

# Comparative Study of Micro-Amperage Neural Stimulation and Conventional Physical Therapy Modalities

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## INTRODUCTION

The tremendous strides of computer technology have greatly influenced nearly every aspect of society. The medical profession is certainly no exception. A computerized medical instrument for pain management, the Electro-Acuscope 80, is currently creating a great deal of interest within the health care professions. This relatively new instrument is making its way into the offices of doctors, therapists and psychologists. The Electro-Acuscope 80 is proving itself to be successful in relieving pain and promoting healing by using a pulsating electronic micro-current to read, analyze, then treat pathological areas of the body. Many professional organizations have chosen this electro-neural stimulator as their alternative to conventional methods of pain management. Among them are the Los Angeles Raiders, Walter Reed U.S. Army Hospital, Massachusetts General, Kaiser Hospitals, the Buffalo Bills, the Seattle Seahawks plus hundreds of private doctors, hospitals, universities, and physical therapists across the nation.

### *Background on the Instrumentation*

The Electro-Acuscope was developed in 1978. The instrument operates on the principle that every cell in the body produces a particular pattern of electrical charge which is altered when an injury occurs. This altered or abnormal pattern can be detected by sophisticated electro-vibratory circuitry as it monitors the cellular responses of a particular area of the body. It analyzes and then treats the problem area by sending out an appropriate corrective electronic signal. In essence, the Electro-Acuscope 80 is designed to communicate with the human body by receiving (monitoring) and transmitting corrective treatments based on equilibrium principles that are stored in unique integrated circuit chips and other discrete components. These complex components "acquire" the actual value or condition of the treatment area and then compare it to the desired norms or to the equilibrium principles. In effect, the instrument is designed to produce a state of homeostasis within the involved tissue by subtle electronic interaction.

The Electro-Acuscope 80 is actually an input/output device. Its micro-processors analyze and translate the electrical properties of a given tissue area into digital characteristics, which are displayed as a numerical L.E.D. readout on the front instrument panel. The information is received from the body through input terminals which utilize tips of a specially formulated bi-polar alloy. Moistened with an electrolyte solution, the probes are placed on the involved treatment zones. The required treatment either neutralizes or corrects any abnormal tissue responses through a series of brief stimulations.

The Electro-Acuscope 80 has been used to treat a wide variety of pain syndromes including back spasms, arthritis, tendonitis, bursitis, fractures, sprains, torn muscles and ligaments, and headaches.

### *Definition of Conventional Physical Therapy*

Physical therapy is a method of treating pathology with the aid of physical agents such as ultrasound, high voltage stimulation, hot packs and diathermy. The object of physical therapy is to bring about certain physiological responses by using a combination of these standard modalities and treatment procedures.

### *Review of Related Literature and Clinical Experience*

Researchers have been experimenting with the use of electricity in medicine for centuries.<sup>1</sup> Recently it has become apparent that an effective method of achieving pain control is transcutaneous nerve stimulation.<sup>2</sup> It has been shown that broken bones heal more quickly if treated with an electrical energy.<sup>3</sup> Other experiments have shown that patients treated with electrical stimulation while in a cast will have less muscle atrophy.<sup>4</sup> Modern electronic instrumentation has made it possible to provide stimulation with the most beneficial levels of current for maximum cellular ATP production and protein synthesis.<sup>5</sup>

Therapist Ron Siegel of Thousand Oaks, California, has worked with dozens of racquetball players, primarily treating musculo-skeletal problems in the elbow and shoulder. He uses the Electro-Acuscope to treat pain immediately post-trauma. Siegel states that 90% of his patients have been helped by the Electro-Acuscope. Further, he feels that 10% obtain excellent results, meaning they leave the office free of pain and the problem is nonrecurring. The other 80% obtain very good results, leaving pain-free but returning at a later time for another treatment or for a routine series of treatments. Only 5 - 10% of his patients appear unaffected by the treatment. Other physicians and therapists report similar results in terms of percentages.<sup>6</sup>

### *Hypotheses*

The following hypotheses were adopted for the purposes of this study:

- H<sub>a1</sub>: Patients treated with micro-amperage neural stimulation will require significantly fewer treatments to relieve pain than patients treated with conventional physical therapy modalities.
- H<sub>a2</sub>: The side effects associated with micro-amperage neural stimulation are significantly less severe than the side effects associated with conventional physical therapy.
- H<sub>a3</sub>: The total cost of treatment using micro-amperage neural stimulation is significantly less than the total cost of treatment with conventional physical therapy.
- H<sub>a4</sub>: The patients' ratings of the effectiveness of micro-amperage neural stimulation in pain control are significantly higher than the ratings of the effectiveness of conventional physical therapy.

## PROCEDURE

### *Experimental Design*

A two-group design was used in which a sample from a designated population was randomly assigned to one of two treatment procedures. The two groups consisted of an experimental group and a control group. The control group was treated with any one or a combination of the conventional physical therapy modalities. The experimental group was treated by one method only — micro-amperage neural stimulation utilizing the Electro-Acuscope 80.

## Sampling

In order to save time, reduce costs, and make the sampling process generally more convenient, patients from only one doctor's office were studied. The population consisted of patients seeking treatment for pain at the office of John J. Magrann, M.D. in La Palma, California. The patients were referred randomly to one of the two treatments by Doctor Magrann. The sample consisted of an N of 12 patients, 60 in the experimental Electro-Acuscope group and 60 in the conventional physical therapy control group. Only one therapist in each group was responsible for treatment of these patients.

## Data Collection

A questionnaire was developed to gather data on the effectiveness of micro-amperage neural stimulation and conventional physical therapy. The questionnaire asked the type of pain treated, the degree of pain before and after treatment, the age of the patient, the number of treatments required to relieve pain, the side effects associated with the treatment, the total cost of the treatment, and the overall effectiveness of the treatment. The questionnaires were administered by the therapists to all patients in the sample after the completion of their treatment programs.

The administrators assured respondents that all reports would remain confidential in order to encourage an honest response. As another means of motivating respondents to answer truthfully, the administrators explained to the patients that the questionnaire would be used in a comparative study for the benefit of other pain patients.

## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### Summary

The study was based on four hypotheses. A questionnaire was developed to obtain the necessary data. Included in the study were patients who received treatment for pain at the La Palma Medical Center with either the Electro-Acuscope 80 or conventional physical therapy. The null hypotheses and test results are discussed below.

The first null hypothesis stated that no significant differences could be found between Electro-Acuscope and conventional physical therapy patients with regard to the number of treatments required to relieve pain. This null hypothesis was tested using Chi-square test of statistical significance and was rejected at the 0.01 risk level.

The second null hypothesis stated that no significant difference could be found between Electro-Acuscope and conventional physical therapy patients with regard to the severity of side effects resulting from the treatment. Chi-square test of statistical significance was used. The null hypothesis was rejected at the 0.01 risk level.

For the third hypothesis, Chi-square tested the null hypothesis that there was no significant difference between the Electro-Acuscope and conventional physical therapy with regard to the total cost of treatment. The null hypothesis was rejected at the 0.01 risk level.

The fourth and final null hypothesis stated that there was no significant difference between the Electro-Acuscope and conventional physical therapy with regard to the patients' ratings of the effectiveness of the treatment. Chi-square test of statistical significance was performed, and the null hypothesis was rejected at the 0.01 risk level.

### Conclusions

The study suggests that the Electro-Acuscope 80 is significantly superior to conventional physical therapy in the following areas: number of treatments required to relieve pain, severity of side effects, total cost of treatment, and patient satisfaction with the treatment. These findings were tested using Chi-square test for statistical significance and was rejected at the 0.01 risk level.

The hypothesis stating that, "The total cost of treatment using micro-amperage neural stimulation is significantly less than the total cost of treatment with conventional physical therapy", was upheld in this study. This finding is particularly noteworthy since the cost of medical care has spiraled in recent years. Lowering the cost of treatments and reducing the number of treatments required are very

important considerations. Thus the hypothesis stating that, "Patients treated with micro-amperage neural stimulation will require significantly fewer treatments to relieve pain than patients treated with conventional physical therapy", has far-reaching implications. With less severe side effects and high effectiveness ratings, patient satisfaction with the Electro-Acuscope 80 over conventional methods of physical therapy is evident.

Micro-amperage neural stimulation appears to have considerable merit in the treatment of physical injuries. This concluding statement is based on the effectiveness hypothesis which, through the use of Chi-square, was found to be significant.

## Recommendations

The skill and experience of the therapist may influence the outcome of the treatment. This significant factor could result in the halo effect and placebo effect. This could account for some of the results found in this study. In view of this fact, a larger random sampling of therapists in each treatment group needs to be employed in future research to counteract this possible influence.

It is known that the greater the pain, the more difficult it is to obtain favorable results. For this reason, efforts should be made in the future research to utilize matched groups ensuring that both groups begin with similar levels of pain. In future research, the pre-test period, if properly controlled, can produce groups which are statistically similar in such aspects as area of involvement of type of pain requiring treatment. The time it takes to administer the various treatment procedures is another factor which might be taken into consideration in future studies.

\*Notes: See page 4 for copy of Data Collection Questionnaire.

Table and figures for the test of each hypotheses are presented on pages 3 and 4.

For further information regarding micro-amperage neural stimulation and the Electro-Acuscope, contact The Institute of Bio-Molecular Education and Research; 7132 B. Garden Grove Blvd.; Garden Grove, California 92683.

## REFERENCES

- <sup>1</sup>Kovacs, Richard A Manual of Physical Therapy (Philadelphia: Lea & Febiger, 1949), pp 13-17.
- <sup>2</sup>Shealy, C. Norman, "Six Years' Experience with Electrical Stimulation for Control of Pain." *Advances in Neurology*, 4:775-781, 1974.
- <sup>3</sup>Bassett, Andrew L.; Pawluk, Robert J.; and Philla, Arthur "Augmentation of Bone Repair by Inductively Coupled Electromagnetic Fields," *Science*, 182 (3 May 1974), 575-577.
- <sup>4</sup>Hinsenkamp, Bourgois, Basset, Chiabrera, Burny and Rvaby, "Electromagnetic Stimulation of Fracture Repair; Influence on Normal Healing of Fracture," *Acta Orthopædica Belgica*, 44 (1978), 671-198.
- <sup>5</sup>Cheng, Ngok, et al, "The Effects of Electric Currents on ATP Generation, Protein Synthesis, and Membrane Transport in Rat Skin." *Clinical Orthopedics and Related Research*, 191:264-271, Nov.-Dec., 1982.
- <sup>6</sup>Huey, Lynda, "RX for Winning — Electro-Acuscope", *Racquetball Illustrated*, 6 (March/April 1983), 12-13.

Table 1  
Distribution of Patient Responses to  
Number of Treatments Statement

Treatment Group	Number of Treatments			
	one	two to six	seven to ten	eleven or more
Electro-Acuscope	11 18.3%	29 48.3%	15 25.0%	5 8.3%
Conventional Physical Therapy	1 1.7%	12 20.0%	14 23.3%	33 55.0%
Total	12 20.0%	41 68.3%	29 48.3%	38 63.3%

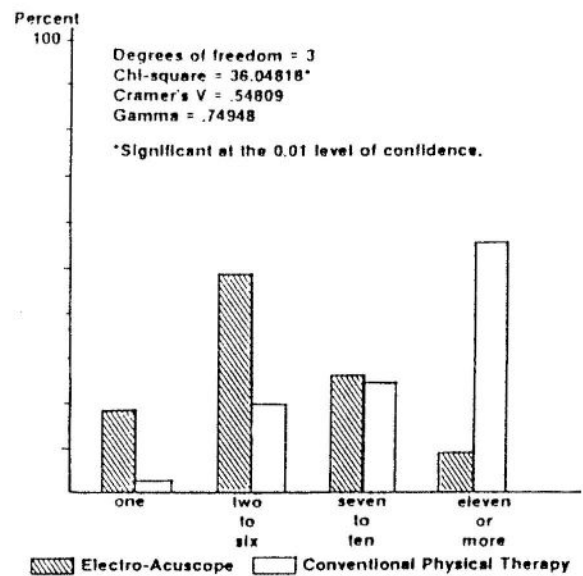


Figure 1  
Distribution of Number of Treatments  
Required to Relieve Pain

Table 2  
Distribution of Patient Responses to  
Severity of Side Effects Statement

Treatment Group	Severity of Side Effects			
	extremely severe	moderately severe	minimally severe	no side effects
Electro-Acuscope	0 0%	0 0%	9 15.0%	51 85.0%
Conventional Physical Therapy	10 16.7%	1 1.7%	11 18.3%	38 63.3%
Total	10 16.7%	1 1.7%	20 33.3%	89 148.3%

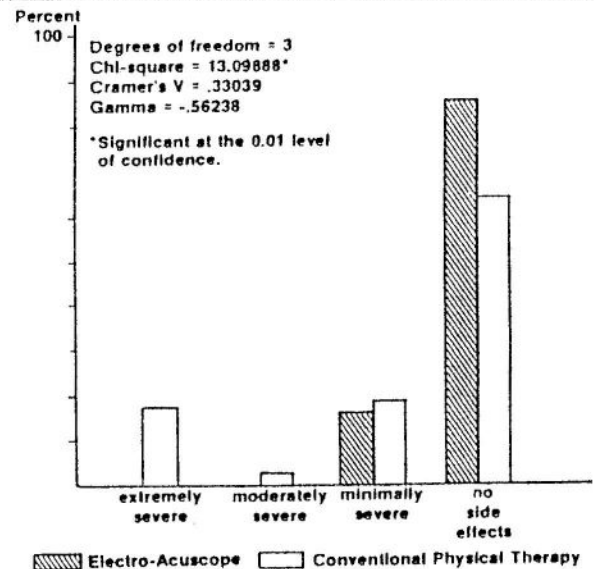


Figure 2  
Distribution of Severity of Side Effects  
Resulting From Treatment

Table 3  
Distribution of Patient Responses to  
Total Cost of Treatment Statement

Treatment Group	Total Cost of Treatment			
	0-\$50	\$51-\$100	\$101-\$150	\$151 and up
Electro-Acuscope	23 38.3%	17 28.3%	3 5.0%	17 28.3%
Conventional Physical Therapy	1 1.7%	6 10.0%	2 3.3%	51 85.0%
Total	24 40.0%	23 38.3%	5 8.3%	68 113.3%

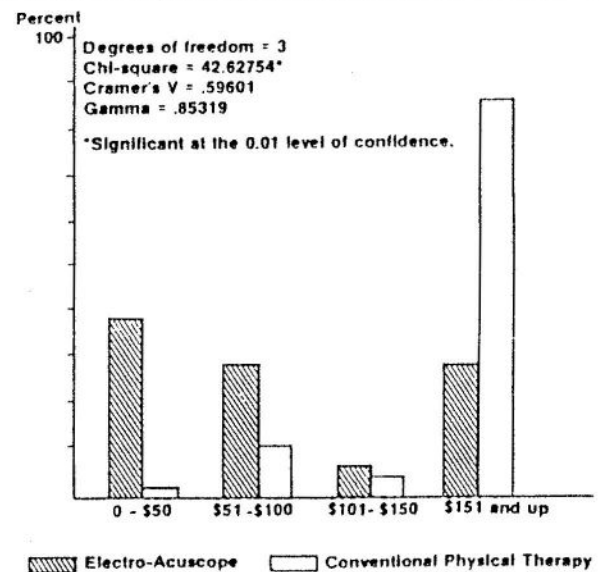


Figure 3  
Distribution of Total Cost of Treatment

Table 4  
Distribution of Patient Rating of  
Treatment Effectiveness

Treatment Group	Effectiveness Rating			
	Excellent	Good	Fair	Poor
Electro-Acuscope	41 68.3%	11 18.3%	7 11.7%	1 1.7%
Conventional Physical Therapy	25 41.7%	14 23.3%	13 21.7%	8 13.3%
Total	66 110.0%	25 41.6%	20 33.4%	9 15.0%

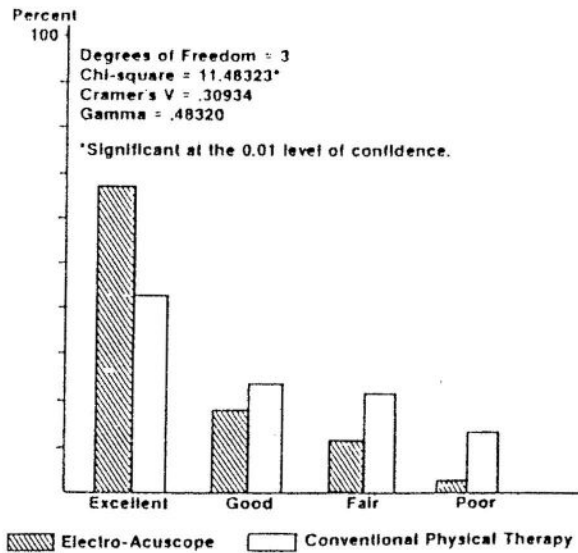


Figure 4  
Distribution of Patient Rating of  
Effectiveness of Treatment

### QUESTIONNAIRE ON PAIN CONTROL

**Instructions:** Please answer all questions as accurately as possible. Do not write or sign your name.

- For what type of pain were you treated? Please check one.
  - Headache
  - Joint pain
  - Muscle pain
  - Other, please specify \_\_\_\_\_
- Please use the following scale for the following 2 questions:
  - Mild pain, only aware of it at times when attention is brought to it.
  - Discomforting pain which may be ignored at times.
  - Distressing pain, but able to continue tasks.
  - Intolerable pain, concentration difficult, able to perform certain tasks of an undemanding nature.
  - Excruciating pain, often debilitating.
  - Degree of pain **before** treatment, (A, B, C, D, E)? Please circle one.
  - Degree of pain **after** treatment, (A, B, C, D, E)? Please circle one.
- What is your age group?
  - 0 to 24
  - 25 to 39
  - 40 to 54
  - 55 and over

- How many treatments did it take to relieve the pain? Please check only one.
  - one
  - two to six
  - seven to ten
  - eleven or more
- What were the side effects involved in using the treatments? Please list.
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
- How severe were your side effects from this treatment? Please check one.
  - extremely severe
  - moderately severe
  - minimally severe
  - no side effects
- What was the total cost of treatment? Please check one.
  - 0 - \$50
  - \$51 - \$100
  - \$101 - \$150
  - \$151 and up
- How would you rate the effectiveness of this method of pain control? Please check one.
  - Excellent
  - Good
  - Fair
  - Poor