# STUDIES ON THE HISTOLOGY, HISTOCHEMISTRY, AND KINETICS OF SPLEEN TISSUES OF RAT TREATED WITh GAMMA IRRADIATION

*A THESIS SUBMITTED*

*B Y*


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*TO*

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*For*

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*"Zoology "*

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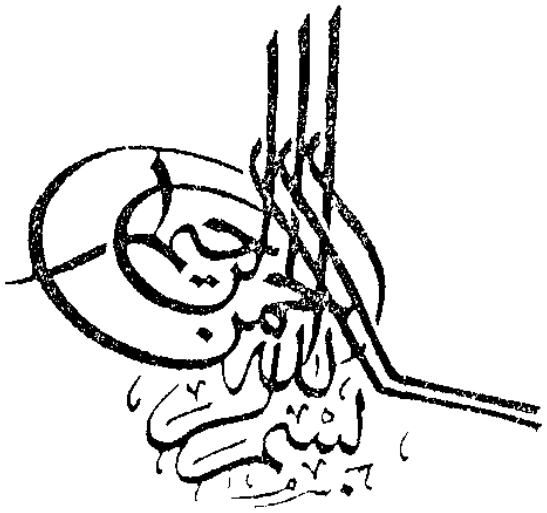
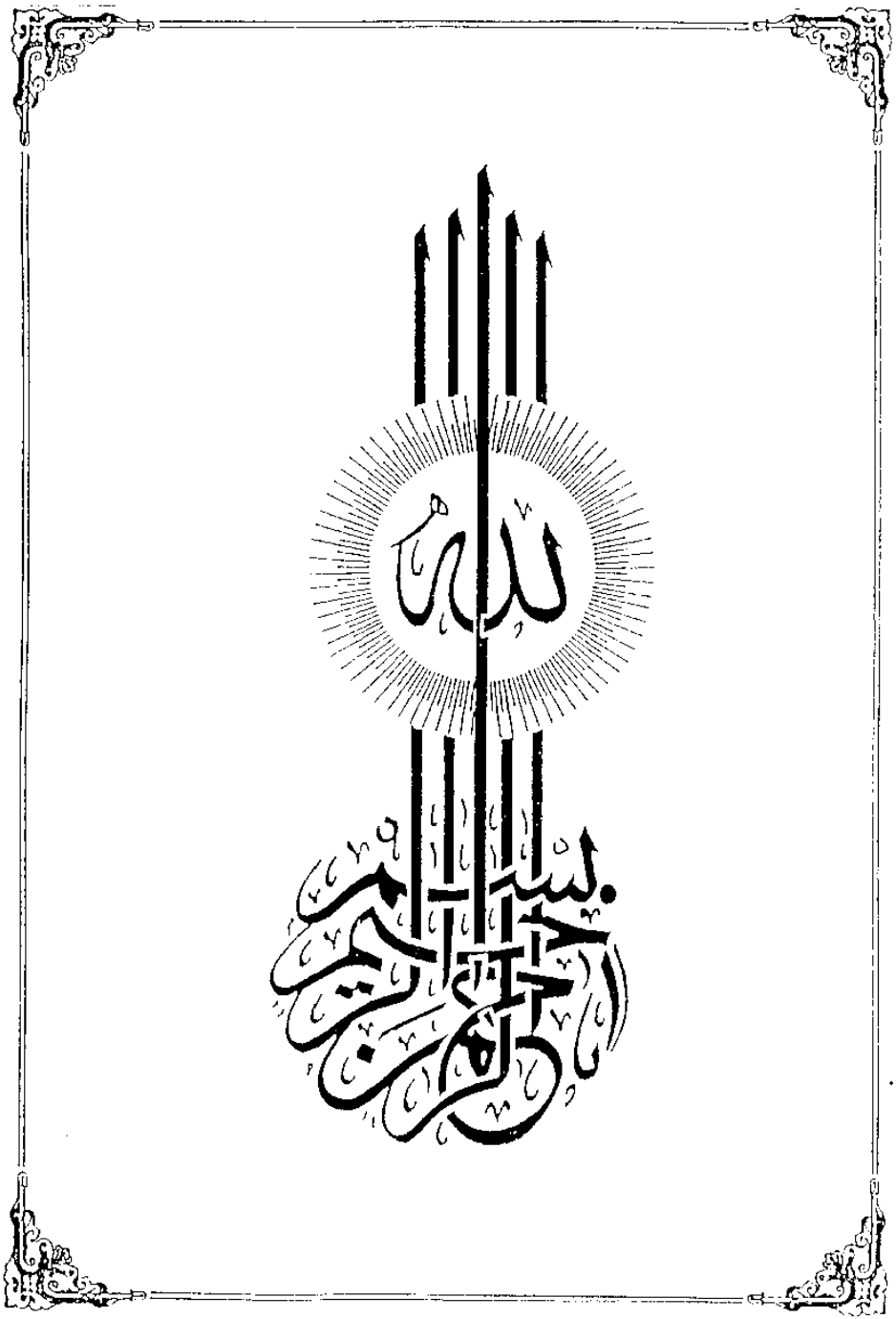


قال الله تعالى :

ويسألونك عن الروح قل الروح من أمر ربي .
وما أوتيتم من العلم إلا قليلاً .

صدق الله العظيم

سورة الإسراء آية ٨٥



DEDICATION

To

My Father's Spirit

and all my family

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# INTRODUCTION

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Cell population kinetics is mainly concerned with the study of the dividing cells taking into consideration both normal and abnormal circumstances. Examples of the normal conditions are represented by the cell populations which proliferate with higher frequency such as the gastro-intestinal epithelium, haemopoietic tissues, gonads, urinary bladder linings, etc., relative to other ones. (**Duncan** and Nias,1977).

According to Awad (1990), the study of the kinetics of tumor cell proliferation, In comparison with the corresponding normal prototypes, warrantrs special attention aiming to better understanding of the clinical sequences of malignant diseases, in general, and in human beings- in particular.

In this respect, the spleen provides a good model for such investigations. This organ is known to play a principal role in haemopoises, especially in the removal of fatigued erythrocytes, phagocytosis, blood storage and blood production in fetal life, though the last activity becomes confined to the formation of lymphocytes only after birth. (Firkin et al., 1989). However,this process is mainly carried out in the white pulp (nodules) of the spleen.

The same above authors also elucidated that the spleen is an essential source of the manufacture of antibodies. Under antigenic stimulation, its contents of B-lymphocytes give rise to antibodies producing plasma cells and lymphoblasts.

In a rather similar direction, Abdel Rahman (1985), revealed that exposure of albino rats to gamma irradiation at the dose level of 8 Gy-had induced a fast and pronounced decline of the lymphocytic constituents in the bone marrow and spleen of rats after the 3rd day subsequent to irradiation.

The sensitivity of an organ to gamma irradiation was previously elucidated by Schvenzel et al., (1975), to be generally proportional to its rate of cell renewal.

In such cases, the mitotic index could be adequately applied as a measure to demonstrate and determine the level of cellular activity, regarding the radiation damage induced in one particular cell population.

# AIM OF THE PRESENT WORK

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In view of the foregoing introductory statements, the present investigation was directed to demonstrate and evluate the kinetics of cellular populations in the spleen of rats under different conditions including normal, colchicine-injected, and gamma irradiated-colchicine injected ones.

**This comprised the following objectives:**

(I) Identification of the Proliferation fraction of lymphocytes and the ratio of large lymphocytes relative to the small lymphocytes **(L/S ratio)** in the spleen white pulp, using light microscopy.

(II) Assessment of the histolgical features of the splenic tissues in both the normal and experimental animals.

(III) Histochemical illustration of certain essential parameters, (i-e total proteins, connective tissue matrix, DNA, and RNA also in those different instances.

(IV) Estimation of the **Mitotic Index (MI%),** involving examination of the spleen white pulp sections obtained from the different animal groups with the oil immersion lens to

record the percentage of the dividing cells at the metaphase stage.

(V) Statastical analysis of cell proliferation and measurments of the potential doubling time, or the mean rate of cell production **(Tp)**, and mitotic rate **(MR)** in the white pulp of the rat spleen.

(VI) Evaluation of **DNA** content-by score as an indirect measure of its synthesis using t-test.