The Role of Contrast Enhanced Mammography in Assessment of Malignant Breast Lesions

Essay

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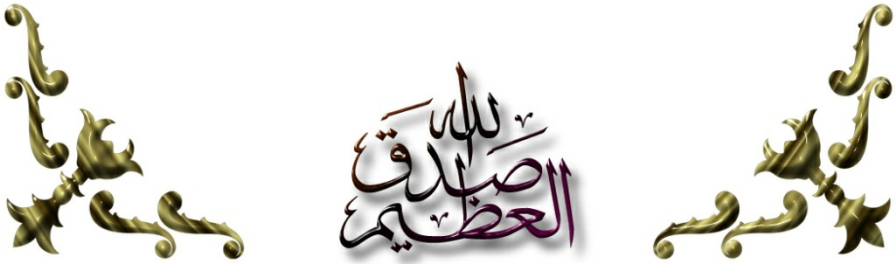
وَقُلِ اعْمَلُوا فَسَيَرَى اللَّهُ
عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ



First of all I thank God who blessed me in all my steps.

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دور الماموجرام للثدي بالصبغة في تقييم أورام الثدى السرطانية

رسالة
توطئة للحصول على درجة الماجستير فى الأشعة التشخيصية

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LIST OF ABBREVIATIONS

2D	Two –dimensional
3D	Three–dimensional
ACR	American College of Radiology
ADH	Atypical ductal hyperplasia
AEC	Automatic exposure control
AJCC	American Joint Committee of Cancer
ATM	Ataxic telangiectasia mutated gene
BI-RADS	Breast Imaging-Reporting and Data System
BRCA 1	Breast cancer gene 1
BRCA 2	Breast cancer gene 2
CC	Cranio-caudal
CEDM	Contrast enhanced digital mammography
CEM	Contrast enhanced mammography
DBT	Digital breast tomosynthesis
DCIS	Ductal carcinoma in situ
DE-CEDM	Dual energy contrast enhanced digital mammography
DNA	Deoxyribonucleic acid
ELTD	Extralobular terminal duct
FFDM	Full field digital mammography
IDC	Invasive duct carcinoma
IDC-NOS	Invasive duct carcinoma-Not otherwise specified
ILC	Invasive lobular carcinoma
ILTD	Intralobular terminal duct
IV	Intravenous
keV	Kiloelectron-Volts

kVp	Kilovoltage peak
LCIS	Lobular carcinoma in situ
LN	Lymph node
Min	Minute
mGy	MilliGrays
ML	Medio-Lateral
MLO	Medio-lateral oblique
mL/sec	Milliliter per second
mm	millimeter
MRI	Magnetic resonance imaging
MRM	Modified radical mastectomy
Mx	Mammography
TDLU	Terminal ductal lobular unit
TNM	Tumor, Lymph nodes, Metastases
T*p*53	Tumor Protein 53 gene
PTEN	Phosphatase and tensin homolog gene
UK	United Kingdom
US	Ultrasonography

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INTRODUCTION

Breast cancer is the most common cancer and the leading cause of cancer death in females, accounting for 23% of the total new cancer cases and 14% of the total cancer deaths in 2008. Like other cancers, early detection, accurate staging, and appropriate treatment can improve survival from breast cancer ***(Eo et al., 2012).***

As x-ray mammography is considered the most effective screening and diagnostic tool for early detection of breast cancer, about 10%-30% of cancer may be missed ***(Pisano et al., 2005).***

Mammography remains a very technically demanding imaging procedure. This is partly because the breast is exclusively soft tissue and that normal and abnormal tissues have similar radiographic properties. In addition, the appearance of normal breast tissue varies enormously from woman to woman ***(Robson, 2010).*** Also, Mammography has some limitations, such as lesions masked by normal fibro-glandular tissue, lesions seen on only one view, and subtle architectural distortions. Partly because of these limitations, mammography misses about 20% of invasive breast cancers ***(Dromain et al., 2012).***

Estimates of the sensitivity of mammography vary widely, with one recent study giving a figure of 78%. Sensitivity varies

with age and breast density, with figures as low as 48% being reported for the most dense breasts. However, despite these limitations, mammography remains the main modality for breast screening ***(Robson, 2010).***

Tumor angiogenesis factors stimulate formation of abnormal vessels that leak and shunt blood. Therefore, imaging methods with contrast medium, can potentially aid in the detection and diagnosis of cancer ***(Jong et al., 2013).*** Although CT and MRI are used for detection of angiogenesis by tracking contrast agent up-take and wash-out in tissues. They both still hold a number of limitations ***(Dromain et al., 2011).***

Conventional CT results in a high-radiation dose to the breast and chest wall. Breast MRI using gadolinium-based contrast agents is currently considered the most sensitive imaging technique for the detection of breast carcinoma. However, breast MRI has a variable specificity and positive predictive value and is more time-consuming and more expensive than mammography ***(Dromain et al., 2012).***

Contrast-enhanced digital mammography is a new breast imaging technique that aims at demonstrating breast carcinoma angiogenesis. Recent investigational clinical results on contrast enhanced digital mammography suggesting that the technique may be a useful adjunct to mammography with lesion contrast-