CENTRO DE REHABILITACION INFANTIL TELETON OCCIDENTE

Gait analysis and human movement laboratory

TRAMA Project

Movement analysis in upper limb.
Standarization in Mexican population

Approach to the problem

- During clinical practice, aspects and conditions obtained either through observation or the application of tests with subjective values are taken into account when evaluating the patients, and that only allows us classify the health condition of the person being evaluated.

- The upper limbs are basic for the development of various activities, and some are very essential such as, eating, grooming and writing. When one of these functions is affected, involving any or all of the segments that make up this joint appendix, it is committed to a significant degree of independence of the individual.

Shunichi Henmi, Kazuo Y., Takashi M. A biomechanical study of activities of daily living using neck and upper limbs with an optical three-dimensional motion analysis system.

Approach to the problem

- We know that the upper limb is well studied in terms of its anatomy, physiology, biomechanics and functionality, and that has also developed specific tests for clinically classifying some degree of disfunction, allowing the therapeutic treatment to follow.

- But with the possibility of objectively measuring the movement of this part of the body and establishing a parameter of normality. We believe it is important to obtain numerical values that serve as a standard in evaluating the movement of the upper limb.

- In the revision made, I have not found a study conducted as standardization of mobility values in the upper limbs in healthy adults.

Ramos E., Michel P., Eduard A. Quantification of Upper Extremity Function Using Kinematic Analysis. Arch Phys Med Rehabil. Vol. 78 1997.

- For the above reasons, the following questions are made :

- Is there a standardization of the upper limb mobility?
- Are they the same values in the movements of the left and right?
- Are they the same movement values as those reported in other countries?

Justification

- The upper limb is the man's basic tool, indispensable for the development of some other tools.
- A person in their daily routine and in the performance of any professional job has required and will require of either his arms or his hands.
- It is necessary, directly or indirectly for the performance of virtually all daily routine activities.
- The assessment portion of this body has had man busy for a long time, in the desire to obtain a more accurate measurement of the function of it. This is possible in normal conditions, and in processes that hinder their proper job.

C. Anglin, U. Wyss. Review of arm motion analyses, Proc Instn Mech Engrs Vol. 214 Part H. Imech E 2000.

Justification

- As already mentioned, some tools have been developed with which we can assess the movement in an objective form. For about 20 years up to now, it has been insisted on the creation of protocols for the measurement of the upper limb, with which it is obtained target values of mobility under various conditions, whether in health condition or that compromises any disease process or sequel.

- This is why it is considered important to obtain the measurement of upper limb movement and to standardize it in the Mexican population.

- So far, It has not been encountered studies previously carried out on this topic in our country, and those in other countries include few subjects.

C. Anglin, U. Wyss. Review of arm motion analyses, Proc Instn Mech Engrs Vol. 214 Part H. Imech E 2000

- This study is aimed at analyzing the movement of upper limb in healthy subjects, obtaining according to the protocol designed, the standard in the arc of motion and parameters of time.

- It also intends to see if there is a difference between the values of right and left side of upper limb, each subject evaluated, and to compare the results with those of other previous studies.

Overall objective

- To standardize the values of movement of upper limb obtained through a functional test.

Specific objectives

- To standardize the kinematics of shoulder, bilaterally.
- To standardize the kinematics of the elbow, bilaterally.
- To standardize the kinematics of the wrist, bilaterally.
- To describe the speed of execution, bilaterally.
- To compare the kinematics of right and left shoulder.
- To compare the kinematics of the right and left elbow.
- To compare the speed of right and left.
- To describe the muscle activity agonist antagonist in flexo extenders elbow.
- To describe the muscle activity agonist antagonist flexo extenders wrist.
- To compare the obtained values with parameters established in other countries.

Hypothesis

- Alternating: The parameters of mobility upper limb are similar to those reported in other studies.
- Alternating: There is no standardization of values of mobility in upper limb in the Mexican population.
- Alternating: The parameters of mobility of upper limb are similar in right and left.
- Null: The parameters of mobility upper limb are not different to those obtained and reported in other studies.
- Null: There is no difference between mobility of upper limb right and left.

Materials and methods

- Design of study:
  Transversal, prospective, descriptive and comparative.

- Working universe definition:
  It will be conducted at Centro de Rehabilitación Infantil Teletón Occidente. In the area that corresponds to the laboratory of human movement.
  It will be used an optoelectronic system for the analysis of human movement from the BTS Eng. Company.
  The samples will be obtained with the Gait El 3.0 system, and data processing will be done using the Software Smart Analyzer.

- It will be used a sequential video system with passive reflective markers to infrared light, and it will be taken digital video for simultaneous evaluation in coronal and sagittal plane.

- A system will be used in order to read the muscle activity, with surface electrodes.

- Size of the Sample :

  It is expected to evaluate 30 healthy subjects, from ages 18 to 50.

- Defining the units of observation.

  Flexion.
  Extension
  Muscle contraction
  Velocity

- Defining the control group: The same patient both upper limbs.

Inclusion criteria

- Healthy subjects .
- Subjects ranging from 18 to 50 years.
- Mexican population.
- Volunteers.
- Full intellectual integrity.
- Agree to sign the letter of informed consent

Exclusion criteria:

- Those with a systemic disease process, as Hypertension; Diabetes Mellitus, degenerative joint disease.
- Those with antecedents of surgery, fracture or dislocation of a joint in upper limb.
- Those who do not accept the preparation for the test.
- Those with a disabling process.
- Those who do not accept to sign the letter of informed consent.
- Those with some degree of intellectual disability.
- Those being under 18, and those being older than 50 years.

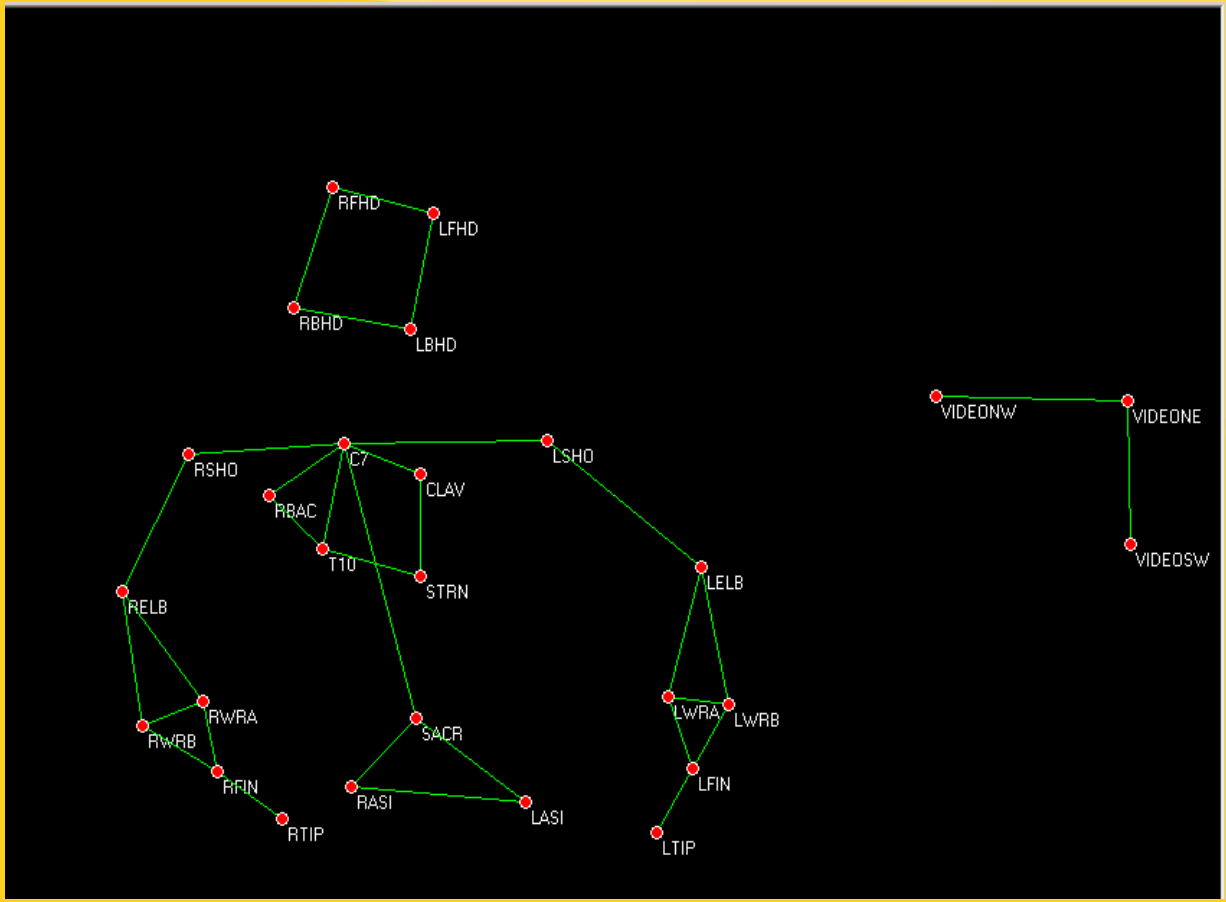
Criteria for elimination

- Those who did not complete the study

- Incomplete information.

Procedure

- 30 volunteers were assessed, healthy subjects, ranging from 18 to 50 years.
- Applied functional protocol for the evaluation of upper limb, doing the movement of the hand to the mouth; and reaching, with both upper limbs. We will use surface electrodes to record activity in the flexo extensor muscles of the elbow and wrist.
- Giving specific instructions to mobilize upper limb.
- The target will be installed taking into account the distance between the epicondilo and radial styloid.
- 4 tests will be taken in the upper limb. Each test will include 6 movements of reaching and the same for the hand to mouth movement, bilaterally.
- Data acquisition will be taken and processed in Gait eliclinic 3.0 and data analysis in the Smart analyzer software.
  With the simultaneous acquisition of digital video.



Rab G., Petuskey K., Bagley A. A method for determination of upper extremity kinematics. Gait & Posture 15; 2002: 113-119.

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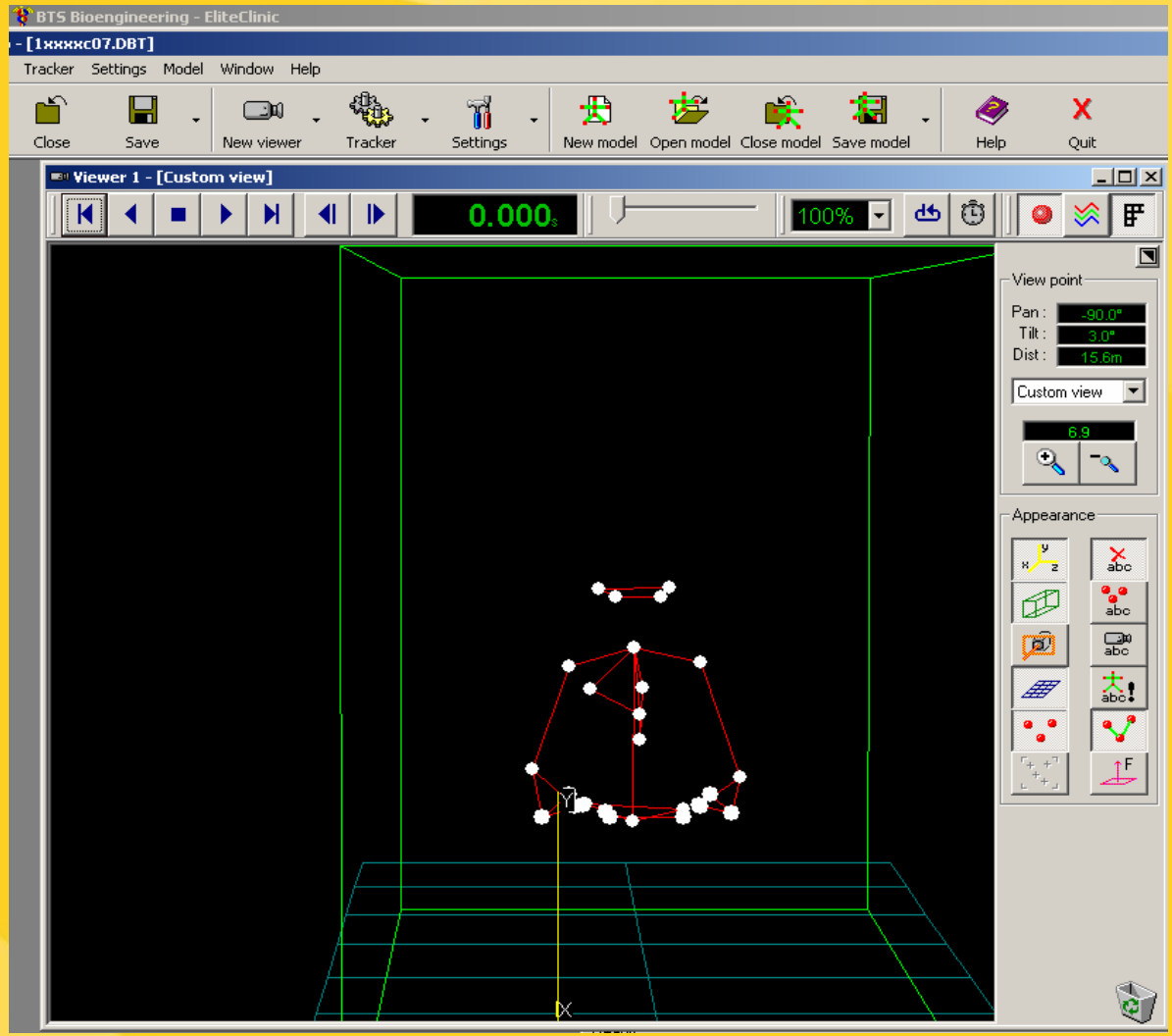

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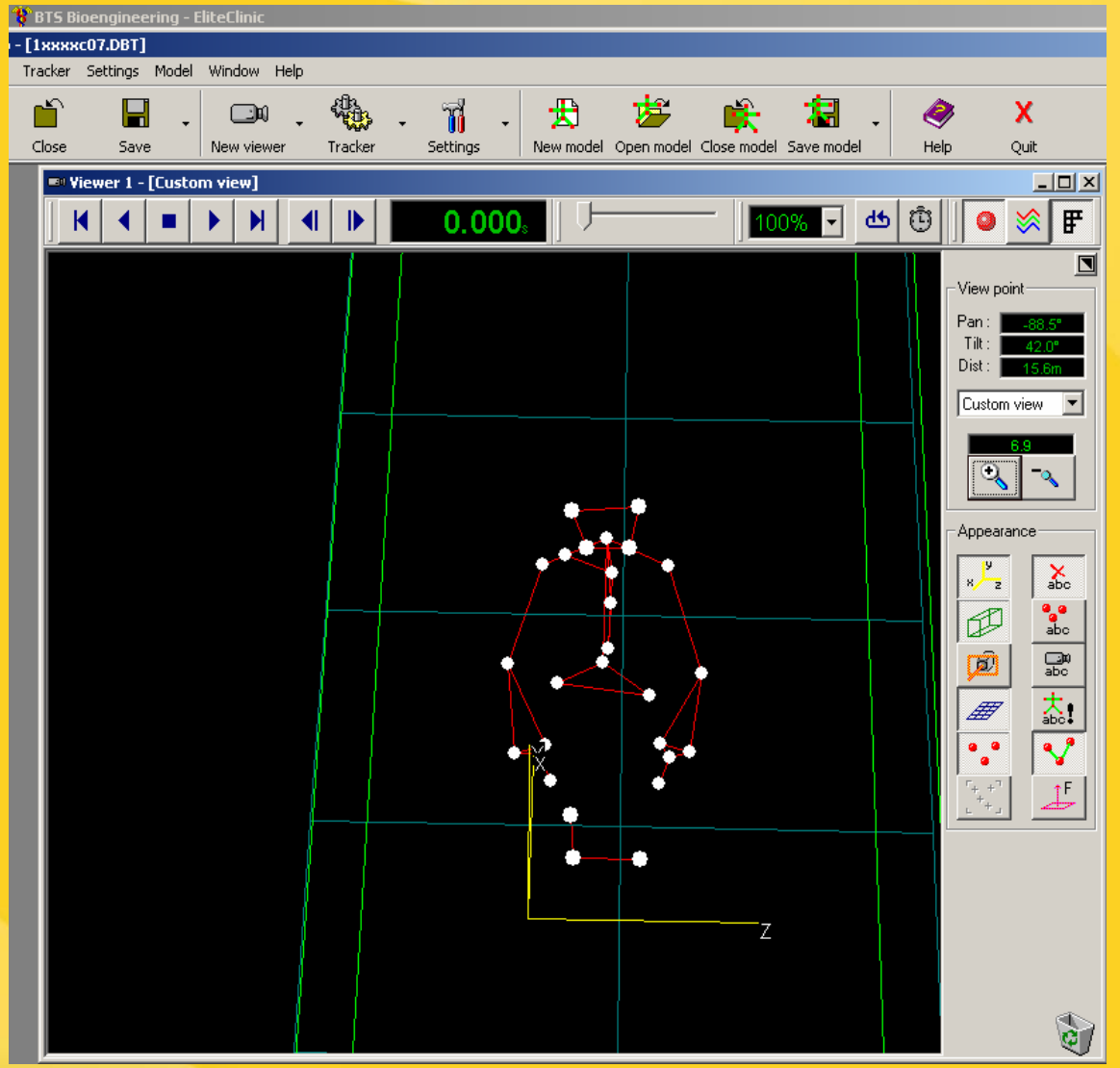

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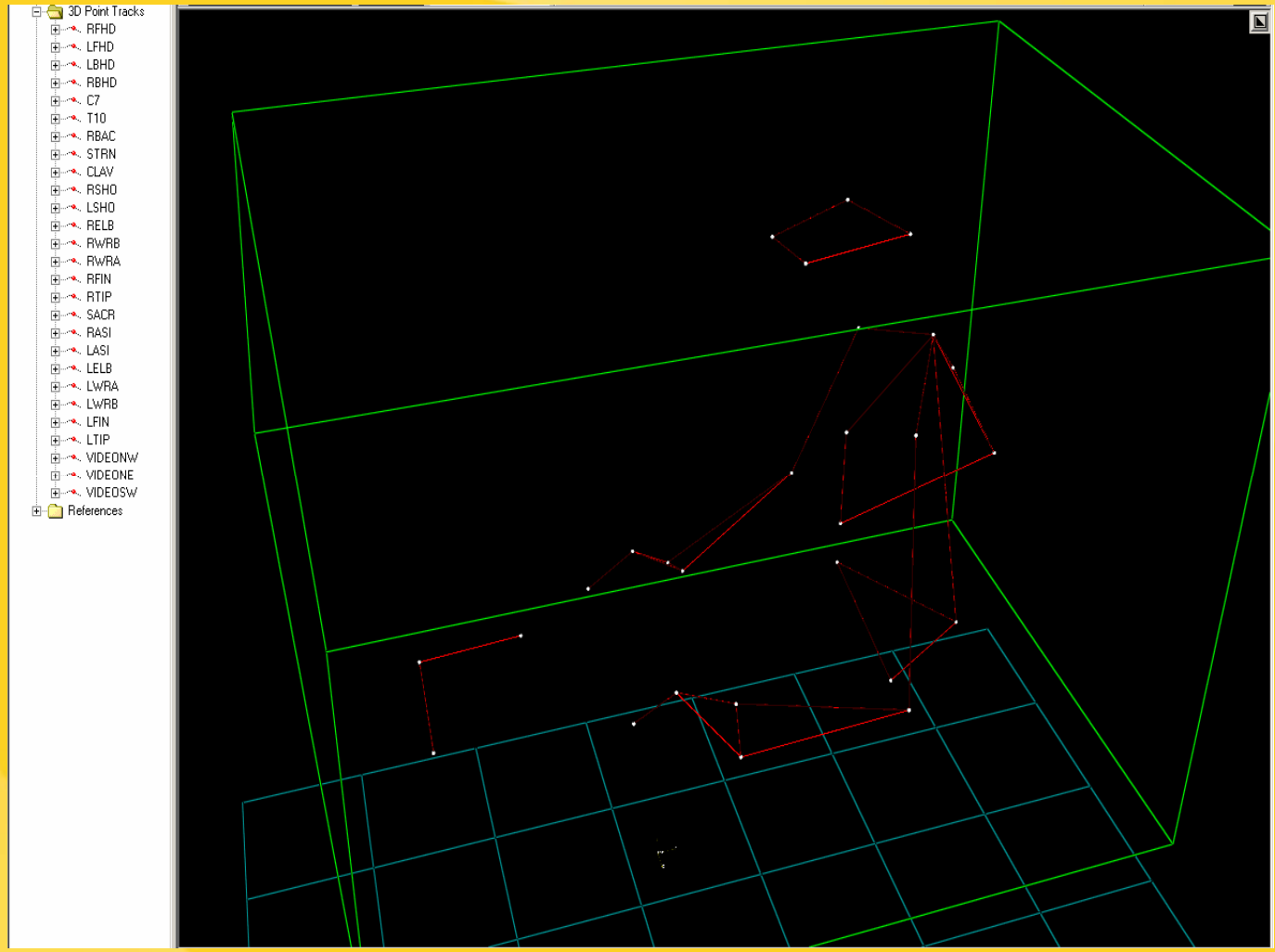

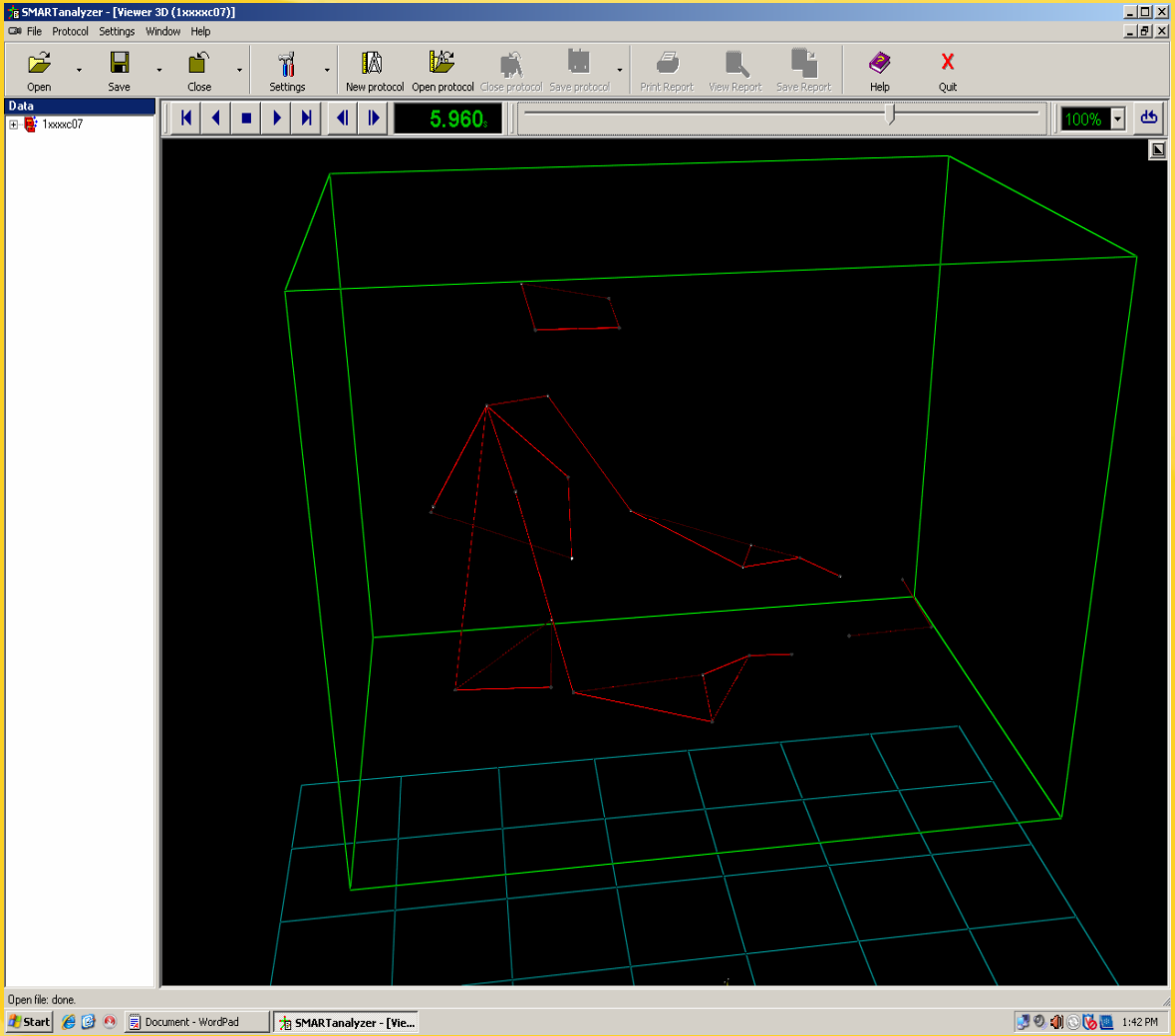

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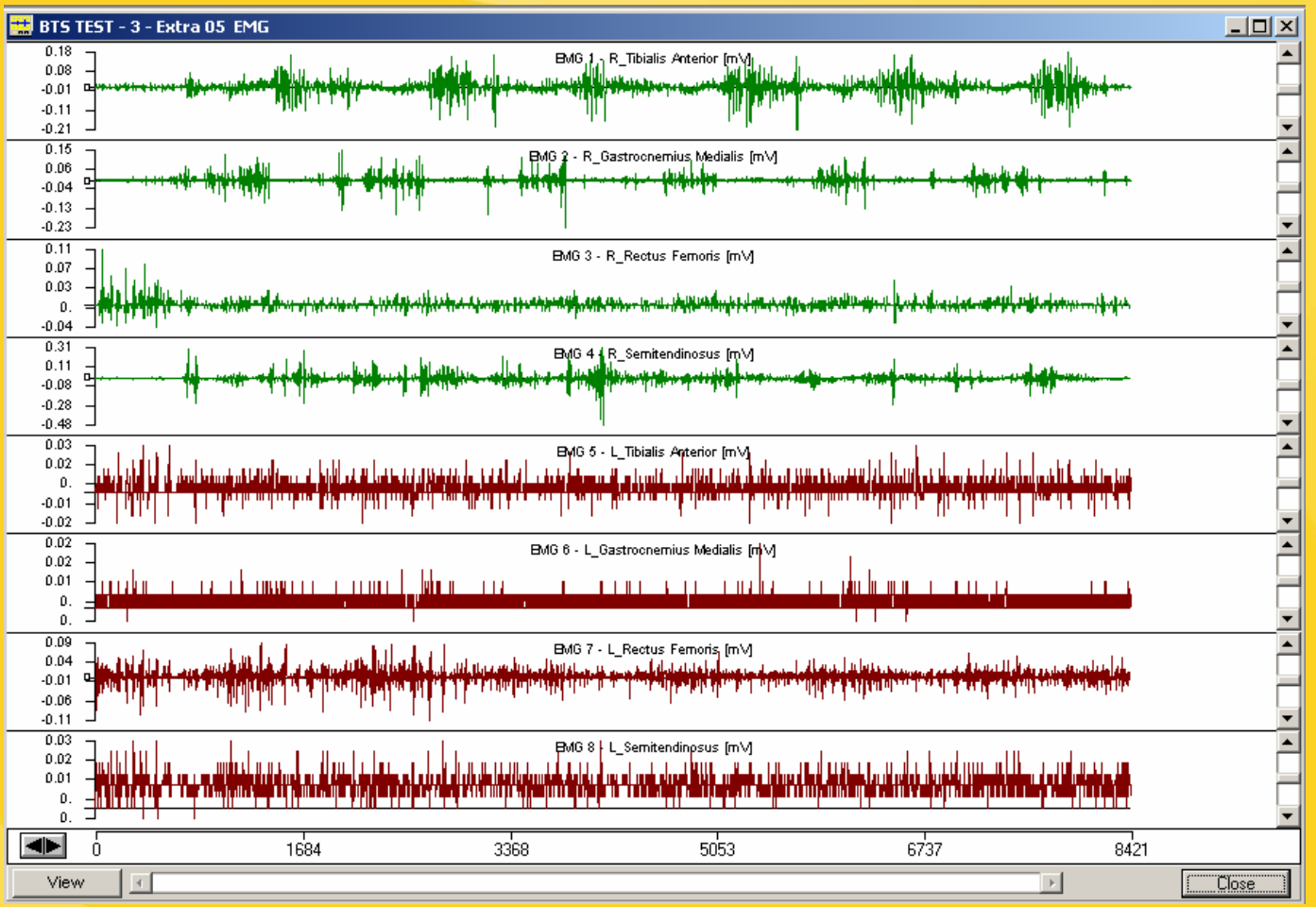

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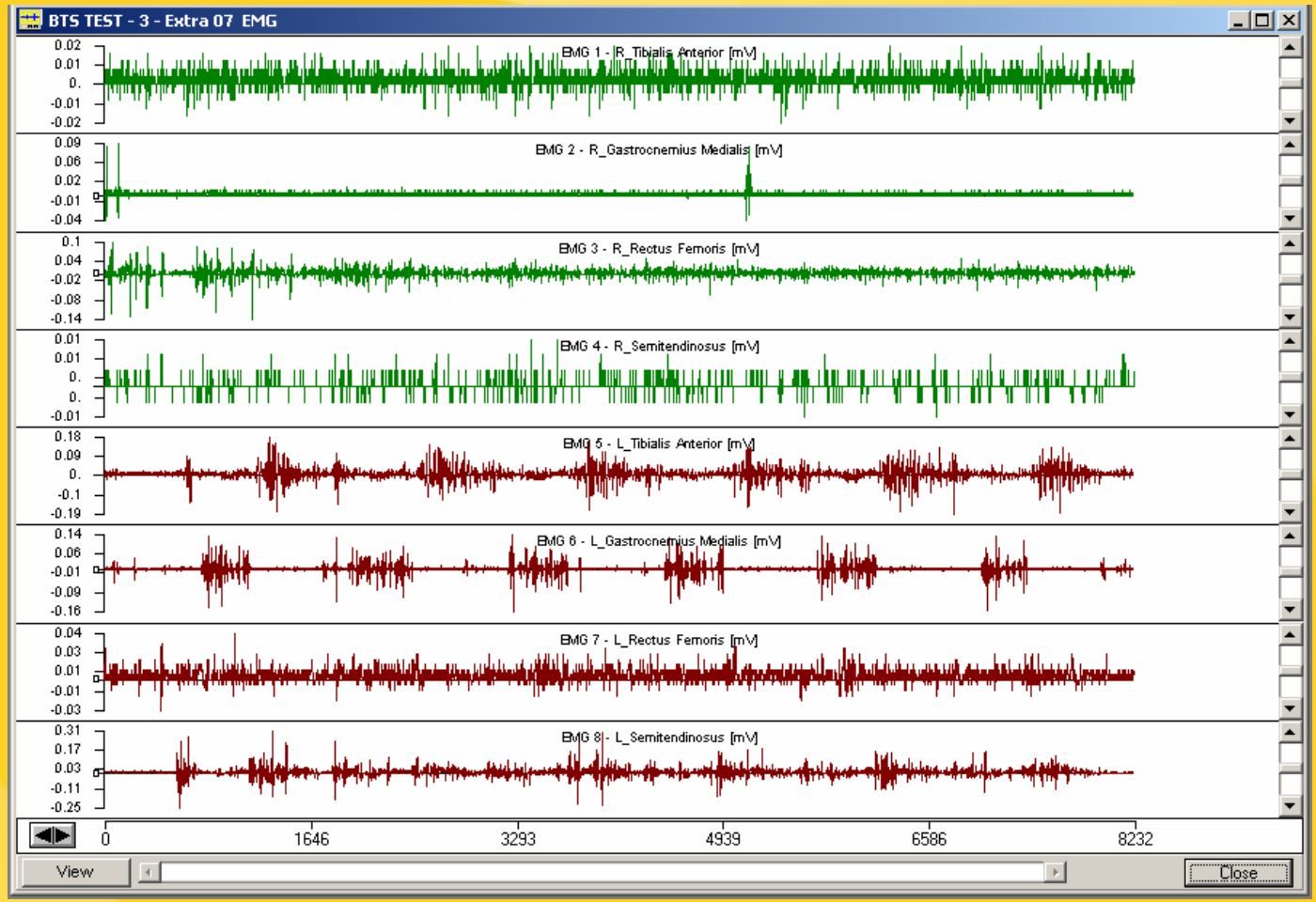

- Transcendence: To provide new information about the functional movement of upper limb.
  Vulnerability: The possibility of a malfunction in the system, which would not allow to take samples.
  Feasibility: It is feasible, because we have the equipment and systems for data collection.
  Feasibility: It is not an invasive study, it will be only a description of the records obtained during these tests. There are resources for the development of the study.
  Importance to the field of specialty: No previous studies reported in the Mexican population. In the field of Rehabilitation we hope to recover most of the functions of the human being. So that, it is important for a good assessment of patients, this is easier if we have the comparative tools to objectify.

- The aim of this study is to analyze the kinematic parameters of the upper limb movement, speed and performance is described as the muscle activation.
- Finding the correlation between these values and other previously obtained in order to provide information on the matter, and this could be utilized as a point of reference when assessing people with any disease process.