

Introduction To MRI

FOR
MEDICAL STUDENTS

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By

Dr. Ahmad Mokhtar Abodahab



Lecturer of Radiology – Faculty of Medicine Sohag University

Radio diagnosis Consultant

Sohag Military Hospital & Police Clinics.

Teleradiology & PACS Expert – Telemedicine Technologies Co. , KSA

Certified Trainer – Egyptian Supreme Council of Universities

What is MRI ?



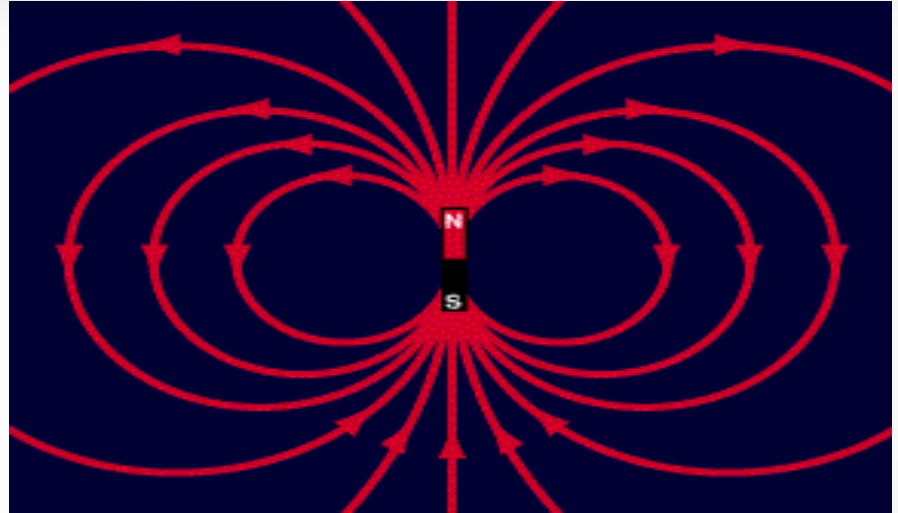
Magnetic Resonance Imaging



ENERGY USED

Energy

STRONG MAGNETIC FIELD



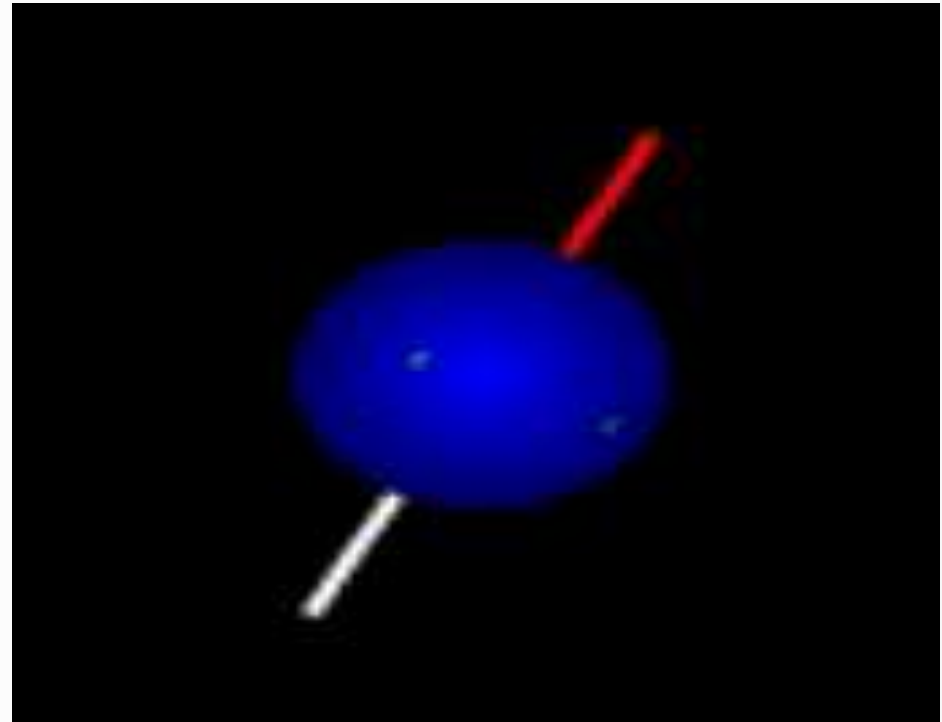
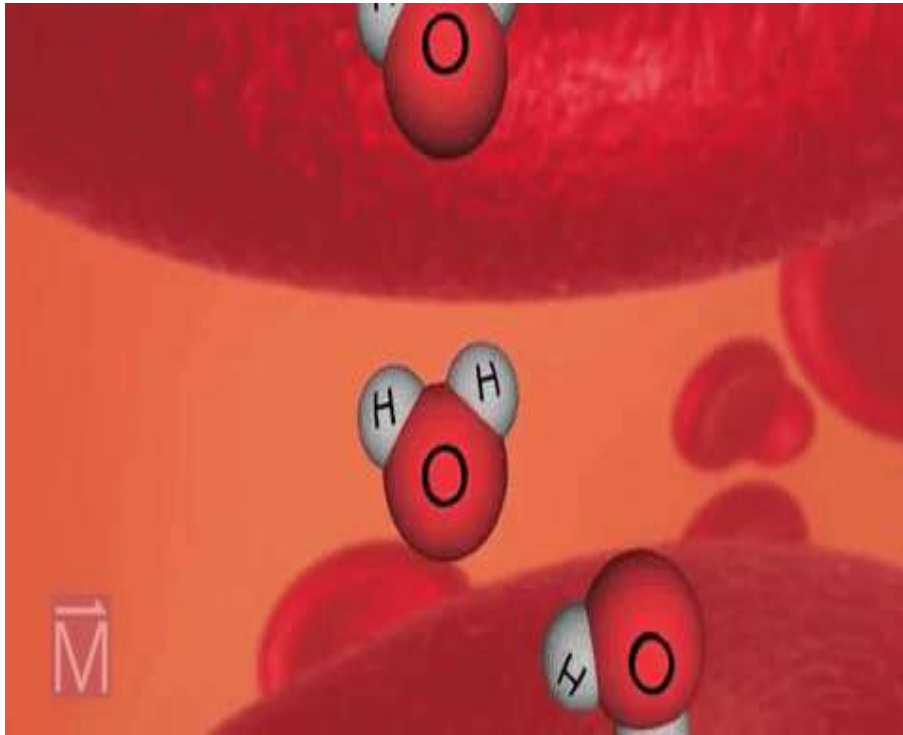
RADIO FREQUENCY



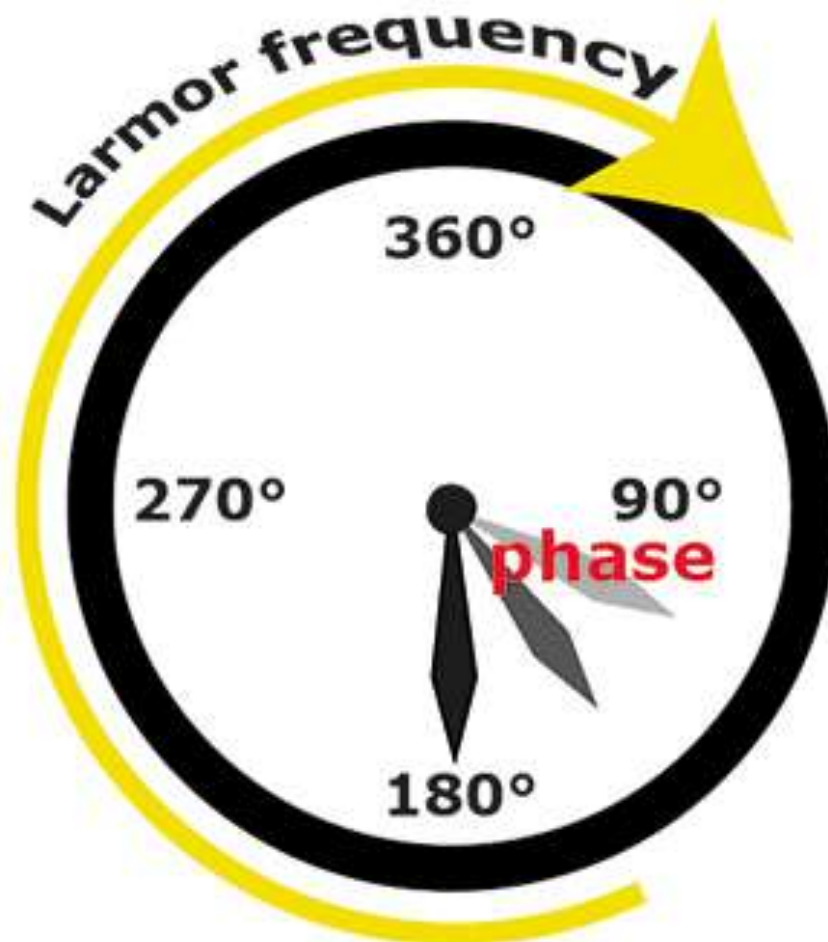
IDEA

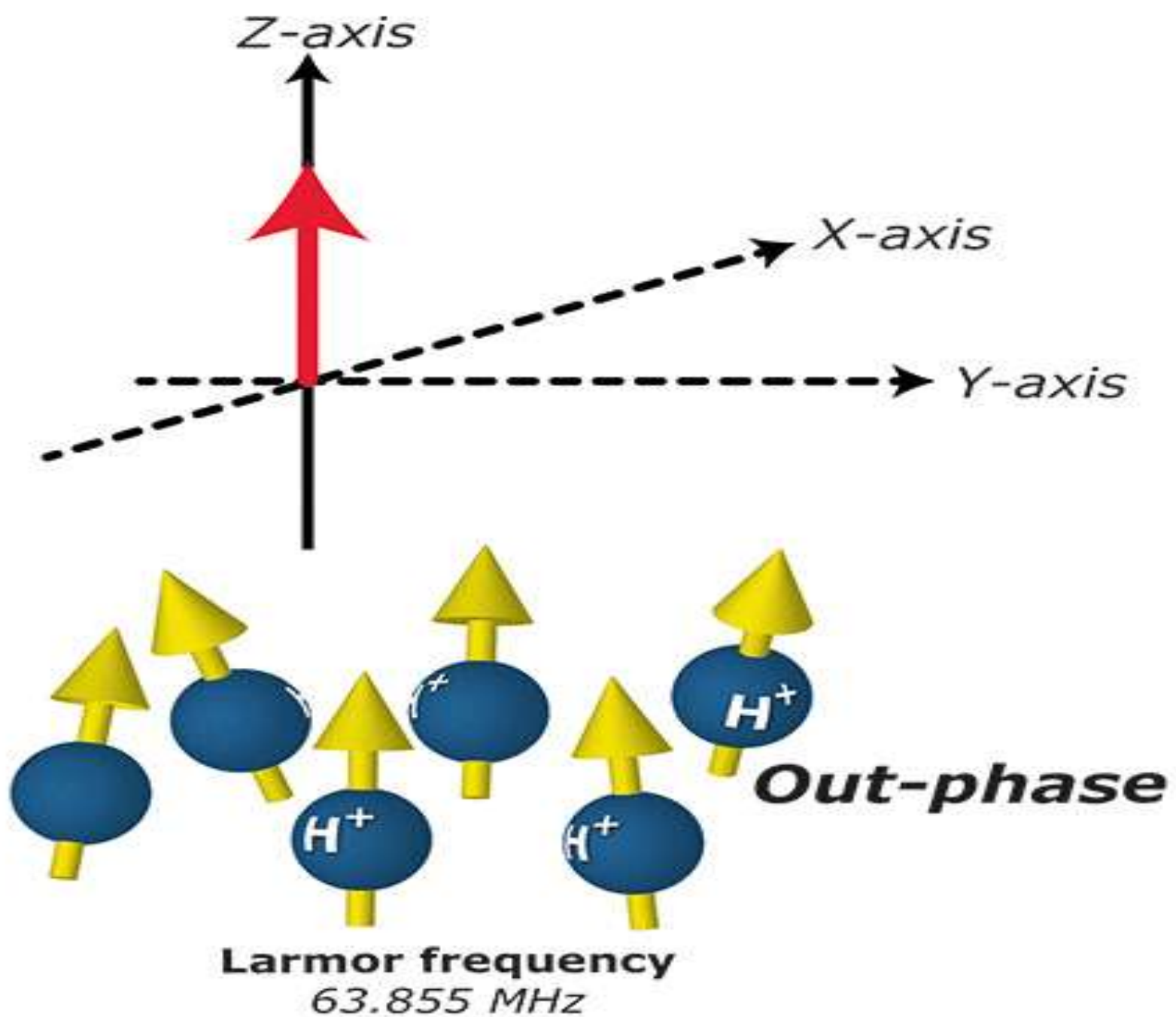
idea

Magnetic Resonance Phenomena



Larmor frequency





Inventors

- **1946 - Felix Bloch and Edward Purcell** → magnetic resonance phenomena .
- until the 1970s MRI was being used for **chemical and physical** analysis.
- **1971 Raymond Damadian** showed that nuclear magnetic relaxation times of tissues and tumors.



Felix Bloch



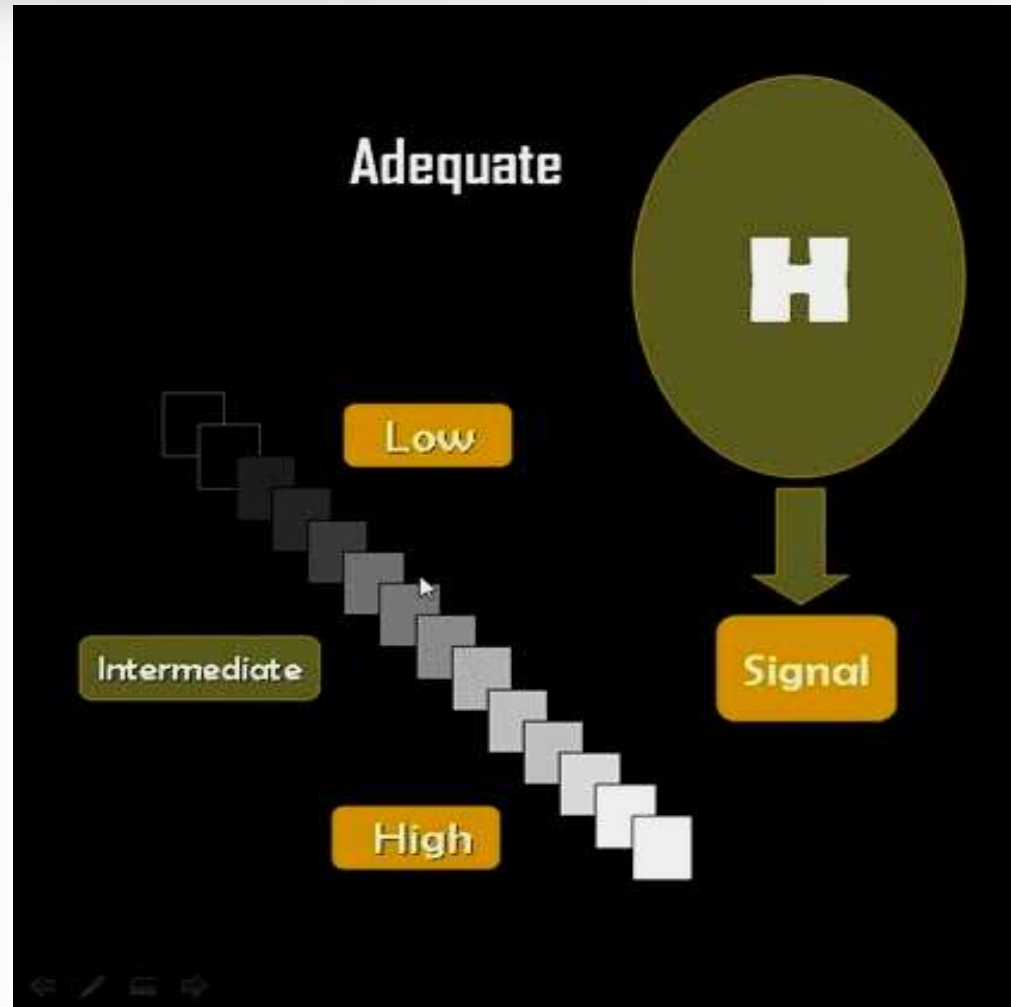
Edward Mills Purcell

Reporting Term

signal intensity



- Hyper
 - Iso
 - Hypo
- Intense



Types Of MRI :

- **According to shape:**
 - Open
 - Closed
 - Dynamic
 - Extremity
- **According To type of magnet:**
 - Fixed
 - Electric
 - Superconductive

Closed MRI



CLAUSTROPHOBIA



Open MRI





VS



Extremity MRI

For Joints :

- Wrist & Elbow**
- Ankle & Knee**



Dynamic MRI



Contraindications Of MRI

No Iron or Magnetic objects



- ✓ Iron Processes.
- ✓ Iron F.B.
- ✓ Firearm
- ✓ **Pacemaker.**
- ✓ Vascular **metallic clips.**

DANGER



STRONG MAGNETIC FIELD

Magnet is always on.

Notify the MRI technologist or radiologist if:

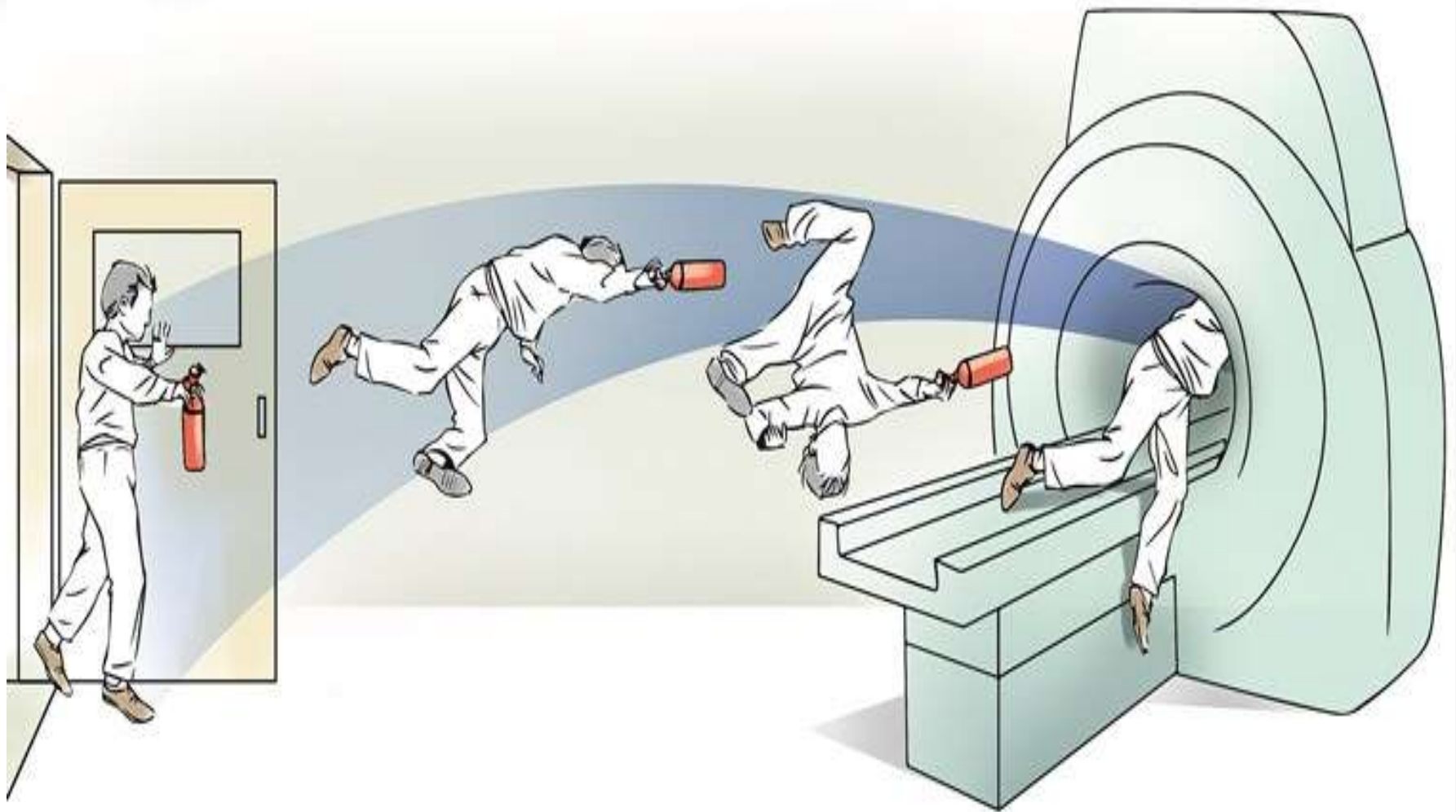
- 1) You have any metallic, electronic or magnetic implants or devices in your body**
- 2) You have been exposed to metal shavings from operations like grinding or sawing as part of your occupation**
- 3) You have metal embedded in your body due to injury**
- 4) You have any object which may contain metal or metallic parts (cell phones, scissors, watches, hearing aids, tools or keys)**

Failure to follow these instructions could result in serious injury or death.



Contra-indications to MRI

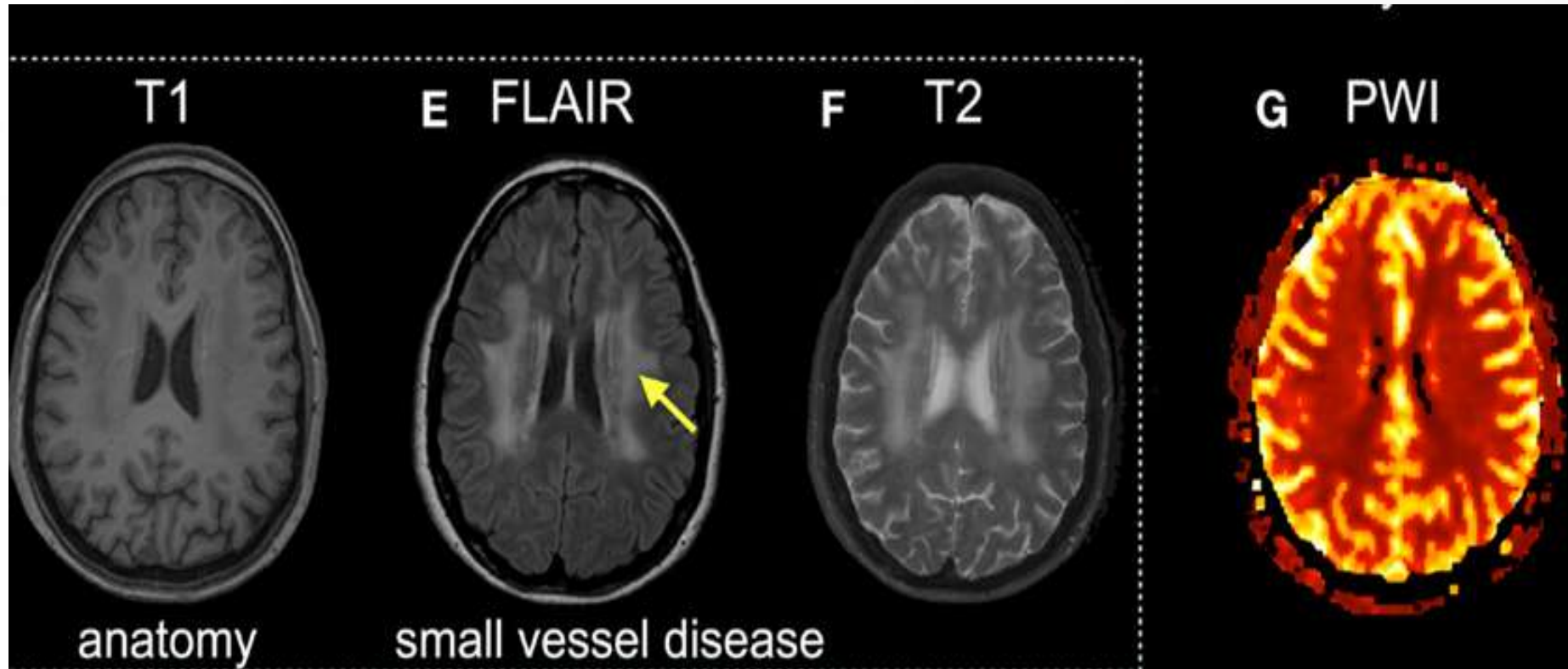




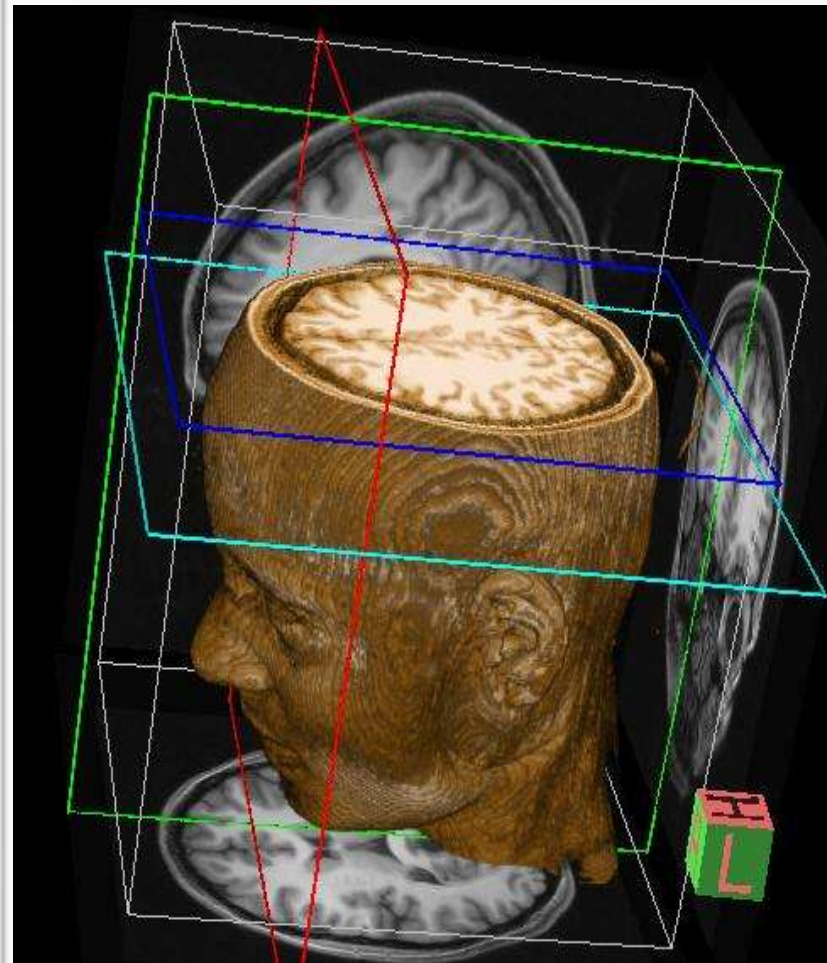
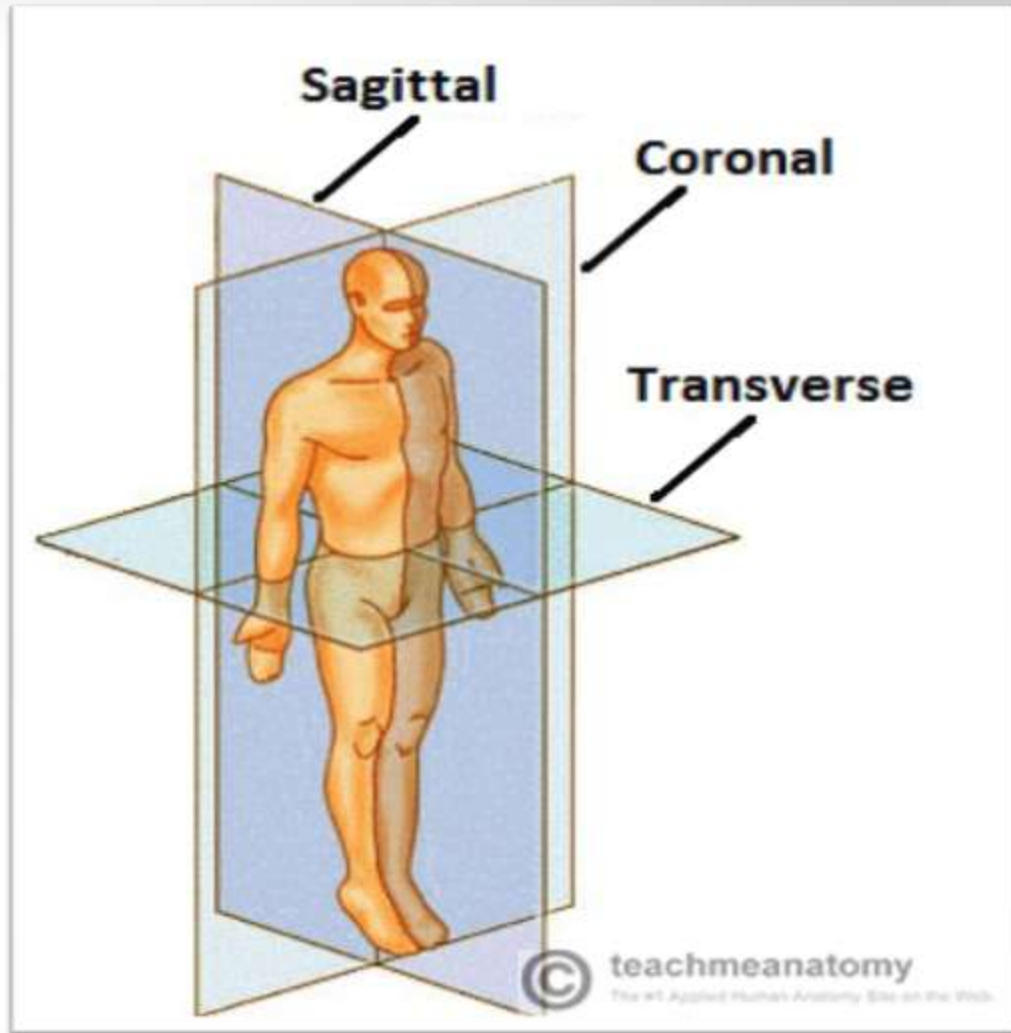


MRIMulti Sequences

- Multi sequences..... T1 , T2 , FLIR ,etc.



....Multi Planner



T1

T2

Low

Low

High

High

High

Low

Low

High



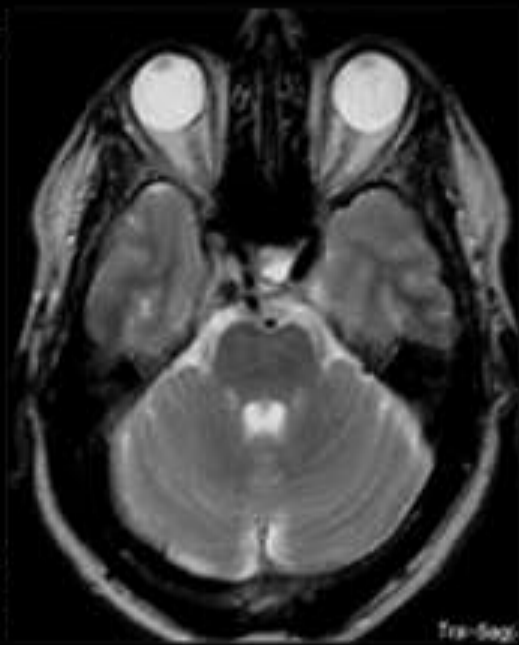
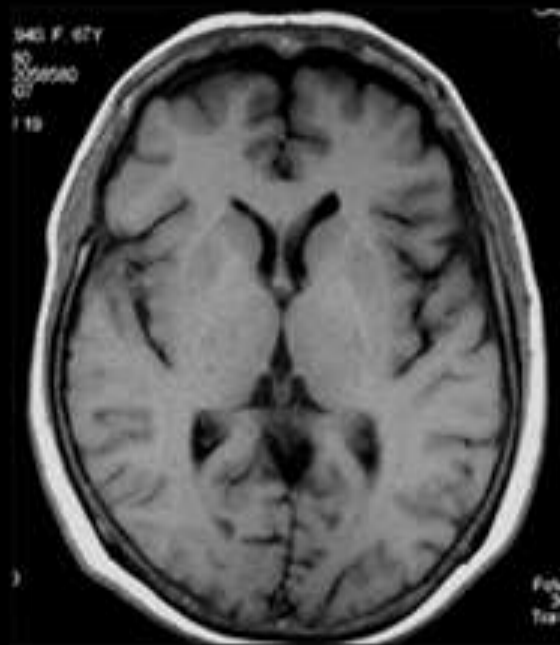
T1

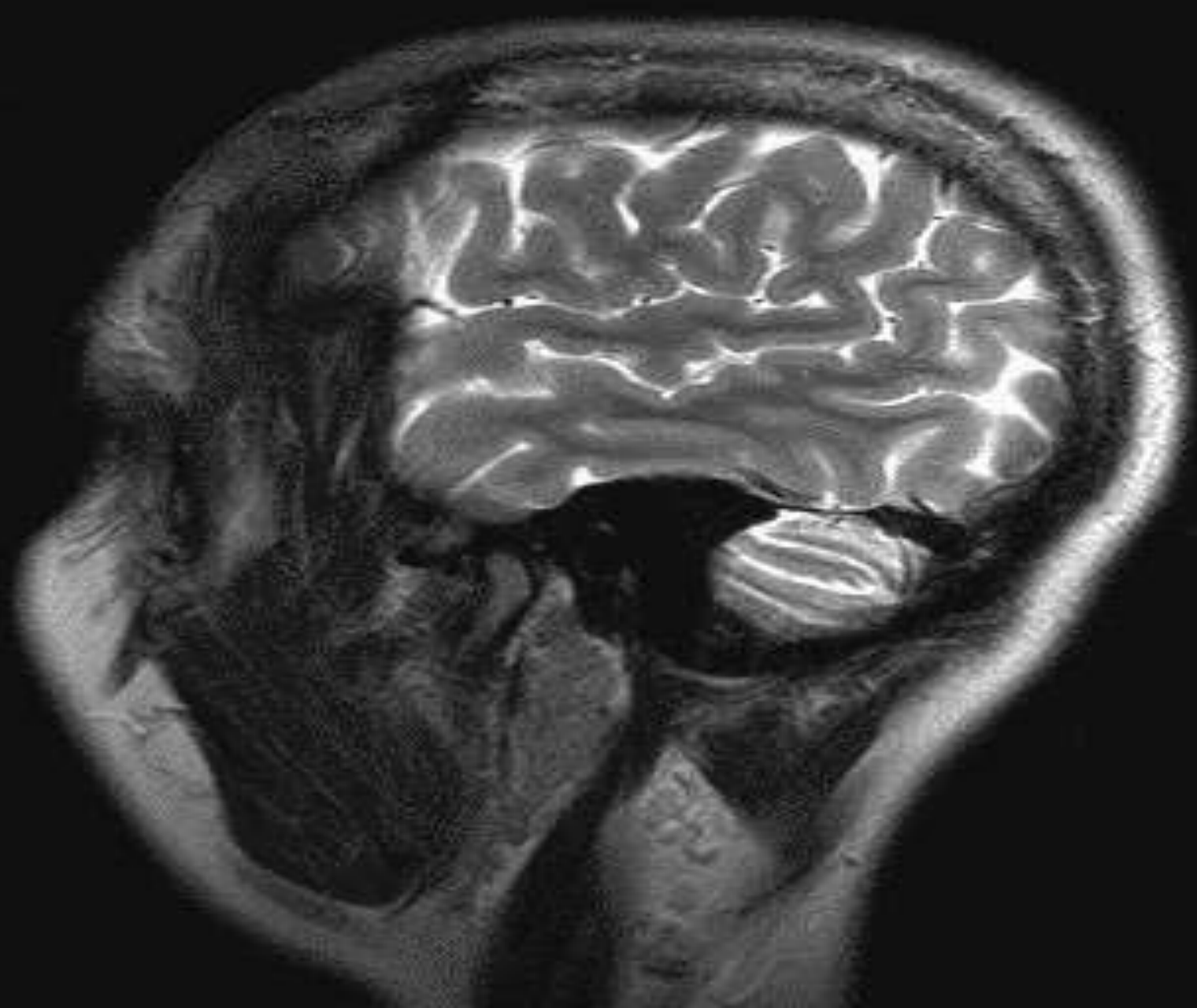
Low signal

T2

High signal

- ◆ Fluid [CSF , effusion , ascites , urine , vitreous ,]





PEARSON, LUKE
0817781

SIDCUP MRI

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ADVANTAGES



& DISADVANTAGES

Advantages of MRI :

- ✓ **Non Ionizing Radiation**
- ✓ **Best soft tissue differentiation**
- ✓ **Non iodinated Contrast (Gadolinium)**
- ✓ **Multiplexer : scan at any direction**

Disadvantages of MRI :

- × **Expensive / Limited availability**
- × **Limited use in Lung / cortical bone Imaging**
- × **Ferromagnetic Contraindications**
- × **Long scanning time**

Indications



Main Indications of MRI :

® MRI is used for almost all body organs & systems

..... But it must be well indicated

Main Indications of MRI :

® **Neuro imaging : (The best)**

® **Cerebral Infarction (Diffusion MRI earliest sequence to detect it)**

® **Brain Tumors (Best detection & differentiation)**

⊗ **Limitations :**

I C Hemorrhage - Skull Fractures

Main Indications of MRI :

® **MSK imaging :**

® **Joints – Spine**

(Trauma – Degenerative – Inflammatory – Neoplastic)

⊗ **Limitations :**

Bone Fractures - Cortical Bone imaging - Calcification

NB. Bone tumors (X ray is a must + CT Or MRI)

Main Indications of MRI :

® Other Systems :

® UT – GIT – Cardiac – Breast – Gynecology – vascular Etc

⊠ MRI Techniques :

**Tractography, Spectroscopy , Functional MRI , Defecography
..... etc**

&

WHOLE-BODY MRI

Examination
Indications
Patient Care



Matthew Gray

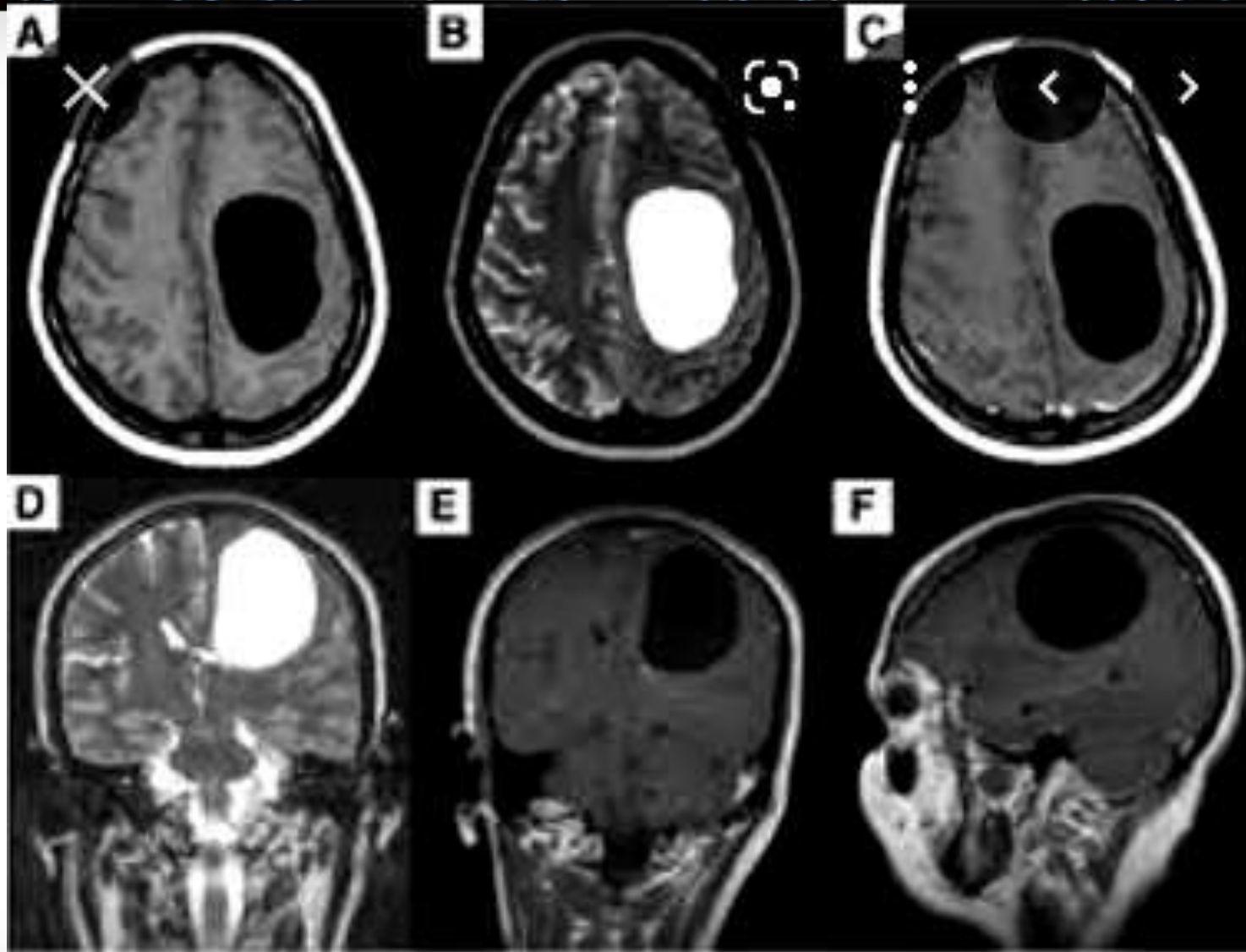
SPOT FINDING



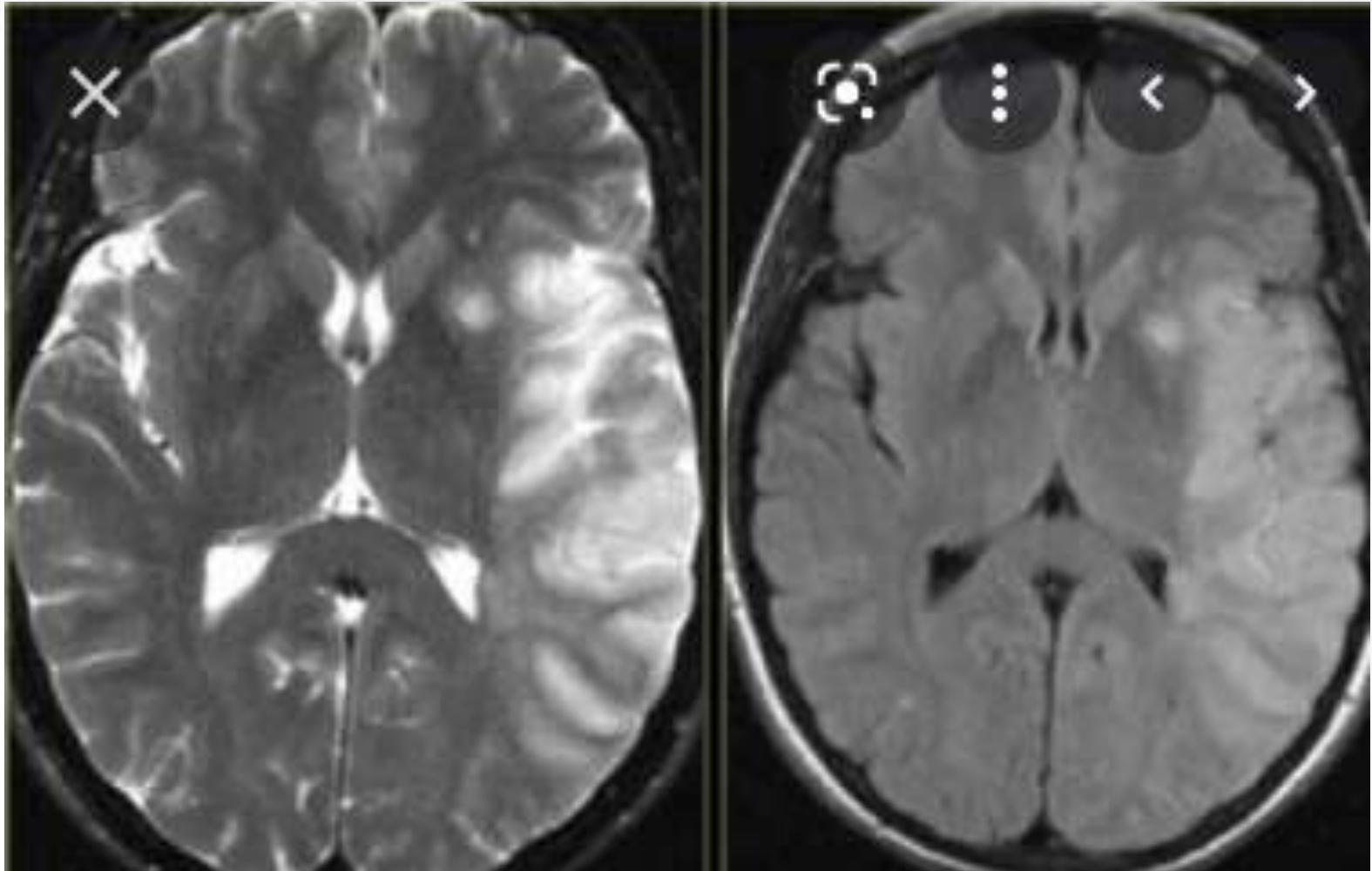
Much findingneed Qualified Radiologist

But , just an examples.

Cerebral Cyst



Cerebral Infarction



LSS Spondylodegenerative





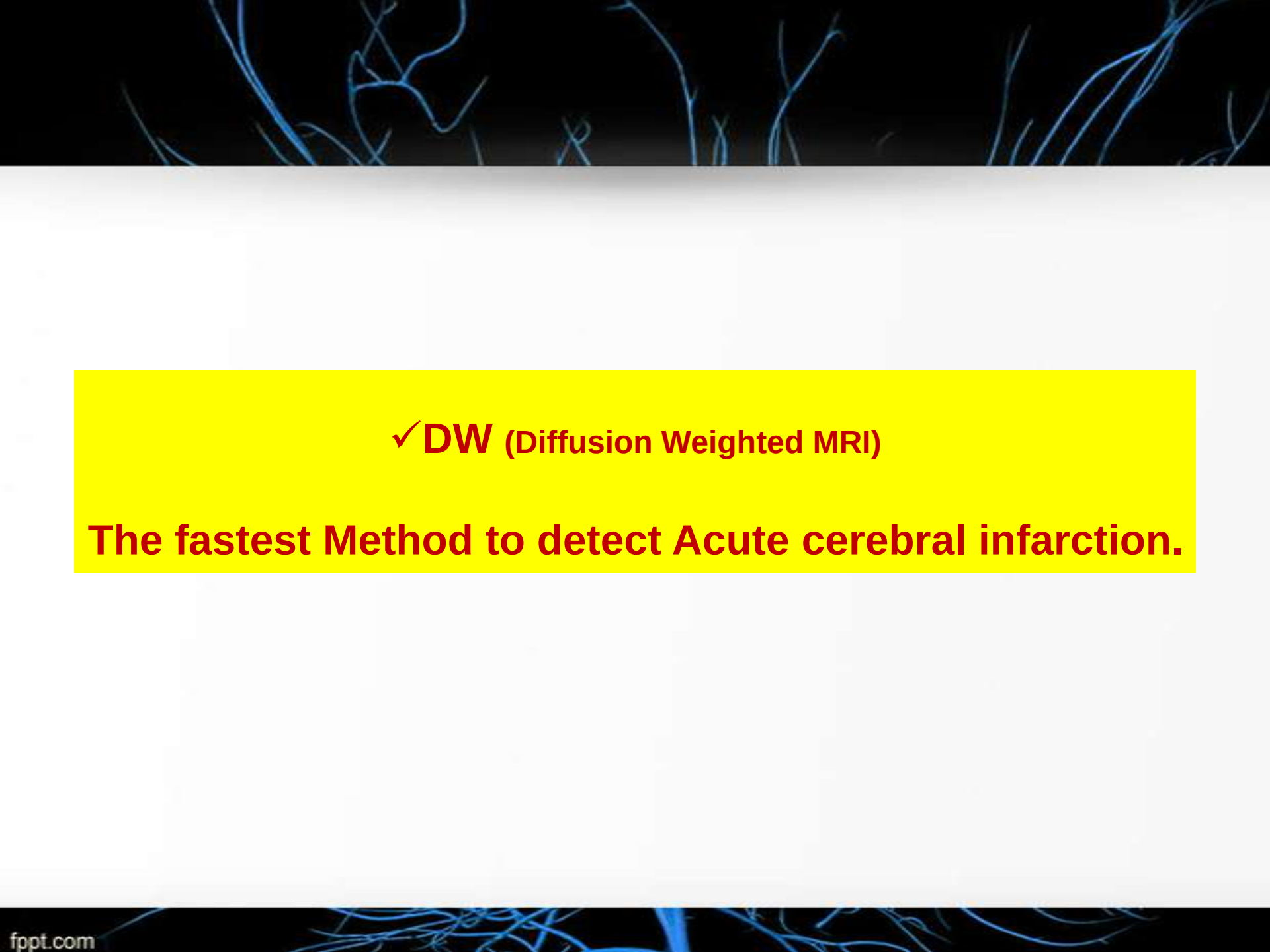
Normal



Torn

summary

- ✓ **MRI = Magnetic Resonance Imaging**
 - ✓ It use Magnetic Field + Radiofrequency
- ✓ **Ferromagnetic Contraindications**
 - ✓ Reporting Term : **Signal Intensity**
- ✓ **MRI Types : Closed, Open Dynamic & Extremity.**



✓ **DW** (Diffusion Weighted MRI)

The fastest Method to detect Acute cerebral infarction.

Radiological examinations are generally Expensive +/- Hazards

So please

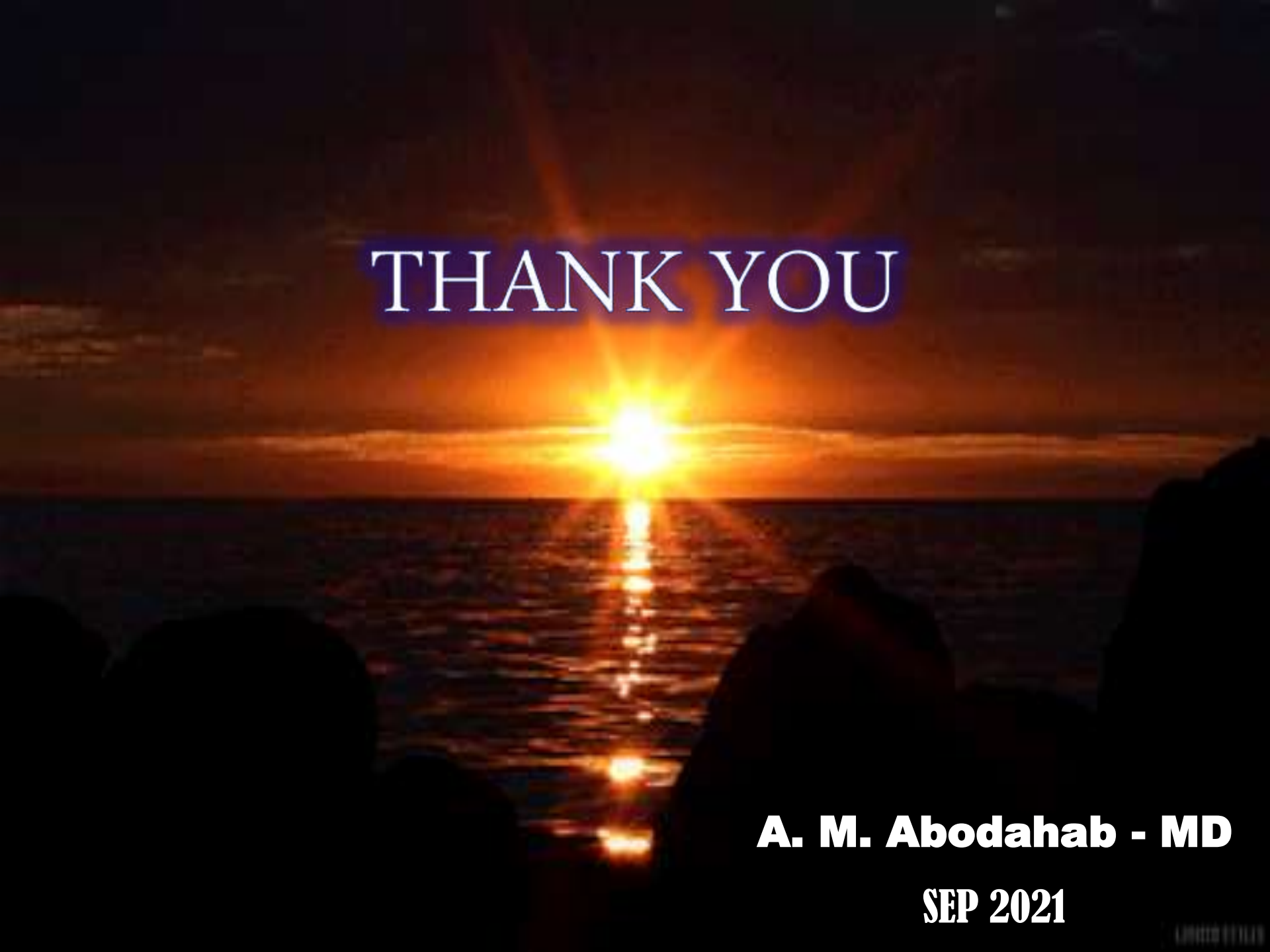
Consult Radiologist before you chose the diagnostic modality.



Contact Data

DR.AHMADABODAHAB@GMAIL.COM

- ✓ **YOUTUBE CHANNEL:** <https://goo.gl/oGtAlQ>
- ✓ [https://staffsites.sohag-univ.edu.eg/ahmed abodahab](https://staffsites.sohag-univ.edu.eg/ahmed_abodahab)
- ✓ <https://www.linkedin.com/in/dr-ahmad-abodahab/>

A sunset scene over the ocean with silhouettes of people in the foreground. The sun is low on the horizon, creating a bright orange glow and a reflection on the water. The sky is dark with some clouds. The text "THANK YOU" is centered in the upper half of the image.

THANK YOU

A. M. Abodahab - MD

SEP 2021