

شبكة المعلومات الحامعية

## بسم الله الرحمن الرحيم



-Caro-



شبكة المعلومات الحامعية



شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم





ببكة المعلم مات المامعية

#### hossam maghraby

## جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

#### قسو

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة يعبدا عن الغيار





شبكة المعلومات الجامعية





شبكة المعلومات الحامعية



بالرسالة صفحات لم ترد بالأصل



## Role of color Doppler ultrasonography in assessment of benign and malignant breast tumors

B16603

Thesis
submitted for partial fulfillment of
M.Sc. degree
in
Radiodiagnosis

Sameh Raafat Ibraheem M.B.B.CH

#### Supervised by

Prof. Dr.

iaila Mohamed El-Kady

Professor & head of Radiodiagnosis Department Faculty of Medicine Suez Canal University Prof. Dr.

Soliman Hamed El-Kamash

Professor of General Surgery Faculty of Medicine Suez Canal University

Dr,

Mohamed Ali El-Beblawy

Lecturer of Radiodiagnosis
Faculty of Medicine
Suez Canal University

Faculty of medicine Suez Canal University 1999

### Acknowledgement

First and most, I would like to thank Allah, Most Gracious, Most Merciful, for helping me finishing this study.

I wish to express my sincere gratitude to Prof. Dr. Laila Mohamad Cl Kady, Professor and head of Radiodiagnosis Department-Suez Canal University for her moral support, meticulous supervision and valuable advice aiming at the perfection of this work.

I'm greatly indebted to Prof. Dr. Soliman Hamed El Kamash, Professor of General Surgery Suez Canal University for his continuous guidance, sincere advice and thorough concern throughout the various stages of this work.

My sincere appreciation go to Dr. Mohamed Ali El Beblawy, Lecturer of Radiodiagnosis, Suez Canal University for his generous help and kind supervision that were essential for this study to be achieved.

Special words of thanks and recognition of deep gratitude are given to Prof. Dr. Mohamad Osama El-Ohda, Professor of Pathology, Suez Canal University who supported me a lot.

Lastly, I would like to offer my worm thanks to all staff of Radiodiagnosis Department, Suez Canal University and my colleagues for their collaboration and advises.

#### **Contents**

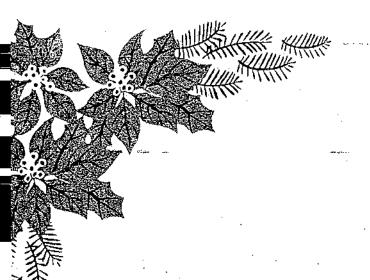
Introduction	1
Aim of the work	3
Review of literature	4
- Anatomy	4
- Pathology	12
- Ultrasound	36
- Doppler	65
Subjects and Methods	104
Results	110
Selected cases	145
Discussion	202
Summary and Conclusions	217
Recommendations	222
Appendix	223
References	228
Arabic Summary	

#### List of tables

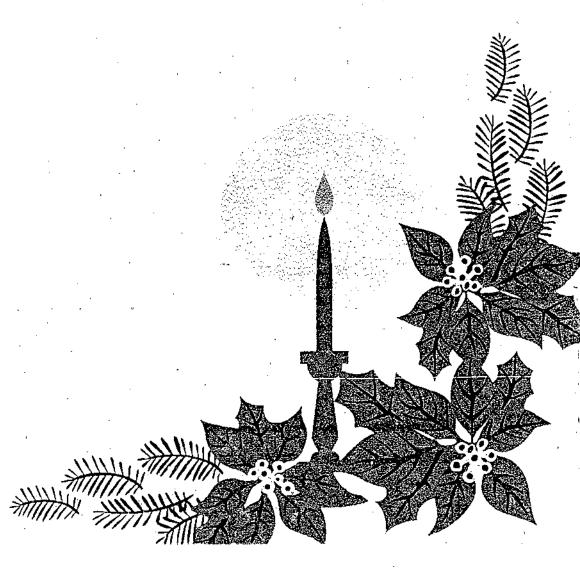
		Page
Table (1)	Age distribution	110
Table (II)	Benign histopathological types	112
Table (III)	Malignant histopathological types	114
Table (IV)	Site distribution of tumors in the breasts	116
Table (V)	Maximum tumor dimension distribution	118
Table (VI)	Shape distribution	120
Table (VII)	Wall character distribution	121
Table (VIII)	Content distribution	122
Table (IX)	Echogenicity distribution	123
Table (X)	Heterogenicity distribution	124
Table (XI)	Posterior sound transmission distribution	125
Table (XII)	B-mode ultrasound diagnosis	126
Table (XIII)	Vascularity distribution	128
Table (XIV)	Distribution of number of feeding arteries	129
Table (XV)	Distribution of shape of feeding arteries	130
Table (XVI)	Distribution of location of feeding arteries relative to the	
, ,	tumor	131
Table (XVII)	Distribution of vascularization patterns amongst benign	
,	tumors according to their histopathological type	134
Table (XVIII)	Distribution of vascularization patterns amongst malignant	
,	tumors according to their histopathological type	135
Table (XIX)	Distribution of Doppler indices	13.6
Table (XX)	Distribution of peak systolic flow velocity cut-off value	137
Table (XXÍ)	Distribution of systolic/diastolic ratio cut-off value	138
(Table (XXII)	Distribution of pulsatility index cut-off value	139
Table (XXIII)	Distribution of resistive index cut-off value	140
Table (XXIV)	Distribution of scoring system model cut-off value	142
Table (XXV)	Color Doppler and scoring system results in benign	
. ,	tumors	143
Table (XXVI)	Color Doppler and scoring system results in malignant	
•	tumors	144

#### List of figures

		Page
Figure (1):	The mammary gland	
Figure (2):	The arterial supply of the breast	5 9
Figure (3):	The lymphatic drainage of the breast	11
Figure (4):	Anatomy of the breast and major lesions at each site	
	within the various units	.12
Figure (5):	Acute mastitis (pathology)	. 13
Figure (6):	Fibroadenoma (pathology)	18
Figure (7)	Infiltrating lobular carcinoma (pathology)	29
Figure (8)	Papillary carcinoma (pathology)	31
Figure (9):	Generation of a sound wave in air by a vibrating funing	1 -
- 18-2 - (1)	fork	36
Figure (10):	Ultrasound spectrum	36
Figure (11):	The Piezo-electric effect	38
Figure (12):	Basic construction of an ultrasound transducer	38
Figure (13):	Sectional anatomy of the breast (Sagittal section)	45
Figure (14):	B-mode ultrasound appearance of a typical breast	
	carcinoma	55
Figure (15):	B-mode ultrasound appearance of a typical fibroadenoma	60
Figure (16)	B-mode ultrasound appearance of intraduct papilloma	61
Figure (17):	Origin of the Doppler shift	66
Figure (18):	The back scatter information	67
Figure (19):	The Doppler effect	68
Figure (20):	The Doppler equation	70
Figure (21):	The effect of the Doppler angel on the frequency shift	72
Figure (22):	Basic elements of the simplest type of CW Doppler	
•	frequency shift detector	73
Figure (23)	Basic elements of the simple pulsed Doppler system	75
Figure (24):	Basic element of a typical duplex Doppler system	77
Figure (25):	Basic element of a typical Doppler color flow imaging	70
	system	78
Figure (26):	Aliasing on Doppler	87
Figure (27):	Mirror image on Doppler	.89
Figure (28):		na
DI (40)	neovascularization in a 1.0 cm carcinoma	92
Figure (29):	The mean age of the studied group	111
Figure (30):	Benign histopathological types	113
Figure (31):	Malignant histopatholgical types	115
Figure (32):	Site distribution of tumors in the breasts	117
Figure (33):	Maximum tumor dimension distribution	119



## Introduction



#### Introduction

Breast cancer causes 20% of cancer deaths among females and has been called the "foremost cancer" in women. It is both ironic and tragic that a neoplasm arising on an exposed organ, readily accessible to self-examination and clinical diagnlosis, continues to exact such a heavy toll (Marshall, 1993).

Carcinoma of the breast is the leading cause of cancer in women in the United States. Until recently, the incidence has been increasing, with 180,300 cases anticipated this year (Breast imaging reporting and data system BI-RADS, 1993).

All women have a baseline of developing breast cancer of 5-6%, and approximately 50% of these women will die from the disease, a subsegment of the population is at an additional risk of one chance in ten (10%) of developing breast cancer during the course of lifetime (Kopans, 1989).

The breast in women represents motherhood, sexuality, and infant nutrition. These special features heighten the tragedy and challenge of diagnosing and treating breast cancer (Anderson, 1992).

The search for non-invasive diagnostic procedure that can further differentiate mammographically detected abnormalities –as color Doppler modality- must increase and continue (Youssefzadeh et al. 1996).

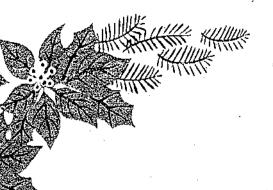
In the breast, several favorable factors combine to make this one of the most promising applications of Doppler, of these factors; the ultrasound beam has to penetrate for only a few centimeters, thus high frequencies can be used for Doppler studies, this improve the ability to detect low-velocity flow of tumor vessels. Also unlike many areas in the body specially the abdomen, interference from unwanted signals due to cardiac and respiratory movements is minimal (Merritt, 1987 and Nelson & Pretorious, 1988).

Doppler has emerged as a promising addition to imaging in detection and differential diagnosis of breast problems because the periphery of malignant lesions is vascularized while most benign processes are hypovascular (Nicolas and O'rourke, 1990).

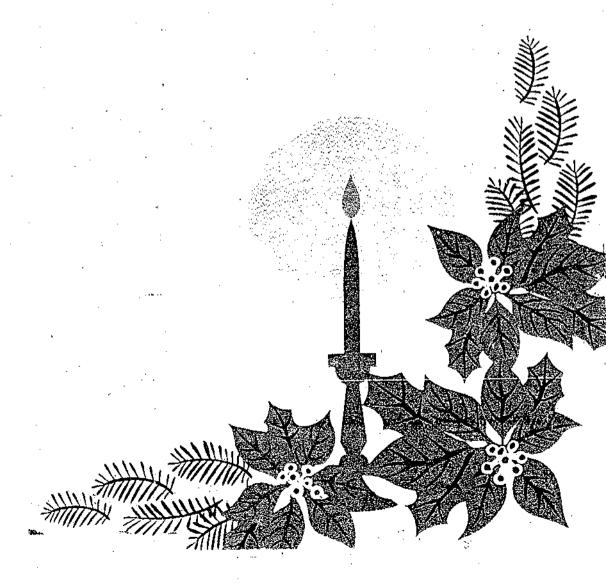
In breast masses color Doppler proved to be of value, partly because of the direct display of vessels it provides but also because of its apparent sensitivity in detecting low-volume and low-velocity flow, so that minute vessels are readily demonstrated both around and within breast masses (Cosgrove et al. 1990).

Angiogenesis is an essential condition for tumor growth; therefore it seems to be of interest to prove if blood flow and vascularization of breast tumors would give information concerning this issue (Grischke et al. 1996).

Highly significant differences between benign and malignant breast tumors were found for all Doppler flow data (Majar et al. 1997).



# Aim of the Work



#### Aim of the Work

To find out the differences in the patterns of color Doppler ultrasonography in benign and malignant breast tumors.