EVALUATE THE TWO WAVELENGTH OF Nd: YAG (532-1064NM) LASER TO REMOVE THE TATTOO FROM HUMAN SKIN

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ABSTRACT

Nd:YAG laser wavelength (532-1064nm) was used tattoo removal. The result of treatment tattoo removal to different type. This laser is better than by using ER: YAG or IPL. By using this process the skin later are absorbed laser beam, especially in superficial treatment these laser532nm. Therefore, there are many different characteristic, which related to the skin layer, such as the thermal and thermal relaxation time (TRT) and the target (TRT) time, which is required for the heated tissue that used to lose about half of its heat.

Keywords: use of Nd: YAG Laser to treatment tattoo removal

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INTRODUCTION

However, the light of laser differs from normal lights, because it has (intensity, energy, tip,frequency) is high compare of normal light. The different type of laser such as (CO₂ (10600nm),Nd:YAG (1064nm),Er:YAG (2940nm). The effect laser ray in biological tissue is dependent on (wave length, tip, energy, frequency)\(^1\). The low the absorption coefficient is burns types is simple use Nd:YAG fraction in the treatment and the high absorption coefficient is removal tattoolotype is deep of the skin use Nd:YAG(1064nm) in the treatment. The use laser Nd:YAG(532-1064nm) in treatment removal tattooand vascular make temperature on the tissue we need to cooling system treatment region. The cooling system express cold air used temperature low on the tissue in figure (1). The laser parameters depend:-

Wavelength: - It preferable to select longer wavelength whenever possible. This is important for patients with darker skin. If short wavelength laser are used melanin may absorb. The laser energy intended for hemoglobin and result in depigmentation. Longer wavelength short may be suited for superficial tattoo removal; Pulse duration: - The pulse duration is determined by the thermal relaxation time (TRT) of the target [The time required for the heated tissue to lose about half of its heat]; Fluencies: - energy per unite area.A higher fluencies will be necessary if a target is deep within the dermis; Size spot: - larger spot size tend to have less scattering of the laser beam and deep dermal penetration; Frequency: - Number of the waves per time (HZ); Power density: - Number of photo energy of absorption by special cross section area of treatment tattoo under treatment time.
Experimental part

Q-switched principle of laser in tattoo removal

The basic of high quality switch laser the study that when the specific wavelength was sticks the chromophore and the pulse width at the same condition against the area study of the skin thermal relaxation time. The plasma generated by absorbed beam of laser [1]. This effect yield another mechanism are called acoustic wave by thermal effect in the skin [2]. The removal of tattoo depends on the specific color in table [1-3].

Table 1: The wavelengthspectrum of the different tattoo pigment colors, measure in nanometers

<table>
<thead>
<tr>
<th>Color</th>
<th>Maximum absorption (nm$^{-1}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>600-800</td>
</tr>
<tr>
<td>green- blue</td>
<td>570-800</td>
</tr>
<tr>
<td>Violet-red</td>
<td>500-570</td>
</tr>
<tr>
<td>Orange</td>
<td>420-540</td>
</tr>
<tr>
<td>Yellow</td>
<td>470-485</td>
</tr>
</tbody>
</table>

Table 2: The type laser different
### Type of tattoo

The Qs Nd:YAG laser (532-1064nm) are all used nowadays in the practices of dermatology. The color of the tattoo and the type of the skin that the patient has all are to be taken into consideration when deciding the perfect laser used for tattoo removal.

#### Black or blue tattoo

Black as well as blue can be treated by Q.S Nd:YAG (1064nm) in an effective way. This, however, due to the fact that there is an increase absorption by the epidermal melanin with this short wavelength and their resulted destructive treatment with the longer wavelength (1064nm). This results in minimal absorption by the epidermal melanin and let’s light comes in greater.

#### Green tattoo

Both the Q.S Nd:YAG wavelength (1064-532nm) is the considered to be effective in treating the green tattoos. The Q.S Nd:YAG laser is considered the modality of choice is regarded as effective for treating black, blue and green tattoos.

#### Tattoos colored light

Tattoos which are cosmetic or pale are more difficult to treat for they contain iron oxides and titanium dioxide. They may turn black directly after Q.S laser radiation. The reduction of ferrous oxide that is chemical although ablative laser also been success fall used in cosmetic tattoos.

### Selective photo-thermolysis

It is a term which first introduced by Anderson, and parish. This term is clearly refers to the objective of selective destruction of the tissue structure, by increasing the temperature which induced by source of light moreover, there are three types of significant parameters, can be taken into account, to achieve selective photo - thermolysic.

#### Wave length

It is the determines depth of the penetration, during the epidermis and dermis figure (2). The wavelength (532nm) is the superficial removal tattoo while wavelength (1064nm) the real length the range near infrared ray used of the deep remove tattoo. The used operation laser is the used application different (vascular lesion).
Pulse duration

It is determined by using the thermal Relaxation time (TRT).

Spot size

Refers to minimal scattering of the laser beam, and deep dermal penetration as shown in figure (3).
Cooling system

The cooling include air cooling or cool gels applied to the surface.

Determining variables tattoo removal

In order to figure out the response of rate of laser, it is important to understand the variable made in tattoo removal that is shown in figure (4). Three broad things are made. The laser that uses the phenotype and tattoo dependent factors that contains the size, type and depth of the tattoo, figure (4). The appreciated aspect of the tattoos removal is the role of the lost immune response that phagocytoses through the lymphatics ultimately [4-6].
CONCLUSION

Interaction of laser light with skin laser is electromagnetic beam with wavelength (532-1064nm). The incident rays are interact with surface skin and some part are reflected another part are penetration inside the layer of skin. The change refractive index between air and surface of the skin, another part of these rays are transmitted through the laser tissue of the skin. There are special complex used as a good absorption the two type (special and fractional). The wavelength from (532-1064nm). Most the application of laser depended essentially on the mechanism between electric dipole of filed beam and specific molecule. The kind of these interacted are: photo thermal effected when the laser stick the chromophore are absorbed by these molecule and raise temperature and density these tissue, and these operation depending on the kind of wavelength (532-1064nm). The absorption coefficient are deep as wavelength (1064nm). This middle age female presented with tattoo removal. In the (1st) cessation the removal is large and hard in consistency after (4cases). The removal smaller in size and safer in consistency and the ugly appearance become better especially. The Q-switched Nd:YAG (1064nm) is the used deep tattoo. While the wavelength (532nm) is the
superficial the tattoo. It is important to utilize the largest spot size possible when treating tattoo, as smaller spot size result in greater beam scatter, with resultant decreased depth of penetration the tattoo generally require four to six treatment and professional tattoos may need eight or move sessions.

ETHICAL CLEARANCE

The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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REFERENCES


