

**MINISTRY OF HIGHER EDUCATION &  
SCIENTIFIC RESEARCH  
AL MUTHANNA UNIVERSITY  
COLLEGE OF SCIENCE**



# **Effect of Low Level Laser Intensity on Biological Activity of Tyrosinase by Means of Chemiluminescence**

**A thesis Submitted to department physics in partial fulfillment of the  
requirements for the degree of Master of Physics Science**

by  
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# بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

( هُوَ الَّذِي أَنْزَلَ عَلَيْكَ الْكِتَابَ مِنْهُ آيَاتٌ مُحْكَمَاتٌ هُنَّ أُمُّ الْكِتَابِ وَأُخَرُ  
مُتَشَابِهَاتٌ فَأَمَّا الَّذِينَ فِي قُلُوبِهِمْ زَيْغٌ فَيَتَّبِعُونَ مَا تَشَابَهَ مِنْهُ ابْتِغَاءَ الْفِتْنَةِ  
وَابْتِغَاءَ تَأْوِيلِهِ وَمَا يَعْلَمُ تَأْوِيلَهُ إِلَّا اللَّهُ وَالرَّاسِخُونَ فِي الْعِلْمِ يَقُولُونَ آمَنَّا بِهِ كُلٌّ  
مِنْ عِنْدِ رَبِّنَا وَمَا يَذَّكَّرُ إِلَّا أُولُو الْأَلْبَابِ (7) )

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## **Certificate**

I certify that this thesis entitled "*Effect of Low Level Laser intensity on Biological Activity of Tyrosinase by Means of Chemiluminescence*" was prepared by "*Saja Imad Dawood*" under my supervision in the Department of Physics, College of Science, ALMuthanna University, as a part of the fulfillments of the Master degree of Science in Physics.

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### **Recommendation of the Head of Department of Physics**

In view of the available recommendations, I forward this thesis for debate by examining committee.

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# *Dedication*

To the pot of the cup is empty to hold me a drop of love

To whom did he wish to give us a moment of happiness

To the one who took the thorns from Derby, to guide me through the flag

To the big heart (*my dear father*)

To those who gave me love and tenderness

To the symbol of love and healing balm

To the pure white heart (*my beloved mother*)

To the pure and kind hearts and the innocent souls to the winds of my life (*my brothers*)

To the Spirit that dwelled my soul (*Mujtaba*)

I dedicate this humble research to the Lord

Almighty to find acceptance and success

*Saja*

## **ABSTRACT**

This dissertation presents a study of the effect of low intensity lasers on tyrosinase and to study of Chemiluminescence of the enzyme and amino acid containing DL-Tyrosine. This enzyme is also linked with vitiligo disease which is result from a deficiency in the melanin pigment, and to study the effect of laser on increasing the concentration of tyrosinase.

Blood samples were collected from four people (three patients with vitiligo and healthy person used as a control) and lymphocytes were extracted.

The samples were irradiated by Helium-Neon laser with power of (1mW) for two different periods (2 and 6) min, and then ELISA technique was used to estimate tyrosinase concentration. The DL-Tyrosine was also irradiated for different times (0, 10, 15, 20, 25, 30, 35, 40, 45, 50) min with a He-Ne laser of output power (1 and 0.2) mW and its absorption and Chemiluminescence have been measured.

The results of this study indicated that the effect of low level laser on Tyrosinase enzyme increase its concentration when exposure time is increased. In addition, there is a relation between the results of Chemiluminescence and UV/VIS spectroscopy as alternative techniques for ELISA in the determination of tyrosinase concentration in vitiligo patients.

## LIST OF CONTENTS

- Abstract .....	vii
- List of Contents .....	viii
- List of Figures .....	x
- List of Tables .....	xii
- Abbreviations .....	xiii

### **CHAPTER ONE: GENERAL INTRODUCTION & LITREATURE REVIEW**

1.1: History of Lasers development .....	1
1.2: Laser physics.....	1
1.2.1: Properties of Laser Radiation.....	2
1.2.2: Parameters of Laser Radiation.....	4
1.3: Lasers Classifications .....	5
1.3.1: Classification of Lasers According to Power.....	5
1.3.2: Classification of Lasers According to Wavelength.....	6
1.3.3: Classification of Lasers According to Active Media ...	6
1.4: Helium - Neon Gas Laser .....	7
1.4.1: Advantages of He- Ne Laser .....	8
1.4.2: Applications of He-Ne Laser .....	9
1.5: Amino Acids.....	9
1.5.1: Tyrosine.....	11
1.6: Tyrosinase (EC.1.14.18.1).....	11
1.7: Vitiligo Disease.....	12
1.8: The Principle of Chemiluminescence.....	12
1.8.1: Advantages of Chemiluminescence .....	13
1.9: Aim of the study.....	14
1.10: Literature Review.....	15

### **CHAPTER TWO: MATERIALS AND METHODS**

2.1: Chemical Materials .....	19
2.2: Instrumentations and Equipment.....	20
2.3: Chemiluminescence System .....	21

2.4: Experimental Procedure .....	22
2.4.1: Preparation of Solutions .....	22
2.4.2: Optimization of Experiment Conditions.....	23
2.5: Analyses Procedure.....	24
2.5.1: Evaluation CL of DL-Tyrosine.....	24
2.5.2: Evaluation the Absorbance of DL-Tyrosine.....	25
2.5.3: Isolation of Human Lymphocytes.....	25
2.5.4: Irradiation Lymphocyte by He-Ne laser.....	26
2.6: Procedure of ELISA Kit.....	27
2.6.1: Reagent Preparation.....	27
2.6.2: Assay Procedure .....	28
2.7: Measurements of Absorbance and CL for Lymphocyte.....	30
<b>CHAPTER THREE: RESULTS</b>	
3.1: CL of DL-Tyrosine.....	31
3.2: Absorbance Measurement Study of DL-Tyrosine .....	32
3.3: Results of ELISA Technique for Tyrosinase.....	33
3.4: Absorbance and CL for Lymphocyte.....	34
<b>CHAPTER FOUR: DISCUSSION</b>	
4.1: Procedure of Optimization Measurements.....	37
4.1.1: Optimum CL Solvent Temperature.....	37
4.1.2: Optimum CL solvent pH.....	37
4.2: The Optical Absorption Spectra and CL Intensity of DL-Tyrosine.....	37
4.3: ELISA Technique for Tyrosinase.....	39
4.4: Absorbance and CL for lymphocyte.....	39
<b>CHAPTER FIVE: CONCLUSIONS AND FUTURE WORK</b>	
5.1: Conclusions ... ..	42
5.2: Recommendations.....	43
<b>REFERENCES.....</b>	<b>44</b>
<b>LIST OF PUBLICATIONS .....</b>	<b>.....</b>

## LIST OF FIGURES

Figure No.	Title	Page No.
1.1	Basic laser components including gain medium, Pumping source and mirror cavity	2
1.2	Laser cavity configuration	3
1.3	Coherent and incoherent light waves	4
1.4	He- Ne Laser Tube	7
1.5	Energy level diagram for He–Ne laser system	8
1.6	The basic structure of amino acids	9
1.7	illustrate the L and D isomer of amino acids	10
1.8	The structure of DL-Tyrosine	11
1.9	Types of CL reaction, P: product, F: fluorescing substance	13
2.1	(a) Electronic Balance, (b) UV/VIS spectrophotometer	20
2.2	(a) Centrifuge, (b) Incubator	21
2.3	Schematic diagram of a chemiluminescence detection equipment	21
2.4	The relation between operating voltage and CL intensity	23
2.5	The relation between time and CL intensity	23
2.6	Best temperature for CL intensity	24
2.7	Influence of pH on CL intensity (DL-Tyr=2mL, [NaOH]=10 <sup>-4</sup> M)	24
2.8	(a): The blood after addition of 5 mL of PBS. (b): Three mL of ficoll added for the tube 5ml of blood. (c): Blood sample after centrifuge for 30 min and Lymphocyte prepares as cloudy layer	26
2.9	ELISA Kit	27
2.10	Preparations of standard diluent	28
2.11	Color change when added substrate solution	29
2.12	Color change from blue to yellow when addition stop solution	29
2.13	ELISA reader consist on microplate	30

3.1	The relation between CL intensity of DL-Tyr irradiation by He-Ne laser and irradiated time. (power 0.2 mW), (1mL of NaOH solution (pH 8), 20mg of DL- Tyr, at Room Temp. = 25°C)	31
3.2	The relation between CL intensity of DL-Tyr irradiation by He-Ne laser and irradiated time. (power 1mW), (1mL of NaOH solution (pH 8), 20mg of DL-Tyr, at Room Temp. = 25°C)	31
3.3	The dependence of absorption spectra of DL-Tyr (2 mL) on the wavelength after irradiation for (0,10,15,20,25,30,35,40,45,50) min by He-Ne laser. (power 0.2mW) , at 25°C)	32
3.4	The dependence of absorption spectrum of DL-Tyr (2 mL) on the wavelength after irradiation for (0,10,15,20,25,30,35,40,45,50) min by He-Ne laser (power 1mW), at 25°C)	32
3.5	Standard curve for tyrosinase enzyme	33
3.6	The concentration of tyrosinase for patient with vitiligo and healthy person after exposed to He-Ne laser (1 mW) for (2 and 6) min	34
3.7	The standard curve for tyrosinase in Lymphocyte by UV/VIS spectrophotometer	35
3.8	Relation between the concentration of tyrosinase in lymphocyte of patients and the exposure time when exposed to He-Ne laser (power 1mW)	35
3.9	The standard curve of Tyrosinase by CL	36
3.10	The variation of the concentration of tyrosinase in lymphocyte of patients after exposed to He-Ne laser (power1 mW) for periods (2 and 6) min by CL	36

## LIST OF TABLES

<b>Table No.</b>	<b>Title</b>	<b>Page No.</b>
1.1	List of solid-state lasers	6
1.2	List of the most popular gas lasers	7
2.1	Reagents and material using in this study	19
4.1	Exposure time required for patient samples to reach the same value of Tyr concentrations for healthy samples for different technique	41

# Abbreviation

Abbreviation	Key
a.u	arbitrary unite
CL	Chemiluminescence
cm <sup>2</sup>	centimeter squared
DL-Tyr	DL-Tyrosine
EDTA	Ethylene Diamine Tetra Acetic Acid
ELISA	Enzyme Linked Immunsorbent Assay
He-Ne	Helium-Neon
IR	Infrared
J	Jouls
LLL	Low Level Laser
mg	Milligram
min	minute
mL	MilliLiter
mW	MilliWatt
NIR	Near Infrared
nm	nano meters
O.D	Optical Density
OEM	Original Equipment Manufacturer
PBS	Phosphate Buffer Saline
pH	power of Hydrogen
PMT	Photomultiplier Tube
R	Correlation confections
rpm	round per minute
sec	second
UV	Ultraviolet
UV/VIS	Ultra-Violet Visible spectroscopy
W	Watt
$\lambda$	Wavelength (Lambda)