Name# Hanifullah
Subject # MRI
Program # B.S Radiology
ID # 14095
Semester # 6th
Teacher # Mam AToofa Azmat
Date # 14/04/2020

Q1:- write down MR spectroscope? Its usage in clinical Partice?

Ans:-

MR Spectroscope:-

-> MR Spectroscope has been use for long time, long before before MR was used for imaging.
-> The procedure is used for analytical tool.
-> MR Spectroscopy (MRS) is an exciting application of MRI to access various metabolites.
-> The biochemical from the body tissues non-invasively.
-> The metabolite information used for diagnose dieases.
-> The assessing response to the treatement.
-> Theorotically MRS can be Performed with spins.
-> Nuclei of 1H, 13C, 19F, 23Na, 31P, MRS in present clinical use are mainly 1H and 31P spectroscopy.

(P.T.O)

-> Forexample, may be useful in the evalution of many dieases and the effect of Therapy.
-> As spectroscopy requires magnets with higher field strengths, only potentially be performed with use of MR units which have superconducting magnets.
-> other magnet cannot do imaging as well as spectroscopy.
-> The present time are many people who believe that the spectroscopic of MRI is more important than its potential for anatomical imaging.
-> Proton spectroscopy is commonly used.
-> Some several metabolites of metabolism; can be measured to distinguish among tumor types.
-> Amino acid
-> Lactate
-> choline
-> creatine
-> Lipid
-> The Aim in MRS itself is to detect small metabolites.
-> The Metabolite signals of clinical interest resonate between resonant frequencies of water and fat.
-> Chemical shift is proportional to external magnetic field, smaller chemical shift will not be detected at Low field strength.

(P.T.O)

→ MRS can be performed on 0.5 Tesla.
→ above, field of strength of 1.5 T or above are required for improved spectral separation and increase SNR.
→ Homogeneity required for MRI is about 1 to 10 PPm when a MRS it is about 0.1 PPm.
→ The process of making the magnetic homogeneous is called as Shimming.
→ MRS also known as (NMR).

Clinical uses of MRS

→ 1H (Proton) MRS has its role in almost every neurological condition. Role of MRS discussed here.

① Brain Tumors

→ In tumors there is increase in Cho, lactate and Lipid.

(a) MRS in tumor evaluation:- MRS can differentiate neoplasm from non-neoplastic lesions.
→ MRS also helps based on the metabolite ratio.

(B) Treatement Planning:-
→ MRS guides Biopsy.

② Neonatal Hypoxia

→ The decrease in NAA, Cr, MI and ↑ in cho, lactate / lipid peaks

C.P.T.O.

in neonatal hypoxia

-> MRS can predict outcome of neonatal hypoxia.

-> develope decrease in NAA, ~~cr and~~ can be used to monitor the condition.

-> MRS can be used to find out hypoxia causes of neonatal hemorrhage.

(3) Multiple Sclerosis

-> In MS plaques, there is decrease in NAA/Cr and ↑ Cho/Cr and MI/Cr.

(4) Epilepsy

-> NAA/Cr is reduced in affected lobe. MRS can be used to localise intractable epilepsy.

(5) Toxoplasma:-

-> Elevation of lipids and lactate and reduction of other metabolites.

(6) Abscess

-> The MR spectra in abscess include elevation of amino acid peak at 0.9 ppm.

• X • ——— • X • ——— • X • ——— X

Q2:- write a details note on contrast media and how it effect image details?

Ans:- Contrast media:-

~~-> The part to improve~~

-> The Part of the body to improve the visibility of internal structures during radiography.

-> MR may not need any contrast medium injection because its inherent tissues contrast.

-> Contrast media are use for Pathology.

-> It is also called contrast agents.

-> It is contrast enhancement improves detect the pathology.

-> ~~contrast~~ MRI contrast Chemical Name gadolinium (Gd):-

-> ~~Triad Name~~

-> It is triad Name Magnevist.

-> Gadolinium is indication for Postoperative spine.

-> Contraindication:- vertebral Metastases.

-> Atomic No 64

-> Paramagnetic agent

Classification of MR contrast Media

1. Parenteral
2. oral

CP.t.01

Oral contrast Agents

① Positive contrast

Example:- Manganese chloride, Gd-DTPA, oil emulsions image degradation can occur with Peristaltic movements of bowel.

② Negative contrast

- ↓ signal from bowel lumen.
- Example:- Superparamagnetic iron oxide particle reduce signal by susceptibility effects. Barium, Blue-berry juice.
- reduce signal from bowel.

Adverse Reactions

- Nausea
- headache
- Anaphylaxis
- abdominal Pain
- renal failure
- edema
- Hypotension
- Hypertension

Contrast media effect on image detail

- The effect of contrast media on both signal intensity of T_1 and

(P.t.o)

T_2.

- -> T_1 Shorten and the T_2 the respective curves are shifted towards the left.
- -> More signal for TR.
- -> less signal of TE.
- -> signal intensity of two tissue is illustrated.
- -> The IV route Gadolinium-DTPA enters to the one tissues.
- -> The T_1 tissues are short and T_1 curve are left.
- -> TR is stronger.
- -> The two tissues can be better differentiated because good resolution.
- -> vascular tumor tissues are elevated or visible.
- -> contrast media develope lesion and diagnose accuracy of MRI.
- -> contrast media improve the pathology.
- -> contrast media improve the internal structure.
- -> contrast media shows the black and white on the image.
- -> contrast media shows structure of Anatomy.

-x———x———x———x———

Q3:- How can we determine or select a certain slice thickness and from where does the signal come from?

Ans(3) Determine or Select a certain Slice Thickness:-

-> Select a different slice thickness in two ways.
-> one solution is sent is not only one specific frequency.
-> But RF Pulse that has a range of frequencies.
-> The large range of frequencies, the thicker the slice in which proton will be excited.
-> when RF Pulse with frequencies from 64 to 65 mHZ, we get slice like.
-> Therefore we only use frequences from 64 to 64.5 mHZ; the Protons in a Smaller slice will show resonance.
-> Another way of select a dif slice thickness.
-> used a gradient field.
-> Therefore have a steeper gradient field.
-> ① e.g:- field strength.
-> The precission frequences will also vary to a large degree.
-> The same range of radio frequences, the same band width as it is called slice thickness.

-x Signal come from

(p.t.o)

-> After, Now we have Selected position and thickness of our slice.

-> But how can we ~~fi~~ determined, from what point of our slice.

-> This technique is similar to the slice selecting gradient which is turned on only during application of the RF Pulse.

-> Nine Proton in the Slice Selected.

-> Now After the RF Pulse is sent in total then Precess with the same frequency.

-> We now apply another gradient field which in our example ↓ from Left to right.

-> In the end of that the Protons in the diff columns eject their signals with these diff ~~of~~ frequencies.

-> The gradient applied as thus also called frequency encoding gradient.

-> All Protons have same frequency.

-> After the RF Pulse the Protons are "whipping".

-> magnetic gradient along this column for short time.

-> Than become exposed.

(x) ———— x ———— x ———— (x)

THE End