

# TABLE OF CONTENTS

<b>Contents</b>	<b>Page</b>
Declaration	ii
Abstract	iii
Dedication	iv
Acknowledgements	v
Table of Contents	vii
List of Figures	x
List of Tables	xii
Nomenclature	xiii
<b>CHAPTER ONE</b>	
<b>INTRODUCTION</b>	
1.0 An Overview	1
1.1 Objectives	3
1.2 Treatment	4
1.2.1 Radiation	4
1.3 Justification	5
<b>CHAPTER TWO</b>	
<b>MECHANISMS OF RADIATION EFFECTS</b>	
2.0 Introduction	7
2.1 Single Hit Model	8
2.2 Multi-Target Single Hit Survival Model	9
2.3 Molecular Theory of Radiation Action	9
<b>CHAPTER THREE</b>	
<b>RADIOBIOLOGICAL MODELS</b>	
3.0 Why Model Radiotherapy?	12
3.1 Radiobiological Models	13
3.2 Tumor Control Probability	14
3.3 Normal Tissue Control Probability	15

3.3.1	Dose-volume effects	15
3.3.2	Lyman-Kutcher-Burman model	17
3.4	Clinical Applications of NTCP	18
3.5	Uncomplicated Tumor Control Probability (UTCP)	19

## **CHAPTER FOUR**

### **METHODS AND MATERIALS**

4.0	Patients' Characteristics	20
4.1	Radiotherapy	21
4.2	Bioplan	23
4.3	Input Data	23
4.3.1	Dose-volume histograms	23
4.3.2	Model Parameters	23
4.3.3	LQ correction to the physical DVH	24
4.4	Statistical Analysis	24

## **CHAPTER FIVE**

### **RESULTS AND ANALYSIS**

5.0	Overall Survival Rate	25
5.1	TCP Calculations Using Bioplan With Respect to Treatment Planning Technique	25
5.1.1	TCP calculations for patients with three-dimensional plans	25
5.1.2	TCP calculations for patients with two-dimensional plans	28
5.2	Overall Mean Tumor Control Probability	33
5.3	NTCP Calculations	33
5.4	UTCP Calculations	34
5.5	TCP versus cell radiosensitivity	37
5.6	Delta-TCP function	38
5.7	Statistical Analysis of Prognostic Factors	39

## **CHAPTER SIX**

### **DISCUSSIONS AND RECOMMENDATIONS**

6.0	Discussion	42
6.1	Recommendations	46

## **CHAPTER SEVEN**

### **CONCLUSIONS**

7.0	Conclusion	48
-----	------------	----

## **APPENDIX A**

### **RHABDOMYOSARCOMA**

A.0	Introduction	50
A.1	Causes of Rhabdomyosarcoma	51
A.2	Symptoms	51
A.3	Histology	52
	A.3.1 Embryonal	52
	A.3.2 Alveolar	53
	A.3.3 Botryoid	55
	A.3.4 Pleomorphic	55
A.4	Prognostic Factors	55

<b>REFERENCES</b>	57
-------------------	----