SAWA UNIVERSITY

اسم المادة و الكورس

اسم المحاضرة ورقمها

جامعـــــة ســـــــاوة الاهلية — Sawa University

كليـــــة التقنيـــات الصحيـة والطبيـة — College of health and medical techniques

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المرحلـــــــــــة : الرابعة — Stage ..... .

الجانب النظري ..... محاضرة رقم

Theoretical Lecture No. ……..

تدريسي المادة : المحاضر م .م فاضل عوفي عواد

Introduction: المقدمة

MRI technicians need to know MRI terms definitions for several reasons, including:

Understanding medical terminology: MRI technicians need to have a basic understanding of medical terminology to communicate effectively with physicians and other healthcare professionals Mastering MRI procedures: MRI technicians need to understand and master MRI procedures, including the terminology used in MRI imaging, to perform their job effectively

Ensuring MRI safety: MRI technicians need to have sound knowledge of the physical principles of the MRI scanner and understand the associated safety risks to avoid adverse events from occurring.

Encountering MRI terminology: MRI technicians are likely to encounter MRI terminology in the course of their work, and they need to be familiar with the terminology to perform their job effectively

الاختبار القبلي: :Pretest

Q: Why the radiology technicians need to know the MRI terms?

Q2: Mention the differentiation between MRI Terms of T1, T2?

Scientific Content: :المحتوى العلمي

2D volumetric acquisition: acquisition where a small amount of data is acquired from each slice

before repeating the TR.

3D volumetric acquisition: acquisition where the whole imaging volume is excited so that the images can be viewed in any plane.

Actual TE the time between the echo and the next RF pulse in SSFP.

Aliasing artefact produced when anatomy outside the FOV is mismapped inside the FOV.

Alignment when nuclei are placed in an external magnetic field their magnetic moments line up with the magnetic field flux lines .

Ampere's law :determines the magnitude and direction of the magnetic field due o a current; if you point your right-hand thumb along the direction of the current, then the magnetic field points along the direction of the curled fingers

Angular momentum: the spin of MR active nuclei that depends on the balance between the
number of protons and neutrons in the nucleus.
Anti-parallel alignment describes the alignment of magnetic moments in the opposite direction to the main field atomic number sum of protons in the nucleus B0 the main magnetic
field measured in tesla.
Acquisition : the process of measuring and storing image data.
Acquisition matrix : the total number of independent data samples in the frequency (f) and
phase (f) directions.
Acquisition time : the period of time required to collect the image data. This time does not
include the time necessary to reconstruct the image. ADC - analog-to-digital converter

Aliasing : the phenomenon resulting from digitizing fewer than two samples per period in a
periodic function. Aliasing can occur in MR imaging whenever the area of anatomy extends
beyond the field of view. These areas extending beyond the field of view boundaries are aliased
back into the image to appear at artifactual locations.
Archiving : the storage of image and patient data for future retrieval.
Axial : a plane, slice or section made by cutting the body or part of it at right angles to the long
axis. If the body or part is upright, the cut would be parallel to the horizon.
B or Bo : a conventional symbol for the constant magnetic field produced by the large magnet in
the MR scanner.
B1 : the conventional symbol used for identifying the radio frequency (RF) magnetic field.

Band Width (BW) : an all-inclusive term referring to the preselected band or range of frequencies which can govern both slice select and signal sampling.

Bipolar : describes a magnet with two poles, north and south.

Black blood imaging :acquisitions in which blood vessels are black

Blood oxygen level dependent (BOLD) :a functional MRI technique that uses the differences

in magnetic susceptibility between oxyhemoglobin and deoxyhemoglobin to image areas of

activated cerebral cortex.

Bright blood imaging acquisitions in which blood vessels are bright.

Brownian motion internal motion of the molecules.

Claustrophobia : a psychological reaction to being confined in a relatively small area.

Coherence : the act of maintaining a constant phase relationship between oscillating waves or rotating objects.

Contrast : the relative difference of signal intensities in two adjacent regions of an image. Image contrast is heavily dependent on the chosen imaging technique (i.e., TE, TR, TI), and is associated with such parameters as proton density and T1 or T2 relaxation times

Contrast reversal : an image phenomenon where the darks become bright, and the brights become dark. This is usually most prevalent in sequences utilizing an extended TR.

Contrast – to –Noise Ratio (CNR) : the ratio of signal intensity differences between two regions, scaled to image noise. Improving CNR increases perception of the distinct differences between two clinical areas of interest.

Coronal :a plane, slice or section made by cutting across the body from side to side and therefore parallel to the coronal suture of the skull.

Central lines : area of K space filled with the shallowest phase encoding slopes.

Chemical shift : artefact along the frequency axis caused by the frequency difference between fat and water .

Co-current flow : flow in the same direction as slice excitation .

Counter-current flow : flow in the opposite direction to slice excitation.

Cross excitation : energy given to nuclei in adjacent slices by the RF pulse .

Cross talk : energy given to nuclei in adjacent slices due to spin lattice relaxation .

Cryogen bath : area around the coils of wire in which cryogens are placed .

Cryogens substances used to supercool the coils of wire in a superconducting magnet .

Coherent the magnetic moments of hydrogen are at the same place on the precessional path .

Dephasing : the fanning out or loss of phase coherence of signals within the transverse plane.

Diffusion : a term used to describe moving molecules due to random thermal motion .

Dipole : a magnetic field characterized by its own north and south magnetic poles separated bya finite distance.

Display matrix : the total number of pixels in the selected matrix, which is described by the
product of its phase and frequency axis.
Electromagnet : a type of magnet that utilizes coils of wire, typically wound on an iron core, so that as current flows through the coil it becomes magnetized. See also Resistive Magnet,
Superconducting Magnet.
Equilibrium : a state of balance that exists between two opposing forces or divergent forms of influence.
Excitation : delivering (inducing, transferring) energy into the "spinning" nuclei via radiofrequency pulse(s), which puts the nuclei into a higher energy state. By producing a net
transverse magnetization an MRI system can observe a response from the excited system.

Echo spacing : spacing between each echo in FSE .

Echo train : series of 180° rephasing pulse and echoes in a fast spin echo pulse sequence .

Echo train length (ETL) : the number of 180° RF pulses and or turbo factor resultant echoes in FSE .

Effective TE : the time between the echo and the RF pulse that initiated it in SSFP and FSE sequences .

Electrons orbit : the nucleus in distinct shells and are negatively charged.

External magnetic field (EMF) : drives a current in a circuit and is the result of a changing magnetic field inducing an electric field .

Entry slice phenomena : contrast difference of flowing nuclei relative to the stationary nuclei because they are fresh .

Even echo rephrasing : the use of evenly spaced echoes to reduce artefact .

Extrinsic contrast parameters :contrast parameters that are controlled by the system operator

Fast scanning : a specialized technique usually associated with short TR, reduced flip angle and repeated 180° rephasing pulses

Fast Spin Echo (FSE) : a fast spin echo pulse sequence characterized by a series of rapidly applied 180° rephasing pulses and multiple echoes, changing the phase encoding gradient for each echo.

Fat Saturation (FAT-SAT) : A specialized technique that selectively saturates fat protons prior

to acquiring data as in standard sequences, so that they produce negligible signal.

FAT Suppression : the process of utilizing specific parameters, commonly with STIR (short TI

inversion recovery) sequences, to remove the deleterious effects of fat from the resulting images.

See also STIR.

FDA : the United States Food and Drug Administration FID - see Free Induction Decay

Thank You