

# DEDICATION

I dedicate this research to which I have always loved

my parents,

my family,

my teachers,

my friends

## ACKNOWLEDGEMENT

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## ABSTRACT

Low-power helium-neon laser recently has been used numerously in medical applications. FTIR and UV-Vis spectroscopic technique is employed to study the spectral differences in the serum of whole blood samples. Human Whole Blood was Irradiated to (He-Ne) laser ( $\lambda = 632 \text{ nm}$ , power = 2 mW) and (He-Ne) laser ( $\lambda = 632 \text{ nm}$ , power = 1 mW) with different times from 10 min to 100 min. Blood samples were collected from healthy volunteers; and exposed to (He-Ne) laser and compared with control. UV-Vis spectrophotometer and FTIR were used to study the effect of laser radiation. FTIR spectrum of non exposed blood showed the peaks due to O-H (free group), C=O (amide I group), N=O (nitro group), and C-H (aromatic group). N-H (Amino acid (amide II) for all exposure times He-Ne laser ( $\lambda = 632 \text{ nm}$ , power = 1 mW) irradiation, showed significant changes. Increased in transmittance was observed at different exposure times for all groups (C=O, O-H, N=O, C-O & C-H, N-H) and indicates significant decreasing in their concentration. The most effects are found when whole blood was irradiated to He-Ne laser radiation power 2 mW for 10 and 20 min and transmittance decreases for C-H, and He-Ne, while transmittance increase for all groups at rest of exposure times. Blood irradiated to He-Ne laser radiation power 1 mW for 80 min show decrease of transmittance for groups (N=O, C-H, N-H, C-O, O-H) but an increase for group C=O only is observed. Photodegradation of blood components due to absorption of laser radiation causes changes in the structure and conformational changes in the polypeptide. Human Whole Blood Irradiated to (He-Ne) laser ( $\lambda = 632 \text{ nm}$ , power = 2 mW shows, in Uv-Visible spectra a significant decrease in intensity. Result showed Blood Irradiated to (He-Ne) laser, power = 1 mW absorption intensity decreases for all exposure time except at (10, 40 and 70 min), this fluctuation of light absorption is known as a biphasic response.

## مستخلص البحث

تم استخدام ليزر الهيليوم والنيون منخفض الطاقة في الاونة الاخيرة بصورة واسعة في التطبيقات الطبية. تقنيات مطيافية الاشعة تحت الحمراء و الاشعة فوق البنفسجية والمرئية استخدمت لدراسة الفروقات الطيفية في مصل عينات الدم. تم تشيع دم الانسان بواسطة الليزر (He-Ne) بطول موجي 632 نانومتر وطاقة 2 ملي وات، والليزر (He-Ne) بطول موجي 632 نانومتر و طاقة 1 ملي وات، في فترات زمنية مختلفة 10 دقائق الي 100 دقيقة. تم تجميع عينات الدم من متطوعين اصحاء، تم تعريض العينات لليزر الهيليوم والنيون و تم مقارنتها مع العينات غير المعرضة لليزر. استخدم مطياف الاشعة تحت الحمراء و الاشعة فوق البنفسجية والمرئية لدراسة تأثير اشعة الليزر. اوضح طيف الاشعة تحت الحمراء لعينات الدم غير المشع قمم عند الزمر الوظيفية (O-H (free group)، C=O (amide I group)، N=O (nitro group)، و C-H (aromatic group). N-H (amide II) (Amino acid). ، لكل فترات التعرض لتشيع ليزر (He-Ne) بطول موجي 632 نانومتر و طاقة 1 ملي وات اظهرت تغيرات واضحة، زيادة في النفاذية في فترات تعرض مختلفة لكل المجموعات (C=O, O-H, N=O, C-O & C-H, N-H) وهذه اشارات الي نقص واضح في تراكيدها. التأثير الواضح وجد عند تشيع الدم بالليزر (He-Ne) بطاقة 2 ملي وات لفترة زمنية 10 الي 20 دقيقة وانخفضت النفاذية لكل من C-H و N-H ، بينما ازدادت النفاذية في كل الزمر في بقية الفترات الزمنية. اما الدم المشع بالليزر (He-Ne) بطاقة 1 ملي وات لفترة 80 دقيقة فقد اظهرت انخفاض في نفاذية المجموعات (N=O, C-H, N-H, C-O, O-H)، ولكن لوحظ زيادة في نفاذية مجموعة C=O فقط. التحلل الضوئي لمكونات الدم نتيجة امتصاص اشعاع الليزر يسبب تغير في تركيب و تغيرات تشكيلية في البولي ببتيدات و نقص الامتصاص. اظهر دم الانسان المشع بالليزر (He-Ne) طاقة 2 ملي وات و طول موجي 632 نانومتر في طيف الاشعة فوق البنفسجية و المرئية انخفاض واضح في شدة الامتصاص. كما اظهرت نتائج الدم المشع بالليزر (He-Ne) طاقة 1 ملي وات انخفاض شدة الامتصاص لكل الفترات الزمنية للتعرض (10، 40 و 70 دقيقة)، التذبذب في امتصاص الضوء فيما يعرف بالاستجابة ثنائية الطور.

# Content

No.	Title	Page
	Dedication	I
	Acknowledgement	II
	Abstract	III
	مستخلص البحث	IV
	Content	V
	List of tables	VIII
	List of figures	IX
<b>CHAPTER ONE</b>		
<b>INTRODUCTION</b>		
1.1	Background	1
1.2	Research problem	2
1.3	Precious studies	2
1.4	Objectives of thesis	7
1.5	Research methodology	8
1.6	Thesis layout	8
<b>CHAPTER TWO</b>		
<b>BASIC CONCEPTS</b>		
2.1	Introduction	9
2.2	Laser	9
2.2.1	Laser properties	10
2.2.2	Elements of laser	11
2.2.3	Laser types	13
2.2.4	Laser applications	16
2.2.4.1	Medical applications of lasers	17
2.3	Blood	20
2.3.1	Blood functions	25
2.3.2	Blood types	26

2.3.3	Blood test and results	27
2.4	Laser matter interaction	29
2.4.1	Reflection	29
2.4.2	Light scattering	30
2.4.3	Transmission	31
2.4.4	Absorption	31
2.5	Spectroscopy	36
2.5.1	UV/Visible spectrometer	38
2.5.2	Fourier Transform Infrared (FTIR )	40
<b>CHAPTER THREE</b>		
<b>EXPERIMENTAL PART</b>		
3.1	Introduction	43
3.2	Materials	43
3.2.1	Blood samples	43
3.2.2	Instruments	43
3.2.2.1	Laser power 1Mw	43
3.2.2.2	Laser power 2Mw	44
3.2.2.3	SP UV-26 spectrophotometer	44
3.2.2.4	FTIR spectrophotometer	45
3.3	Methods	45
3.3.1	Sample preparation	45
3.3.2	Sample exposure to Helium-Neon laser	46
<b>CHAPTER FOUR</b>		
<b>RESULTS AND DISCUSSIONS</b>		
4.1	Introduction	48
4.2	Results	48
4.2.1	UV/Vis spectra results	48
4.2.2	FTIR spectra results	55
4.3	Discussions	67

4.4	Conclusion	72
4.5	Recommendations	73
	References	74
	Appendix	80

## LIST OF TABLES

No.	Title	Page
2.1	Tissue changes with temperature increases	35
4.1	The Absorbance of normal and irradiated power 2 mW samples	48
4.2	The Absorbance of normal and irradiated to power 2 mW samples	49
4.3	The Absorbance of normal and irradiated power 1 mW samples	49
4.4	The Absorbance of normal and irradiated to power 1 mW samples	50
4.5	FTIR spectral data (wave number, function group and transmission) for normal blood control	55
4.6	Show the FTIR spectral data (wave number, function group and transmission) for irradiated blood sample power 2mW	56
4.7	Show the FTIR spectral data (wave number, function group and transmission) for irradiated blood sample power 2mW	58
4.8	Show the FTIR spectral data (wave number, function group and transmission) for irradiated blood sample power 1mW	60
4.9	Show the FTIR spectral data (wave number, function group and transmission) for irradiated blood sample power 1mW	62



## LIST OF FIGURES

No.	Title	Page
2.1	Laser system	13
2.2	Typical He-Ne tube and structure	15
2.3	3he components of blood	21
2.4	Red blood cell	23
2.5	White blood cell	24
2.6	Platelets	25
2.7	Laser matter interaction	29
2.8	Absorption of the main chromophore	33
2.9	Thermal zones after laser impact	36
2.10	Electromagnetic spectrum	37
2.11	Block diagram of UV/visible spectrometer	40
2.12	Fourier transform infrared spectrometer	41
3.1	He-Ne laser (632.8 nm, 1Mw)	43
3.2	He-Ne laser (632.8 nm, 2Mw)	44
3.3	SP UV-26 Spectrophotometer	44
3.4	FTIR Spectrophotometer	45
3.5	Blood sample	46
4.1	The relation between Absorbance (a) and wavelength ( $\lambda$ ) for whole blood before irradiated to ( He-Ne)laser	50
4.2	Relation between Absorbance (a) and wavelength ( $\lambda$ ) for whole blood before and after irradiated to (He-Ne) laser power 2 mW	51
4.3	Relation between Absorbance (a) and wavelength ( $\lambda$ ) for whole blood before and after irradiated to (He-Ne) laser power 2 mW	51
4.4	The relation between Absorbance (a) and wavelength ( $\lambda$ ) for whole blood before and after irradiated to (He-Ne) laser power 1 mW at difference exposure time 10,20,30,40 and 50 minute	52
4.5	The relation between Absorbance (a) and wavelength ( $\lambda$ ) for whole blood before and after irradiated to (He-Ne) laser power 1 mW at difference exposure time 10,20,30,40 and 50 minute	52
4.6	Absorption of light at 340nm with different irradiation time	53
4.7	Absorption of light at 340nm with different irradiation time	53
4.8	Absorption of light at 340nm with different irradiation time	54
4.9	Absorption of light at 340nm with different irradiation time	54
4.10	FTIR spectrum for normal blood samples (control)	64
4.11	FTIR spectrum for before and after irradiated blood to He-Ne laser power 2mW from 10,20,30,40 and50 minute	65
4.12	FTIR spectrum for before and after irradiated blood to He-Ne laser power 2mW from 60,70,80,90 and100 minutes	65
4.13	FTIR spectrum for before and after irradiated blood to He-Ne laser power 1mW from 10,20,30,40 and50 minute	66
4.14	FTIR spectrum for before and after irradiated blood to He-Ne	66

	laser power 1mW from 60,70,80,90 and100 minute	
4.15	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 2mW for 10 mine	80
4.16	FTIR spectrum for normal blood sample irradiated to He Ne laser power 2mW for 20 min	80
4.17	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 2mW for 30 min	81
4.18	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 2mW for 40 min	81
4.19	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 2mW for 50 min	82
4.20	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 2mW for 60 min	82
4.21	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 2mW for 70 min	83
4.22	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 2mW for 80 min	83
4.23	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 2mW for 90 min	84
4.24	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 2mW for 100 min	84
4.25	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 1mW for 10 min	85
4.26	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 1mW for 20 min	85
4.27	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 1mW for 30 min	86
4.28	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 1mW for 40 min	86
4.29	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 1mW for 50 min	87
4.30	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 1mW for 60 min	87
4.31	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 1mW for 70 min	88
4.32	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 1mW for 80 min	88
4.33	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 1mW for 90 min	89
4.34	FTIR spectrum for normal blood sample irradiated to He-Ne laser power 1mW for 100 min	89