

# Introduction



- **Digital radiography** is a form of X-ray imaging, where digital X-ray sensors are used instead of traditional photographic film.

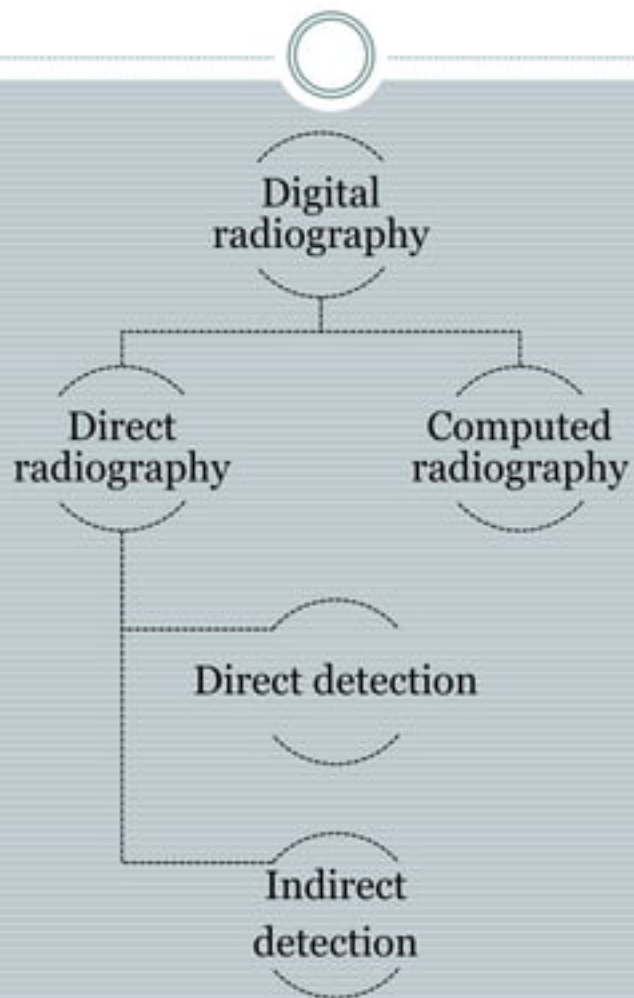


# Advantages

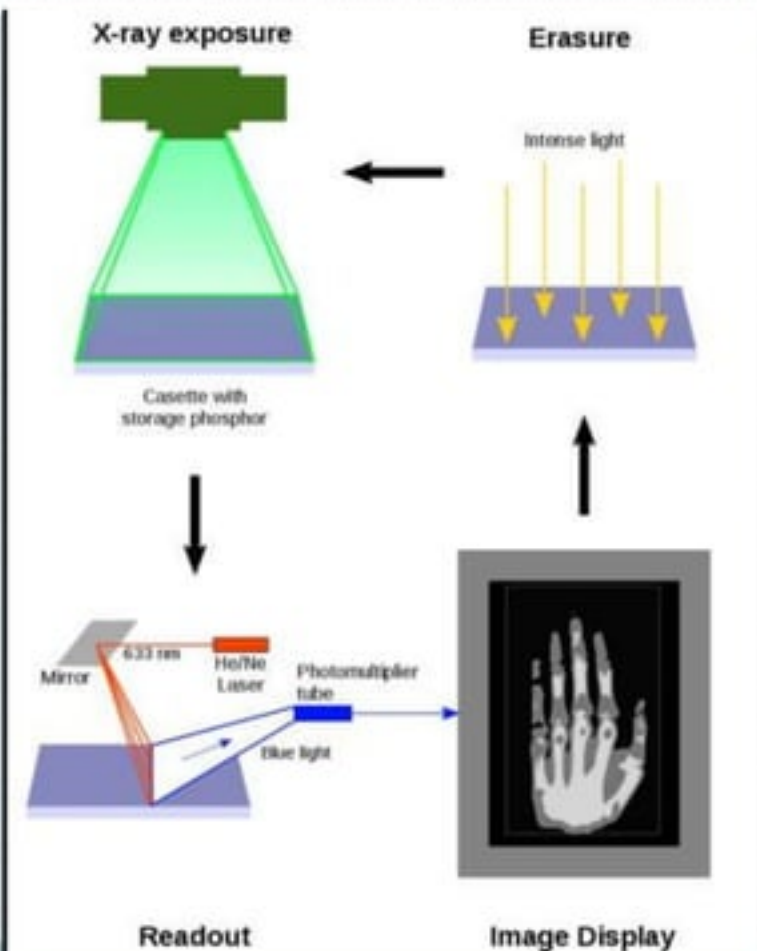


- Immediate image preview and availability
- Elimination of costly film processing steps
- A wider dynamic range, which makes it more forgiving for over- and under-exposure
- As well as the ability to apply special image processing techniques that enhance overall display quality of the image.

# Classification



# Computed radiography



**Definition :** digital radiography that records radiographic images on photostimulable phosphor plates instead of film/screen image receptors. The acquired image data are converted to electronic signals and digitized so they can be stored and manipulated by a computer and displayed on a high resolution monitor or recorded on film by using a laser printer.



## **Advantages :**

- 1) CR plate can be reused.
- 2) No dark room processing required.
- 3) Image can be manipulated electronically.
- 4) Great dynamic range and reduced exposures

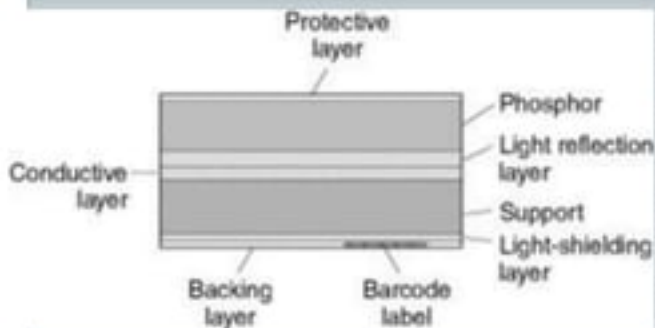
# CR Cassette



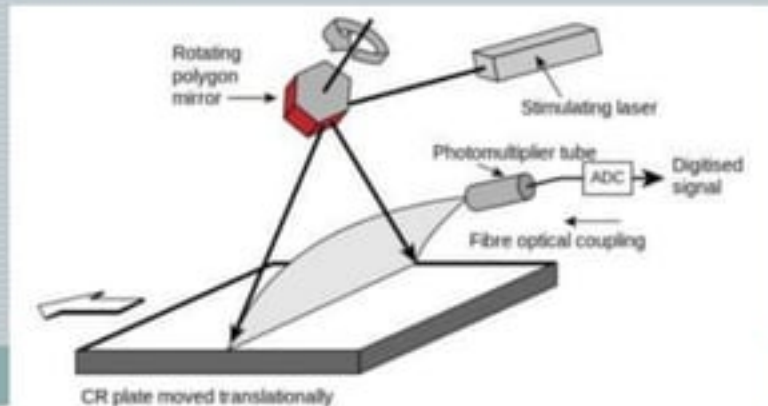
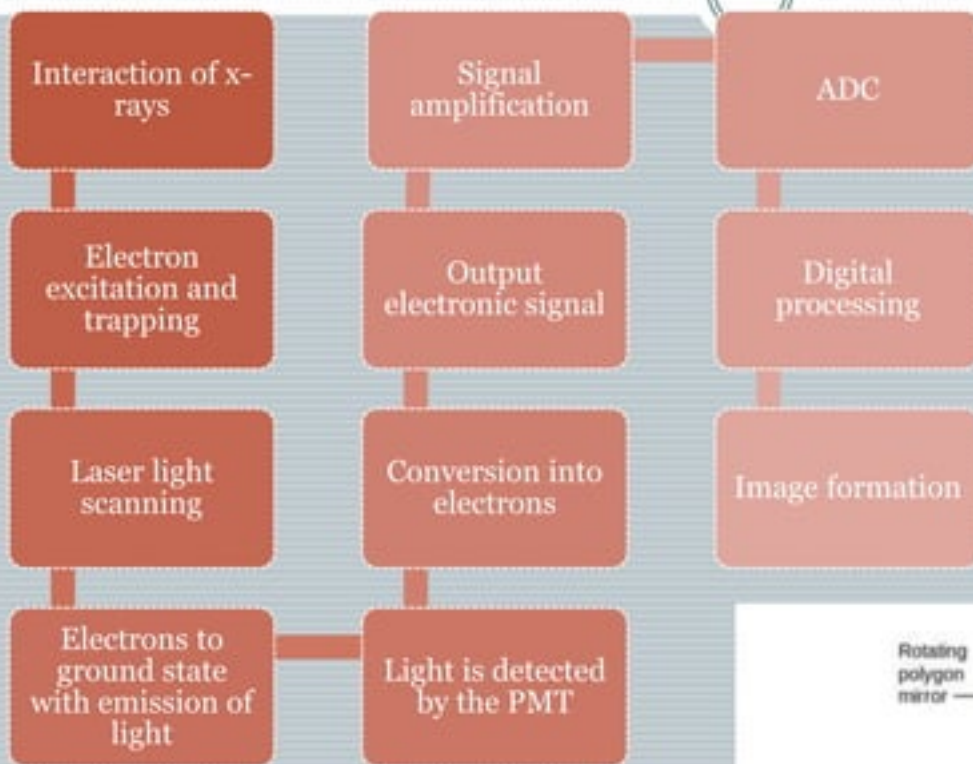
CR cassette is the container that hold the imaging plate

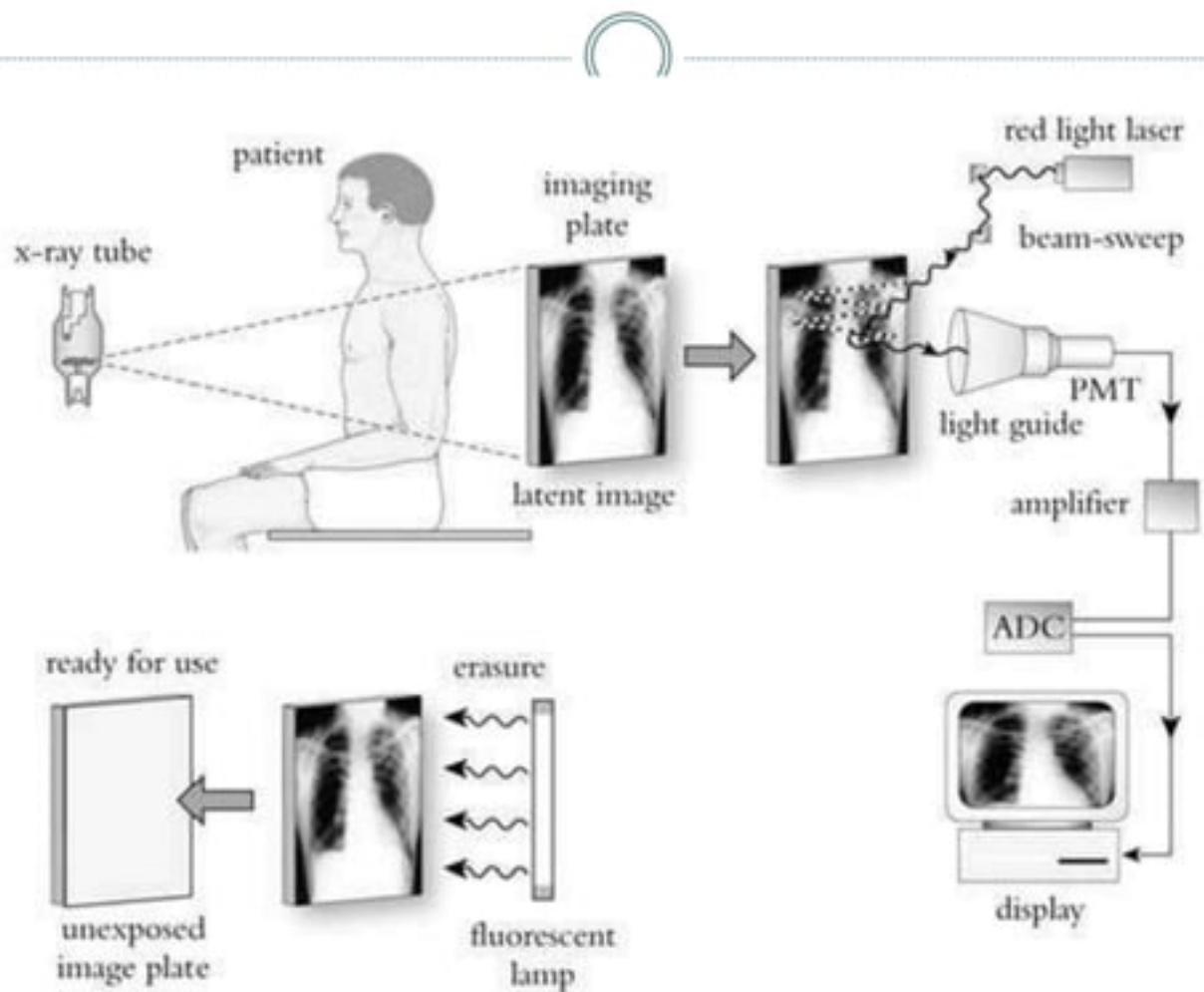
Different layers in CR imaging plate are

- 1) Supercoat – it protects the imaging plate from external trauma
- 2) Phosphor layer – traps electrons during imaging
- 3) Conductive layer – it grounds the IP to reduce the static electricity problems
- 4) Support layer – it provides strength to the base for coating other layers.
- 5) Backing – it is made up of soft polymer and protects the back of the cassette.



# Readout process







# Care and maintenance of cassette and plate



- Store imaging plates in their cassettes to protect them from dirt and damage.
- Do not store imaging plates and cassettes near a radiator or water source.
- Damage or dirt can result in streaks or artifacts appearing in the diagnostic image.
- Inspect cassettes for damage and proper opening and closing.

# Cleaning the imaging plates



1. Safely remove the imaging plate from the cassette.
2. Wiping the plate gently with a dry, lint-free soft cloth or wipe.
3. If soil remains after Step 2, moisten a lint-free soft cloth and gently wipe the soiled area of the plate. Gently wipe the moistened area with a dry lint-free soft cloth to remove residual moisture.
4. If Step 3 is not effective, repeat using isopropyl alcohol.

# Direct Radiography

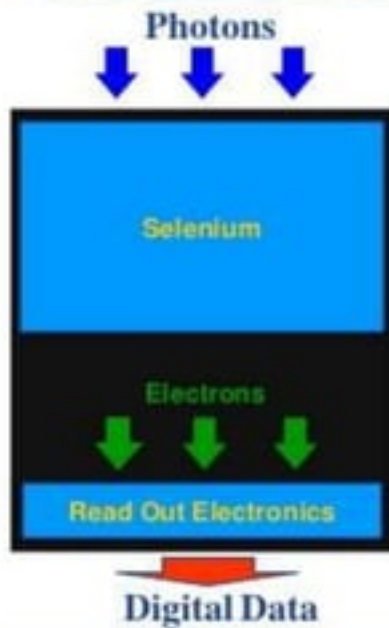


- The conversion of x-ray energy received from and imaged body part into a digital format using semiconductors, without first collecting images on an image plate or as light.
- **Advantages :**
  - provides 2x-3x more dose efficiency.
  - Image is rendered faster
  - DR offers superior throughput and improves workflow.

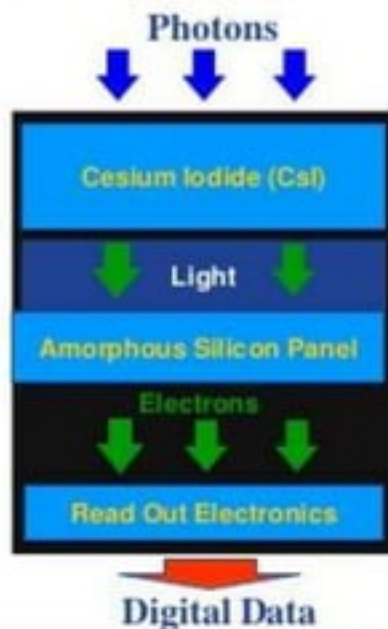
# Detectors

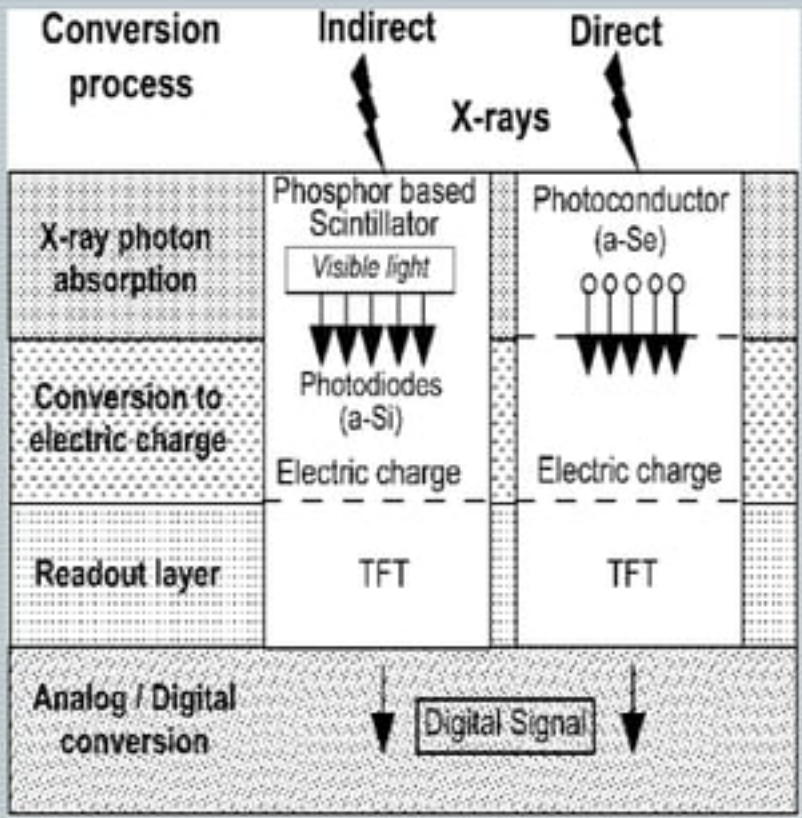
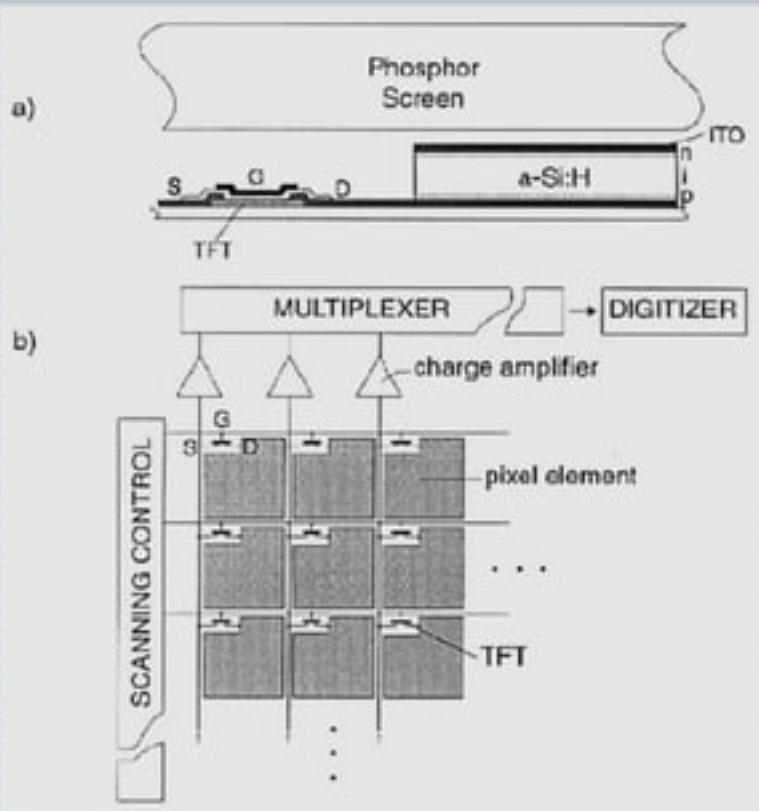
## Flat Panel Technology

Direct Conversion (Se)

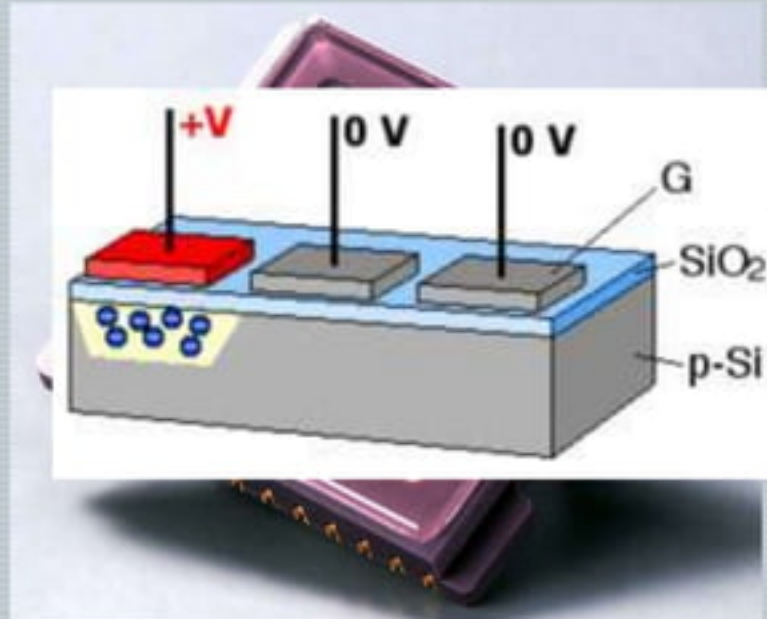


Indirect Conversion (CsI)





# Image display



## Care and maintenance



- Do not do hit the DR plate with repetitive high energy raw radiation.
- Careless handling can shorten the useful lifetime of an digital imaging detector
- When there is a risk of fluids contacting the detector, place the detector in a protective bag .
- If you are using a protective enclosure around the detector, remove the enclosure immediately after use to prevent the detector from overheating.
- When storing DR plate, store somewhere secure where the DR plate can be laid flat and cannot fall.

# Cleaning



- Do not operate the equipment when cleaning the equipment.
- Do not spray cleaning solution directly onto the equipment. Moisten a cloth with a 70 % isopropyl alcohol solution and apply to patient contact areas after each contact.
- Do not immerse the equipment in liquid.
- Consider purchasing approved clinical cleaning lint wipes.



# System maintenance







- Do not attempt mechanical or electrical repair of the System. The System must be repaired only by authorized service personnel
- Contact authorized service personnel . if any unit does not perform to your satisfaction. The System must be maintained in good operating order at all times to provide safe conditions for technician and patients.
- The System must also be maintained to prevent possible loss of patient or image data.

# Image formation

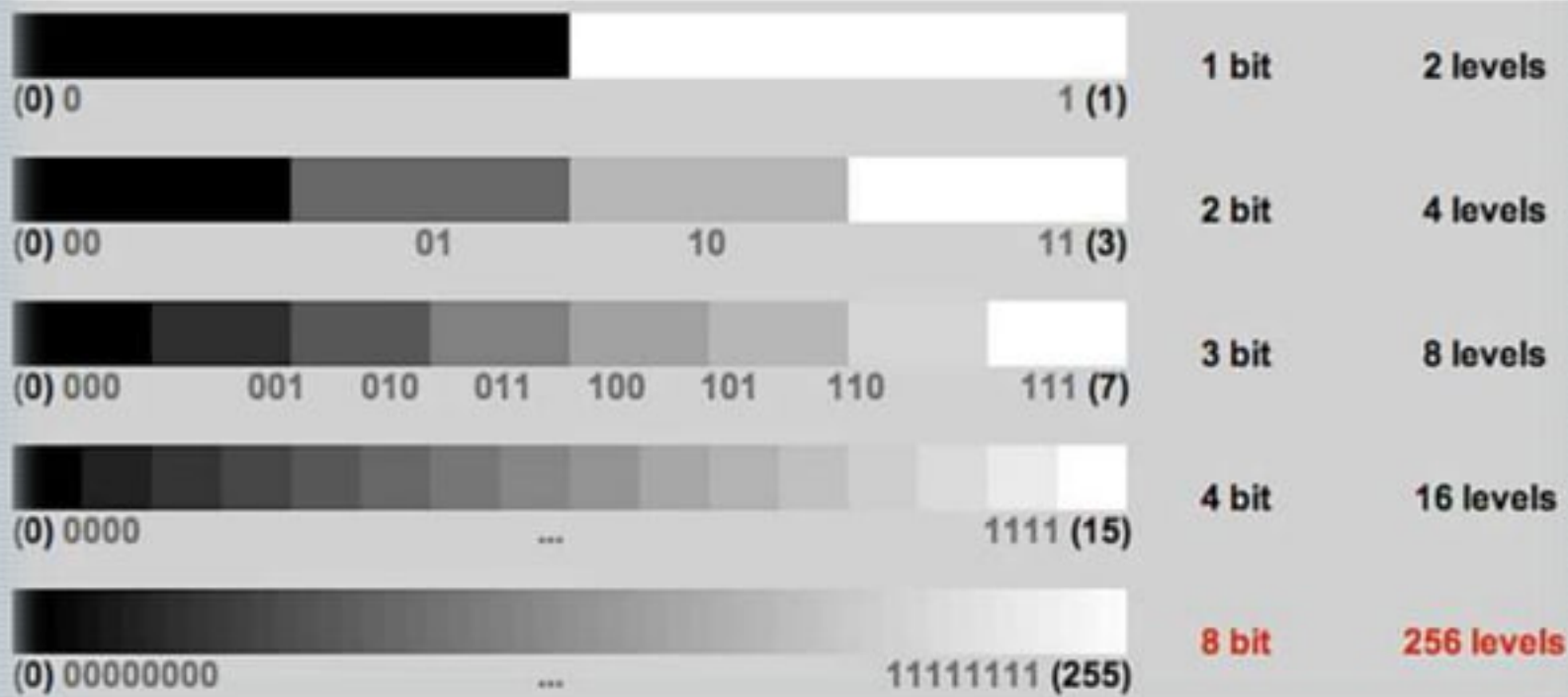
## Digital Image Formation

### Analog to Digital Converter

- The Analog to Digital Converter (ADC) classifies the analog voltage of each pixel into one of 256 levels (8 bit ADC) and assigns a digital value to it.

ADC Analog to Digital Converter		
Analog →	Sampling	→ Digital
1.00V - 	 - 255	→ 11111111
0.38V - 	 - 98	→ 01100010
0.00V -	- 0	→ 00000000

# Digital Image Formation



# Disadvantages



- Whilst underexposure will give us a grainy appearance, overexposure is automatically corrected by imaging software so there is a tendency to overexposure to ensure a good quality image.
- One of the main disadvantages of digital radiography is the high start-up cost but generally this is accepted due to the long term benefits of having the system and recouping costs over time
- With computed radiography systems, images need to be processed almost immediately as any delay will result in loss of image information due to trapped electrons returning to a lower energy state. This tends to be a problem in field radiography where images are required away from the practice

## Reference



- <https://quizlet.com/88158595/advantages-and-disadvantages-of-digital-radiography-flash-cards/>
- [https://en.wikipedia.org/wiki/Digital\\_radiography](https://en.wikipedia.org/wiki/Digital_radiography)
- <https://radiopaedia.org/articles/digital-radiography>
- [www.vareximaging.com](http://www.vareximaging.com)
- <http://www.nova-medical.com/tec-04.html>

