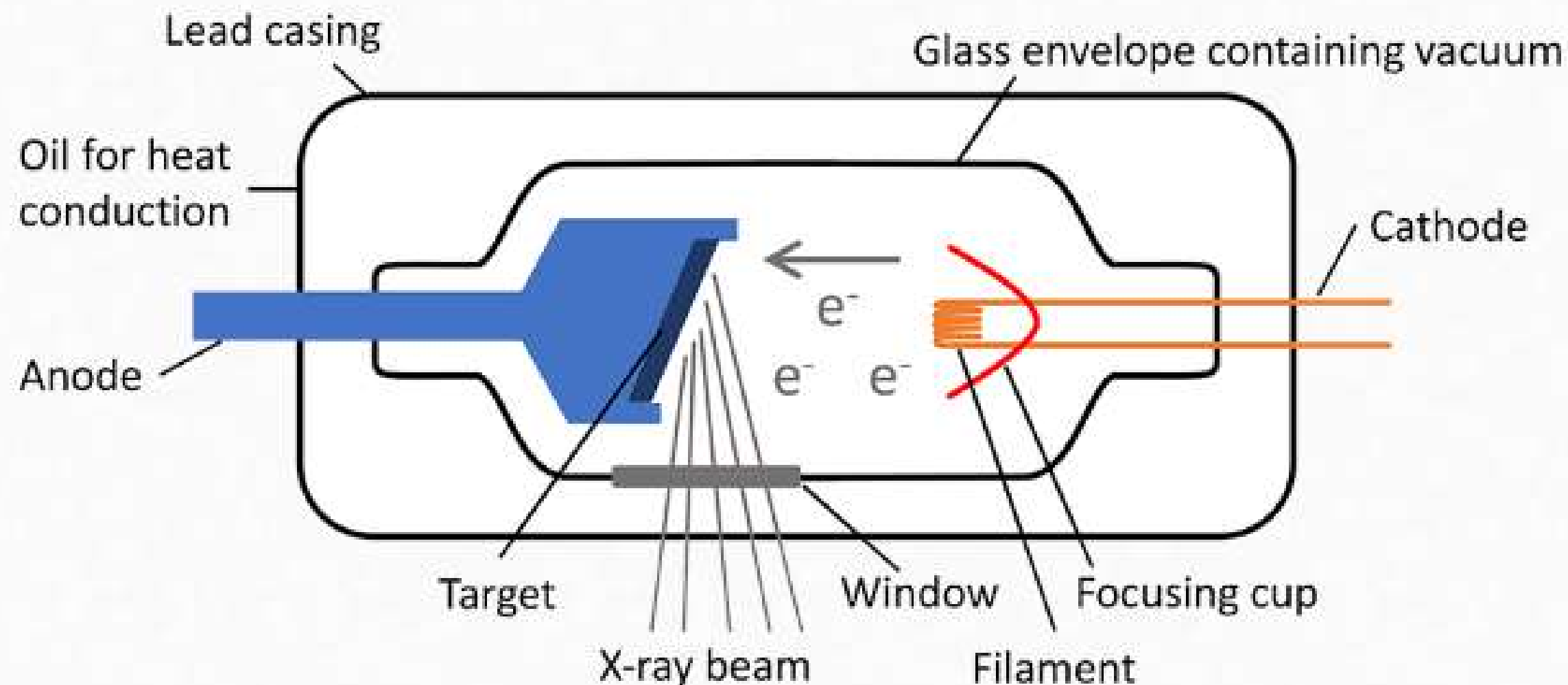
How do X-rays work?

7) With high voltage and energy, these electrons move fast and they start to hit or collide with the metal target.



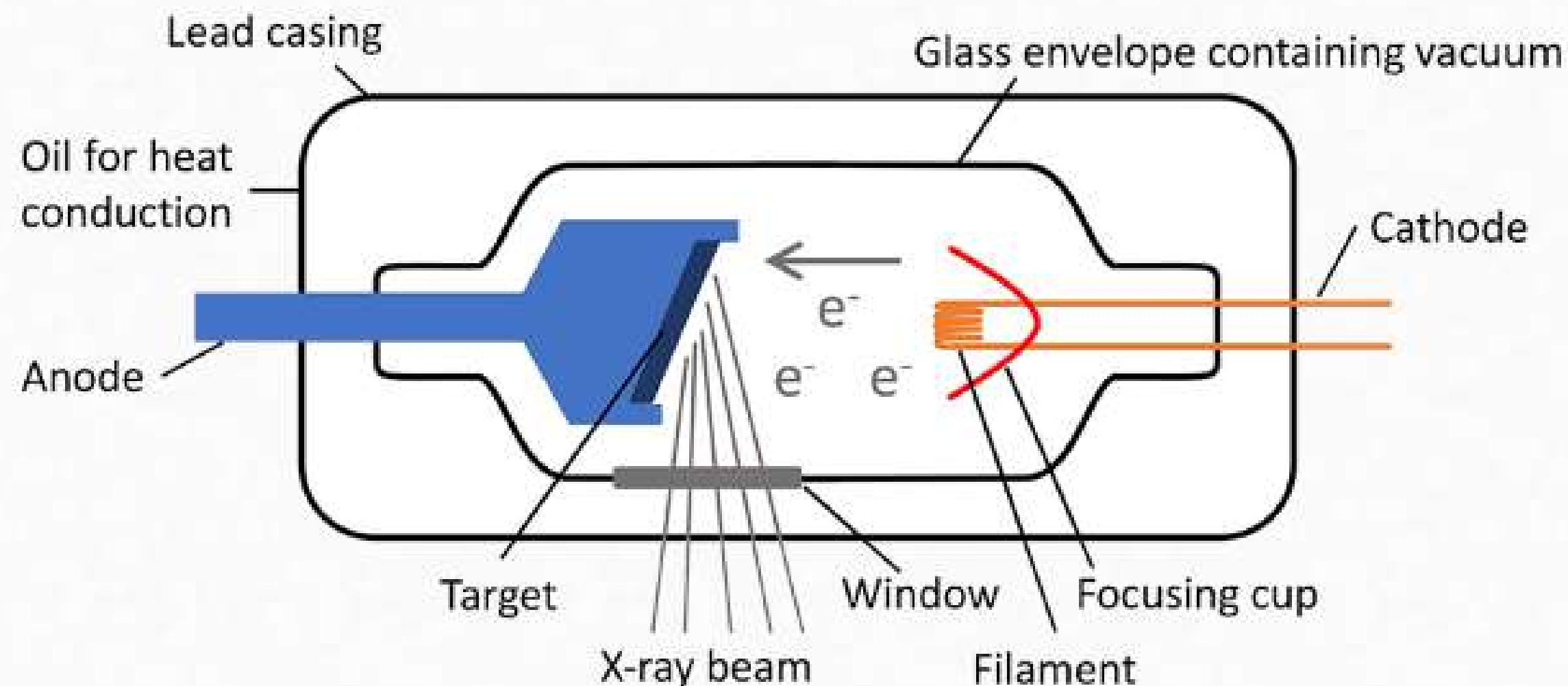
How do X-rays work?

8) This is because electrons are attracted to the anode that has a positive charge.



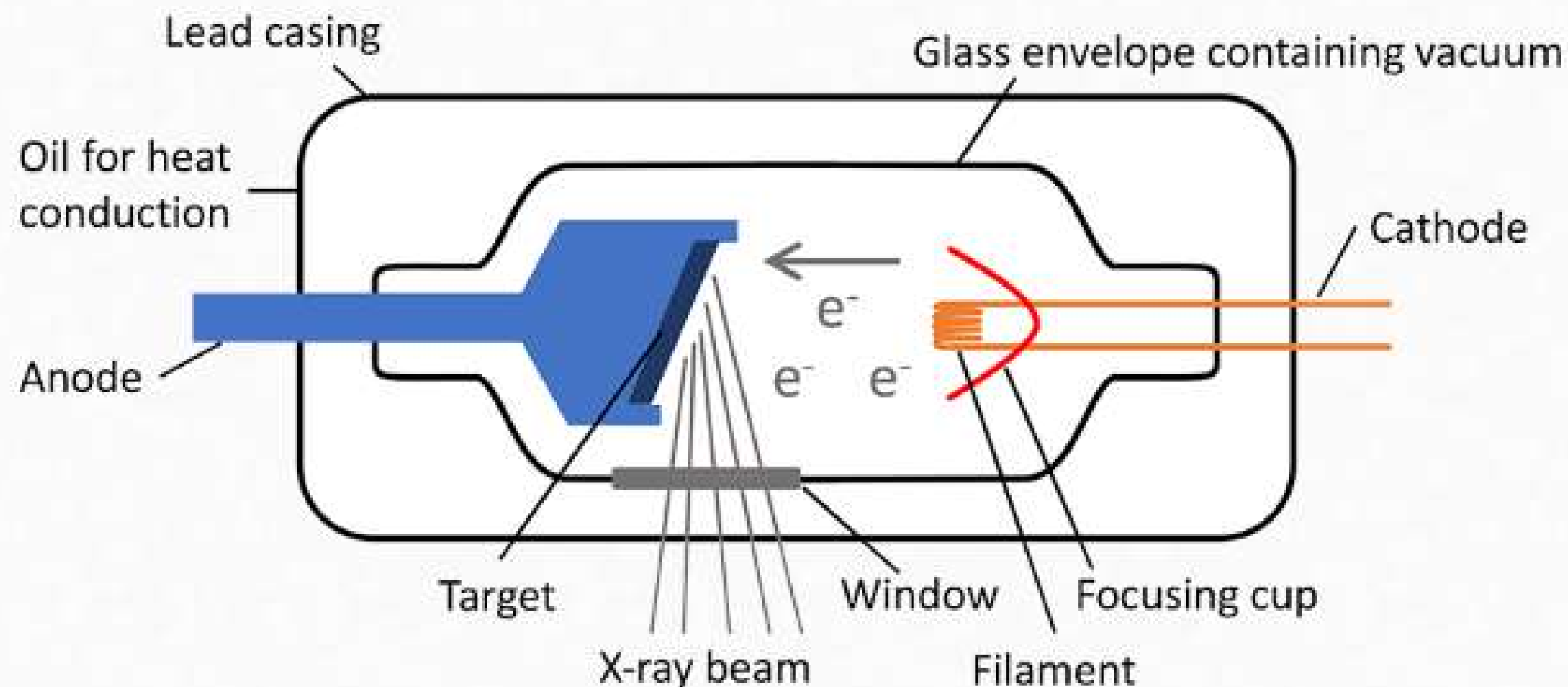
How do X-rays work?

9) X-ray are formed when the bombarding electrons slow down. This is called braking radiation.



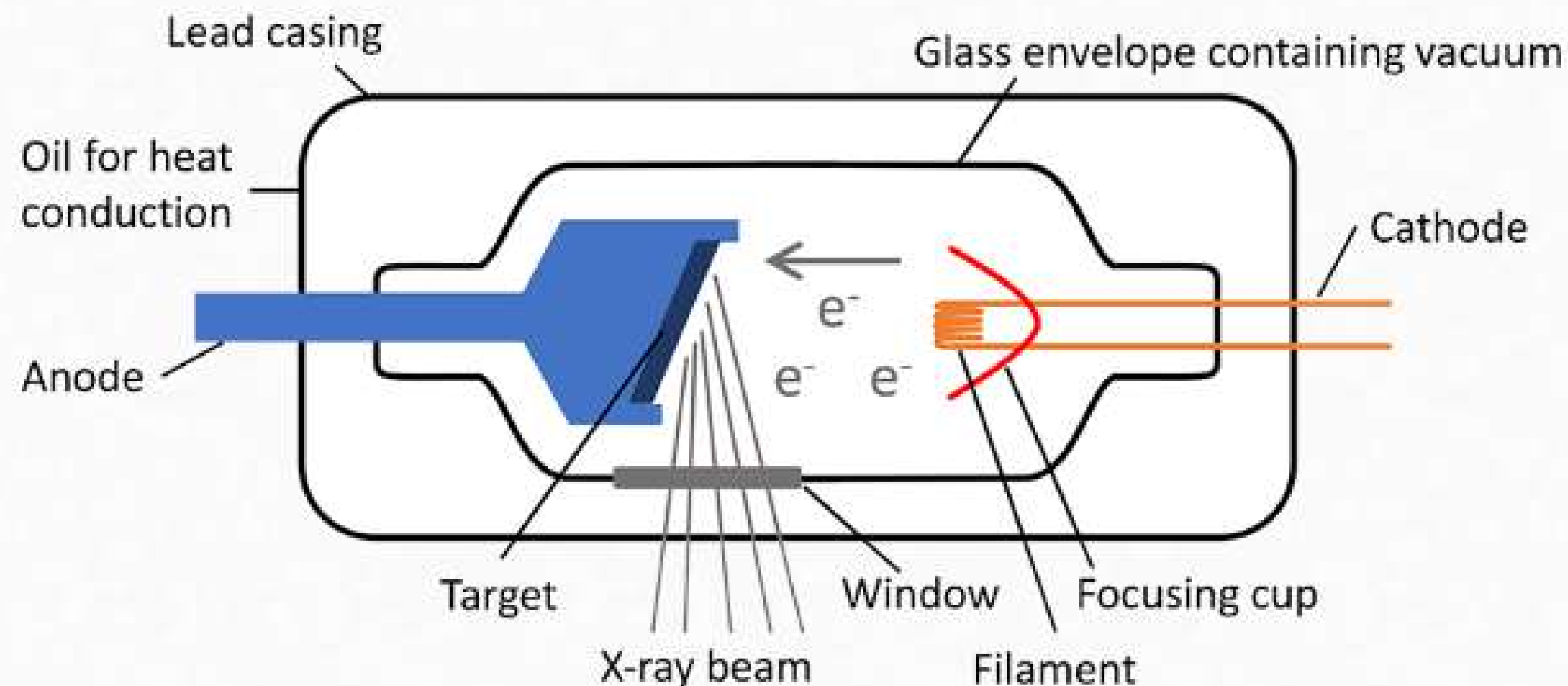
How do X-rays work?

10) If electrons have enough energy, they will take away an electron from the target metal atom.



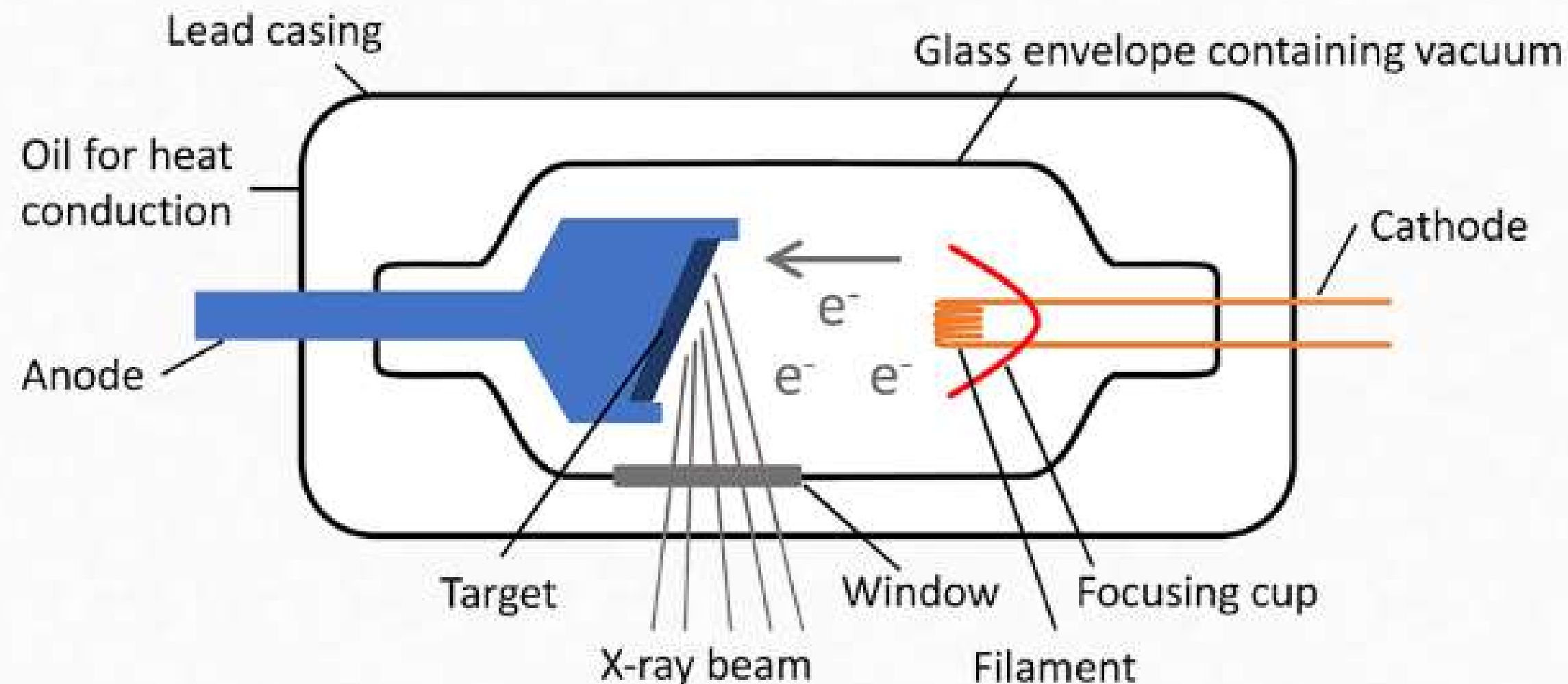
How do X-rays work?

1 1) To fill in the space, electrons with high energy move in position.



How do X-rays work?

12) This causes another type of particle called a photon that has an equal/neutral charge and make up light to be emitted or given out with energy based on the electrons.



How do X-rays work?

13) There are many types of detectors that is used to produce images. One example is photographic film.

The x-ray images are called radiographs.



The process

Preparation of the X-ray

No preparation required so drinking, eating and having medication as normal.

Metals such as jewellery are removed so it does not react with the x-ray.

Radiographer may ask to change in a hospital gown.

During the X-ray

A chest x-ray is done standing up against x-ray machine.

If the patient cannot stand, they can sit or lay down on x-ray table. Some patients cannot sit (supine).

The radiographer checks to ensure position is correct.

The process

What else happens during the X-ray

Whilst taking the image, the radiographer goes behind the screen.

Patient needs to be still and the radiographer may ask to hold breath for a few seconds whilst taking the x-ray.



Densities

Black

Gas

Dark grey

Fat

Light grey

Soft tissues and fluid

White

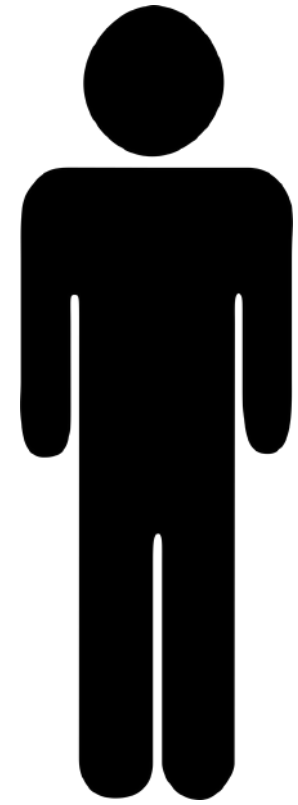
Bone and calcification

Intense white

Metal



Factors that affect the X-ray



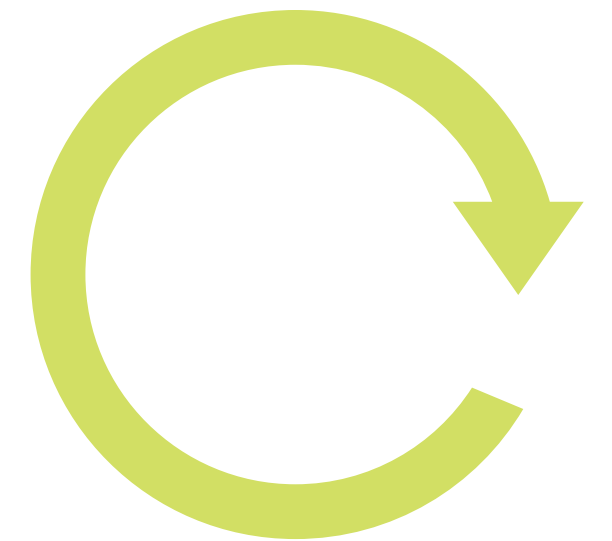
Projection (direction of x-ray)

Type of film

Position

Orientation

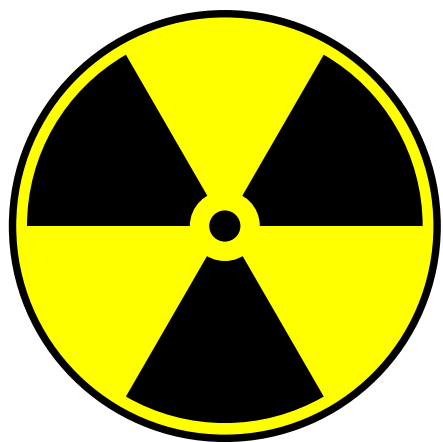
Rotation



Exposure (size of patient)

Inflated (high inspiration/breathing in)

Inclusion (all structures required)



Radiologist



Once the image is done, it is sent to a doctor called a radiologist who will examine the image and create a report.



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Part 10: Diagnosis - MRI

UPCOMING VIDEO RELEASING SOON!

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Acknowledgements

Oxford Handbook of Clinical Examination and Practical Skills.

Canva

webmd.com

Oxford Handbook of Oncology

Shutterstock images

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Hyperphysics

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***Thank
you!***