

# بسم الله الرحمن الرحيم





# شبكة المعلومات الجامعية

## التوثيق الالكتروني والميكروفيلم



# جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

## قسم

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



## يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار





# بعض الوثائق الأصلية تالفة







# بالرسالة صفحات لم ترد بالأصل



**Post Irradiation Effect On Some Antiphagocytic Substances  
Produced by Pathogenic Microorganisms**

*A Thesis*

**Submitted In Partial Fulfillment of  
The Requirements for The Master Degree of Science  
In  
Botany  
(Microbiology)**

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**APPROVAL SHEET**

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**POST IRRADIATION EFFECT ON SOME ANTIPHAGOCYTIC  
SUBSTANCES PRODUCED BY PATHOGENIC MICROORGANISMS**

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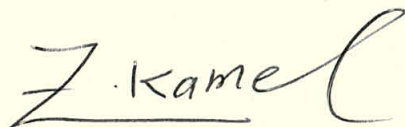
**(B. Sc. In Microbiology)**

**Submitted to the**

**Botany Department, Faculty of Science, Cairo University**

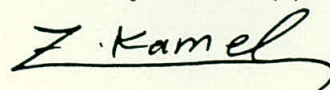
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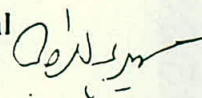
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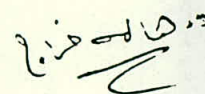
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## *Acknowledgment*

First of all, my gratitude and thanks to **Allah**, who support me to continue this work.

I would like to express my great thanks and my gratefulness to *Dr. Zeinat Kamel Mohamed*, Professor of Microbiology, Botany Department, Faculty of Science, Cairo University for her kind supervision, valuable advices, continuous encouragement throughout my work.

My sincere thanks and gratitude to *Dr. Soheir Abdel-Latif Issa*, Professor of Clinical Pathology, Clinical Pathology Department, National Cancer Institute, Cairo University for her continuous scientific guidance, valuable suggestions, criticism, encouragement and facilities offered to accomplish this work.

I deeply appreciate the effort of *Dr. Hala Abd-Allah Farrag Massoud*, Assistant Professor of Microbiology, National Center for Radiation Research and Technology (NCRRT), Atomic Energy Authority for devoting much of her valuable time in the supervision of this work, suggestions, valuable remarks and comments, continuous encouragement and unlimited help in preparing this thesis.

I am very thankful to Dr. Mohamed Lotayef, M.D. Lecturer (consultant) of Radiation Oncology, National Cancer Institute, Cairo University for his cooperation and valuable help in calculation of radiation dose and radiation exposure of the tested samples.

I am also taking this opportunity to thank all staff members of the Drug Microbiology Laboratory, Drug Radiation Research Department at (NCRRT), all staff members of Radiation Department at (NCRRT) and all staff members of Radiotherapy Department at National Cancer Institute for their keen cooperation.

*Mona Kamal*





## **Dedication**

*To My Roots*

*My Mother and Father*

*To the Delicate Flowers*

*My Sole Sister & her Family and My Sole Brother*

*The Kind understanding and great support of every  
member of my family helped me to get through this study*

*So,*

*Many Thanks to All of You*

*Mona*

**This thesis has not been previously submitted for any degree at this or at any other university.**

## **Note:**

Beside the work carried out in the thesis the author has attended and passed successfully the following post – graduate courses:

**1- Virology.**

**2- Bacteriology.**

**3- Tissue culture.**

**4- Radiobiology.**

**5- Hydrobiology.**

**6- Host – Parasite relationship.**

**7- Soil Microbiology.**

**8- Applied Microbiology.**

**9- Biostatistical Analysis.**

**10- Instrumental Analysis.**

**11- German Language.**



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## Abstract

Some clinically isolated microorganisms can produce antiphagocytic virulence substance. In this study 43 bacterial strains were isolated from cervix of 50 patients. *Escherichia coli* was the most common species isolated (39.53%) followed by *Klebsiella pneumoniae* (23.26), *Pseudomonas aeruginosa* (11.63%), *Proteus mirabilis* (9.30%), *Klebsiella oxytoca* (4.65%), *Staphylococcus warneri* (4.65%), *Klebsiella group 47* (2.33%), *Morganella morganii* (2.33%) and *Staphylococcus hominis* (2.33%). Four yeast fungal organisms were isolated in this study. *Candida albicans* was the only *Candida* species isolated representing 8.51% of total number of pathogenic bacteria and yeast fungi isolated. Radiotherapy of these cancer patients had many effects on the microbial cells. The tested isolates were exposed to *in-vivo* multiple fractionated doses 10 – 50 Gy and *in-vitro* single equivalent dose 7.04 – 20 Gy.

The isolated strains were tested for antimicrobial agent susceptibility using 18 different antibiotics for bacterial isolates and nystatin for *Candida albicans*. The effect of bacterial and yeast fungal virulence factors on neutrophil phagocytosis and antimicrobial activity was examined. Disk susceptibility testing suggested that, the isolated producer strains which were positive for extracellular proteinase enzyme and/or for slime production that correlate with infectivity were resistant to erythromycin, streptomycin, neomycin, kanamycin, tetracycline, cephalothin and sulphamethoxazol / trimethoprim and rarely susceptible to amoxicillin /clavulanic acid and cefotaxime. In contrast, many non-producer strains were susceptible to most of the tested antibiotics with marked variability among species. In case of *Candida albicans* all the tested strains were susceptible to the tested antimycotic agent used before and after *in-vitro* irradiation at a dose level of 20 Gy. It was found that slime substance and / or proteinase enzyme reduced the phagocytic activity of the leukocytes against the producer bacterial strains. *In-vivo* irradiation at 10, 30 and 50 Gy, decreased the phagocytosis by human polymorphonuclear leukocytes (PMNs) of the irradiated bacterial strains. The ability of the tested bacterial isolates to



produce slime was changed after *in-vitro* irradiation in about 50% of the producer strains from positive to weak positive or negative, this increased phagocytosis in some cases, while the percentage of the antibiotic resistance was increased.

In case of *Candida albicans*, the isolated strains were grown on medium containing bovine serum albumin (BSA) as the sole nitrogen source for enzyme production. Proteinase enzyme production was detected by agar plate method. The majority 75% of the isolated strains were proteinase enzyme producer before irradiation, whereas, 25% only were enzyme producer after *in-vitro* irradiation. The enzyme activity before irradiation was greater than that after irradiation where, the mean proteinase activity of all isolates was  $(8.17 \pm 4.9)$  before irradiation compared with  $(2.33 \pm 3.8)$  after irradiation, P-value = 0.0001 was highly statistically significant. A dose level of 20 Gy resulted in decrease of slime production in 25% of *Candida albicans* isolated strains from positive reaction to negative reaction comparing to the pre-exposure results. Phagocytosis by polymorphonuclear leukocytes (PMNs) of the *in-vivo* irradiated *Candida albicans* strains were decreased comparing to non-irradiated strains, the mean phagocytic index (PI) was  $4.89 \pm 1.00$  and  $7.19 \pm 0.49$  respectively (P-value = 0.0029). Whereas, marked decrease in phagocytosis were detected after *in-vitro* irradiation than that of *in-vivo* and non-irradiated strains, the mean (PI) after *in-vitro* irradiation was  $0.67 \pm 0.28$  with P-value = 0.0004. This study clearly shows that microbial virulence is a function of many factors working jointly to overcome the host defences.

**Key Words:**  $^{60}\text{Co}$  gamma radiation, antiphagocytic substances, extracellular polysaccharide slime production, extracellular proteinase enzyme production, pathogenic bacteria, pathogenic yeast fungi, cancer cervix, phagocytosis, polymorphonuclear leukocytes (PMNs), antimicrobial agents.