



Role of Diffusion-weighted MR imaging in pre and post therapeutic assessment of breast cancer.

Essay

*Submitted for partial fulfillment of Master Degree in
Radiodiagnosis*

By

Manar Mohamed Najib

M.B., B.Ch.

Supervised by

Prof. Dr. Sahar Mohamed El-Fiky

Professor of Radiodiagnosis

Faculty of Medicine - Ain Shams University

Dr. Amal Ibrahim Ahmed

Lecturer of Radiodiagnosis

Faculty of Medicine - Ain Shams University

Faculty of Medicine

Ain shams University(2016).



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Manar Mohamed

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

سورة البقرة الآية: ٣٢



دور الإنتشار الجزيئي بالرنين المغناطيسي في تقييم ومتابعه سرطان الثدي

رسالة توطئة تمهيدا للحصول على درجة الماجستير في الاشعة التشخيصية

مقدمة من

الطبيب/ منار محمد نجيب السعيد

بكالوريوس الطب والجراحة

جامعة عين شمس

تحت إشراف

أ.د/ سحر محمد الفقي

أستاذ الأشعة التشخيصية

كلية الطب-جامعة عين شمس

د/ أمل ابراهيم أحمد

أستاذ مساعد الأشعة التشخيصية

كلية الطب-جامعة عين شمس

كلية الطب

جامعة عين شمس (2016)

Abstract.

Breast tumor is the most widely recognized and the main source of growth related demise among ladies around the world.

Early and exact conclusion of the breast tumor is fundamental for effective treatment and for enhancing the personal satisfaction.

A few imaging modalities are utilized for determination of bosom injuries. Commonest are the mammography and ultrasonography (sonomammography). In any case, in perspective of the impediments of mammography and different strategies utilized, an impressive interest is centered around breast MRI.

Taking into account morphology and the improvement example of injuries, differentiation upgraded MR giving a general affectability of 90% and affectability of 72% in discovery of breast sores. Other indications of breast MRI including evaluation of multicentric and multifocal ipsilateral disease; for contralateral side in patient newly diagnosed with cancer, for assessment of the treatment reaction in patient treated with the neo-adjuvant chemotherapy; for assessing persistent with

axillary lymph hubs or inaccessible metastases when bosom essential is not known or for axillary lymph hubs metastases with obscure essential. Additional signs consolidate screening in patients with history of danger treated with breast conservation treatment and dealing with issue of ambiguous disclosures on the other imaging modalities.

Perfect execution of MRI breast is significantly framework reliable. Persistent situating, imaging parameters including transient and spatial resolutions, and timing of the dynamic stage imaging are of urgent significance in execution of MRI breast.

The BI-RADS framework is empowers predictable and institutionalized depiction of morphologic and motor attributes of the bosom lesions. In any case, various troubles are accessible while translating the bosom injuries as respects morphologic and dynamic qualities. To decline number of the superfluous biopsies, more exact route for separating between the false positive improved injury and the genuine positive malignancies is required. A DW MR imaging innovation has demonstrated an extraordinary guarantee for location and portrayal of numerous tumor sorts, through imaging of the modifications in infinitesimal movement of water particles. DWI can give subjective data

mirroring the cellular changes that give a remarkable bits of knowledge into tumor cellularity.

The ADC (evident dissemination coefficient) which is a quantitative measure that is straightforwardly to dispersion of water and contrarily to tumor cell thickness, has been accounted for as a helpful device for portrayal of breast tumor and recognizing the dangerous from kindhearted tissue.

So the utilization of DWI as analytic instrument can expand specificity of breast MR imaging and diminish number of the false-positive results and partner superfluous biopsies.

Besides, novel utilizations of the DWI which are being worked on, including screen the reaction to neo-adjuvant chemotherapy.

The chemotherapy bringing on cell lysis which prompts increase in extracellular water thus increase in clear dispersion coefficient (ADC).

Appraisal of axillary lymph hubs, assessment of peritumor tissues and the separation of growth repeat from the surgical scar are additionally usage of DWI.

Key words:

Breast anatomy.

The axilla.

Hormonal changes of the breast.

Breast implants.

Male breast anatomy.

Breast cancer R.F.

Breast cancer classification.

DCIS.

Paget's disease.

IDC.

ILC.

Breast MRI.

Enhancement kinetic curves.

Temporal resolution.

Spatial resolution.

Fat suppression.

MIP.

DW-MRI image.

ADC MAP.

Breast MRI artifacts.

Pitfalls of DWI.

Uses of DWI.

**THE ROLE OF DIFFUSION _WEIGHTED MR IMAGING IN PRE AND
POST THERAPEUTIC ASSESSMENT OF BREAST CANCER**

Essay

Submitted for partial fulfillment of Master degree of radio-
diagnosis

Presented by:

Manar Mohamed Najib

M.B.,B.ch,

Ain Shams University .

Supervised by :

Prof. Dr Sahar Mohamed El-Fiky

Professor of radio-diagnosis,

Faculty of Medicine, Ain Shams University .

Dr. Amal Ibrahim Ahmed

Speaker of radio-determination.

Introduction:

Around the world, breast growth is the second most regular sort after the lung disease and the fifth most basic reason for death.

The danger components of malignancy breast including patient's age, family history of breast tumor or of precancerous injuries, conceptive variables, the hormonal treatment, liquor admission, obesity(for postmenopausal bosom disease only),exposure to ionizing radiation and hereditary inclination(**Colditz&Bohlke,2014**).

Number of screening gadgets have been used, including . Self &clinical examination, hereditary screening, ultrasound, mammography &magnetic reverberation imaging .(**Sankaranarayanan &Swaminathan, 2010**)

Mammography as the standard imaging method for breast cancer screening has resulted in reduced breast cancer mortality. But, the number of breast cancer escaping detection with the mammography is substantial, particularly in dense-breast, with a sensitivity as low as 30-48%. **(Kelly et al., 2010)**

MRI is an imperative device which help in recognizing, and arranging of breast carcinoma. Taking into account the shape and upgrade criteria, CE-MRI offers affectability of around 90% and a specificity of around 72% in the recognition of breast disease **(chen et al., 2012)**.

In last years DWI is applied to differentiate between malignant and benign breast lesions. DW imaging takes into consideration non intrusive portrayal of natural tissues in view of their water dissemination properties **(chen et al., 2012)**.

DWI measure a random (Brownian) extra, intra and trans-cellular motion of water molecules . ADC is a quantitative parameter which is calculated from the DWI . ADC is

ascertained for the every pixel and is shown as a guide. By drawing locales of interests on these maps , the ADCs of various tissue can be inferred(**chen et al.,2012**).

DWI is profoundly delicate in the location of changes in the neighborhood breast natural environment. An advantage of DW-MRI imaging is its high sensitivity to change in the microscopic cellular environment.(**woodhams et al.,2011**)

Diffusion-weighted MRI (DW-MRI) holds promise for use as a cancer treatment response as it is sensitive to the macro-molecular and micro-structural changes which happen at cell level sooner than at the anatomical level amid the treatment (**Thoeny and Ross,2010**).

Studies have shown that effective treatment of multiple tumors can be identified using DW-MRI as early increase in ADC values of various tumors. Furthermore, low pre-treatment ADC estimations of various tumors are prescient of better results, diminishing the pointless systemic harmfulness connected with incapable treatment with the additional advantage of improving the overall patient health

care and associated the costs of treatment(**Thoeny and Ross,2010**).

Points of the Work.

To highlight the part of dispersion –weighted MR imaging in pre-helpful appraisal and post treatment follow up of cancer growth.

Gross anatomy of breast .

The breast tissue exists in subcutaneous layer of thoracic divider.. It overlays [pectoralis major muscles](#) and extending