

CHIROPRACTIC

The Journal of Chiropractic Research, Study and Clinical Investigation



Volume 2 Number 1

January 1989

Guest Editorial

Observations and Research of a Ph.D. in Chiropractic-Related Research

by Stanley Plagenhoef, Ph.D.

Published by

THE AMERICAN CHIROPRACTOR
MAGAZINE OF THE CHIROPRACTIC PROFESSION

5005 Riviera Court
Fort Wayne, Indiana 46825, USA

Observations and Research of a Ph.D. on Chiropractic-Related Research

by Stanley Plagenhoef, Ph.D.

My introduction to chiropractic took place in 1974 at the University of Massachusetts where I taught Biomechanics to 40 chiropractors for continuing education credit. My course was sports medicine oriented, and it became apparent that I had to become more knowledgeable about chiropractic to better relate to them. They cooperated to the extent that I was invited to observe them in action while at work, so I visited several of them. Some patients thought I was an inspector and would always tell me how much help they were getting, always praising the doctor.

After the classes were finished, I maintained a close relationship with Dr. Ken Harling of Worcester, Mass. and that was the second phase of my education. We found we could work together on many projects, so I did the motion analysis of performance and he did the treating of the patient. This worked well in industry, with athletes, and with the general public. We saw all the problems that develop from one sided sports such as tennis, golf, and bowling, and saw the low back injuries due to twisting and bending. The rebalancing of the musculature as well as the realignment of the skeletal structure had to be done together. Proper rehabilitation is now recognized as an integral part of chiropractic.

I gave several talks on sports injuries and on the work that Dr. Harling and I did together at several state conventions. These talks were also given at National College which introduced me to the third phase of my chiropractic education. The faculty and staff were very cooperative and gave freely of their time to give me an understanding of the curriculum and the special needs of a chiropractic education.

The conventions and continuing education talks also gave me the opportunity to meet many practicing chiropractors which gave me an idea of the diversity of work

going on. I watched Dr. Leroy Perry manually adjust marathoners to get them out of pain and back to normal as quickly as possible. I watched Dr. Leander Eckard use his special table for adjusting, and in some cases it seemed he barely touched the person to get desired results. Then I met Dr. George Goodheart who became a blessing in disguise. I had a left heel problem for several months that appeared to be a plantar fascia pull. He looked at it and corrected it immediately with hard rubbing of the abdomen and some kind of pressure on the right ankle. I couldn't believe what happened, and my wife said not to tell anyone about it because they will certainly think I'm crazy. Then I watched Dr. Ted Morter increase the range of motion of an arm that could not be raised overhead using no force, but only a light touch with both hands on the spine. At this stage I could only react with, "what is going on here?"

I had gained great confidence in chiropractic treatments and was sending my friends to get help. The first one had a knee operation and could not shake the accompanying pain. After many treatments and five years, he is still using a cane and is no better. I had filmed a local neighbor in Maine while she was running and found some problems that were causing a right knee problem. She saw Dr. Harling for a time, but we lost her to an exploding career where her problems continued. Joan Benoit went on to cap a brilliant career by winning the 1984 Olympic marathon. She had knee surgery and only two weeks to prepare for the qualifying race. She illustrates the power of the mind better than anyone I've ever known. I continued to see mixed reactions to chiropractic treatment, where some were helped immediately and immensely, while others seemed to get no help. Again I say, "what is going on here?"

Having retired from teaching, I did consulting work for a year with the PGA doing golf research with Gary Wiren. We analyzed hand strength relative to drive distance, and analyzed golf swings of the touring pros, as well as some older seniors, men and women. I did a five-month strength study for Nautilus using specialized research machines to measure progress. Then I designed an exercise machine to correct the faults that most exercise machines on the market were making, and to make it possible to do rehabilitation properly.¹⁰ This led to the collection of a great deal of data on total strength levels, and muscular balance or imbalance. Data was collected on extremely strong weight lifters, athletes in football, tennis, golf, water skiing, as well as computer programmers, high schoolers, and some non-active people. This was to lay the ground work for later work.

Having completed many of my projects, I was fortunate to be accepted as Director of Research at Parker

Address reprint requests to Stanley Plagenhoef, Ph.D., Parker College of Chiropractic, 300 East Irving Blvd., Irving, TX 75060.

College of Chiropractic where I could start investigating all these remarkable things that were happening to me. There are many methods used by chiropractors to evaluate a patient and adjust them, and most will say, "I've been doing it this way for years and it works." But how do you measure success? If you have relieved pain, you are successful, but if a patient must return 20, 30, or 50 times, the cause may not have been treated and total success was not attained.

Chiropractors have one thing in common, all are trying to restore balance to the skeletal structure. No matter what diagnostic technique is used, all are looking for the same end result: what vertebra must be adjusted? After that is determined, how do you correct the problem? This is where the diversity enters the picture. Even if ten chiropractors came up with the same evaluation, you will find several different adjustments used. With this in mind, research was done at Parker College to assess evaluation and adjustment methods.

The first project was to evaluate the vertebral column of the same patients using different doctors with different techniques. Motion Palpation, Gonstead, S.O.T., Activator, B.E.S.T., and a modified Diversified was used. They all located problems, but the results showed little consistency as to the location of the problems. The doctors were very cooperative, although it seemed that this was a competitive shoot out. It was done originally to determine how much time each doctor needed for each patient for a large scale study. It was readily apparent that this would be a useless project to pursue because evaluation without adjustment was not treating the body as a whole integrated system, and some techniques depend heavily on determining what changes have occurred due to adjustment.

The next project undertaken allowed both evaluation and adjustments. The main problem with this undertaking was to decide how to measure success. Only functional changes in the subjects were acceptable because they were measurable. This required instrumentation that could measure functional changes. Pain relief, increased range of motion, and the equalizing of leg length were not acceptable as verification for corrections, but considered only as good by-products of better function. Research to determine whether a bone has been moved, or to try to assess pain differences is difficult and measured changes could be more differentiating. Four methods were used to assess function changes:

1. Gait analysis
2. Neuromuscular testing
3. Energy changes of meridians
4. Strength changes

Gait analysis was done using two standard T.V.

recorders taking front, back, and side views. The analysis was done using a stop action VCR measuring joint angles, stride length, range of joint motion, and body positions. This is a good technique for showing that a functional change has taken place, and all techniques were successful in making some motion changes if the patient had limited range as a major problem. The manual adjustment of C4-5 and the B.E.S.T. method each showed an immediate dramatic change in the range of motion in different patients, but this technique of analysis of function is too limiting to use for differentiating chiropractic techniques because small changes are difficult to measure.

Neuromuscular testing was done using equipment to measure reaction time, dexterity, tap testing ability, coordination, and steadiness. Insufficient numbers of the patients treated did these tests, so functional changes could not be assessed for this study. In the future, these tests will be administered to many clinic patients to record changes over their period of treatment.

Energy changes were measured on the meridians of the fingers and toes using micro-amperage equipment. There were a few significant changes in the energy levels between pre and post treatment, but most of the patients showed no changes. The use of this equipment requires an experienced technician, and the data collected was not easily interpreted. The information may prove to be useful in the future, but it was discarded for this study.

Changes in strength were measured using six electronic research machines originally designed by Nautilus. They gave a digital force readout of a strain gauge continuously throughout the range of motion when used dynamically or in any position for static strength testing. The force was measured separately for each arm or leg. These machines were the most accurate means of the four methods for measuring functional changes in the body. Variations of static strength before and after adjustments were done on at least four of six machines that measured elbow flexion and extension, knee flexion, and extension, hip flexion, and arm horizontal adduction (chest). A major project using 70 subjects had been done previously using these same six machines, and it was found that the mean variation in test, re-test measurements was 6%, with a maximum range of 12%. These data were gathered on immediate repeats, 1/2 hour intervals, on the next day, after varying amounts of warm up, and on different times of the day. Therefore, any significant changes due to chiropractic treatment had to exceed 12%.

An experiment was first done to determine the affects of the testing on the adjustments. It was found that the method of testing did indeed change the adjustment. A general pattern emerged regardless of the chiropractic

method used.

If a non-symmetrical, (use of one arm or leg) high force exertion was used during the strength testing, the adjustment did not hold in most cases. This means that both arms or legs had to have the same joint angle, and both had to be contracted simultaneously even though only one was being measured. Therefore, all tests were done in a mid joint position with the force being exerted as equally as possible with both limbs. If only low forces were exerted, the adjustments were not nullified during non-symmetrical use. This information is not only important for testing, but it shows that all twisting motions and all forceful one sided motions must be avoided following chiropractic care. Simply walking out of the office and pulling hard to open the door could undue the adjustments just given. Certainly patients should be told not to do one sided chores like shoveling, one arm reaching doing housework, playing tennis, golf, bowling, or any throwing for one or more days. It is equally important to start rehabilitation to reestablish muscular balance to correct the imbalances brought on by the one sided exertions or the original problem will only continue to reoccur.

If a strength change was to be made with an adjustment, the patient had to show a significant weakness in the pre testing. Previous research showed that the dominant side of the body was usually 2% to 8% stronger than the non dominant side. This had to be considered when finding patients for testing who had muscular imbalances. If the dominant side measured stronger than an 8% difference, the patient was probably weak in the non dominant side. If the dominant side was the same or weaker than the non dominant side, the patient was considered to have a problem.

The chiropractic methods were limited to 1. Manual, 2. Activator, and 3. Bio Energetic Synchronization Technique (B.E.S.T.). This was necessary to get sufficient patients measured after each adjustment, and because the three represented a hands-on, an instrument (low force), and a nonforce technique. The manual adjustment technique selected for the comparison was a specific thrust with the thumb on the transverse or spinous process. Every bone in the body has a possibility of being out of alignment in 12 specific directions. All vertebral bones were challenged and adjusted using this technique on nine patients. Some of the subjects were treated by the same chiropractors, using the activator adjuster, making the corrections in the same directions as the thumb thrust would have been. The leg length was used to judge corrections, and it was found that the activator made the same changes in leg length as the thumb thrust. The 12 directions of misalignment and the challenges are given in Appendix A, and Figures 1-6. Only two of the nine pa-

tients had significant muscular imbalance on the pre test, and both increased their weak side strength level immediately after the adjustment by 13% and 17%.

An additional nine subjects were evaluated and adjusted using the Activator technique. The leg length, both up and down, in conjunction with specific muscular contractions, to elicit changes in leg length, was the basis for treatment. The specific direction of adjusting using the activator adjuster is always in the direction of the facets. When the adjustment is measured with a force transducer placed on the same soft tissue, a thumb thrust records 8-10 lbs. in about 1/10th of a second, and the activator records about 5 lbs. in about 1/200th of a second. Three patients having a muscular imbalance were improved from 14% to 16%.

The B.E.S.T. method was used on 14 patients. This is a non-force method based on getting a patient out of a defensive mode, which is an inappropriate state of muscular tension due to our fight or flight heritage, and then treating the total body by balancing the bio-magnetic field using several non-force techniques including thoughts. During several levels of adjustments, there is no applied force on a bone with the hands or an instrument. Four of the patients had a muscular imbalance that was immediately corrected with increases from 15% to 22%.

All three methods use the measurement of the leg length to determine whether the patient has been adjusted properly. There is nothing magical about adjusting until the legs are even, but many chiropractors use this technique to indicate that an adjustment has been made. Therefore, measured functional changes remain the criteria for deciding whether the adjustment techniques actually did something worthwhile. The hand challenge to the vertebra, as well as skin strokes and twists, changed leg length manually. Certain muscular contractions acting on the vertebra were used during the Activator method to change leg lengths. While the B.E.S.T. method used the several adjusting techniques in conjunction with leg length and arm testing to assess the adjustment. Apparently, small and unwanted muscular contractions along the vertebra or in the abductors or adductors of the leg cause a pelvic imbalance which shows up in the leg length. When the knees are bent to 90 degrees, the leg length can be different due to abnormal muscular tension in the hip extensors. This means that all three techniques strive to reduce these abnormal tensions to get the legs even.

It now became apparent that there was much more to consider than a comparison of methods. The main point that emerged was that a low force or no force adjustment was successful in creating an immediate, significant, measurable change in function. This means that the force

applied is not the moving force of a bone, but all chiropractic methods of correction have another common bond.

Apparently, regardless of the technique used, signals are being sent to the sensory nervous system to have the muscles of the body make the adjustments necessary to bring the total body back into balance. The immediate strength corrections, while using all techniques, indicates that the nervous system is involved and that the muscles were not actually weak. However, it is also true that if an existing muscular imbalance is not corrected by adjustment, exercises for balancing the body are necessary because the nervous system is fully functional. Manual pressure and the force of the activator is simply sending the proper signals to the body rather than actually moving the bone due to pressure itself. This means that the research of the future must be related to the body's electromagnetic field, and how the methods of adjustment as well as all soft tissue work, acupuncture, lymphatizing, massage, nutrition, or the use of modalities affect this field.

A great deal of work has already been done relative to the bio-magnetic field, but it is not fully understood nor is the magnetic flow mapped so better techniques of evaluating and treating can be done. Dr. Becker¹ was the first of several to heal bones with electrical coils surrounding injured tissue. Dr. Davis and Rawls^{5,6} started working on the effects of magnetism on the body 50 years ago, and Dr. Callahan⁴ has shown how the body is paramagnetic (a receiver) absorbing monopoles from the magnetic energy of the sun. The articles on the body's magnetic field are too numerous to list here, but the references by Dr. Nakagawa⁸ and Dr. Burr³ would be a good starting point for those interested in learning more about magnetism relative to health care.

Dr. Morter⁷ is the originator of the B.E.S.T. method. His initial work on a patient is similar to Dr. Benson's² in that both use the power of the mind to reduce muscular tension. Dr. Morter finds it is necessary to eliminate defensiveness before treatment can be successful in balancing the bio-magnetic field, and Dr. Benson uses the mind to control high blood pressure which is an instigator of chronic degenerative diseases.

The activator sends signals so rapidly that the body does not become defensive due to treatment, while a slower, more forceful manual adjustment apparently can cause a defensive mode that can nullify the adjustment. We found this to be true with some of the patients who only got up and walked, and again showed leg imbalances. Knowing that all methods of treatment initiate body responses through the sensory nervous system, and that signals can be sent to the body in various ways that need not be manual, additional research was done by Dr.

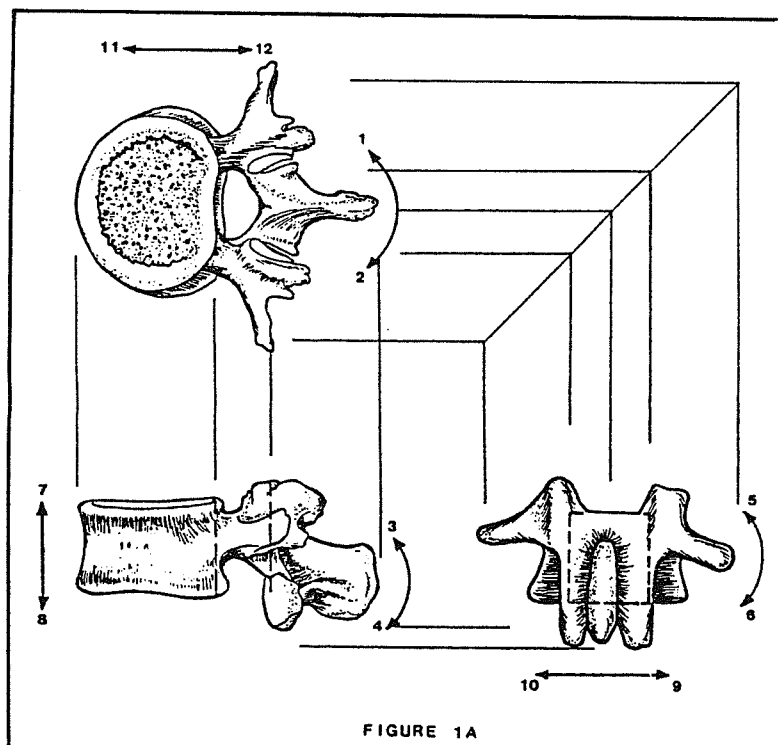
Duane Barr and Dr. Dave Morgan.

Instead of using the manual pressure, they used a tuning fork. They found that adjustments (changes in leg length) were made if the tuning fork was held in line with the direction they would have used manually, and held about one inch from the body. They tried random waving, revolving the fork, and different frequencies, but they were the most successful when the fork was in line with the vertebral column, and at the frequency of 512. These experiments were done only to find out if bodily changes could be elicited by a method other than those traditionally used. This also supports the premise that future research must be related to the affects of the adjustments relative to the bio-magnetic field.

Instead of finding out what was intended, a much more important fact was discovered. Chiropractic is more unified than many believe, because everyone is working on the bio-magnetic field regardless of the technique used. All the methods are effective to some degree, with the low or no force techniques seemingly more effective than manual from the evidence gathered. The correct signals through the sensory nervous system, while not initiating a defensive mode, will produce the balancing of all the systems of the body as well as produce proper skeletal alignment. When more is known about the flow of this field, even better techniques of evaluating and treating will become available. It appears that there is much more to chiropractic than just moving the bones, so I now have a mission in life to find out - what is going on here?

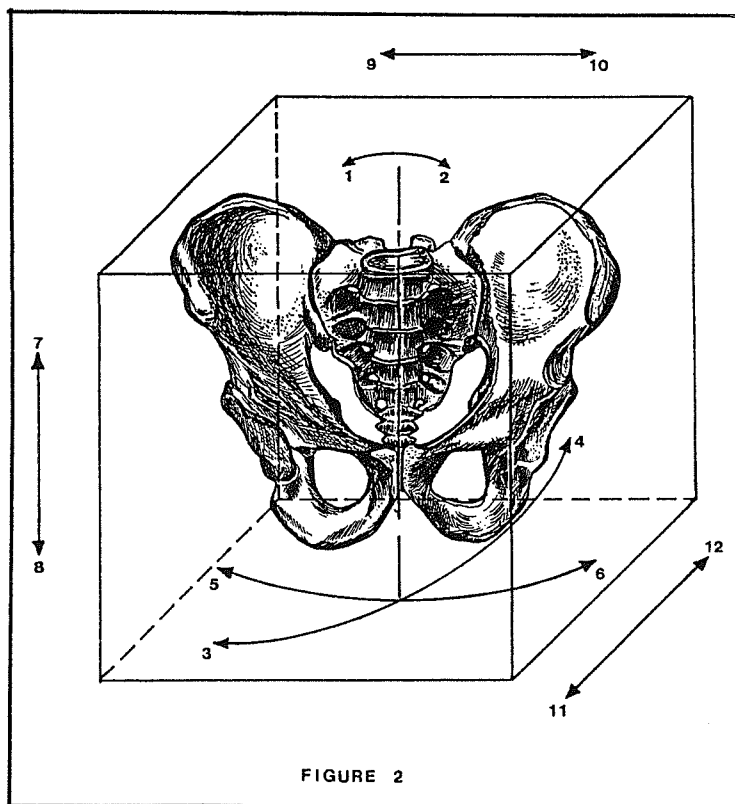
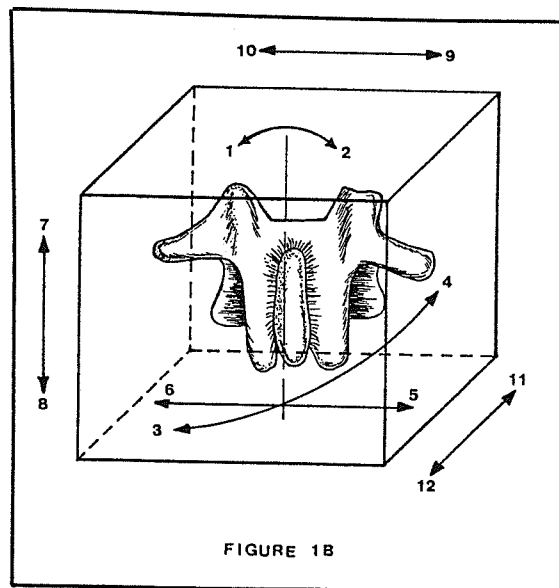
References

1. Becker, Robert and Selden, Gary. 1985. *The Body Electric*. William Morrow, New York.
2. Benson, Herbert. 1985. *Beyond the Relaxation Response*. Berkley Books. New York.
3. Burr, Harold S. 1982. *Blue Print for Immortality*. Neville Spearman, London.
4. Callahan, Philip S. 1984. *The magnetic life of agriculture. Ancient Mysteries, modern vision*. Acres U.S., Kansas City, Mo.
5. Davis, Albert and Rawls, W.C. 1984. *Magnetism and Its Effects on the Living System*. Exposition Press, Smithtown, N.Y.
6. Davis, Albert and Rawls, W.C. 1979. *The Magnetic Blueprint of Life*. Exposition Press, Hicksville. N.Y.
7. Morter, M.T. Jr. 1988. *Chiropractic Physiology*. Best Research Inc., Rogers, Ark.
8. Nakagawa, Kyoichi. 1976. *Magnetic Field Deficiency Syndrome and Magnetic Treatment*. Japan Medical Journal No. 2745.
9. Plagenhoef, Stanley. 1985. *The Rhythm of the Universe. Biomechanics in Sports II*. Edited by Juris Terauds, Academic Publishers, Del Mar, Cal.
10. Plagenhoef, Stanley. 1987. *Anatomy for Rehabilitation*. Bennett Ergonomic Lab., Largo, Florida.



Mal-Alignment of a Single Bone
Vertebral Column and Sacrum
(Figure 1a, b, and 2)

1. Rotation - spinous process right.
2. Rotation - spinous process left.
3. Tilt - spinous process upward.
4. Tilt - spinous process downward.
5. Wedging - right transverse process upward.
6. Wedging - left transverse process upward.
7. Translation - total body moves laterally upward.
8. Translation - total body moves laterally downward.
9. Translation - total body moves laterally right.
10. Translation - total body moves laterally left.
11. Translation - total body moves forward.
12. Translation - total body moves backward.



Total Pelvis and Sternum
(Figure 2)

1. Rotation about mid vertical axis - right side forward.
2. Rotation about mid vertical axis - left side forward.
3. Tilt - distal end forward.
4. Tilt - distal end backward.
5. Wedging - distal end right. Iliac crest high right.
6. Wedging - distal end left. Iliac crest high left.
7. Translation - total bone moves upward.
8. Translation - total bone moves downward.
9. Translation - total bone moves laterally right.
10. Translation - total bone moves laterally left.
11. Translation - total bone moves forward.
12. Translation - total bone moves backward.

Long Bones

Humerus, Radius, Ulna, Carpals, Metacarpals,
Femur, Tibia, Fibula, Tarsals, Metatarsals, Phalanges,
Scapula, Half of Pelvis (Ilium)
(Figures 2, 3, and 4)

1. Medial rotation.
2. Lateral rotation.
3. Tilt - distal end forward.
4. Tilt - distal end backward.
5. Wedging - distal end outward.
6. Wedging - distal end inward.
7. Translation - total bone moves upward.
8. Translation - total bone moves downward.
9. Translation - total bone moves laterally outward.
10. Translation - total bone moves laterally inward.
11. Translation - total bone moves forward.
12. Translation - total bone moves backward.

Ribs and Clavicle

(Figure 5)

1. Rotation about horizontal axis - anterior side downward.
2. Rotation about horizontal axis - anterior side upward.
This also applies to the posterior rib attachment.
3. Tilt - movement forward with axis at either rib joint or wither end of the clavicle.
4. Tilt - movement backward.
5. Wedging - movement upward with axis at either rib joint or either end of the clavicle.
6. Wedging - movement downward.
7. Translation - total bone moves upward.
8. Translation - total bone moves downward.
9. Translation - total bone moves laterally outward.
10. Translation - total bone moves laterally inward.
11. Translation - total bone moves forward.
12. Translation - total bone moves backward.

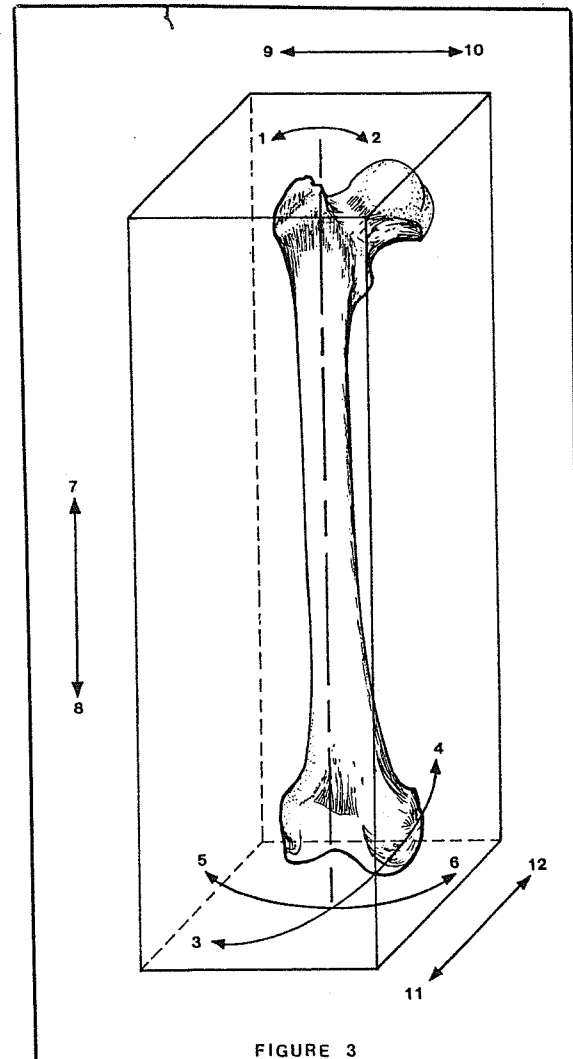


FIGURE 3

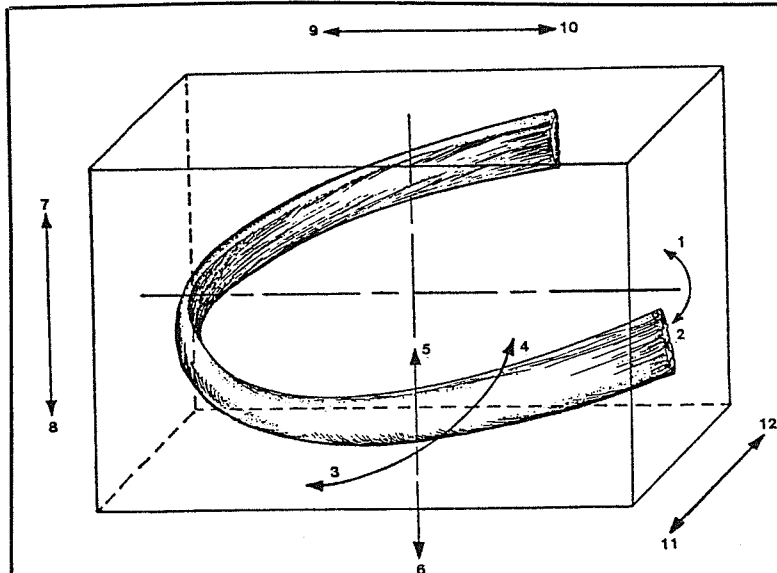


FIGURE 5

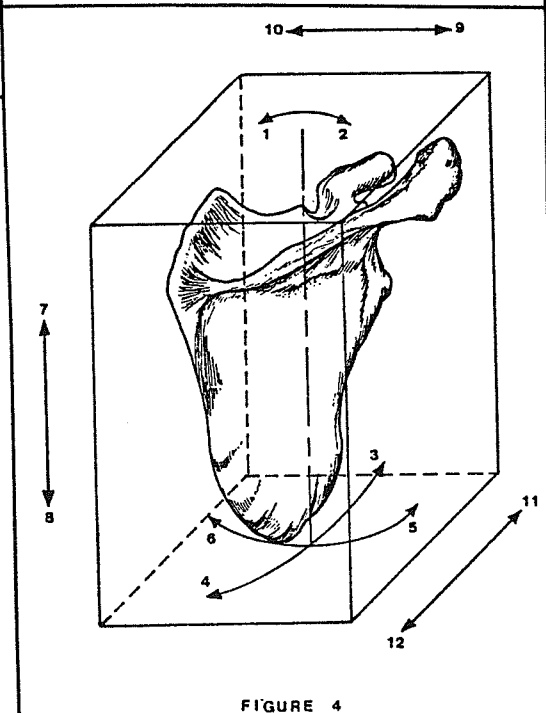


FIGURE 4