Experimental

THE EFFECT OF NON-CONTACT THERAPEUTIC TOUCH ON THE HEALING RATE OF FULL THICKNESS DERMAL WOUNDS

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ABSTRACT

The effect of Noncontact Therapeutic Touch (NCTT) on the rate of surgical wound healing was examined in a double-blind study. Full-thickness dermal wounds were incised on the lateral deltoid region using a skin punch biopsy instrument, on healthy subjects randomly assigned to treatment or control groups. Subjects were blinded both to group assignment and to the true nature of the active treatment modality in order to control placebo and expectation effects. Incisions were dressed with gas-permeable dressings, and wound surface areas were measured on Days 0, 8, and 16 using a direct tracing method and digitization system. Active and control treatments were comprised of daily sessions of five minutes of exposure to a hidden Therapeutic Touch practitioner or to sham exposure.

Results showed that treated subjects experienced a significant acceleration in the rate of wound healing as compared to non-treated subjects at day 8 (Mann-Whitney U; $z = -5.675$; $n = 44$; $p<.001$; 2 tailed), and at day 16 ($\chi^2 = 16.847$, $df = 1$; $p<.001$). Statistical comparisons are dominated by the complete healing of 13 of 23 treated subjects vs. 0 of 21 control subjects by day 16. Placebo effects and the possible influences of suggestion and expectation of healing were eliminated by isolating the subjects from the Therapeutic Touch practitioner, by blinding them to the nature of the therapy during the study, and by the use of an independent experimenter who was blinded to the nature of the therapy. The findings of this study demonstrate, at least, the potential for NCTT in the healing of full-thickness human dermal wounds.

Keywords: Wound-healing, dermal, therapeutic-touch, therapeutic-intent, healing

INTRODUCTION

This study examines the effect of Noncontact Therapeutic Touch (NCTT) on the healing rate of full-thickness dermal wounds in human subjects using a randomized, double-blind, placebo-controlled protocol. It is an extension of previous research by Grad, Cadoret & Paul[1] concerning the effect of a related unorthodox treatment method on wounds in a murine model. Therapeutic Touch (TT) has been defined as a healing process that is not religiously based and that relies upon the conscious intent of the TT practitioner to assist or to heal the individual. The process does not require a declaration of faith on the part of the subject in order for it to be effective[2]. The TT method was derived from the ancient healing practice of laying on of hands and was first formally conceptualized by Dolores Krieger, Ph.D., a registered nurse and professor at New York University. Dr. Krieger's pioneering work, which was based on the research findings of the laying on of hands method, postulated that TT achieved its effect by an interaction of energy fields between the practitioner and subject.

Initial experimentation on the laying on of hands process which was conducted by Grad, Krieger, and Smith utilizing a particular healer (Oskar Estebany) showed an increase in the rate of wound healing in mice[3]; an elevation of serum hemoglobin in humans[4,5,6]; an increase in activity of trypsin in vitro[7]; and acceleration in the growth rate of plants[8,9]. Subsequent research with other healers has confirmed that TT can elevate serum hemoglobin in humans[10], and also suggested that the method can induce a state of deep relaxation as indicated by alterations in EEG, EKG, and GSR[11], decrease "A State of anxiety" as measured by the Self-Evaluation Questionnaire STAI Form X-1[12,13,14], and decrease subjective measures of tension headache pain[15].

In 1982, Janet Quinn advanced TT one step further by taking the theoretical principle behind TT, that of an interaction of energy fields, and demonstrating that physical contact was not necessary for a healing effect to occur[13]. This noncontact approach to TT has been used in at least three other studies to date[16-18]. The present study differs from these reports by employing human subjects in a randomized double-blind

placebo-controlled protocol designed to study the effect of NCTT on the rate of wound healing of full-thickness dermal wounds.

The full-thickness wounds were administered by a medical doctor (Dr. M.) using a local anaesthetic and a skin biopsy instrument. The skin biopsy instrument was chosen due to the fact that it removes a precise, uniform, circular layer of cutaneous tissue which allows for an accurate measurement of wound perimeters. The healing of such cutaneous wounds involves a complex interplay of biological and extra-biological events. Due to the fact that blood vessels are disrupted after an incision is made in the skin, a brief period of vasoconstriction occurs, followed by a period of vasodilation. The skin edges then separate and various blood components fill the wound cavity. From this point, platelets release a host of biologically active substances such as soluble clotting factors, adenosine diphosphate, etc., which direct the subsequent states of healing[19]. Wound healing is traditionally classified into three types: primary, secondary, and tertiary[20]. This study deals with wounds that are left open due to adequate tissue loss and are, therefore, said to heal by secondary intention.

One of the factors to consider in cutaneous wound healing is the type of dressing applied. Current research indicates that wound healing is enhanced with the use of dressings which retain a moist wound environment[21-23]. The present study employed the use of polyurethane dressings because they permit oxygen and carbon dioxide transmission through the dressing material, while also maintaining fluid impermeability[24]. This feature was considered important in that the naturally moist environment of the wound was thereby maintained, which helped to prevent the formation of an eschar - i.e., a scab[20]. At the same time, the wound was shielded from external fluids and contaminants - for example, a shower would not adversely effect the rate of wound healing. This shielding provided a high degree of wound isolation which created an otherwise difficult to obtain level of control over the external influences on the wound. The dressings were extremely thin and could be worn without noticeable interference with motion or daily function. An additional advantage of using a dressing of this type is that it could be left on for an extended period of time without concern that the dressing would separate from the skin.

Of fundamental importance to research into the rate and quality of various forms of healing is the utilization of an accurate measurement system. Conventional methods of measurement include: 1) Direct Tracing; 2) Slide Photography of the wound with a rule in the picture to provide scale. It was felt that the Direct Tracing method was better suited to the current clinical setting due to the fact that it was both easily utilized by the doctor and unobtrusive to the patient. The method is a widely accepted and accurate measurement system for cutaneous wound studies. Tracing was performed by Dr. M. after the incision was made by using a transparent acetate plastic sheet. The acetate sheet was laid over the wound and the edge traced with a pen. The use of polyurethane dressings allowed for an accurate measurement of the actual wound perimeter and not simply a measurement of the perimeter of the eschar.

METHODOLOGY

The purpose of this experiment was to test the hypothesis that subjects who were treated by a Therapeutic Touch (TT) practitioner utilizing Noncontact Therapeutic Touch (NCTT) would have a faster rate of wound healing than the subjects who were not treated.

Subjects

Subjects were solicited from a university student population. Initially 175 subjects responded. An introductory interview was conducted by the experimenter for each of the 175 subjects. During the interview, subjects received a comprehensive verbal and written explanation of the surgical procedure being used and the potential minor medical complications inherent in such a procedure. They were kept blind to the actual experimental protocol, however, because it was decided that such information would bias the study and, therefore, mitigate the strength of any results obtained. Subjects voluntarily agreed to participate in the study knowing that it was a double-blind experiment and that there were certain aspects of the experiment that would be explained to them at a later date. In lieu of explaining the entire study, subjects were told that

the study was designed in a manner similar to Kirlian photography experiments conducted in the past. It was explained that the bioelectrical energy contained within the body could best be measured by removing a surface layer of skin which would allow the energy to flow freely from the body to an external monitoring instrument. No inference or suggestion was made to subjects that the current study was a healing experiment.

Subjects were told that the monitoring instrument would be located on the opposite side of a specially modified door and that they would neither hear the instrument nor feel any physical contact with their arm during the sessions. In addition, subjects were informed that, in order to comply with standard experimental procedure, the monitoring instrument and the data would be shown to them only after the experiment had been completed.

Of the initial group, 44 male students volunteered. All 44 participants were in good health and ranged in age from 21 to 32 years with an average age of 26. Subjects health was assessed during the introductory interview by questions pertaining to: (1) whether or not they were currently receiving treatment and/or drugs for a condition; (2) the participants' subjective analysis of their current health; and (3) whether or not they had been treated for a major medical problem within the last year. Based upon the answers given, all subjects were found to be in good general health.

Equipment and Facilities

A laboratory was constructed within a residential setting (Figure 1). The laboratory consisted of three main rooms, two of which were adjoining rooms separated by a specially modified door (Figure 1 detail). The modifications consisted of cutting a ten-inch circle in the center of the door which was then sealed by an occlusive rubber material that allowed for easy passage of the subject's arm, but which, at the same time, did not allow the subjects to see to the other side of the door. On both sides of the door, an additional one-quarter inch plastic sheet which covered the entire surface area was applied. Within Room 2 (Figure 1 detail), a platform was constructed six inches below the bottom of the hole in order

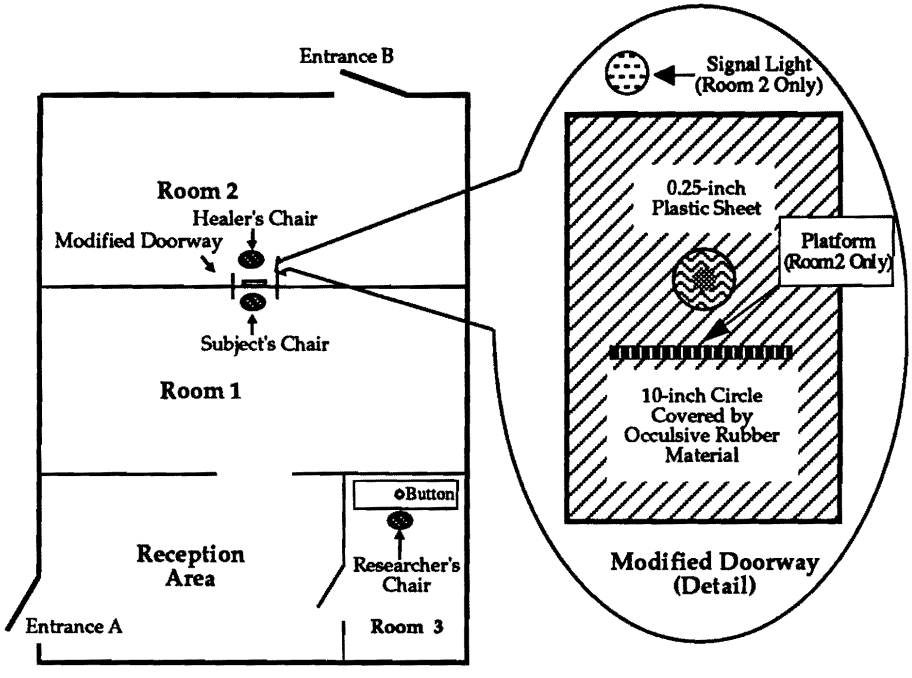

Figure 1. Laboratory setting including room detail.

that the subject's arm could rest comfortably for the five-minute session. Within Room 3 there was a button which turned on a light in Room 2. The independent experimenter (EI) activated this light with the belief that he was signaling for the commencement and termination of monitoring. It was, in fact, a signal to the TT practitioner to begin and to end the treatment sessions. Treatment sessions were timed at five minutes each using a stop watch.

Additional equipment used included: (1) A skin biopsy instrument; (2) Plastic acetate tracing sheets and a pen with which Dr. M. traced the wound perimeters; (3) Polyurethane dressings (Tegaderm); and (4) a Planix 5000 Digitizing Line-Area Meter used to measure the surface area of the tracings.

PROCEDURE

The 44 subjects who volunteered were randomly divided into treatment and nontreatment groups. Both groups possessed an equal distribution of subjects by age. The treatment and nontreatment groups were then each randomly divided into two additional categories: one designated to receive incisions in the right lateral deltoid, the other designated for incisions in the left lateral deltoid.

The initial block containing 12 treatment and 10 nontreatment subjects was to be run first, while the second block containing 11 subjects in both the treatment and nontreatment categories was to be run later. The initial block of participants were incised and treated for 16 days. For each subject an allotment of 20 minutes per day was allocated. This 20-minute time frame contained a five-minute treatment session for those in the experimental group, or a five minute nontreatment session for those in the control group. The additional 15 minutes was allotted for the introduction necessary upon the subjects' first visit to the laboratory, as well as for delays that might occur.

After the initial block had completed the 16th day of experimentation, the second block of 22 subjects were incised and treated in exactly the same manner. The order of incisions for all 44 subjects was randomly assigned prior to the commencement of the experiment. The first treatment sessions were scheduled to begin within one-half hour after the incision had been made. It was decided that for each treatment day, all treatment subjects would be run in succession in order to reduce the amount of time the TT practitioner would have to spend in the laboratory. Each treatment day was, therefore, divided into a morning and an afternoon session.

On the first day of the experiment, Dr. M. explained the skin biopsy procedure and inherent medical risks individually to the initial 22 subjects. The details of the surgical wounding process were fully disclosed and written consent obtained. Once the consent forms were completed, Dr. M. applied the local anaesthetic, biopsied, measured,

cleansed, and dressed the wounds. It was explained to Dr. M. that this was a double-blind experiment and that there were components of the experiment that would be explained at a later date. He was kept blind to the actual experimental protocol and was, instead, told that the experiment was similar to Kirlian photography and was designed to monitor the bioelectrical conductivity of the body. It was explained to Dr. M. that this type of energy could best be monitored by an opening (i.e., wound) in the lateral deltoid region. In addition, Dr. M. was told to trace the wound perimeters on Days 8 and 16 of the study in order to establish a correlation between the degree of wound closure and the bioelectrical measurements taken. At the time of incision, Dr. M. told the subjects that he would be removing and replacing the dressing twice -- on the 8th and 16th day of the study. He also advised the subjects not to touch or remove the dressings.

Subjects, after leaving the doctor's office on the first day and arriving at the laboratory, were guided to the treatment room (Room 1) by an independent experimenter (EI) who was also not informed of the actual experimental protocol. EI was told that the study was designed to monitor the bioelectrical conductivity of the body by a manner similar to Kirlian photography, and that an instrument would record the energy flowing from an opening (i.e., wound) in the subjects' lateral deltoid. In addition, he was informed that the instrument produced no noise and did not require physical contact in order to register a measurement. Once EI had guided the subjects into Room 1, they were asked to sit in a chair which was situated sideways against a door on the north wall (Figure 1). The chair's position was adjusted to correspond to the subject's wounded shoulder - either right or left. Directly beside the subject's shoulder was the ten-inch circle cut into the door (Figure 1 detail).

Once the subject was seated comfortably, EI informed him that the bioelectrical monitoring of the body would occur on the opposite side of the door and that nothing would be heard or felt by the subject due to the fact that the monitoring instrument did not produce any noise and did not need to touch the skin. The subject was not told whether or not a person was required to run the instrument. The subject was then

instructed to put his arm through the hole, rest it on the platform, and position himself so as to be as comfortable as possible. It was suggested that the subject sit quietly and remain relatively still for the brief five minute session. EI then left the room and entered an adjacent room (Room 3) wherein he pressed a button which turned on a small light within Room 2. After precisely five minutes had elapsed, EI pressed the button again which turned off the light in Room 2. EI reentered Room 1 and told the subject that the session was over. The subject removed his arm from the opening and left the laboratory.

EI followed the same procedure for all 44 subjects. He was not aware of the layout or physical contents of Room 2 due to the fact that his duties and instructions confined him to Room 1 and 3. This meant that, during the actual sessions, EI was isolated in a separate room (Room 3), and, therefore, was not in a position to observe whether or not any monitoring of the wounds occurred within Room 2.

On each morning of the experiment, EI and the TT practitioner met in the reception area of the laboratory (Figure 1). EI was told that he would be meeting with the technician who would be performing the monitoring within Room 2. The TT practitioner would enter Room 2 via entrance B and close the door (Figure 1). EI and the TT practitioner were instructed not to talk about the experiment during their morning meetings.

The TT practitioner was present in Room 2 only during the morning session due to the fact that all treatment group subjects were run at this time. No one monitored the TT practitioner during the treatment sessions due to the fact that the experimenter wanted to eliminate the possibility of external influences and to insure that the TT practitioner felt as natural and as comfortable as possible during the treatment sessions. In addition to possibly hampering the TT practitioner, it was decided that an outside observer would be an ineffective judge of whether or not the TT practitioner was actually performing a healing. The practitioner used in this study was a trained TT practitioner with approximately five years experience. She was not informed of the actual experimental protocol but was told that she would be performing NCTT

for five minutes per subject on approximately 11 subjects per day, and that the wounds would be on the deltoid region and covered by a polyurethane dressing.

During morning sessions, the TT practitioner saw the signal light turn on in her room and began to work on the wounded shoulder in front of her. When the signal light was turned off, she stopped the healing treatment. When all treatment group subjects were finished for a given day, the TT practitioner left the laboratory using Entrance B without the knowledge of EI. Therefore, on the occasions that a nontreatment group subject was present in Room 1, Room 2 remained empty. This meant that the nontreatment group subjects were seated with their arms through the opening with no one in Room 2. An empty room was considered preferable to having a nonhealer within Room 2 during the afternoon sessions because the possibility existed that such a person might unconsciously attempt to influence the healing.

For both the initial and second block of 22 subjects, Dr. M. traced the perimeter of the wound on Day 8 and Day 16 using the Direct Tracing method previously described. Dr. M. was instructed to make no comments whatsoever during the measurement, cleansing, and redressing procedure on these two days.

After all the sessions had been run, Dr. M. sent the wound tracings to an independent laboratory technician who was skilled in calculating surface areas of tracings using a Planix 5000 Digitizing Line-Area Meter. The surface area of each tracing was measured three times, and the resultant mean figures were forwarded to an independent statistician who was asked to analyze the data. After the statistical analysis had been completed, the experimenter interviewed the subjects, the TT practitioner, Dr. M., and EI independently.

Subjects were then informed of the actual experimental protocol and asked what their experience of the study had been. All reported that their experience had been positive and that, in fact, they were quite elated to have been able to assist in a study which they viewed as both very

interesting and of fundamental importance to the scientific knowledge of healing. Subjects were also asked: (1) whether or not they knew that this was a healing study; (2) whether or not they had felt anything touch their arm during the sessions; (3) whether or not they had heard anything from Room 2; and (4) whether or not they utilized any healing substances, medications, or techniques that might have influenced their rate of healing. All participants answered these questions in the negative. The experimenter then thanked the subjects for their assistance.

Upon interviewing Dr. M., the experimenter learned that no infection of the wounds had been detected and that the dressings had shown only the expected amount of wear and no signs of being tampered with, removed, and/or replaced. The experimenter then explained the experimental protocol to Dr. M. and thanked him for his invaluable assistance.

During the interview with EI, the experimenter verified the fact that EI and the TT practitioner had not discussed the experiment during their morning meetings, and that EI had not been aware of the fact that Room 2 was empty during the afternoon session. He was also asked at this time whether or not he had ever entered or looked into Room 2. EI answered that he had not. The exact experimental protocol was then explained to EI and he was thanked for his assistance in the study.

During the interview with the TT practitioner, the experimenter questioned her on: (1) whether or not she had discussed the experiment with EI during their morning meetings; (2) whether or not she had spoken to the subjects; and (3) whether or not she had touched the subjects. The TT practitioner answered all of these questions in the negative. After the experimental protocol had been explained, she was thanked for her very valuable assistance and time.

RESULTS

Due to the fact that the study was conducted in two sequential blocks, the wound size for the two blocks at Days 0, 8, and 16 was first compared. No

significant difference in the mean wound surface area for the two blocks was found. In addition, the data did not demonstrate a significant difference between the wound sizes for subjects receiving left lateral deltoid incisions versus the wound sizes for subjects receiving right lateral deltoid incisions. Therefore, the data were pooled for testing the main hypothesis of the study.

The results of the study are summarized in Table I. Immediately after the surgical wounds had been administered, the treatment group exhibited wounds averaging 58.88 mm^2 and the nontreatment group exhibited wounds which averaged 58.89 mm^2. There was no significant difference between the two groups (t = -.007; df = 42; p>.05; 2 tailed).

On Day 8, the wound sizes of treated subjects showed a standard deviation of 2.95 mm^2, while the wound sizes of non-treated subjects showed a standard deviation of 4.46 mm^2. The treated group, therefore, exhibited significantly less variation in wound sizes on Day 8 (F = 2.28; p<.05). In addition, the treated group had a significantly smaller average wound size than the nontreated group (3.90 mm^2 versus 19.34 mm^2)

Table I

MEAN AND STANDARD DEVIATION OF WOUND SIZES (mm^2)

	DAY 0	DAY 8 (a)	DAY 16
TREATED GROUP* (N = 23)	58.88 mm^2 (4.519)	3.90 mm^2 (2.958)	.418 mm^2 (.732)
NON-TREATED GROUP (N = 21)	58.89 mm^2 (4.369)	19.34 mm^2 (4.469)	5.855 mm^2 (2.952)

* 13 of the 23 Treated subjects (or 57%) had a wound surface area of 0.00 mm^2 on Day 16

(a) The groups differed significantly (Mann-Whitney U; z = -5.675; p <0.001; two tailed)

as assessed by the Mann-Whitney U test ($z = -5.675$; $n = 44$; $p < .001$; 2 tailed). The Mann-Whitney U test was used in lieu of the T-test due to the inequality of variances.

On Day 16, the treated group again showed substantially less variation in wound sizes than the nontreated group (.73 mm^2 versus 2.95 mm^2). This was due to the fact that 13 of the 23 treated subjects were completely healed -- wound size of zero. Table II shows the numbers of subjects in each of the two groups who were completely healed (as evidenced by full wound closure), or not healed on Day 16. There is a significant difference between the two groups ($\chi^2 = 16.847$; $df = 1$; $p < .001$). A standard χ^2 test of independence was used without Yates correction.

Table III presents the average improvement in wound size of the two groups on Days 8 and 16 as percentages of the original wound sizes.

Figure 2 charts the average wound sizes at the time of incision, Days 8 and 16 for both the treatment and nontreatment groups. The dotted line represents the nontreatment group, the solid line shows the treatment group.

Table II

AVERAGE WOUND SIZE IMPROVEMENT AS PER CENT (%) OF ORIGINAL WOUND TREATED AND NON-TREATED SUBJECTS FULLY HEALED ON DAY 16

$\chi^2 = 16.847$; $df = 1$; $p < 0.001$

	HEALED	NOT HEALED	
TREATED (N = 23)	13	10	23
NON-TREATED (N = 21)	0	21	21
	13	31	

Table III

AVERAGE WOUND SIZE IMPROVEMENT TREATED AND NON-TREATED SUBJECTS DAYS 8 AND 16

	DAY 8	DAY 16
TREATED (N = 23)	93.5%	99.3%
NON-TREATED (N = 21)	67.3%	90.9%

DISCUSSION

The significant results obtained in this study appear to indicate that NCTT is a highly effective healing treatment for full-thickness dermal wounds. The significant healing effect which occurred is clearly demonstrated by the data in Table I.

Within this table, Day 0 indicates the mean wound surface area for ing standard deviation (SD), on the day of incision. Due to the fact that all wounds were incised by a medical doctor at the same depth and diameter, only a small difference in mean wound surface area between the treatment and nontreatment groups is to be expected. Although the averages for the two groups were very similar, the wound surface area for individual subjects actually ranged from 52.29 mm^2 to 67.89 mm^2 -- which established that there was, in fact, a difference in individual wound closure rates.

The relative uniformity of wound type and mean wound surface area for all subjects on Day 1 (Table I) allowed the experimenter to accurately compare the amount of wound healing which occurred between the two groups. Had the study utilized subjects with preexisting wounds, a large number of confounding factors would have created an inconsistent dependent variable (wound size) which would have mitigated the strength of any results obtained. The current study, in contrast, contained a dependent variable (wound size upon incision) which was

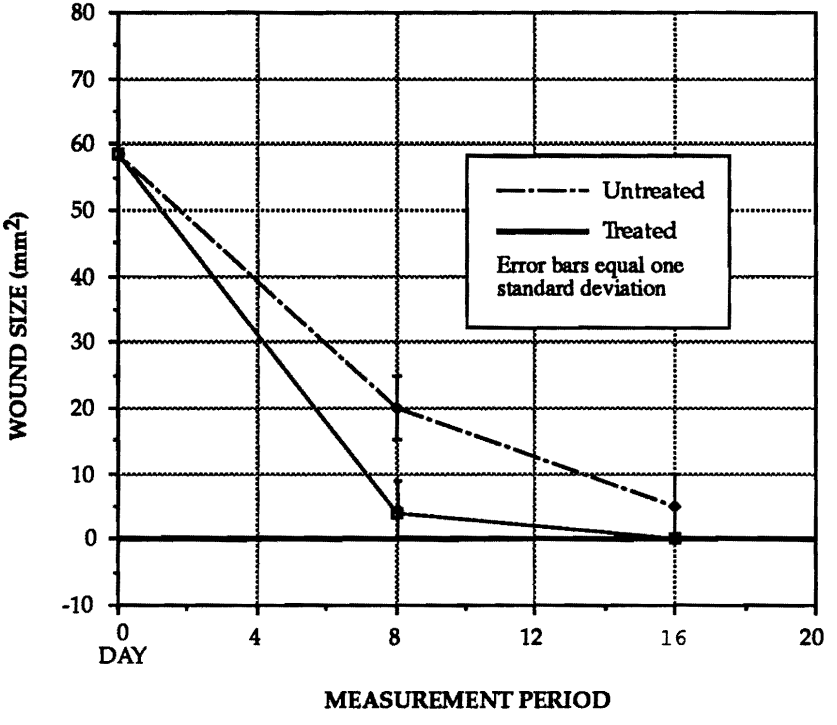

Figure 2. Average Wound Sizes (mm²) Days 0, 8, 16

relatively constant for both the treatment and nontreatment groups. This was demonstrated in column 1 (Table I) by the SD of the treatment group (4.51 mm²), and the SD of the nontreatment group (4.36 mm²). In consideration of the similarity of the SD figures, as well as the similarity of the mean wound surface areas for both groups, it can be concluded that the study contained a relatively constant dependent variable for all subjects on Day 1.

On Day 8 (Table I), the 23 treatment group subjects' mean wound surface area was 3.90 mm², whereas the 21 nontreatment group subjects'

mean wound surface area was 19.34 mm^2. The difference between the two groups was significant at the $p<.001$ level (Mann-Whitney U; $z = 5.675$; 2 tailed). Treatment subjects all possessed a single digit wound surface area on Day 8 (with one exception at 11.85 mm^2 and 3 at 0 mm^2 - or completely healed), whereas the nontreatment group subjects all possessed double digit wound surface area figures on Day 8. On Day 16, the mean wound surface area of the treatment group was .41 mm^2, whereas the mean wound surface area of the nontreatment group was 5.85 mm^2. The difference between the two groups was significant at the $p<.001$ level ($\chi^2 = 16.847$; $df = 1$). The large significance on this day was due, in part, to the fact that 13 of the 23 treatment group subjects (or 57%) were completely healed with a mean wound surface area of zero, whereas none of the nontreatment group subjects were completely healed. A comparison of the average improvement in wound sizes as a percentage of the original wound size can be found in Table III.

Under the Day 8 column, it is noted that the treatment group had an average improvement in wound size of 93.5% of the original, while the nontreatment group had an average improvement of only 67.3% of the original. On Day 16, the treatment group possessed an average wound size improvement of 99.3% of the original, whereas the nontreatment group had an average improvement of 90.9% of the original. The difference between the improvement rates for the treatment and nontreatment groups was statistically analyzed using the mean wound surface areas and found to be significant for both Days 8 and 16.

Confidence in the significant results obtained in this study is enhanced by the double-blind design which alleviated any bias in favor of the treatment group on the part of Dr. M., EI, and the laboratory technician. They were not only blind to the group assignments, but were also unaware of the experimental protocol due to the fact that they believed that the study was designed to monitor the electrical conductivity of the body by a process similar to Kirlian photography. The subjects were of a similar belief, while the TT practitioner was told that she would be performing NCTT on approximately 11 subjects per day without the subjects' knowledge. The result of this experimental design was that the

experimenter, who was not in a position to influence the experiment, was the only person who possessed knowledge of the actual experimental protocol.

Due to the fact that subjects were not aware that this was a healing study, as well as the fact that they did not attempt to influence the rate of healing, only the natural, unguided biological process of wound healing occurred. For treatment subjects, however, there existed the natural healing process with the addition of the NCTT performed by the TT practitioner. The biological aspect of healing which occurs naturally within a human population was, therefore, established by the nontreatment group and formed the control against which the rate of healing of the treatment group could be contrasted.

Traditional explanations used to dismiss the results obtained from alternative healing studies often include suggestion and the placebo effect. These explanations cannot be used for the current findings, however, because suggestion and the placebo effect were ruled out by research design. The present study eliminated the suggestion and expectation of healing from the interactions between TT practitioner and subject, subject and EI, EI and the TT practitioner by: (1) keeping EI and the subjects blind to the fact that a healing study was being conducted; (2) by limiting the amount of information transfer and physical contact between EI and the TT practitioner; and (3) by isolating the TT practitioner from the subjects with the use of a specially modified door (Figure 1 detail). The opening in the door effectively isolated the subject's arm while at the same time ensuring the elimination of confounds which often occur due to physical contact or communication between the practitioner and the subject. The physical separation of the TT practitioner and the subjects eliminated the possibility of nonverbal communication such as: eye contact, facial expression, breathing pattern, etc., which must be eliminated in order to preclude the possibility of suggestion. Thus, the significant results obtained in this study indicate that suggestion, expectation, and communication are not necessary for TT to be effective.

Clinically, suggestion and expectation are inherent ingredients in the placebo effect. That is, in order for the placebo response (or self healing) to occur, the subject must receive some type of suggestion — either overt or covert — that he/she is participating in a healing situation. The placebo effect is normally demonstrated in studies wherein the subject's condition improves even though they are given a treatment that is inert[25]. The subject's belief that he/she is receiving a treatment for a particular ailment has been suggested as the cause of the placebo response[26]. Since subjects in this experiment did not believe that they were receiving a healing treatment, and since they received neither overt nor covert suggestion of being participants in a healing study, the placebo response cannot account for the healing which occurred.

CONCLUSION

In conclusion, the mean wound surface area for treatment subjects in comparison to the mean wound surface area for nontreatment subjects was significantly smaller for both Day 8 and Day 16. The normal rate of wound healing was established by the nontreatment control group and compared to the rate of wound healing in the treatment group. The use of a double-blind design, as well as a specially modified door to isolate the TT practitioner from the subjects, added confidence to the results by precluding the role of suggestion, expectation, and the placebo effect. Due to the exclusion of these factors, and the elimination of contact or communication between the TT practitioner and subjects, it is indicated that such social and physical factors are not necessary prerequisites for an accelerated healing effect to occur.

This research design eliminated the influence of factors which most often confound the results of healing studies. It is concluded, therefore, that the significant results of the present study indicate that NCTT is an effective healing modality on full-thickness human dermal wounds.

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