

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

বিস্মিল্লাহির রাহমানির রাহীম



উদ্ভাস

একাডেমিক এন্ড এডমিশন কেয়ার

Class 10: Physics (Chapter-14)

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EEE, BUET

Physics to Save Life

Lecture: P-35

আলোচ্য বিষয়াবলি

- ❖ Contributions of Jagadish Chandra Bose
- ❖ X-Ray
- ❖ Ultrasonography
- ❖ CT Scan
- ❖ MRI: Magnetic Resonance Imaging
- ❖ Angiography
- ❖ Endoscopy
- ❖ ECG
- ❖ ETT
- ❖ Radio Therapy
- ❖ Isotopes

Contributions of Jagadish Chandra Bose

- Sending wireless radio signal in distant place for the first time
- Reducing the wavelength of electromagnetic field to the order of millimeter (5mm)
- Using semiconductor junction to detect radio signal
- Scientifically proofed that ~~tress response~~ can response to various stimuli

X-Ray

Biomedical Instrument

Battery

100KV

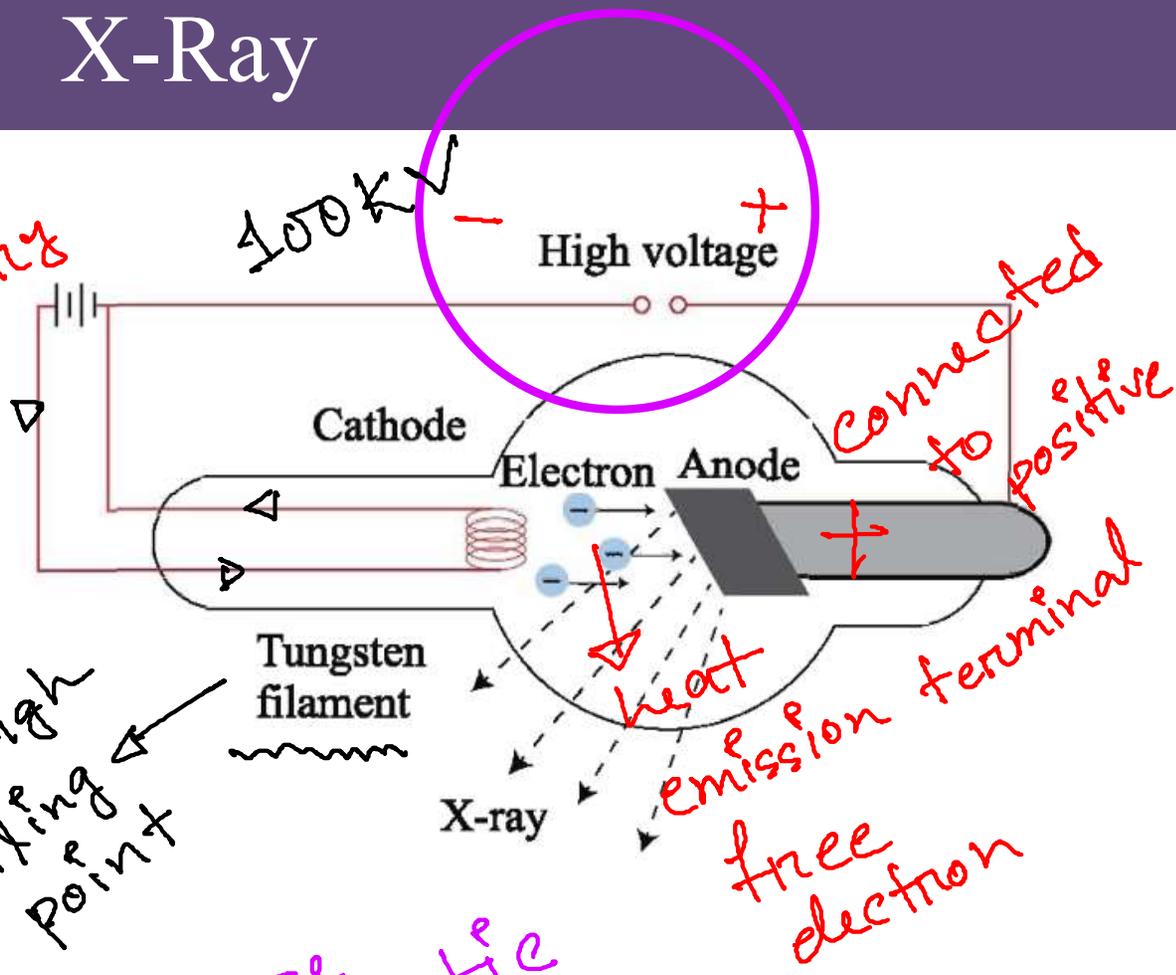
High voltage

heat emission of electron
negatively charged

High boiling point

- 1) small wavelength
- 2) High frequency
- 3) not visible

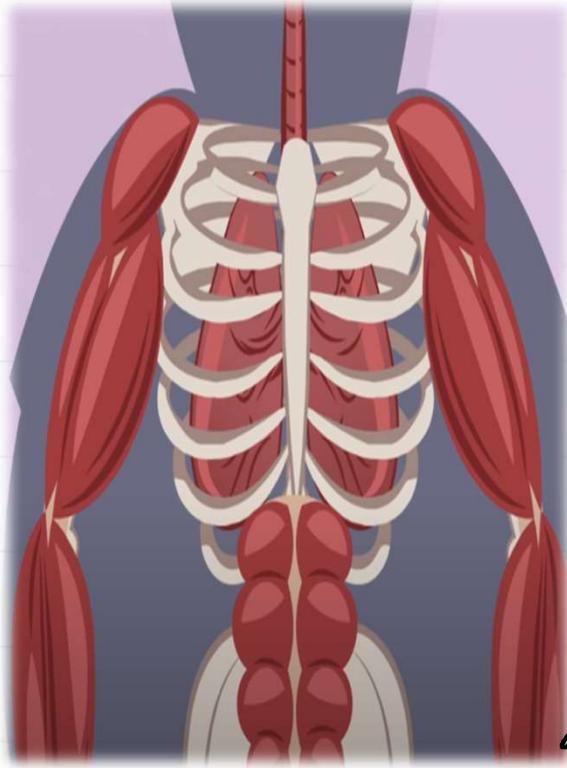
more energetic than visible light



X-Ray



Patient



G40



X-Ray



Lead Apron
↓
Pb 250



POLL QUESTION-01

What are the properties of X-rays?

(a) Smaller wavelength

(b) Higher frequency

(c) Visible

X [not - visible]

(d) a & b

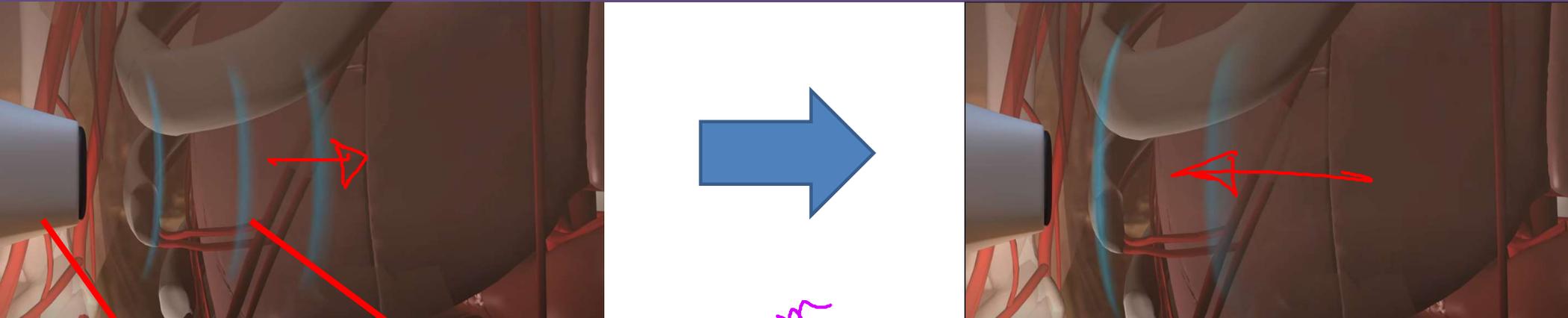
Correct answer

Ultrasonography

Sound
Ultra-sound
1-20 MHz
frequency range



Ultrasonography



sound narrow beam

by internal organs

Transducer

↪ electrical signal ↔ sound signal

↪ Reflect, absorbs or transmitted

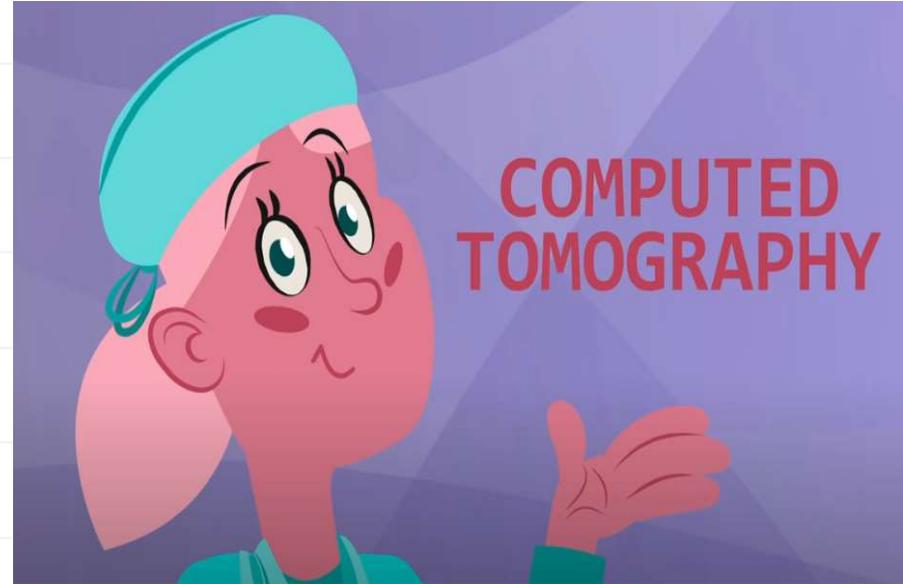
↪ Reflected sound intensity and timings

echo

↪ Image

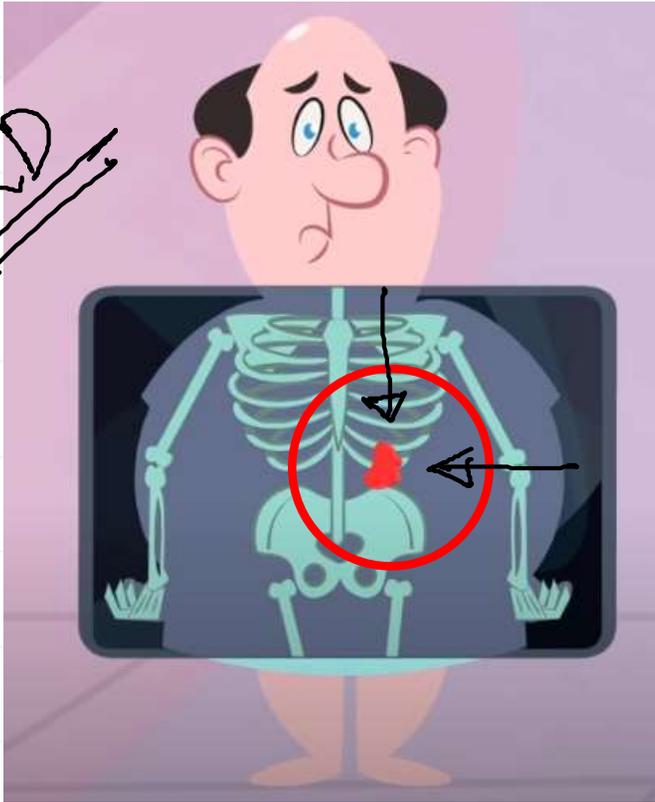
CT Scan

CT Scan X-ray

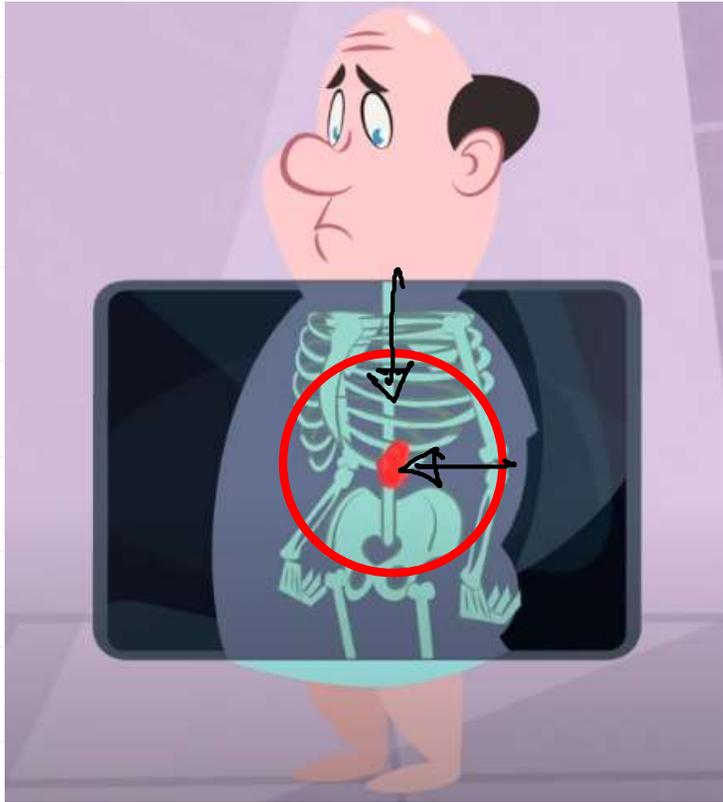


CT Scan

2D



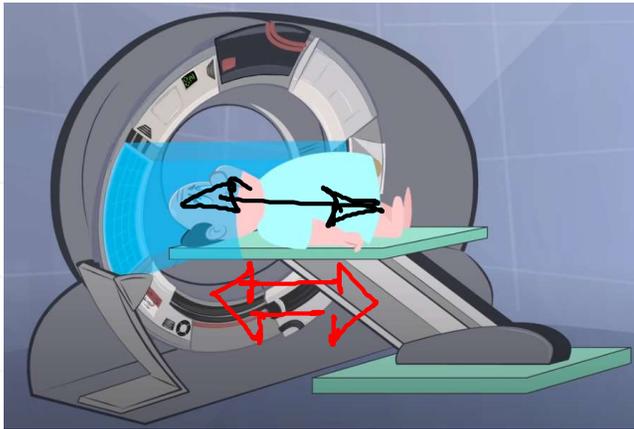
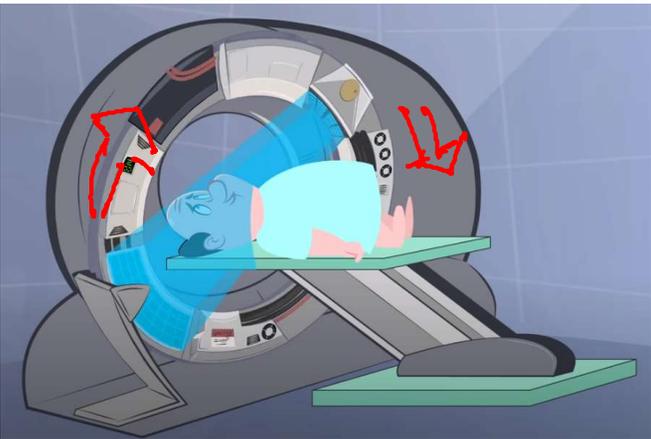
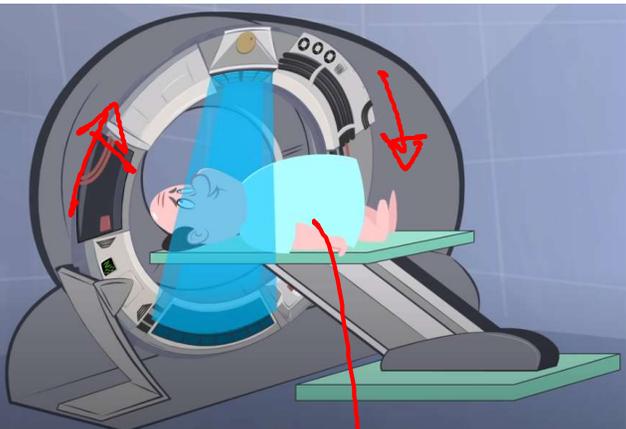
from
Different
angle



CT Scan



CT Scan



360°
Patient

MRI

CT Scan \Rightarrow X-Ray

MRI \Rightarrow Strong magnetic field

MRI

proton will be aligned

Electromagnetic signal

proton energy absorb \rightarrow emit \Rightarrow Image



H_2O 70%
H \rightarrow Basically proton \rightarrow strong magnet

POLL QUESTION-02

What is the full form of CT-scan?

(a) Computed Treatment Scan

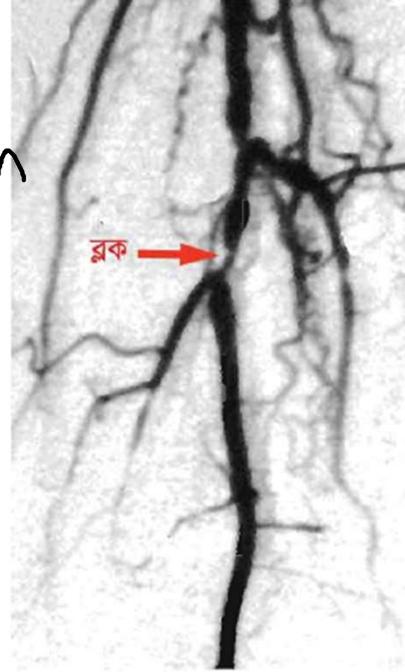
(b) Computed Tomography Scan

(c) Computed Tomology Scan

(d) Conercial Tomography Scan

Angiography

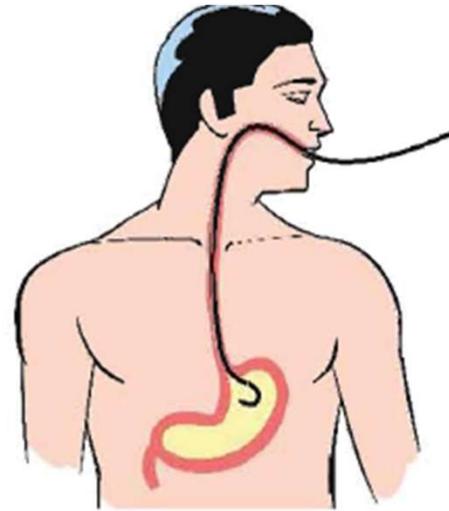
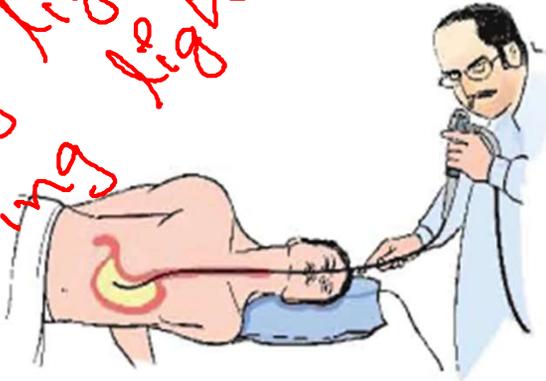
Dye
↓
Catheter
↓
Insert a
Ballon
↓
Expand and compression
↓
Block removed



ENDOSCOPY

two tubes

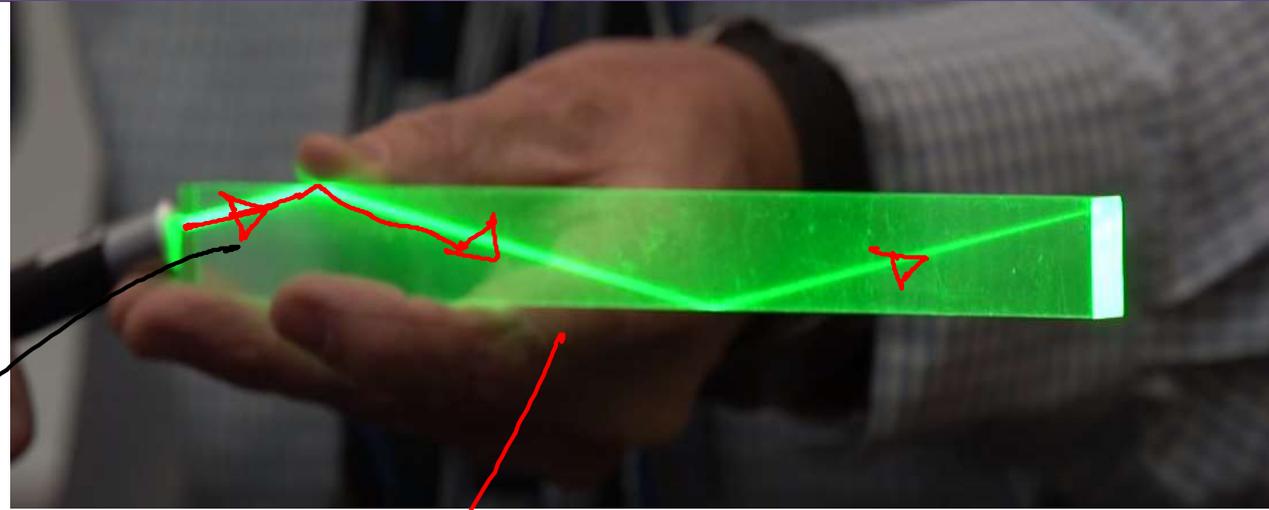
Optical fiber
→ sending light
← receiving light



ENDOSCOPY

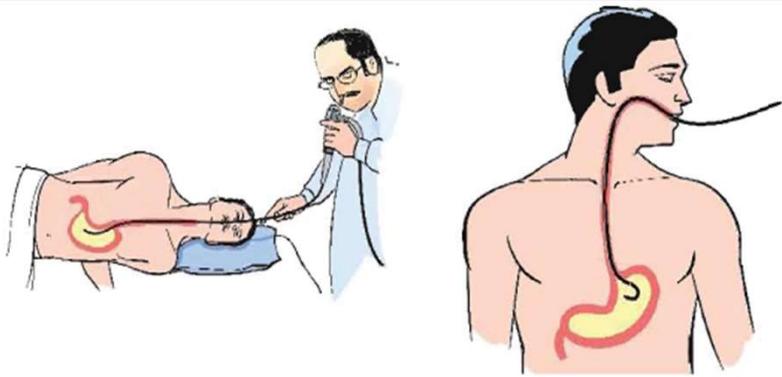
Total
Internal
Reflection

tube made of
optical
fiber

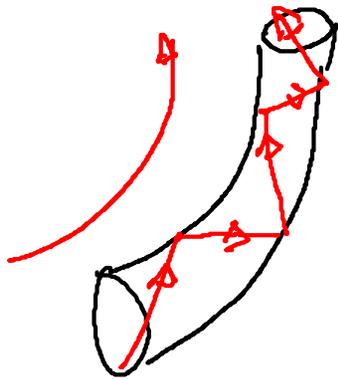
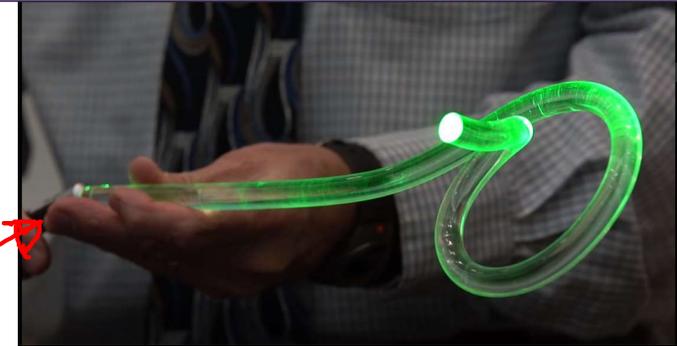


straight
tube

ENDOSCOPY

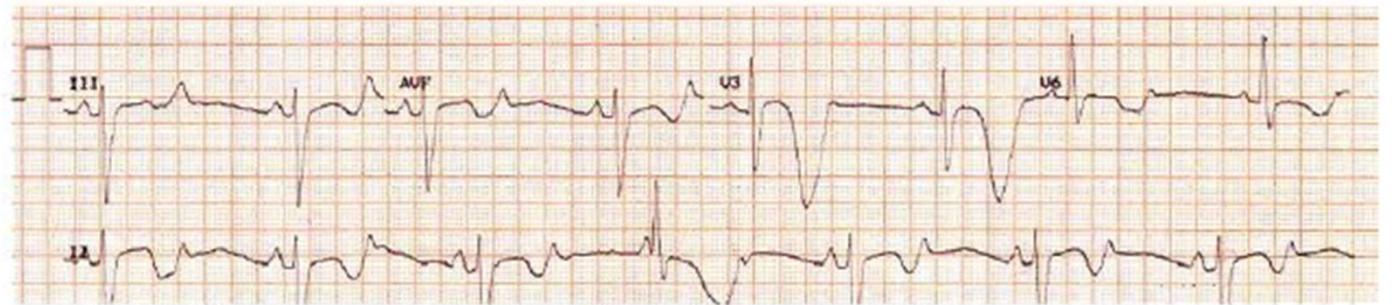
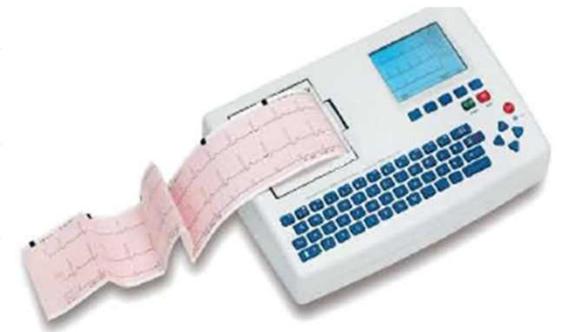


sending light



ECG

Electro
-Cardiogram
Patient



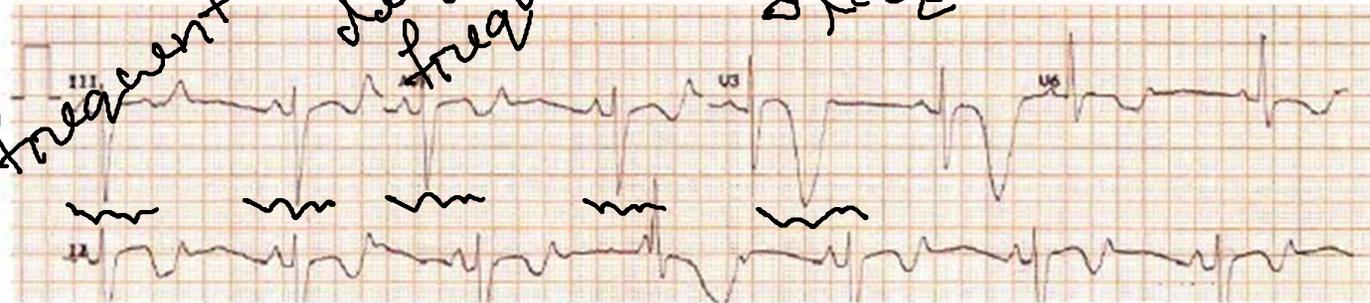
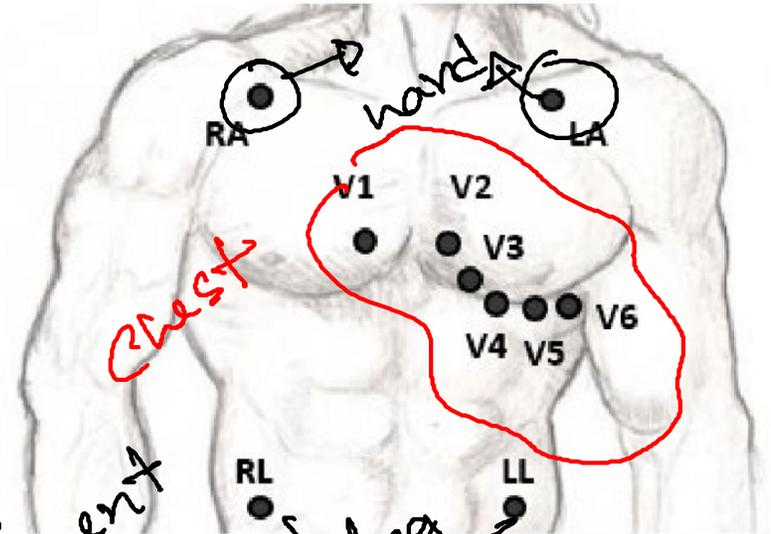
ECG

Total
to spots
Electrode

Electrical
Signal
Receive

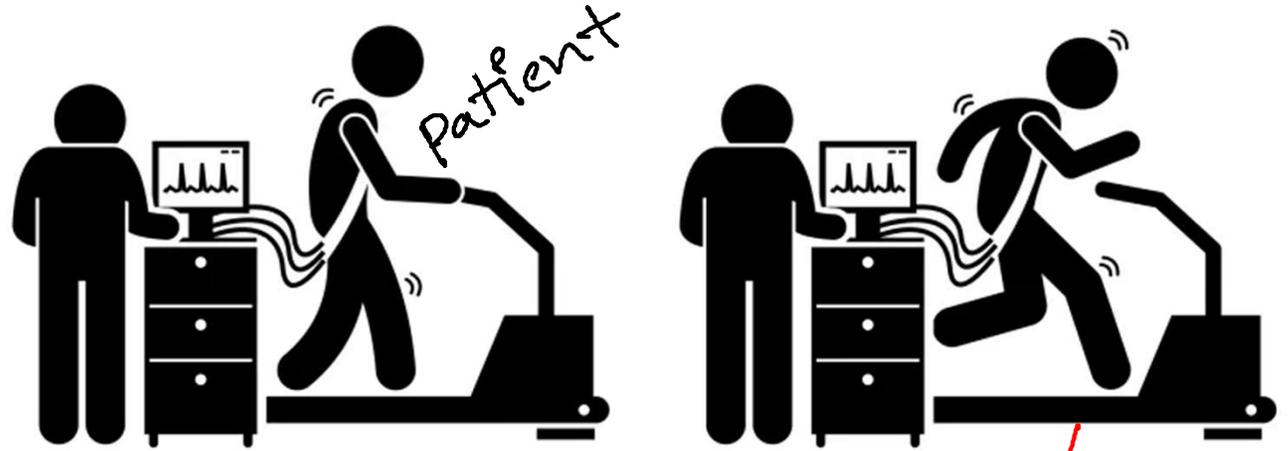
patient's
situation

too frequent or
less frequent



ETT

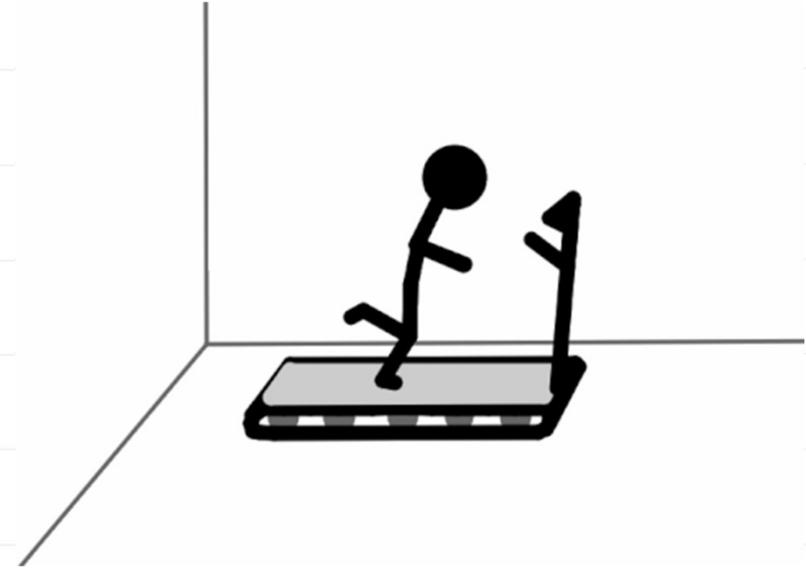
DURING EXERCISE
EXERCISE
+ ECG
= ETT



Exercise tolerance test

treadmill

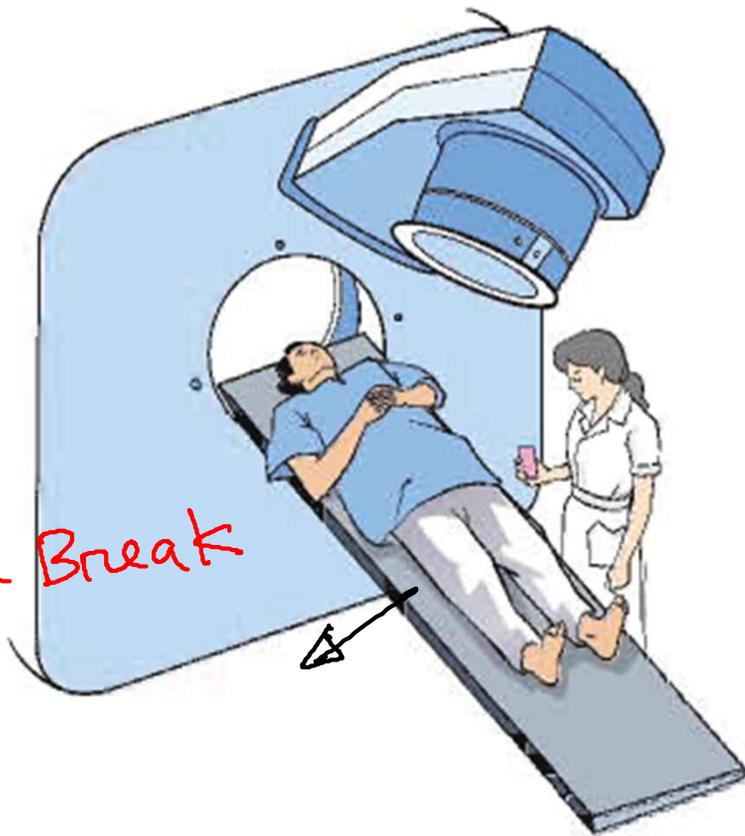
ETT



RADIO THERAPY

X-Ray
↓
High energy
↓
Cancerous Cell
↓
DNA sequence Break
↓
Destory

In addition
→ healthy cell

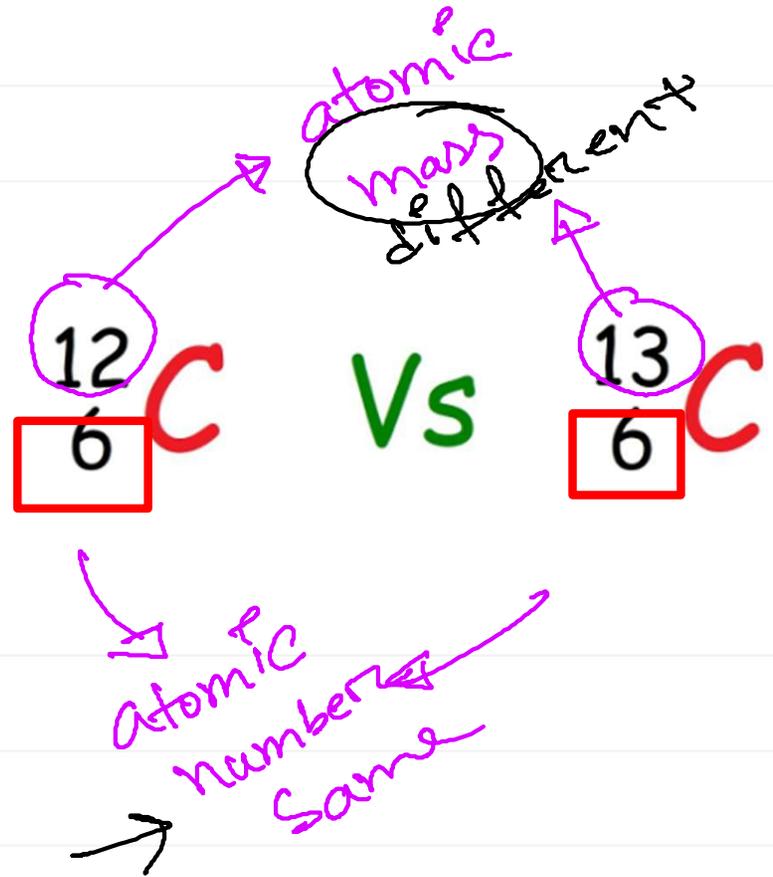


ISOTOPES

Isotope

Radio-active isotopes
+ medicine

↳ trace



POLL QUESTION-03

To get a complete picture of heart how many electrical signals do we need in ECG ?

(a) 9

(b) 10

(c) 11

(d) 12

লেগে থাকো সৎভাবে,
স্বপ্ন জয় তোমারই হবে

ঊদ্ভাস-উন্মেষ শিক্ষা পরিবার