



Al-Mustaqbal university college  
Pharmacy Department

## Medical physics

Assistant lecturer

**Sarab jabbar Musa**

**1<sup>st</sup> class**

Lecture - 1

## Medical Physics

Medical physics is the application of physics to medicine. In medicine, all fields of physics can be applied, such as, Mechanics, fluids, thermodynamics, optics, electromagnetic radiation, atomic and nuclear physics.

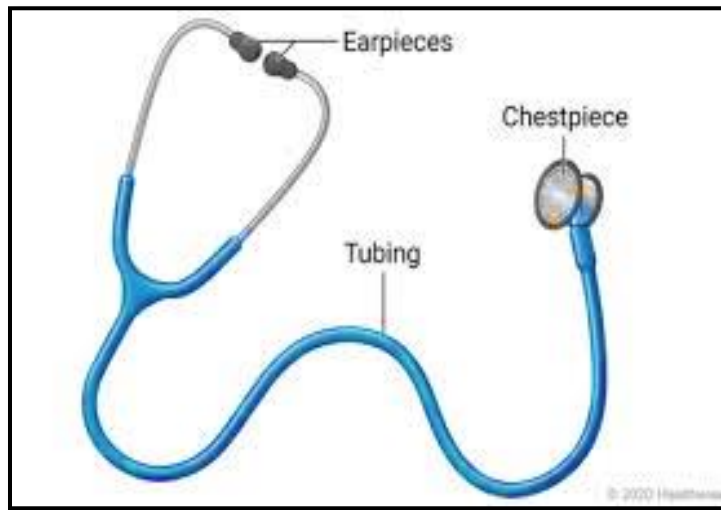
Medical physics involved in the development of new instrumentation and technology used for diagnosis and treatments.

As Known, the human body is a very complex system. The concepts of modeling in physics can be applied to simulate different activities of the human body systems. For example, the modeling of the blood flow in the study of the body's circulatory system.

The human body is made up of different systems working together to keep the body in health. One can use analogies with physics to simulate the function of these systems and to understand the connections between them.

### Application to medical diagnosis

Different techniques of diagnosis and medical instruments are based on physical principles, such as, the measurements of body temperature, the blood pressure, the eye pressure, the heart pulse,...etc. Medical imaging, such as, X-rays radiology, magnetic resonance imaging MRI, ultra-sound scan,, etc. is a very useful discipline of medical diagnosis

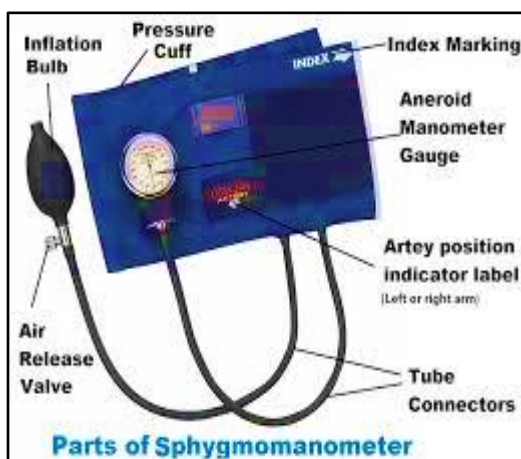


stethoscope

## Medical Instruments

There are many instruments for different measurements, some of these instruments are:

1. Blood pressure (sphygmomanometer, digital wrist tensiometer).



Sphygmomanometer



digital wrist tensiometer

2. Body temperature (medical mercury thermometer, infrared ear thermometer)

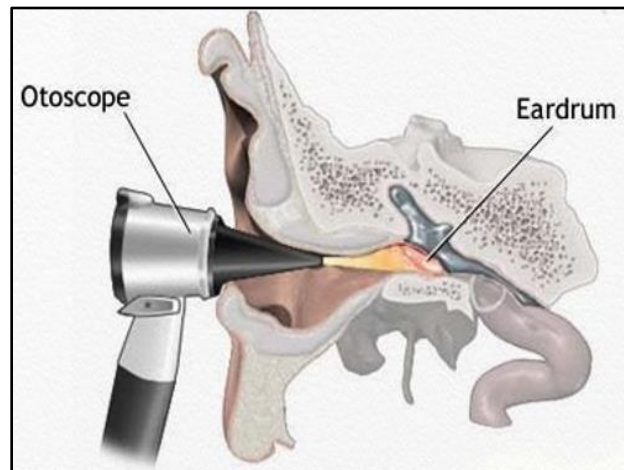


**mercury thermometer**



**infrared ear thermometer**

3. Otoscope: An otoscope is a medical device typically having a light and a set of lenses used for visual examination of the eardrum and the canal of the outer ear.



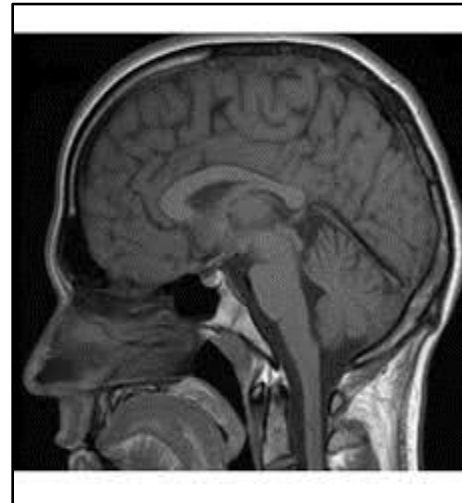
## Medical Imaging

### Magnetic Resonance Imaging MRI

MRI uses the property of the nuclear magnetic resonance NMR to image the nuclei of atoms inside the body, specially the hydrogen atoms H since the body tissues contain lots of water. MRI used for pathologic diagnosis such as lesions in the brain.



MRI device



MRI image

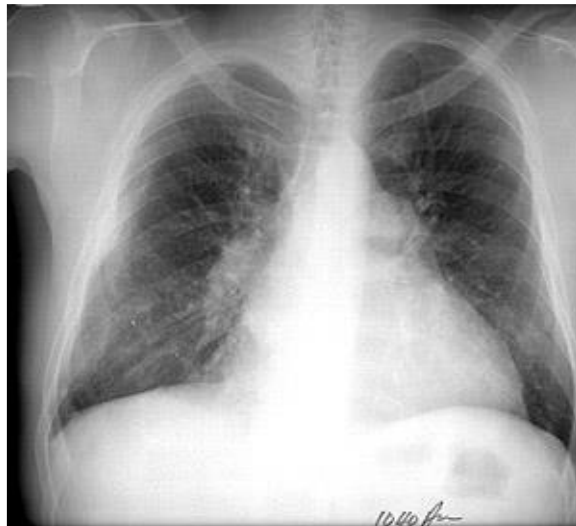
### X-ray Imaging

An X-ray is a painless medical test helps physicians diagnose. Radiography involves exposing a part of the body to a small dose of ionizing radiation to produce images inside of the body. X-rays are the oldest and most frequency used form of medical imaging.



### **Fluoroscopy**

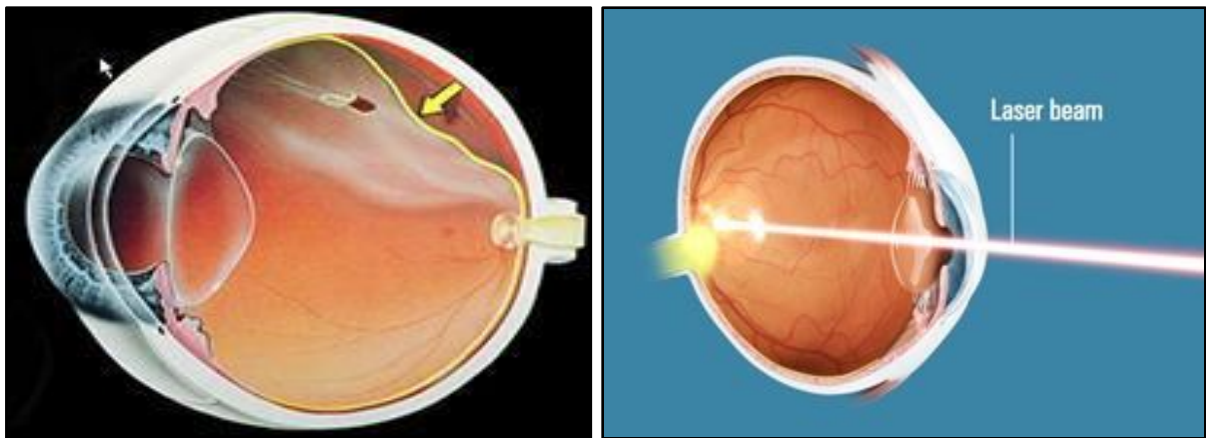
One of the most important benefits of this procedure is that it allows the doctor to view the body inner systems while they are actually functioning. For example, a doctor can watch a patient, stomach as it digests food, allowing the doctor to obtain valuable diagnostic information



## Medical Surgery

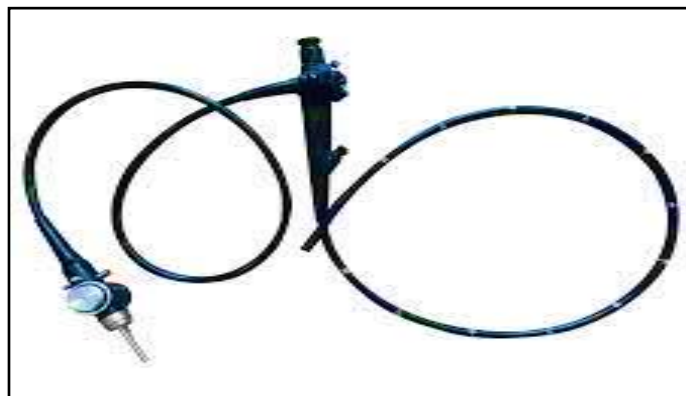
### Laser Surgery (photocoagulation)

Retinal detachment occurs when part of it is lifted from its normal position in the back of the eyeball. During photocoagulation your surgeon directs a laser beam through a contact lens of ophthalmoscope designed for this procedure. The laser makes burns around the retinal tear, and the scarring that results usually (welds) the retina to the underlying tissue.

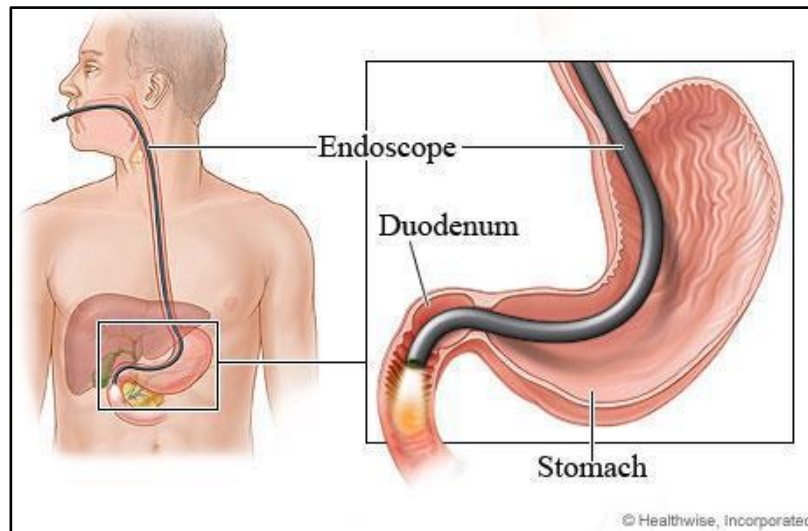


### Endoscopy

Endoscopy surgery uses scopes going through small incisions or natural body openings in order to diagnose and treat disease. Another popular term is minimally invasive surgery (MIS), which emphasizes that diagnosis and treatments can be done with reduced body cavity invasion



An endoscope is a long, thin and flexible tube which has a light a video camera



## Prosthesis

Prosthesis is the replacement of a missing or a defect parts of the body by another made artificially and assuming the same function as the missing part. Artificial devices to replace vital organs continues to be a human dream for thousands of people around the world who are waiting for a heart or kidney graft.

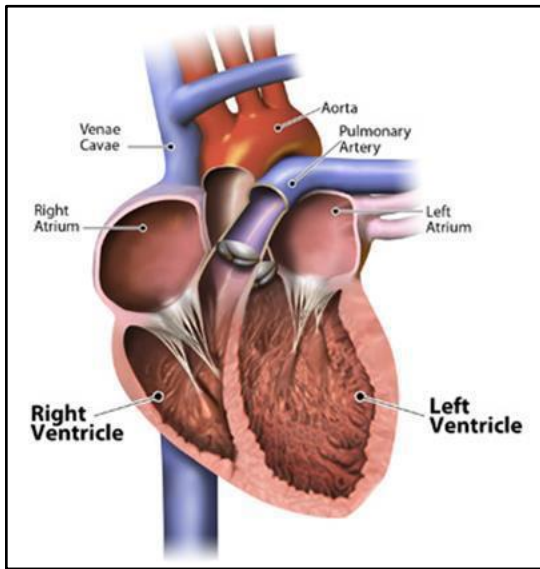


**Hearing Aid**

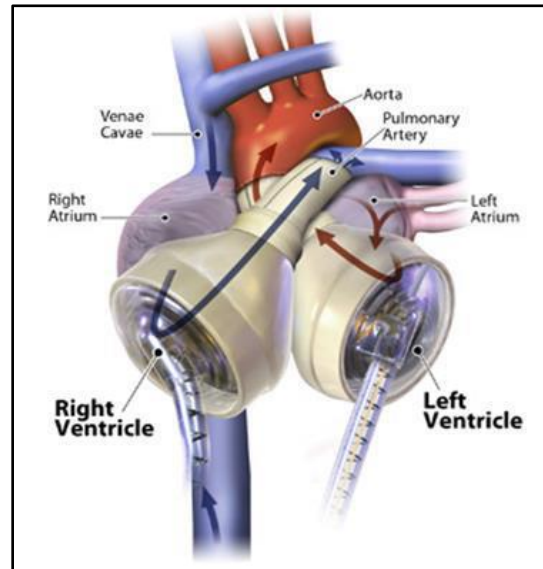


**Artificial Leg**





**Human heart**



**Total artificial heart**