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## **Evaluation of the Effect of a Diode Laser on Wound Healing with Diabetic and Non-Diabetic Mice**

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### Purpose:

A preliminary human study has provided evidence that the Ceralas Diode Laser System enhances the healing of wounds. Our research was conducted in order to provide a more controlled study with an animal model.

### Materials and Methods:

A total of 150 mice, including 75 diabetic and 75 non-diabetic mice, were used. Each group of 75 mice had 5 subgroups of 15 mice, depending on the frequency of the treatment and power used. The five subgroups consisted of mice that received laser treatment at 5 Watts every 2 days, 5 Watts every 4 days, 10 Watts every 2 days, 10 Watts every 4 days, and control group which were wounded but received no laser treatment.

The mice were anesthetized, and their dorsum shaved and cleansed. Then, two full-thickness circular wounds were created on the back of each mouse, using a skin punch biopsy instrument (6 mm diameter). Both wounds at either side of the spine received laser treatment according to the subgroup to which the mouse belonged. During laser treatment, the energy was applied for one second at a distance of approximately one centimeter from the wound. The wounds were then covered with Tegaderm semi-

transparent dressing for four days. Five mice from each subgroup, including the control group, were sacrificed at 1, 2 and 3 weeks.

Two perpendicular diameters of each wound were measured on the day of wounding and at days 5, 12 and 19, using digital calipers, and the area of the wounds were calculated. The percentage of wound closure was then calculated for each wound based on the total area of the wound. The following formula was used:

$$\% \text{ wound closure on day } x = \frac{(\text{area on day } x - \text{area on day } 0)}{\text{area on day } 0} \times 100$$

Results:

The results of average percentage of wound closure and average percentage of wounds closed at the time of sacrifice for the diabetic mice are shown below. The results for the non-diabetic mice are still pending. Histological findings will be presented at a later time.

	% Wound Closure				% of Wounds Healed		
	Day 5	Day 12	Day 19		Day 5	Day 12	Day 19
5W x 2d	39.0	83.5	100.0		0.0	11.1	100.0
5W x 4d	25.3	71.5	91.2		0.0	0.0	30.0
10W x 2d	37.9	62.2	76.9		0.0	0.0	0.0
10W x 4d	42.6	83.6	88.4		0.0	0.0	12.5
Control	37.9	81.9	91.5		0.0	0.0	25.0

Discussion/Conclusion:

The results indicate that the wounds from all of the diabetic groups, including the control group, were reduced in size over time. The wounds that received 5 Watts of power every 2 days appeared to close the fastest. In addition, some of the wounds were completely healed by day 12, and all wounds were healed by day 19. Those receiving 5 Watts every 4 days seemed to close at a rate similar to the controls, but a greater percentage of the wounds were healed completely after 19 days. The wounds that received 10 Watts of power appeared to close the slowest. Treatment at 10 Watts every 2 days resulted in the lowest percent closure after day 12 and no wounds were healed completely after 19 days. Those wounds that received 10 Watts of power every 4 days showed that a lower percentage healed after 19 days, compared to the control group. Thus, treatment of diabetic ulcers at 5 Watts appears to enhance healing.