ROLE OF FUNCTIONAL MRI IN DIAGNOSIS OF CANCER PROSTATE

Essay

By

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M.B. B.CH.

Submitted in partial fulfillment of the requirements for degree of M.Sc. in Radiodiagnosis

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2009

ACKNOWLEDGEMENT

First of all and last of all, thanks to **ALLAH** the All Mighty, the Gracious, whose care has supplied me with much strength to complete this work.

I am horned to express my deepest appreciation and profound gratitude to ***Dr.* HOSSAM ABD ELKADER MORSI,** Assistant Professor of Radiodiagnosis, Faculty of Medicine, Ain Shams University, who has given me the privilege to work under his supervision. His planning, constant guidance and generous cooperation have made the accomplishment of this work possible.

I would like to express my sincere thanks and gratefulness to ***DR.* MOSTAFA MAHMOUD GAMAL ELDIEN,** Assistant Professor of Radiodiagnosis, Faculty of Medicine, Ain Shams University, for his overwhelming supports, and helpful suggestions. His valuable guidance and long experience have affected the outcome of this work.

I would like to express my deep and great gratitude to all staff members and colleagues in the Radiology Department, Faculty of Medicine, Ain Shams University for their helpful cooperation and encouragement.

Mohammad Mounir Mahdy

LIST OF ABBREVIATIONS

Abbreviation	Name
ADC	Apparent diffusion coefficient
B.W.	Body weight
BASING	Band selective inversion with gradient dephasing
BOLD	Blood oxygen level density
BPH	Benign prostatic hyperplasia
CAD	computer-assisted detection
CC:C	Choline and creatine to citrate
Ch	Choline
Cit	Citrate
CM	Contrast media
Cr	Creatine
CT	Computed tomography
DCE	Dynamic contrast enhanced
DHT	Dihydrotestosterone
DRE	Digital rectal examination
DSC	Dynamic susceptibility contrast
DW	Diffusion-weighted
EES	Extra-cellular space
ERC	Endorectal surface coil
FLASH	Fast low-angle shot
FOV	field of view
FSE	Fast spin echo
FSPGR	Fast spoiled gradient-recalled
Gd-DTPA	Gadolinium diethylene-triamine-penta-acetic acid

GRAPPA	Generalized Auto calibrating Partially Parallel Acquisition
GRE	Gradient-echo
HASTE	Half-Fourier single shot turbo spin echo
HGPIN	high grade prostatic intraepithelial neoplasia
HPC	Hereditary prostate cancer
Hz	Hertz
IAUGC	Integral area under gadolinium contrast concentration
kg	Kilogram
Ktrans	Transfer constant
MHz	Mega hertz
mmol	Millimol
MR	Magnetic resonance
MRI	Magnetic resonance imaging
MRSI	Magnetic resonance spectroscopy imaging
MTT	Mean transit time
MVD	Microvessel density
ng	Nanogram
PAP	Prostatic acid phosphatase
PASCs	Phased-array surface coils
PIN	Prostatic intraepithelial neoplasia
ppm	Peak per minute
PRESS	Point-resolved spectroscopy
PSA	Prostatic specific antigen
PZ	Peripheral zone
rBF	Relative blood flow
rBV	Relative blood volume
s	Second

SE	Spin echo
SHBG	Sex-hormone-binding globulin
SI	Signal intensity
SNR	Signal to noise ratio
SSFSE	Single shot fast spin echo
STIR	Short-tau inversion recovery
SV	Seminal vesicles.
T	Tesla
TE	Echo time
TNM	Tumor, Nodes, Metastasis
TR	Repetition time
TURP	Transurethral prostatectomy
TZ	Transition zone
US	Ultrasonography
USA	United states of america
ve	Percentage of unit volume of tissue
VEGF	Vascular endothelial growth factor
VSS	Volume saturation
3D	Three-dimensional

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INTRODUCTION

Prostate cancer is one of the most common malignancies in elderly men. The posterior and lateral aspects of the prostate are the zone in which 70% of prostate cancers arise. Cellular proliferation in the transitional zone results in benign prostatic hyperplasia **(Hricak & Thoeni; 2000).**

The diagnosis of prostate cancer is based mostly on the results of ultrasonography (US)-guided transrectal biopsy. Because of the low accuracy of US for prostate cancer detection and localization, a random biopsy is usually performed instead of a targeted biopsy. However, a random biopsy has several disadvantages. For example, it may lead to an increase in complications of the unnecessary sampling of normal prostate tissue and cancer located outside the routine biopsy site may be missed. For these reasons, an imaging modality is needed that allows the accurate detection and localization of prostate cancer **(Jemal et al; 2005).**

T2-weighted magnetic resonance (MR) imaging has been widely used for pretreatment work-up for prostate cancer, but its accuracy for the detection and localization of prostate cancer is unsatisfactory **(Pound et al; 1999).**

Dynamic contrast material–enhanced MR imaging allows an assessment of parameters that are useful for differentiating cancer from normal tissue. The advantages of this technique include the direct depiction of tumor vascularity. It has limited visibility of cancer in the transitional zone **(Choi et al; 2007).**

Diffusion-weighted imaging demonstrates the restriction of diffusion and the reduction of apparent diffusion coefficient values in cancerous tissue. This technique allows short acquisition time and provides high contrast resolution between cancer and normal tissue, but individual variability in apparent

diffusion coefficient values may erode diagnostic performance **(Sato et al; 2005).**

The accuracy of MR spectroscopy, which depicts a higher ratio of choline and creatine to citrate in cancerous tissue than in normal tissue, is generally accepted. The technique also allows detection of prostate cancer in the transitional zone. However, it requires a long acquisition time, does not directly depict the periprostatic area, and frequently is affected by artifacts **(Qayyum et al; 2004).**

Thus, a comprehensive evaluation in which both functional and anatomic MR imaging techniques are used with an understanding of their particular advantages and disadvantages may help improve the accuracy of MR for detection and localization of prostate cancer **(Choi et al; 2007).**