HAEMATOLOGICAL EFFECT OF RADIOTHERAPY AND IMMUNOTHERAPY IN CANCER PATIENTS

ESSAY

SUBMITTED FOR THE PARTIAL FULFILLMENT
OF THE MASTER DEGREE
IN
CLINICAL PATHOLOGY

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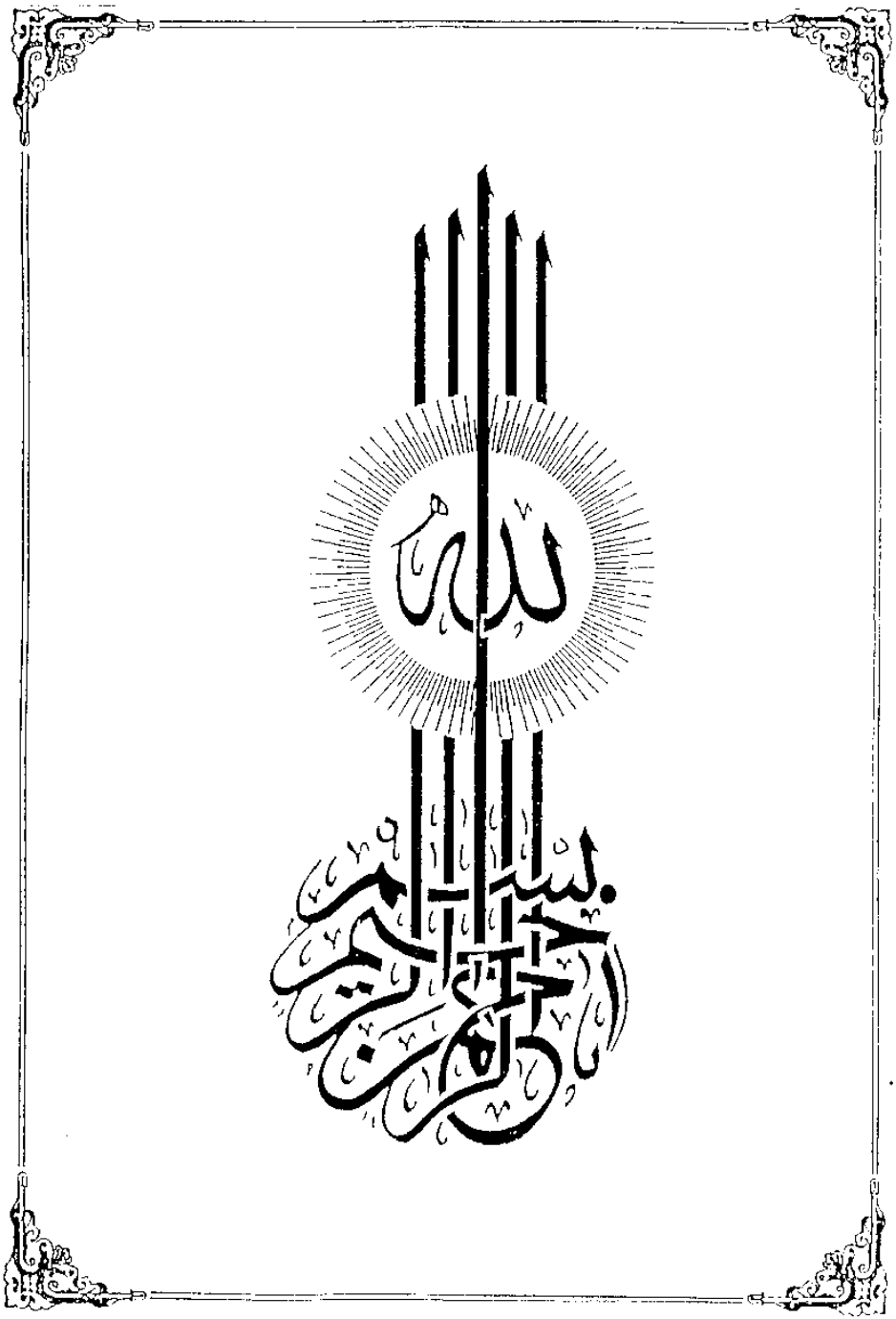
ACKNOWLEDGMENT

I wish to express my deepest gratitude and utmost thanks to Prof. Dr. **SAWSAN ABDEL-MOUATY FAYAD**, Professor of Clinical Pathology, Faculty of Medicine, Ain Shams University. In spite of her over-crowded time, she offered me a great help and support throughout the study.

I wish also to express my deepest appreciation to Dr. **HODA MOHAMED EL-GENDY**, Lecturer of Clinical Pathology, Faculty of Medicine, Ain Shams University, for her valuable advice and great help. Her extreme patience and untiring efforts are more than I can express.

I am also very grateful to Dr. **AFAF ABDEL-AZIZ ABDEL-GHAFAR**, Lecturer of Clinical Pathology, Faculty of Medicine, Ain Shams University for her great help and continuous valuable supervision throughout the study.



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LIST OF ABBREVIATIONS

2D	Two dimensional "Radiotherapy".
3-D-CRT	Three dimensional conformal radiotherapy.
Ab	Antibody.
ADCC	Antibody-dependant cellular cytotoxicity.
Ag	Antigen.
AML	Acute myeloid leukemia.
BCG	Bacillus Calmette-Guérin.
BEV	Beam's eye view.
BSF	Burst-forming unit stimulating factor.
BTV	Biological target volume.
CFU	Colony forming unit.
CFU-F	Fibroblastoid-colony forming unit.
CFU-S	Spleen colony forming unit.
CLL	Chronic lymphocytic leukemia.
CML	Chronic myeloid leukemia.
C.T.	Computed tomography.
DNA	Deoxyribonucleic acid.
D.T.	Diphtheria toxin.
EGF	Epidermal growth factor.
FGF	Fibroblast growth factor.
G_0	Stage o in mitotic division.
GCE	Granulocyte extractor.
GM-CSF	Granulocyte colony stimulating factor.
HAMA	Human anti-mouse antibody.

IFN	Interferon.
IL	Interleukin.
IT	Immunotoxin.
LAK	Lymphokin-activated killer.
LIF	Leukemia inhibitory factor.
MAF	Macrophage activating factor.
MIF	Macrophage inhibitory factor.
MGI-2	Macrophage-granulocyte inducing factor-2.
MSH-α	Melanocyte stimulating hormone-α.
NHL	Non-Hodgkin lymphoma.
RAIT	Radio-active immunotherapy.
RCE	Red cell extractor.
RNA	Ribonucleic acid.
RT (RTA)	Ricin toxin (A chain).
r-TNF-α	Recombinant tumor necrosis factor-alpha.
Tc	Cytotoxic T-cell.
TGF-α	Transforming growth factor-α
TIL	Tumor infiltrating lymphocyte.
TNF	Tumor necrosing factor.
T.N.I.	Total nodal irradiation.
Ts	Suppressor T-cell.

INTRODUCTION

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INTRODUCTION AND AIM OF THE WORK

In the last two decades, considerable advances have been made in treatment of cancer using clinical radiotherapy. The therapeutic radiation has many side effect on different systems both from local as well as whole body irradiation. The hemopoietic system experiences the most severe toxicity from radiation exposure [Hellman, 1989]. These effects have include destruction of W.B. is especially lymphocytes, neutropenia and thrombocytopenia [Stein et al., 1992].

During the last several years, attention has been directed at the use of monoclonal antibodies (MAbs) labelled with therapeutic radionuclides to treat certain cancers. Monoclonal antibodies direct the radiation directly to the tumor site, thus limiting exposure of normal tissue. Therapeutic trials with MAbs have recently been initiated for lymphoma, melanoma, neuroblastoma and other malignancies. However, the radio-immunotherapy (RAIT) had effect on blood observed by drop of circulating B lymphocytes and platelets [Stein et al., 1992].

Recently, strategies for the immunotherapy of cancer has been developed. Immunotherapy may be either active or passive approaches. Active immunotherapy includes the use of immune

adjuvants, interferon, interleukin-2 (IL-2) and immunization with tumor cell vaccines. Passive immunotherapy includes the use of antibodies to tumor cells, or removal of blocking factors [Rosenberg, 1989]. This therapy has effect on the body system as liver dysfunction, kidney affection, anaemia and thrombocytopenia [Denicoff et al., 1987].

AIM OF THE WORK:

The aim of the this study is to review the recent aspects in radiotherapy and immunotherapy in cancer patient and their effect on hematological system.

REVIEW OF LITERATURE

RADIOTHERAPY

INTRODUCTION

Radiation oncology is a clinical scientific endeavor devoted to management of patients with cancer by ionizing radiation, alone or combined with other modalities. Radiation therapy is a clinical specialty dealing with the use of ionizing radiation in treatment of patients with malignant neoplasia and occasionally benign conditions [Perez and Brady, 1991].

The aim of radiation therapy is to deliver precisely measured dose of radiation to a defined tumor volume with as minimal damage as possible to the surrounding healthy tissues, resulting in eradication of the tumor, a high quality of life, and prolongation of survival at reasonable cost. In addition to curative efforts, irradiation plays a major role in cancer management in the effective palliation or prevention of symptoms of the diseases [Perez and Brady, 1991].

HISTORICAL PERSPECTIVE

Roentgen described X-ray in 1895, and the Curies reported their discovery of radium in 1898. Almost immediately, the biologic effects of ionizing radiations were recognized. The first patient cured by radiation therapy was reported in 1899 after which clinical radiation therapy had a long and

challenge growth periods in the early 1920 [Metz et al., 1983].

Radiation therapy as a medical discipline began at the International Congress of Oncology in Paris 1922, when Coutart and Hautant presented evidence that advanced laryngeal cancer could be cured without disastrous treatment induced sequelae. By 1934, Coutard had developed a protracted, fractionated scheme that remains the basis for current radiation therapy and in 1936, Paterson published results in the treatment of cancer with X-ray. The treatment of malignant tumors in many anatomic locations with brachytherapy, starting with ^{226}Ra needles and tubes, has increased steadily since 1910. With time, ionizing radiation became more precise, high-energy proton and electrons were available, and treatment planning and delivery became more accurate and reproducible [DeVita, 1985].

There has been exponential growth in the knowledge of radiation physics, radiation biology, clinical treatment planning, and the use of computers in radiation therapy. In the last two decades, considerable advances have been made in the treatment of cancer, with cure now being a realistic therapeutic objective in more than 50% of newly diagnosed patients. This improvement in therapy can be attributed to progress in several major areas [Rubin, 1985]:

1. Greater dissemination of information to physicians and the public and the innovative screening and diagnostic tools that increase awareness and early cancer detection.
2. Multiple therapeutic approaches for a variety of tumors.
3. Advanced surgical techniques and irradiation equipment and more effective cytotoxic drugs.
4. Greater interaction among cancer surgeons, radiation, oncologists, medical oncologists, and pathologists stressing the combined modality approach in treatment.
5. Closer interaction among physicians and basic scientists, allowing the transfer of clinically relevant biomedical discoveries to the bed side.
6. Broad use of appropriate clinical trial methodology to evaluate innovative or alternative treatment programs [Perez and Brady, 1991].

PRESCRIPTION OF IRRADIATION AND TREATMENT PLANNING

The aim of therapy should be defined at the onset of the formation of therapeutic strategy being either:

1- Curative, in which it is projected that the patient has a probability of surviving after adequate therapy, even if that chance is low as in T_4 tumors of the head and neck or in carcinoma of the lung.