

□ اعتر :
للاق

د ه ش ل ه ن ا ل ا وة ك ن ل ا م ل ع ل ا ق ل ا ب ط ل ا ل
) ه ل ل ا ل ا ل ا ل ا ل ا ه م ل ا و ل و ل ا و ا م ن ا ق س ه ل ا ل ا ل

وه ن ز ن م ي ك ا
ع ل ا

١٨) ق ي ل ا ن ا ر م ع ل ا ق ر و س (

Dedication

To those of the fingers to give us a moment of happiness
To reap the thorns out of my way for me to pave the way science
To heart the great my father
Of whom breastfed of love and healing balm
To the heart as pure whiteness my parents
To my friends , and to all my family

Acknowledgements

First and foremost , I would like to express my deepest gratitude to

Dr. Husain Ahmed, without his help this work could not have been
accomplished

My thanks also go to Antalia hospitals,

and Ear Nose Thyroid Hospital ,

great thanks extend to the staff of Radiology department in Modern
Medical Center.

Deep thanks to my family for their consistent mental support finally,

I would like to thanks my friend.

This study used to evaluate the effect of anode **Ahetron** conventional X-ray tube in image quality femur and humerus dry phantom are exposed, the image was obtained using dry phantom in the Modern Medical Center, Antalia Center , Ear Nose and throat hospital with marks in anode side and cathode side. A total of 10 images was obtained using dry phantom, the exposure factors used to obtain the image, 50 (Kvp), 5 current time product (mAs), and the ESDs was established at a reference point of 100 cm from tube focus for the range of current time product (mAs) and tube potentials encountered in clinical practice. The main results were that the densities increase toward cathode except in digital radiography, which are the same identify in literature, also the variation in densities is due to the variation in x-rays intensities but this does not affect on image quality especially in DR, due to wide capability of post processing of the image which result in enhancing image contrast and visibility and reduced the

effect of x-ray intensities variation.

بعك ريثأتم ييقتي لإية التاجير . عاعشلا قروصلا ةدوجي لعنة ينيسلا ععشلا بوبنلا دونلا ،

قرجنحلاو ف نلاو نذلاي فشتسمو ايلاطنا زكرموت يدحلاي بطلا زكرملاي ف تارابتخلا تيرجا ،

دونلاو دوثا كلا عضو ديدحت مع ععشلا دعاسلاو دخفلا موتنافض يربعت بروص ١٠ ي لعل و صحلا مته

ت مدختسا ي تدا ضرعتلا ل ماعو رايتوت لوفوليك ٥٠ بوبنلا هج قرف ، روصلاي لعل و صحلا

مس ١٠٠ ملقلاو ععشلا بوبنلا نيبدة فاسملثانية او/رييماي لم ٥ .
بوبنلا

ةدايزي لإريشته يئلهنلا جئاتنلا ت ناكو لإ ، لبقن مته ييرجا ي تدا تاساردلاي فامك دوثا كلا وحن

ةعساولا ةيناكملإ ي لاي مقرلا ريوصتلاي فلاتخلا ع جريو ي مقرلاي عاعشلا ريوصتلا ةلاح ي ف
ة فاثكلا

ةجلا عملا دعبام ةي عاعشلا قروصلا ةدوج .

نيسحتلا

Contents

Items	Page NO.
المقدمة	I
Dedication	II
Acknowledgements	III
Abstract (English)	IV
Abstract (الموجز)	V
Contents	VI
List of tables	IX
List of figures	X
List of abbreviation	XII
Chapter one : Introduction	
1.1 Introduction	1
1.2 Problem of study	2
1.3 Objective of study	2
1.4 Overview of the thesis	2
Chapter two :literature review	
2.1 Radiation	3
2.2 Classification of radiation	3
2.3 Types and Sources of Directly Ionizing Radiation	5
2.3.1 Electrons	5
2.3.2 Positrons	6
2.3.3 Heavy Charged Particles	6
2.4 Classification of Indirectly Ionizing Photon Radiation	6
2.5 X-ray Production	7
2.5.1 the x-ray tube	7
2.5.1.1 Cathode	8
2.5.1.2 High voltage	8
2.5.1.3 Anode	9
2.5.1.4 Focal spot size	9
2.5.1.5 Envelope	10

2.5.1.6 Housing	10
2.5.1.6 Motor	11
2.5.2 X-Rays	11
2.6 interaction of radiation with matter	12
2.6.1 Rayleigh Scattering	12
2.6.2 Photoelectric Effect	13
2.6.3 Compton Effect	14
2.6.4 Pair Production	16
2.6.5 Photodisintegration	17
2.7 Specific Features of X-Rays	18
2.8 Anode Heel Effect	19
2.9. Applications	21
2.10 Influence of Anode heel effect	21
2.11. Previous Studies	22
Chapter three : Material and Method	
3.1Materials	25
3.1.1. Phantom	25
3.1.2. Densitometer:	25
3.1.3. X-ray Unit	25
3.2. Methods	26
3.2.1. Study duration	26
3.2.2. Study place	26
3.2.3. Method of data collection	26
3.2.4. Image Evaluation	26
3.2.5. Method of data analysis	27
3.2.6. Method of data storage	27
3.2.7. Ethical issue	27
Chapter four : Results	
4. Results	28
Chapter five : Discussion and Conclusion and Recommendation	
5.1 Discussion	38
5.2 Conclusion	38
5.3 Recommendation	39

Table	Item List of	Page NO.
2.1	Features of X-rays of various energies	18
3.1	X-rays equipments specifications	25
4.1	the mean values of optical density for the femur images at thicker part to the anode	28
4.2	the mean values of optical density for the femur images at thicker part to the cathode	30
4.3	the mean values of optical density for the humerus images at thicker part to the anode	32
4.4	the mean values of optical density for the humerus images at thicker part to the cathode	33
4.5	the mean values of optical density for the exposed film	35
4.6	the visual inspection	36

Figure	Item	Page NO.
2.1	the types of radiation	4
2.2	A diagram of an X -ray tube	7
2.3	The effective focal spot size of an X – ray tube	11
2.4	the Rayleigh scattering	13
2.5	the illustration of photoelectric effect	14
2.6	Math associated with the Compton effect	15
2.7	Illustration of the Compton effect	16
2.8	illustrates the pair production process	17
2.9	the Photodisintegration	18
2.10	X-ray spectrum	19
2.11	the illustration of heel effect	20
2.12	the film plane position	20
4.1	the mean values of optical density for the femur images at thicker part to the anode for manual processing	28
4.2	the mean values of optical density for the femur images at thicker part to the anode for Digital Radiography	29
4.3	the mean values of optical density for the femur images at thicker part to the anode for computer Radiography	29
4.4	the mean values of optical density for the femur images at thicker part to the cathode for manual processing	30
4.5	the mean values of optical density for the femur images at thicker part to the cathode for Digital Radiography	31
4.6	the mean values of optical density for the femur images at thicker part to the Cathode for Computer Radiography	31
4.7	the mean values of optical density for the humerus images at thicker part to the anode for manual processing	32
4.8	the mean values of optical density for the humerus images at thicker part to the anode for Digital Radiography	33
4.9	the mean values of optical density for the humerus images at thicker part to the cathode for manual processing	34

4.10	the mean values of optical density for the humerus images at thicker part to the anode for Digital Radiography	34
4.11	the mean values of optical density for the exposed film for Digital Radiography	35
4.12	the mean values of optical density for the exposed film for Computer Radiography	36
4.13	the visual inspection	37

CR	Computed Radiography
DR	Digital Radiography
MMC	Modern Medical Center
ANT	Antalia
ENT	Ear Nose Throat hospital
FS	Film Screen
AP	Anterior posterior
PA	Posterior anterior
LAT	Lateral
QC	Quality Control
QA	Quality Assurance