

6th “Open Forum for Osteopathic Education” Conference

18th & 19th October 2018 - Lyon, France



TEACHING OSTEOPATHIC DIAGNOSTICS



Universidad
Francisco de
Vitoria

UFV Madrid



“Biomechanical Tools:

Application and Integration in the classroom”.

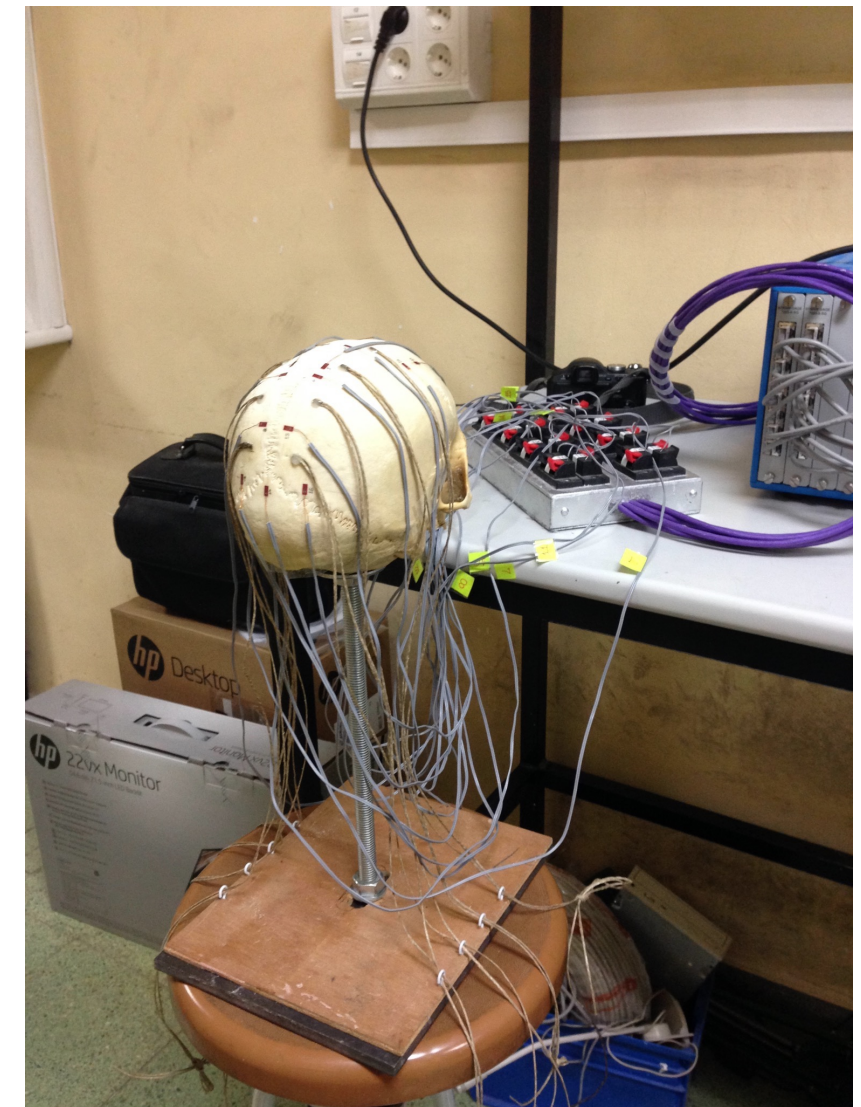
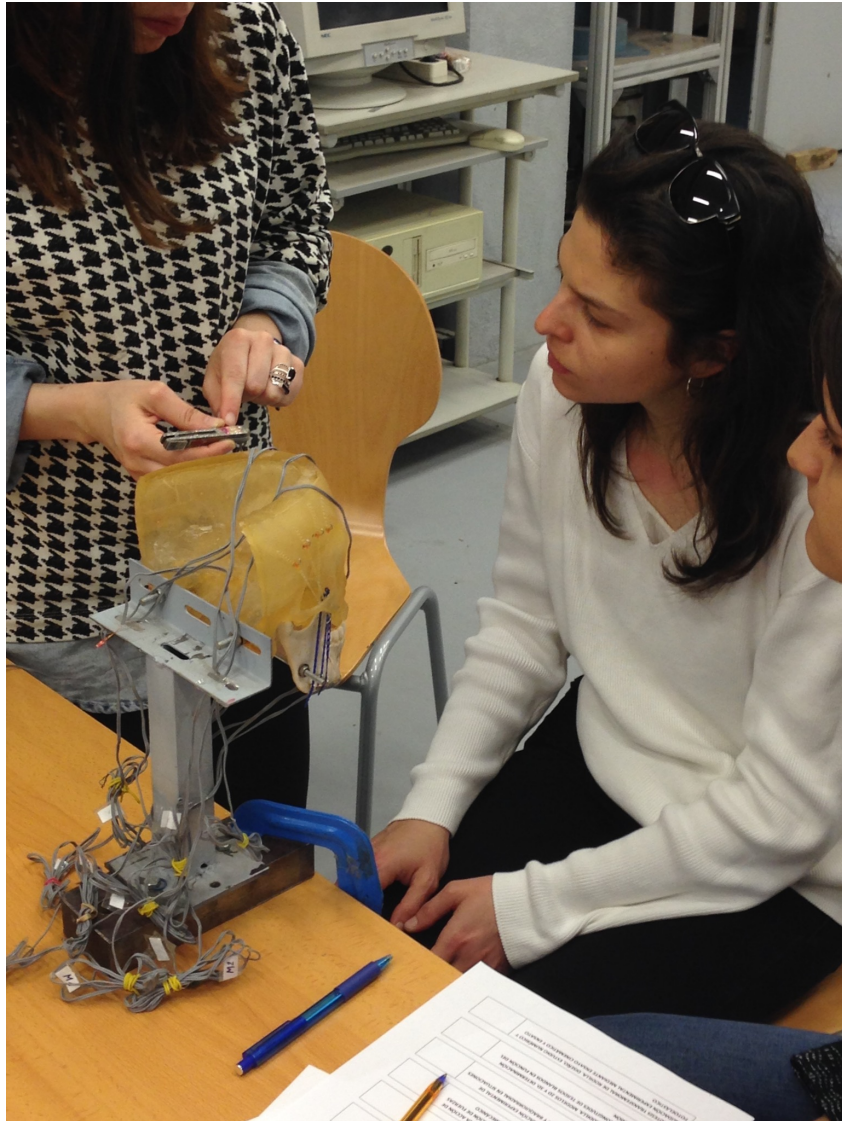

Osteopathic European Academic Network

FBEO TEAM
www.fbeosteo.com

OSTEOPATHY IN SPAIN

- FBEO History
- FBEO Objectives
- FBEO and the University
- FBEO and Clinical investigation
- FBEO and biomechanics topics teaching

INTRODUCTION



BIOMECHANICAL.....

.....BIOMEDICAL ENGINEERING.....

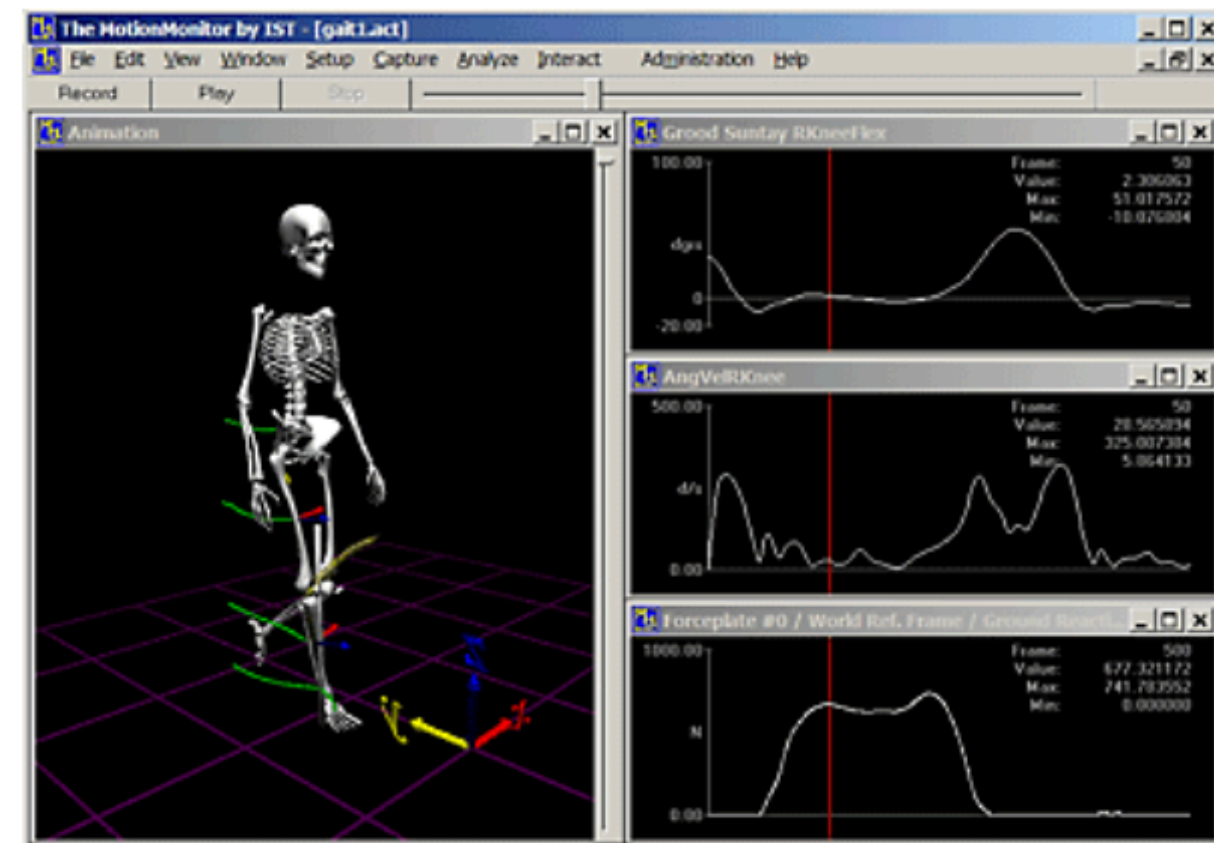
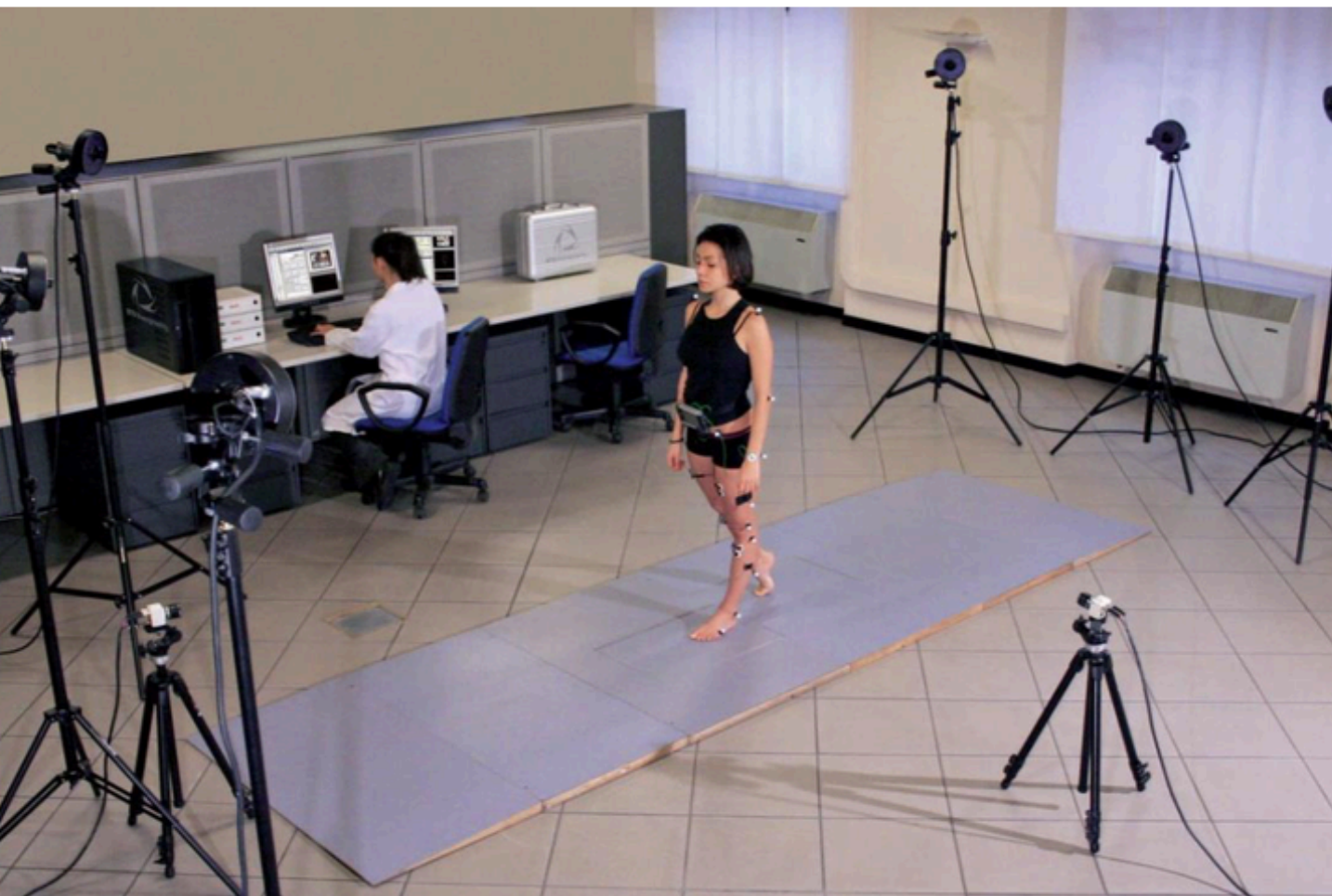
.....SOFTWARE TOOLS.....



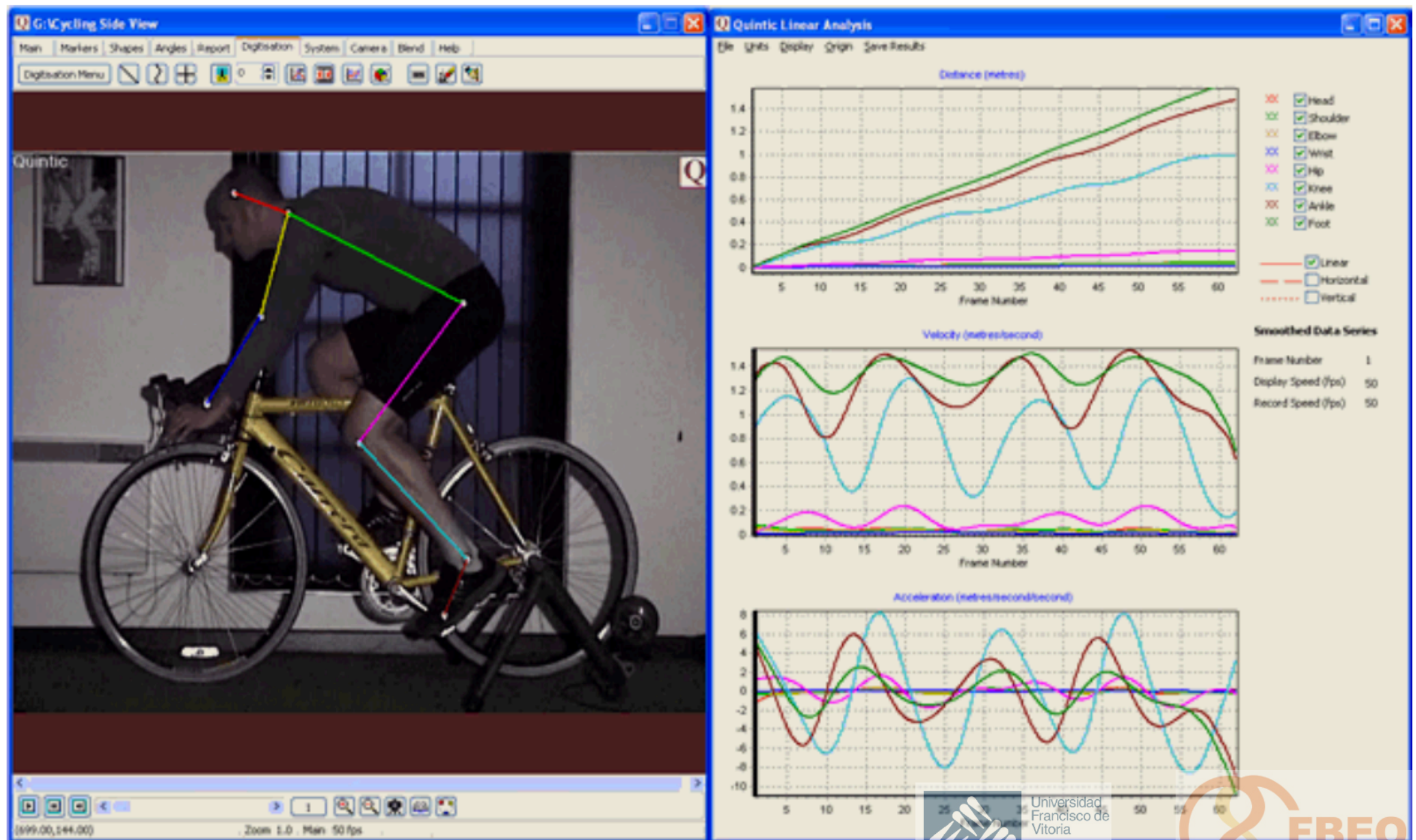
Biomechanics :



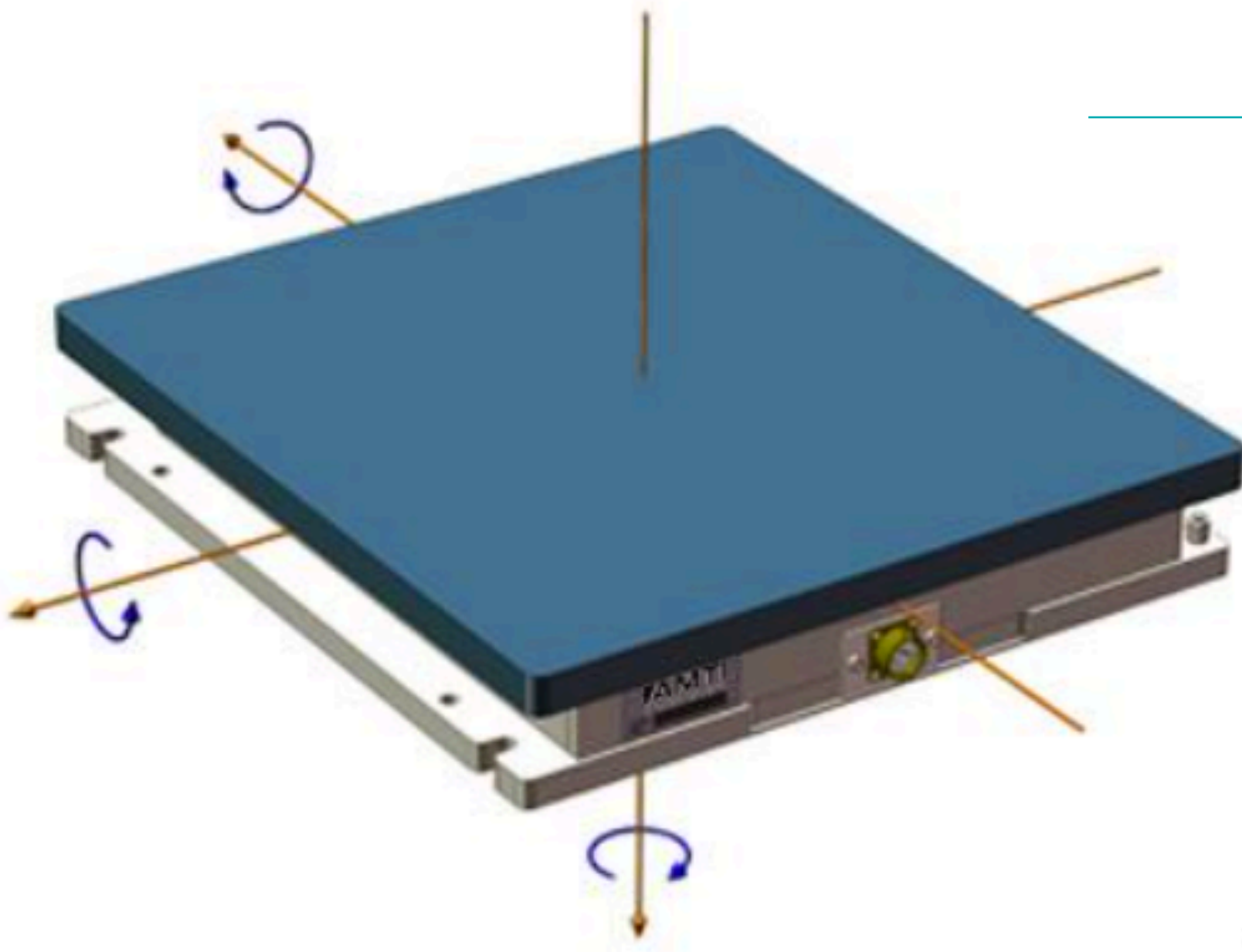
CLASSICAL BIOMECHANICS ANALYSIS



CLASSICAL BIOMECHANICS ANALYSIS

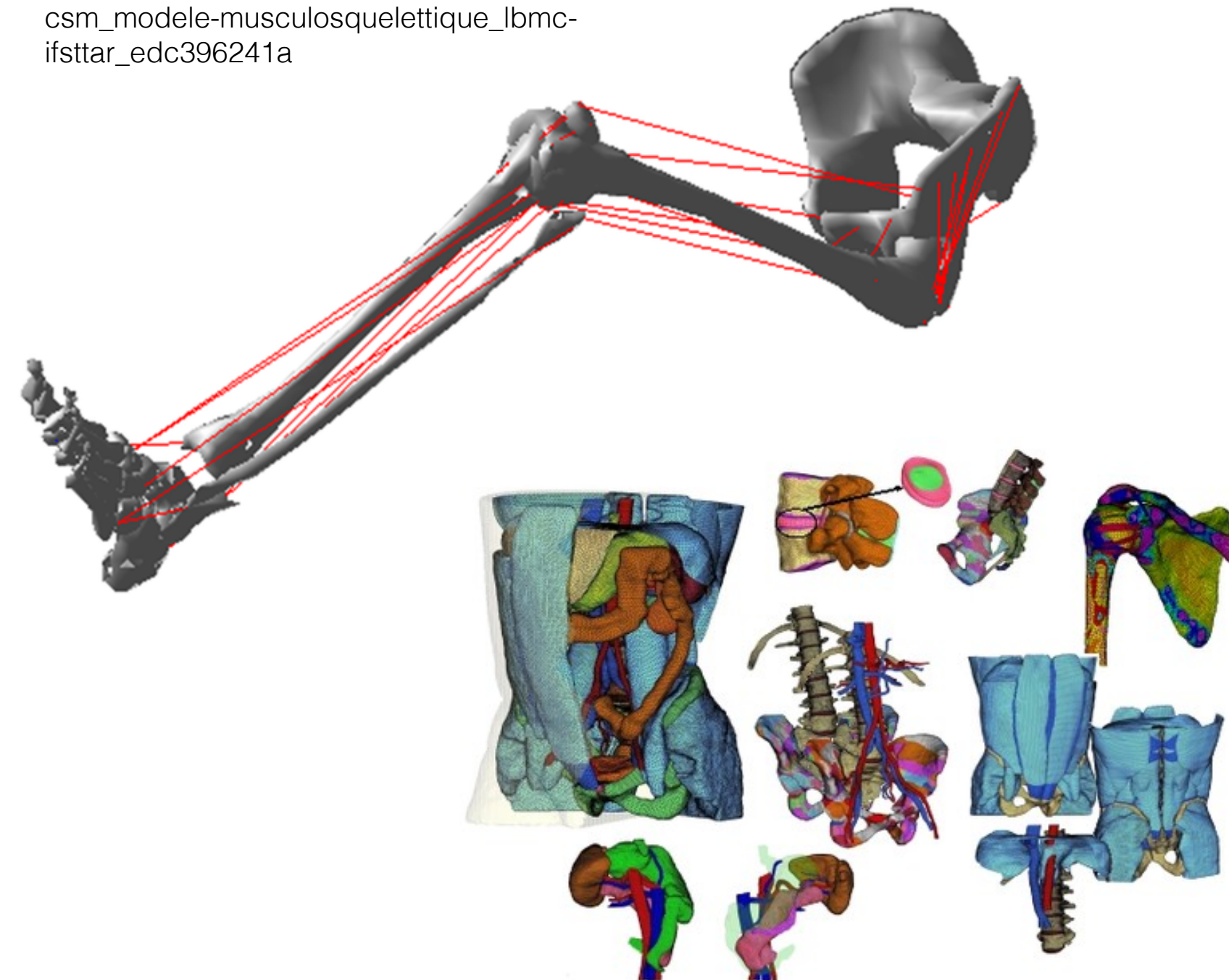


INTRODUCTION

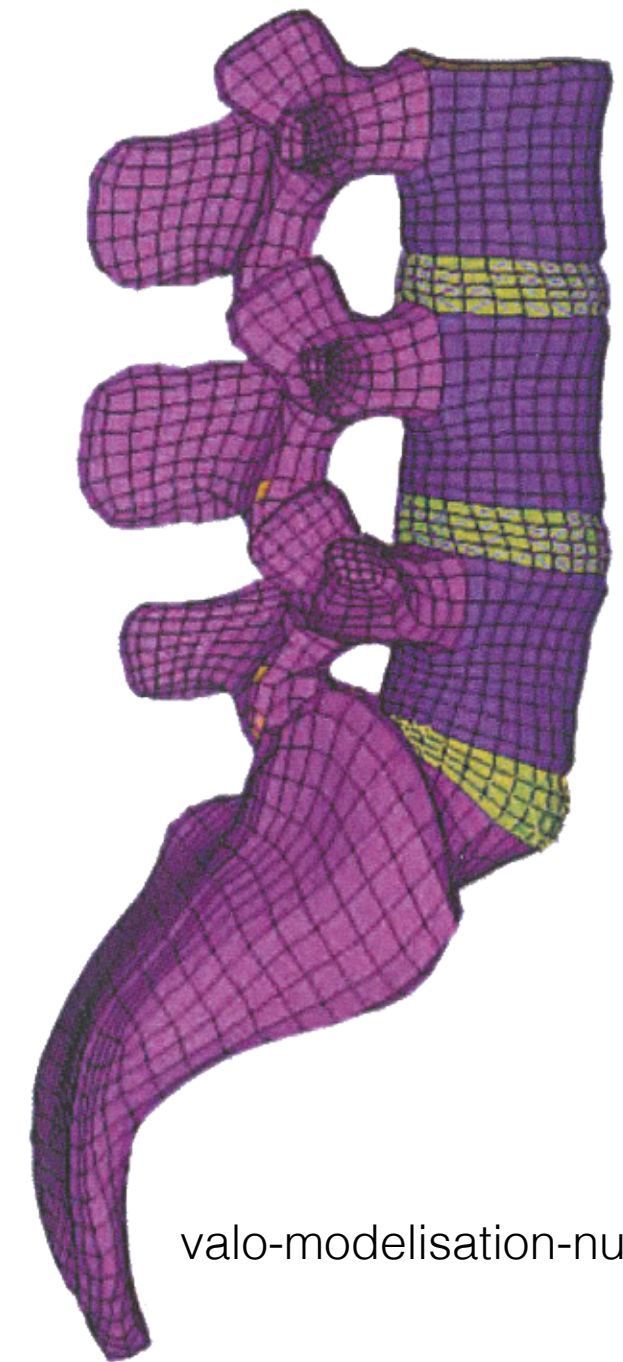


NEW BIOMECHANICS MODELES

csm_modele-musculosquelettique_lbmc-
ifsttar_edc396241a

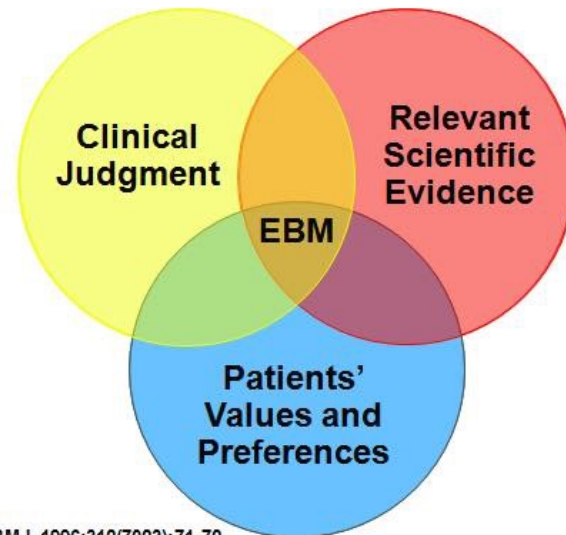


RTEmagicC_modele_EF_melba



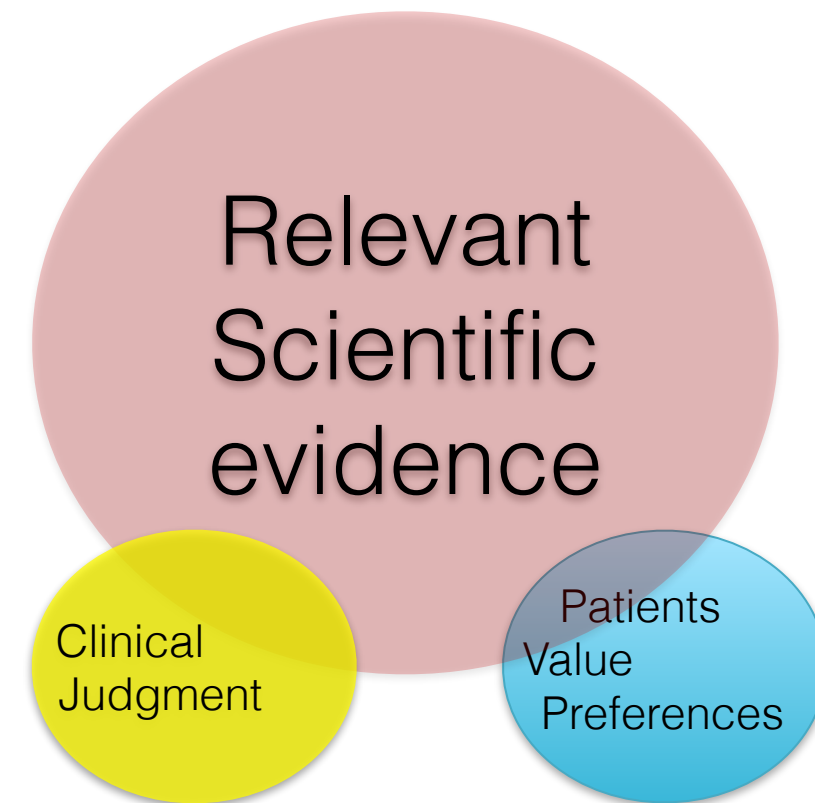
valo-modelisation-numerique

What Is Evidence-Based Medicine?



Sackett DL, et al. BMJ. 1996;312(7023):71-72.

INTRODUCTION



The students: Past and present
Adaptation

CONNAISSANCE-COMPETENCE ????



JOINTS

VISCERAL

BLOOD

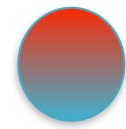
CRANEAL

FASCIAL

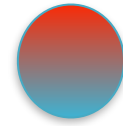
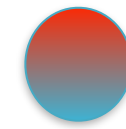
SOMATIC DISFUNCTION



We propose.....

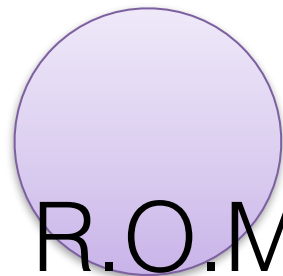


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I.A.R.

PHOTOELASTICITY



R.O.M.

CUTANEOUS
IMPEDANCE

TERMOMOGRAPHY

SENSITIVE
EVALUATION

We propose

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I.A.R.

R.O.M.

TERMOGRAPHY

PHOTOELASTICITY

CUTANEOUS
IMPEDANCE

SENSITIVE
VALUTATION

SOMATIC JOINT DYSFUNCTION

Joint mobility



Hypomobility

CHRONIC DYSFUNCTION

Hypermobility

OVERUSE

MECANOCEPTION
NOCICEPTION
CENTRAL SENSITIZATION

Freeman and Wyke categorized articular receptors into four types: Type I, II, III, and IV.

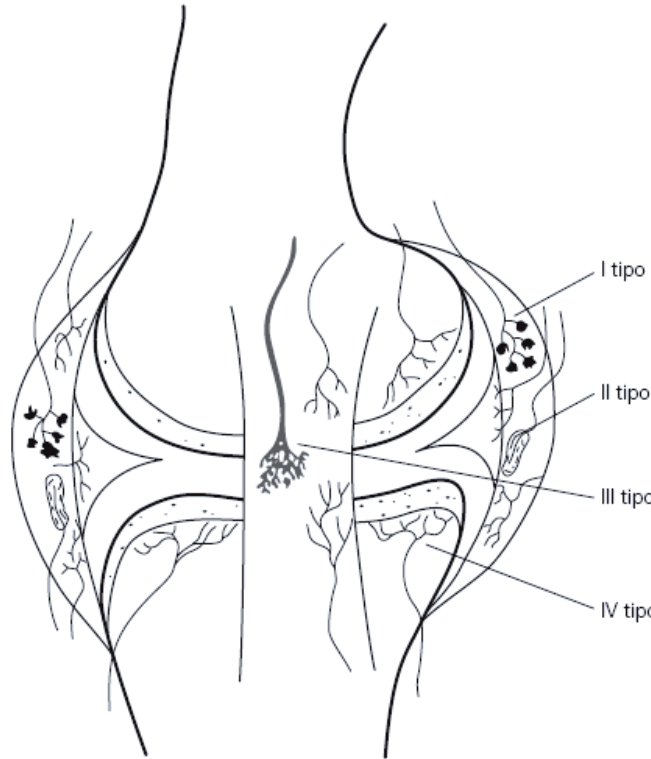
Each is stimulated in a distinctive way and responds to stimulation differently.

Type I and II (Ruffini / Pacini)

mechanoreceptors act as physiological receptors/ active during normal movement.

Type III and IV (Golgi/ terminaciones libres)

receptors normally inactive/ only stimulated at extremes of movement... may function under pathological conditions. 3



Somatic Dysfunction: updating the concept

Gary Fryer B.App.Sc.(Osteo), N.D.

Australian Journal of Osteopathy. 1999;10(2):14-19.

J Am Osteopath Assoc. 1990 Sep;90(9):792-4, 797-809.

Nociceptive reflexes and the somatic dysfunction: a model.

Van Buskirk RL.

West Virginia School of Osteopathic Medicine, Lewisburg.

ANALITIC BIOMECHANICS.....

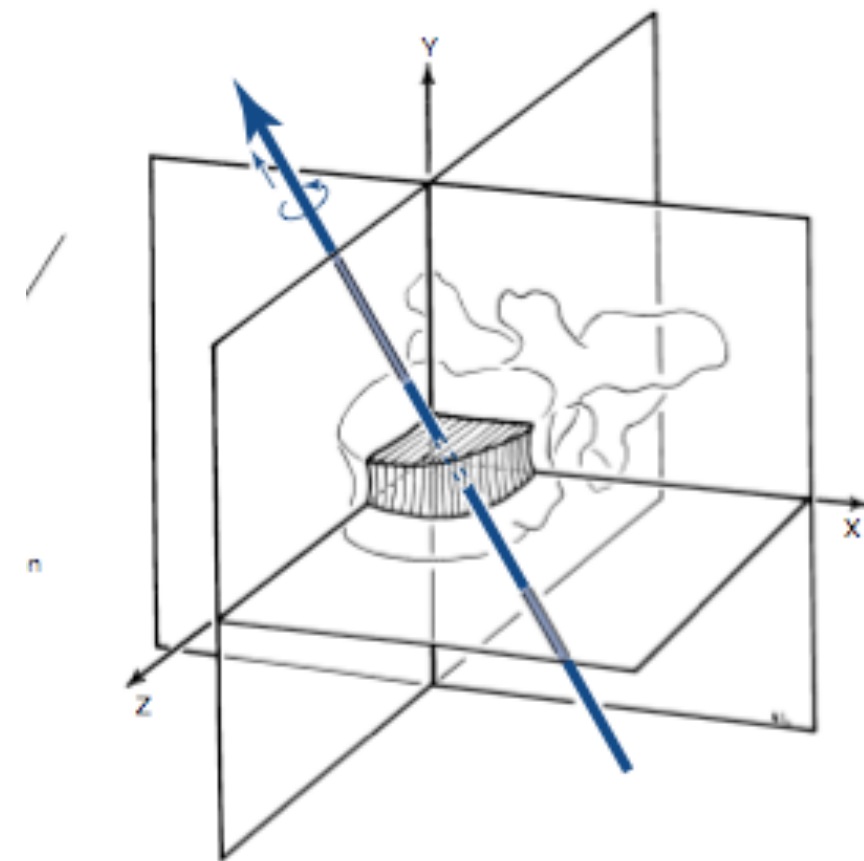
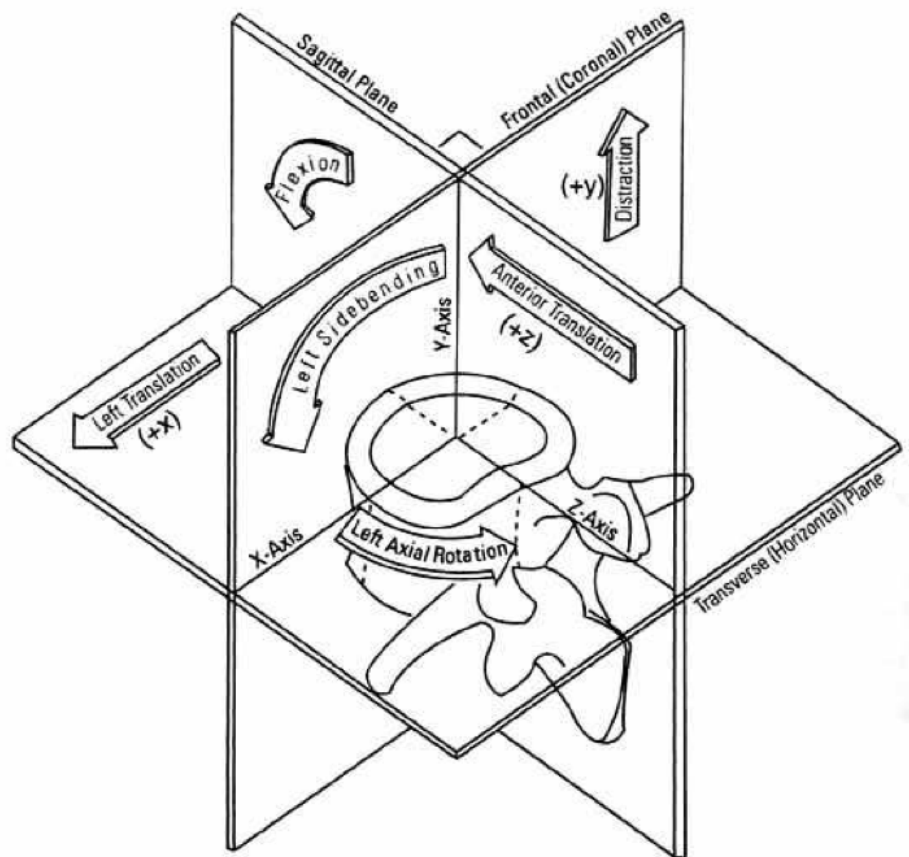


Figure 2-18

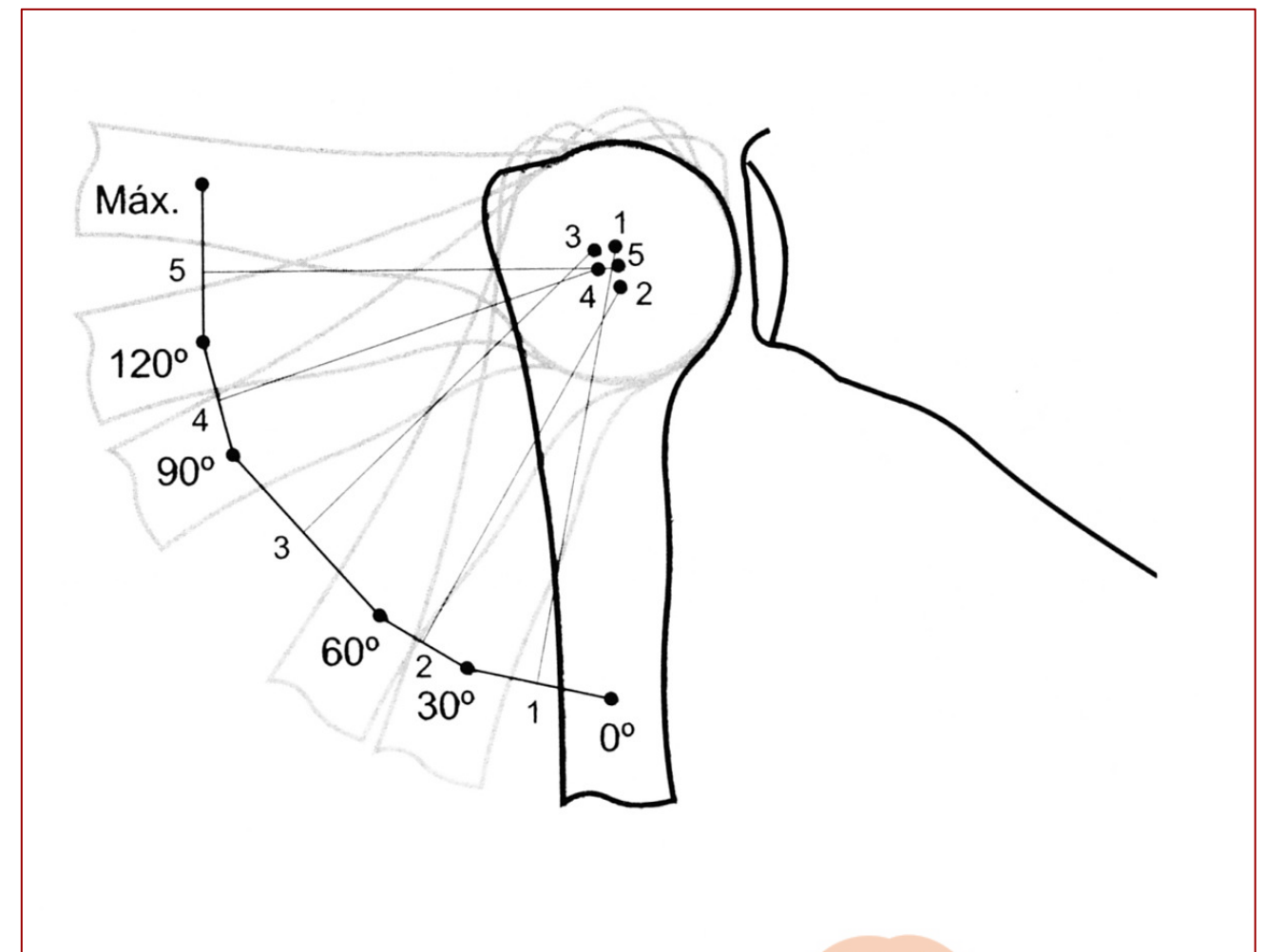
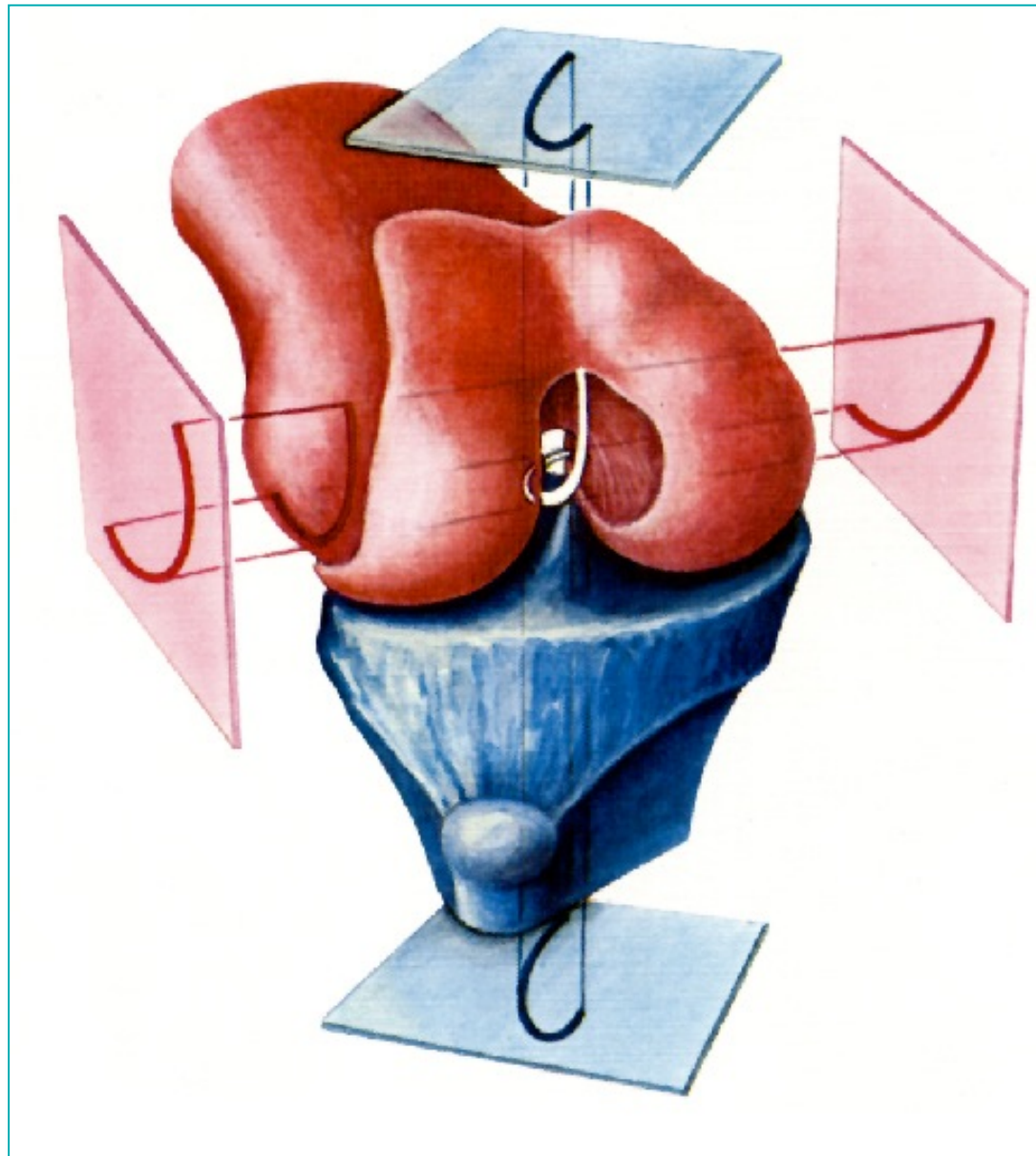
Helical axis of motion. (Modified from White AA, Panjabi MM: *Clinical biomechanics of the spine*, Philadelphia, 1978, JB Lippincott.)



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Ratio Rotation-translation

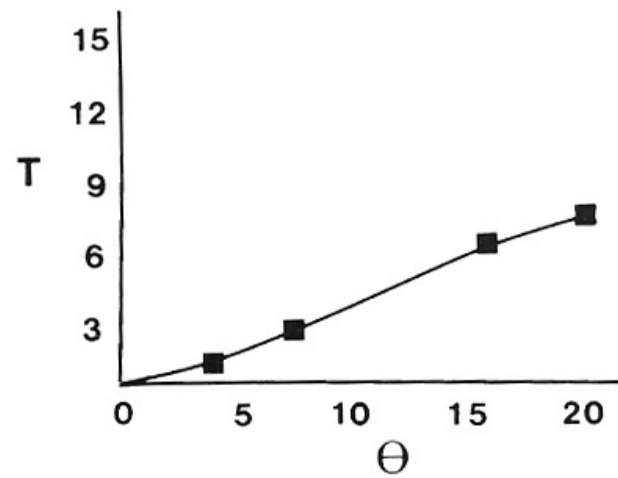


Figure 16.3 A normal movement pattern of a lumbar segment in terms of the ratio between translation and rotation. (Based on Weiler et al.⁷⁸⁹)

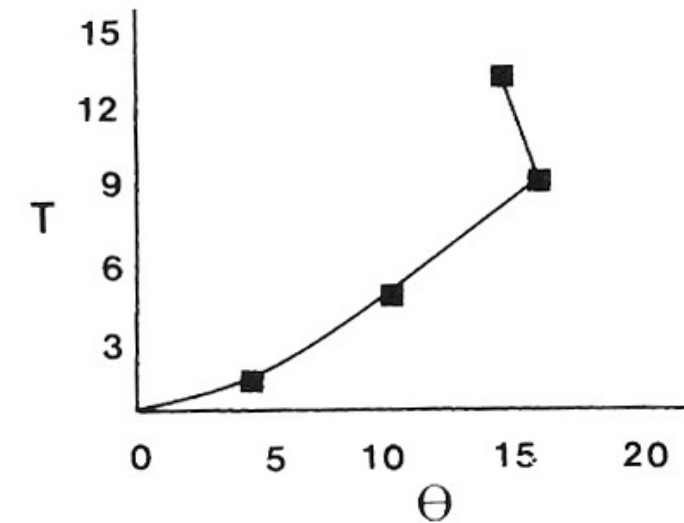
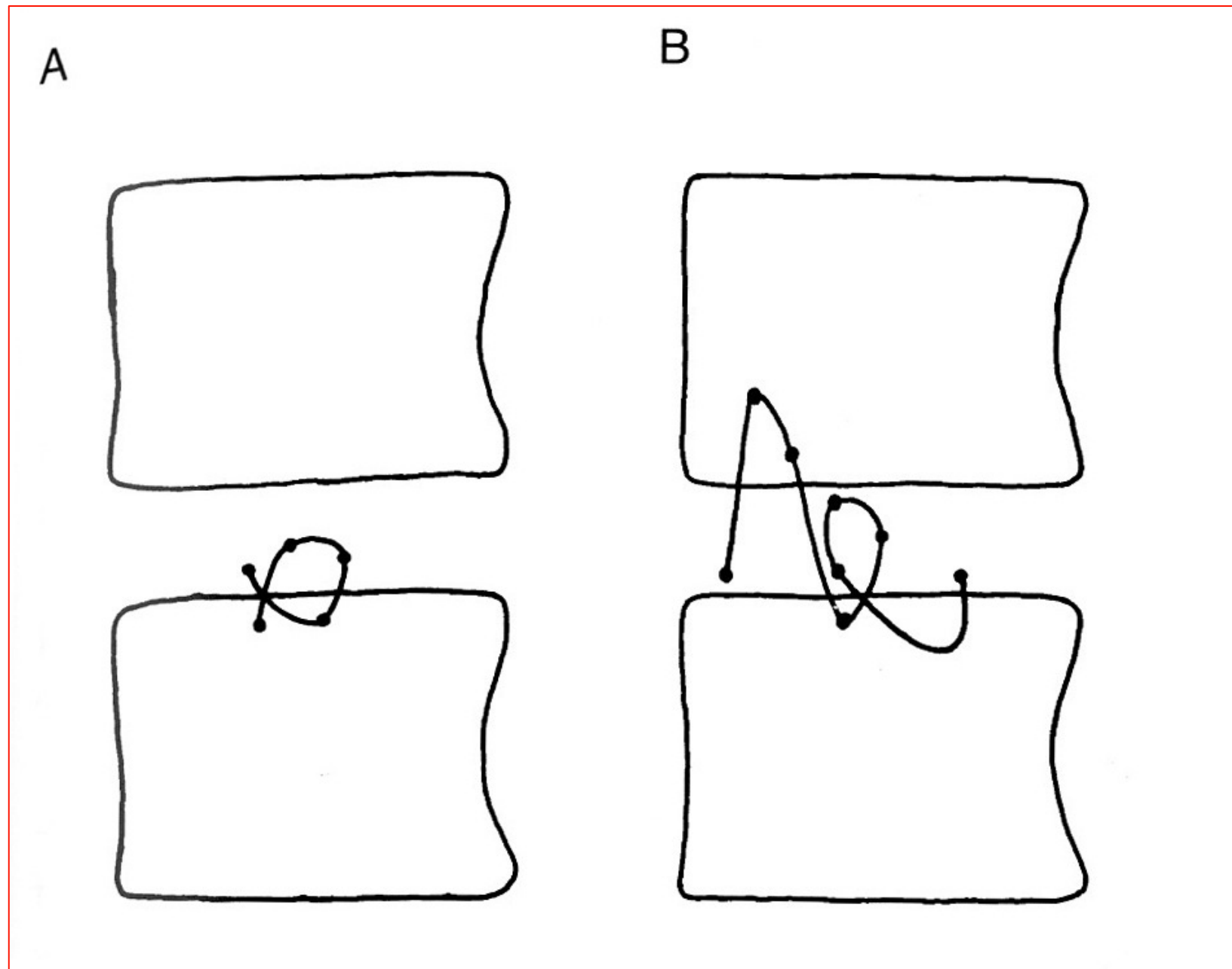


Figure 16.4 A movement pattern of a lumbar segment showing an aberrant ratio between translation and rotation, and an abnormally high instability factor. (Based on Weiler et al.⁷⁸⁹)

Secuencia y simultaneidad organizada involuntariamente por el control motor.

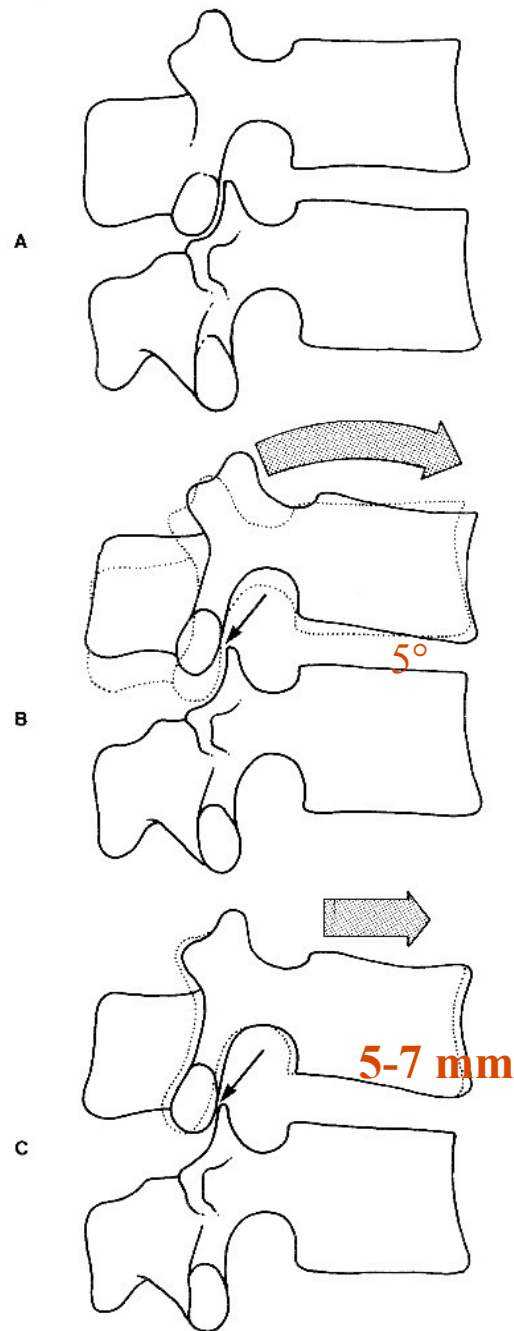
SPECIFIC OVER USE



Coupled movements of the lumbar spine

(Pearcy MJ, Tibrewal SB, 1984)

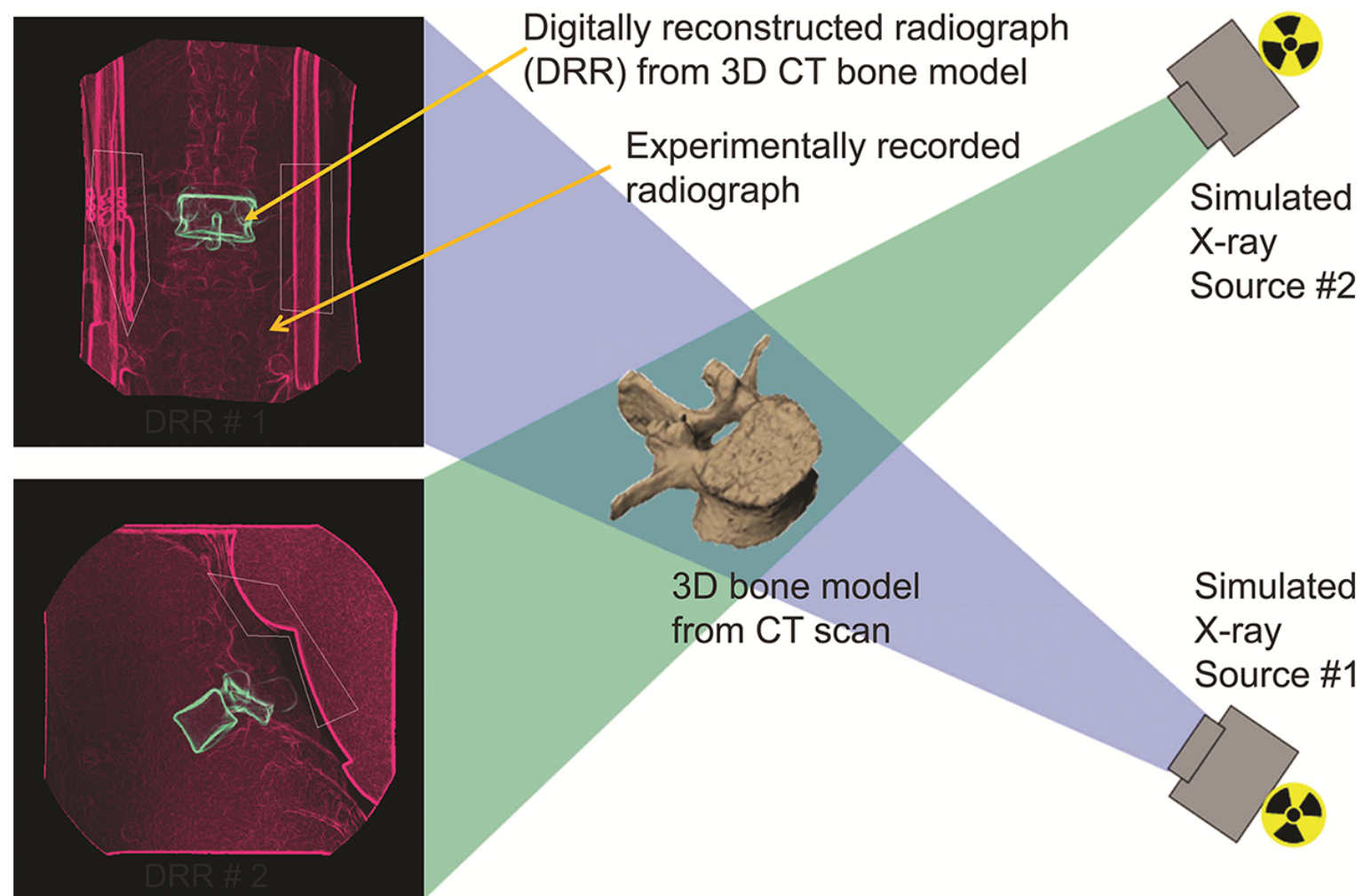
Axial rotation and lateral bending in the normal lumbar spine measured by 3D radiography.



- Pearcy M, Portek I, Shepherd J 1984
3D X-ray analysis of normal movement in the lumbar spine.

- Twomey LT, Taylor JR, 1985
Sagittal movements of the human lumbar vertebral column: quantitative study of the role of the posterior vertebral elements.

- Green TP, Allvey JC, Adams M A 1994
Spondylolysis bending of the inferior articular processes of lumbar vertebrae during simulated spinal movements.



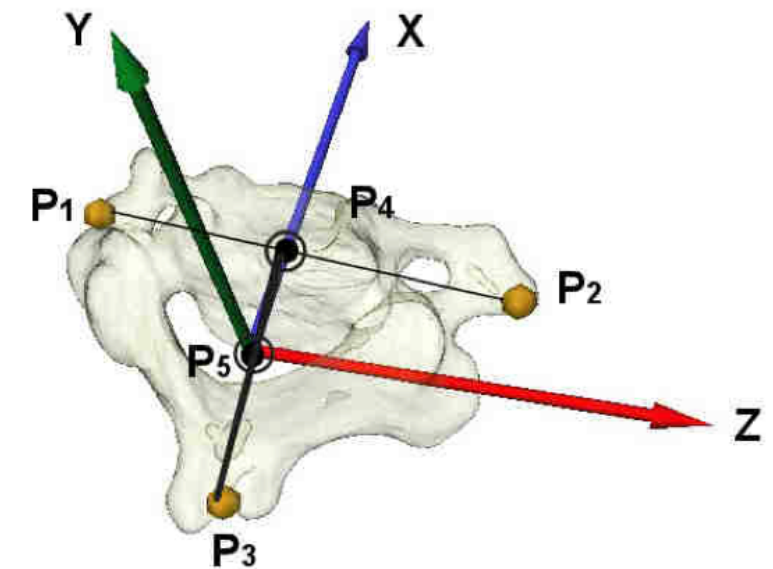
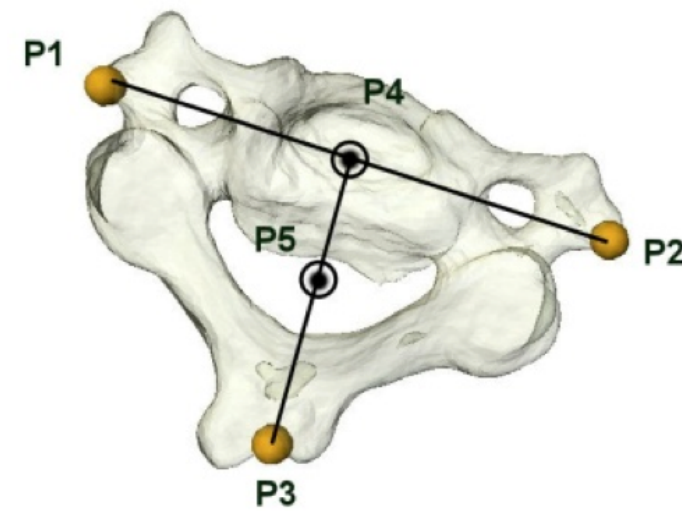
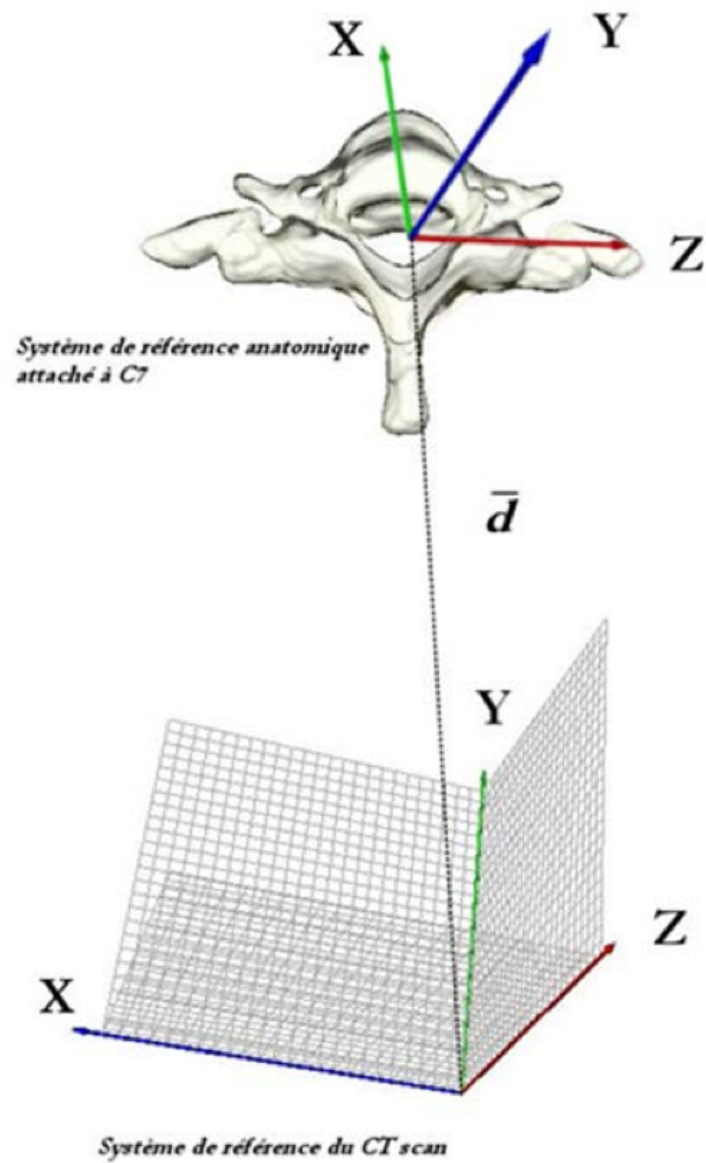
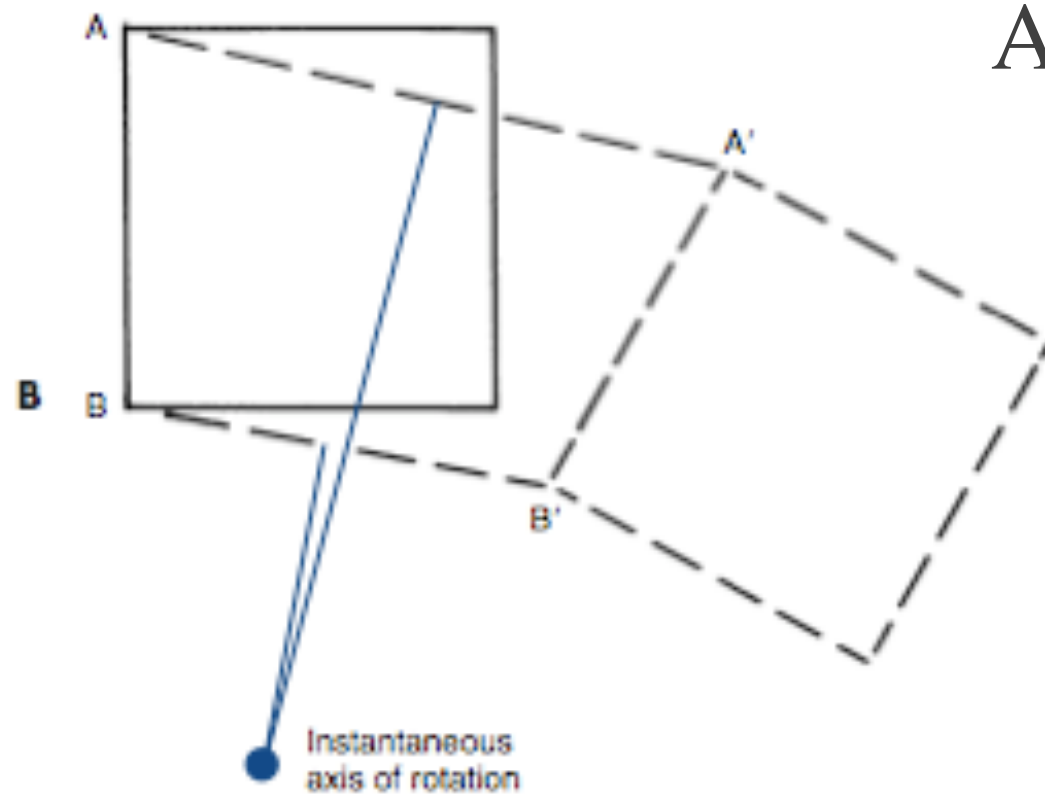


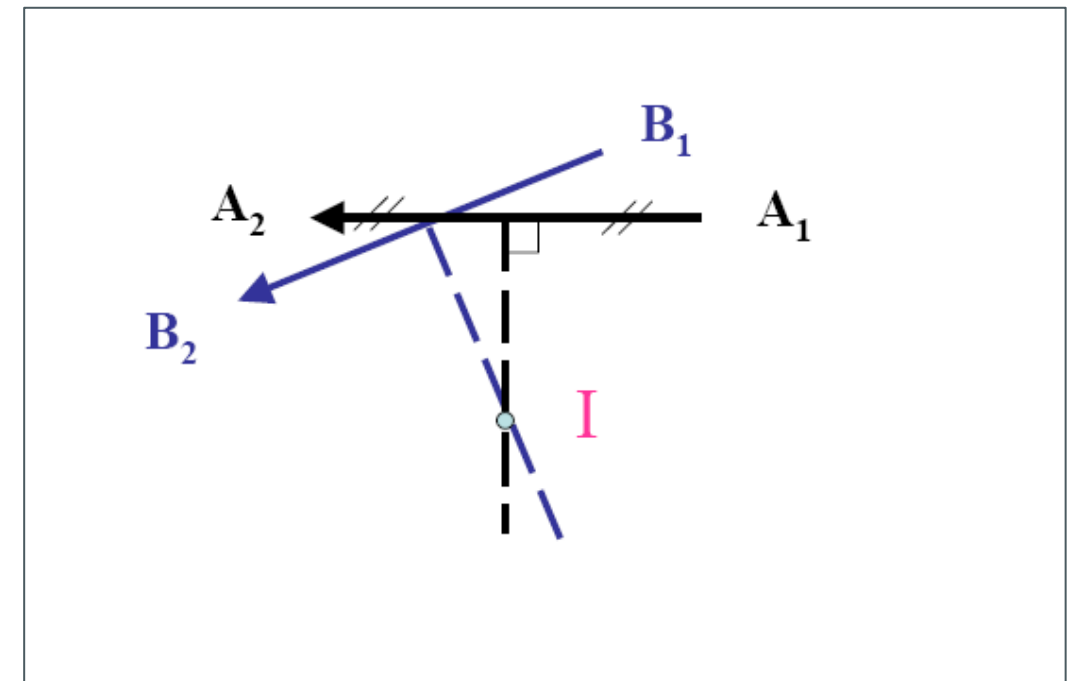
Figure II-5. La création du système de coordonnées local.



Analysis of a 2D movement by graphical drawing of the center of rotation.



Primary Coupled Motion



El método de Reuleaux :

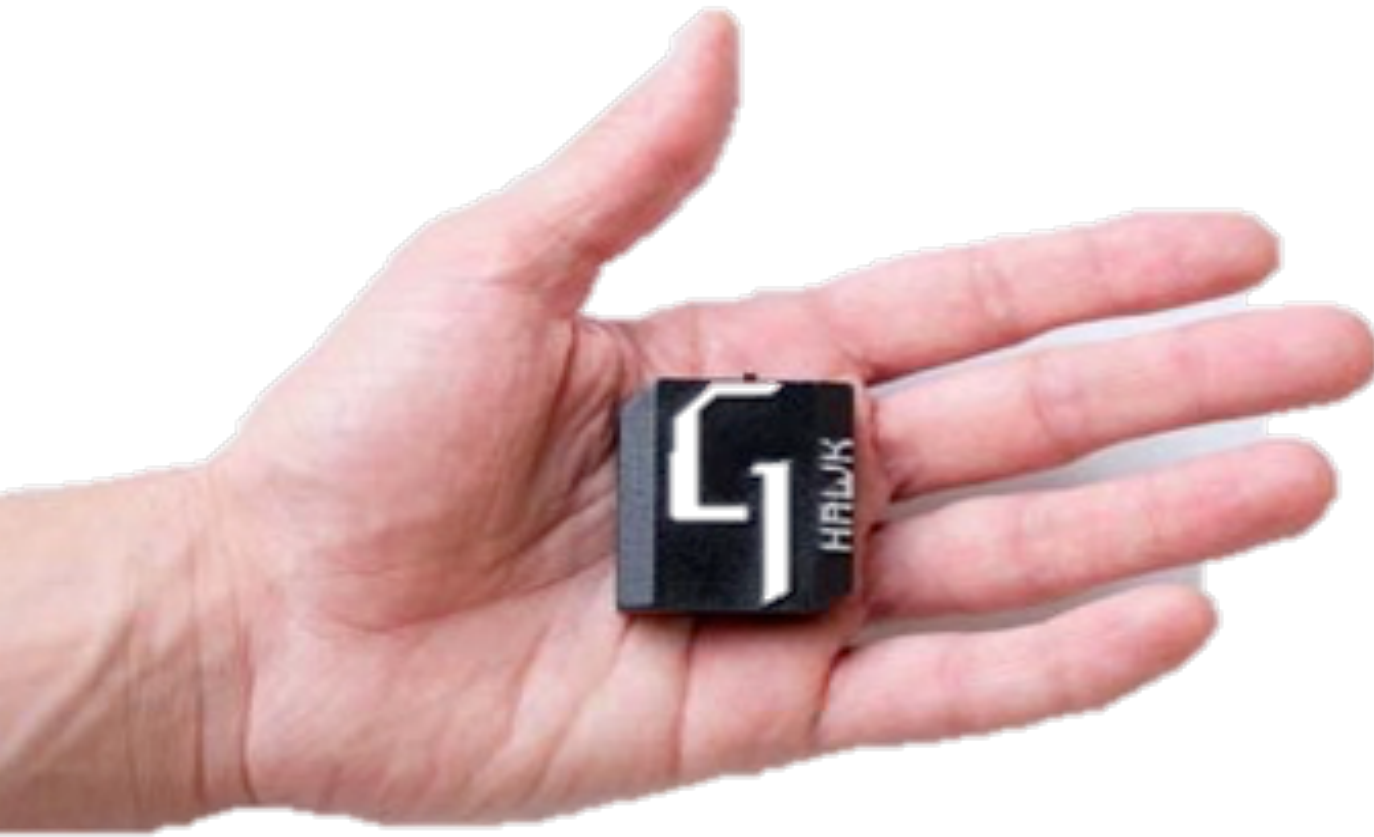


Sistema análisis de
movimiento monitorización
manipulación en en cadáver.

Dugailly PM, Beyer B, Sobczak S, Salvia P, Feipel V. Global and regional kinematics of the cervical spine during upper cervical spine manipulation: a reliability analysis of 3D motion data. *Man Ther* 2014 Oct;19(5):472-477.

Theobald PS, Jones MD, Williams JM. Do inertial sensors represent a viable method to reliably measure cervical spine range of motion? *Man Ther* 2012 Feb;17(1):92-96.

Dugailly PM, Sobczak S, Van Geyt B, Bonnechere B, Maroye L, Moiseev F, et al. Head-trunk kinematics during high-velocity-low-amplitude manipulation of the cervical spine in asymptomatic subjects: helical axis computation and anatomic motion modeling. *J Manipulative Physiol Ther* 2015 Jul-Aug;38(6):416-424.



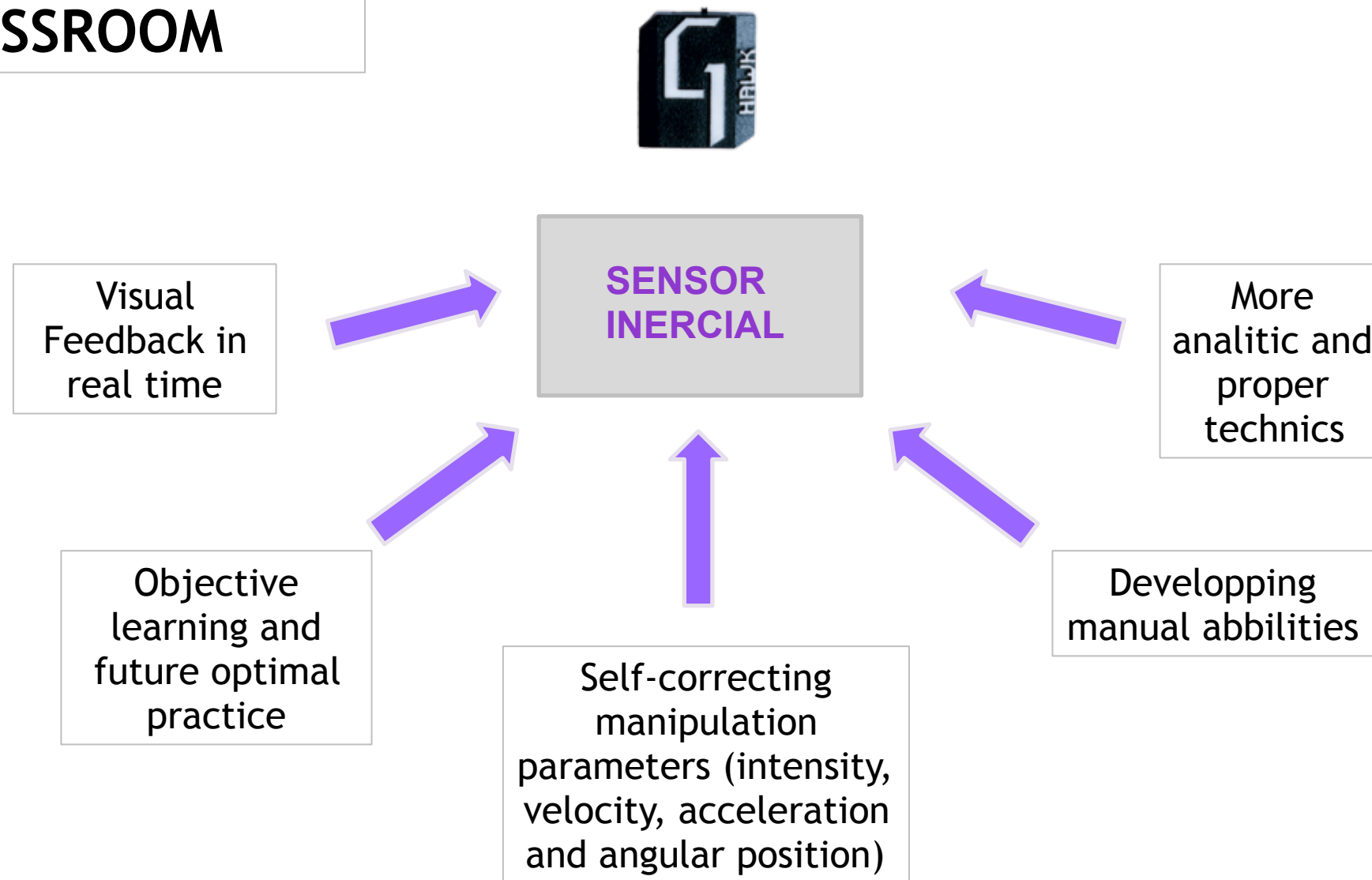
The use of inertial sensors system for human motion analysis

[Antonio I Cuesta-Vargas](#),¹ [Alejandro Galán-Mercant](#),¹ and [Jonathan M Williams](#)²

Tapia Castejon JC. Validación del goniómetro digital Hawk HCT como herramienta de medida para la flexo-extensión de rodilla [Master Tesis]. Repositorio Biblioteca Universidad Pontificia Comillas. Madrid 2017. <https://repositorio.comillas.edu/xmlui/handle/11531/24189>

Cereceda Súnico C. Validación del goniómetro digital Hawk HCT para los movimientos de rotación en la columna cervical [Master Tesis]. Repositorio Biblioteca Universidad Pontificia Comillas. Madrid 2017.

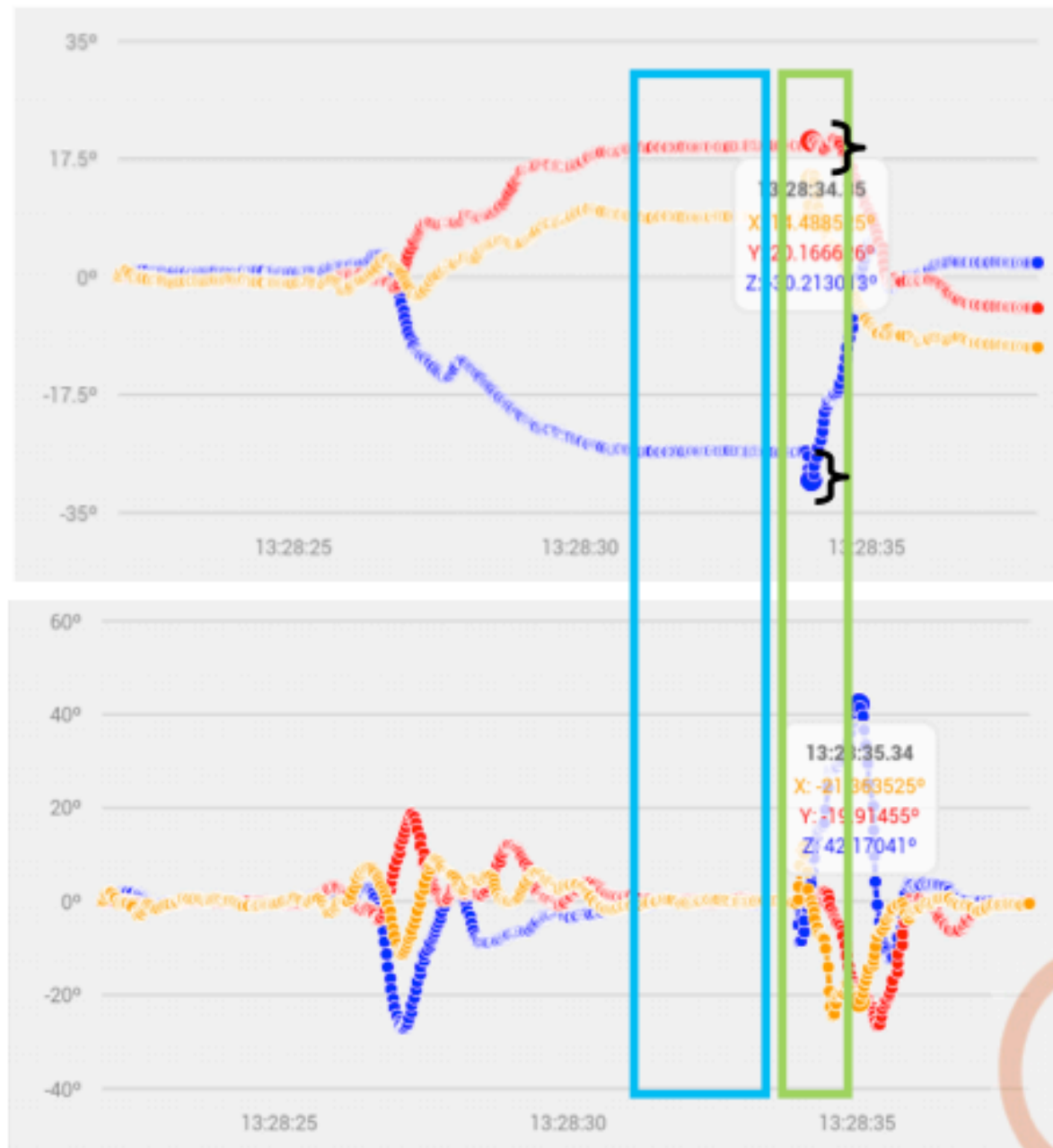
USE IN THE CLASSROOM



INERTIAL SENSOR- ROM



GRAFIC ROM



Leyenda datos

Flexión	+
Extensión	-
Flexión lateral derecha	-
Flexión lateral izquierda	+
Rotación derecha	-
Rotación izquierda	+

Parámetros Manipulación ERSd

- . Flexion.
- . Left rotation.
- . Right sidebending.

INERTIAL SENSOR- ROM



ROM-VELOCIDAD-ACELERACIÓN

Plano todos



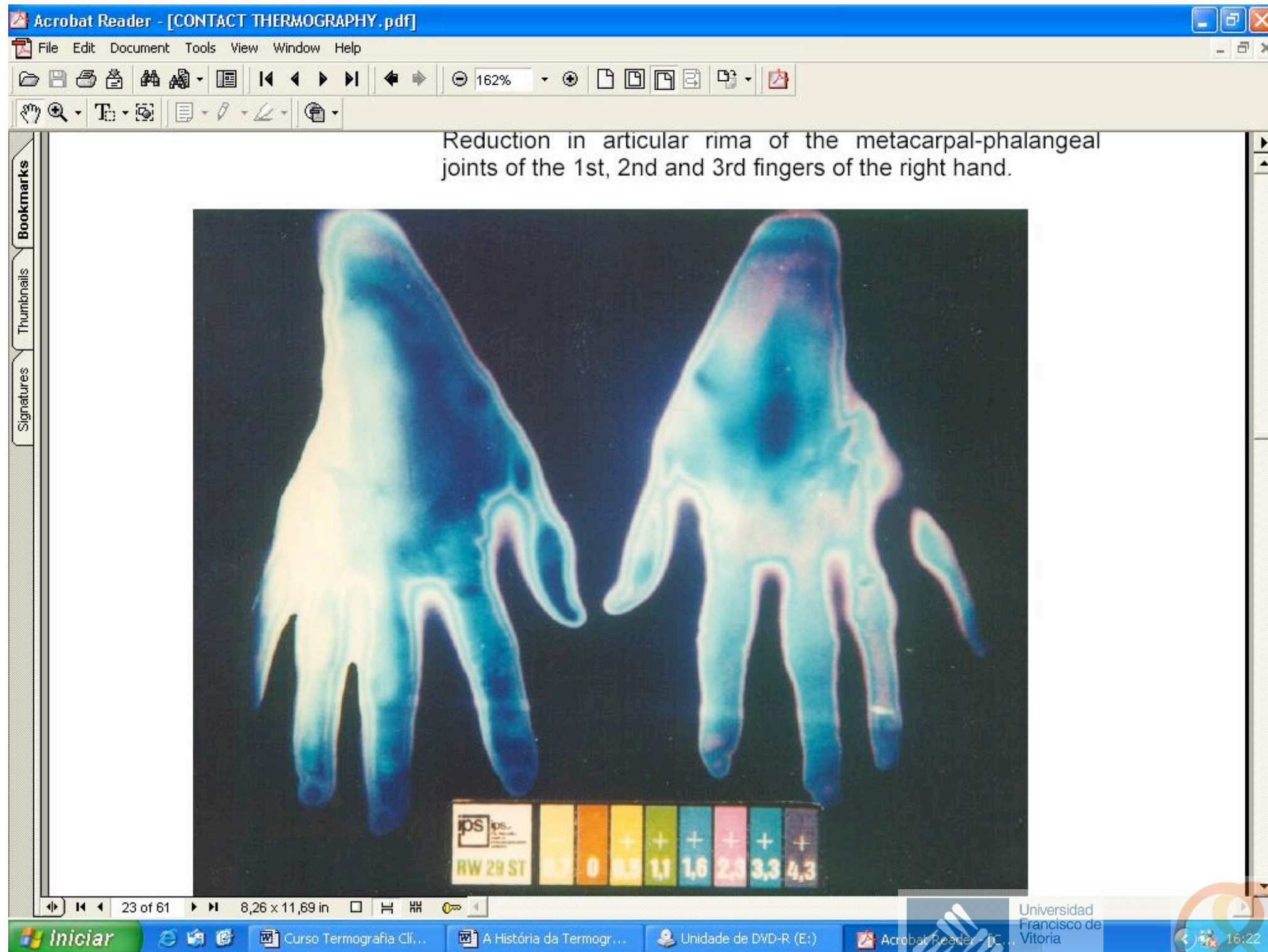


1920 Doss Evins



**FIRST CONFERENCE STRASBURG
26 /03 / 1966.**

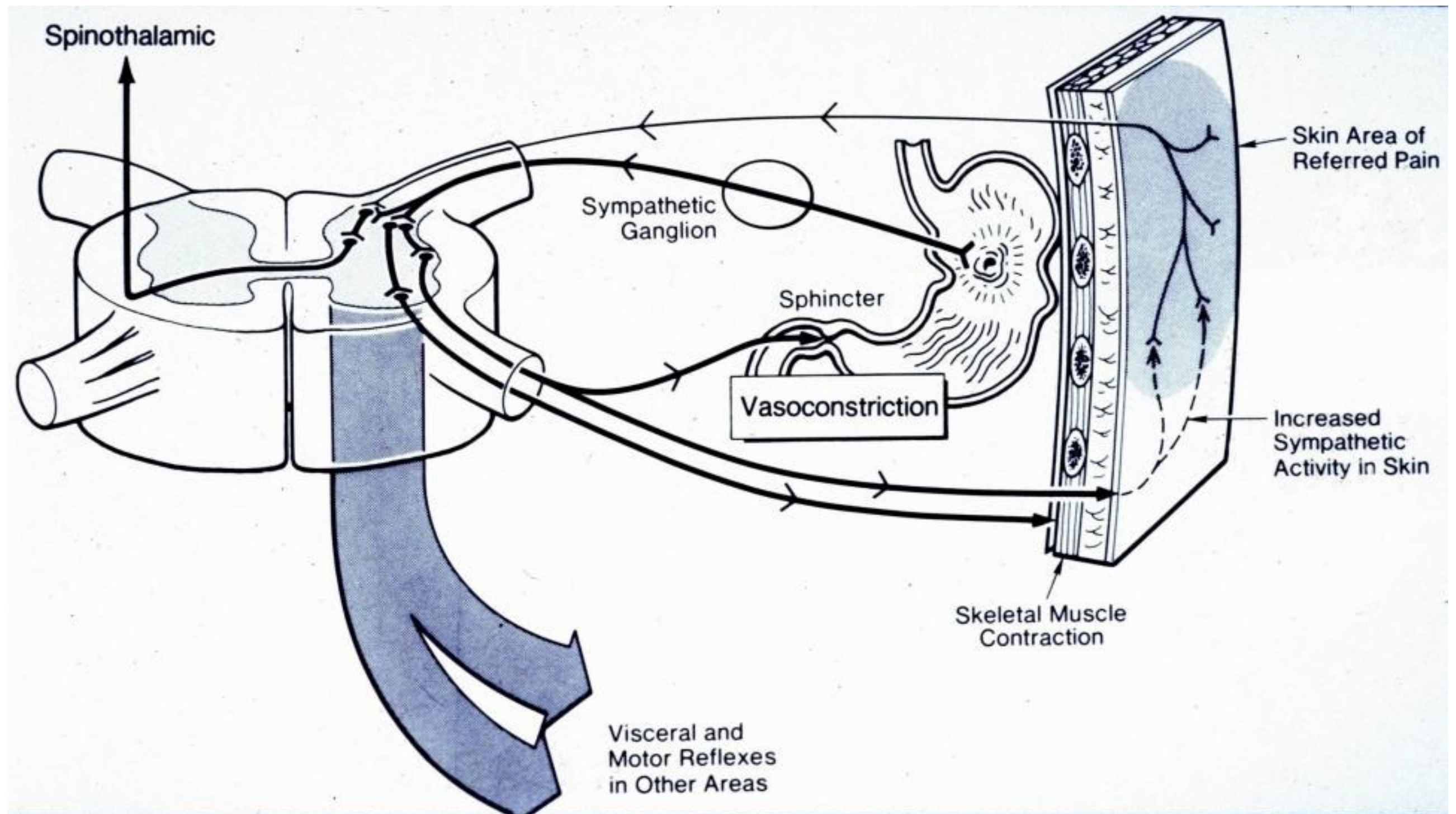
Contact thermography (liquid crystals):



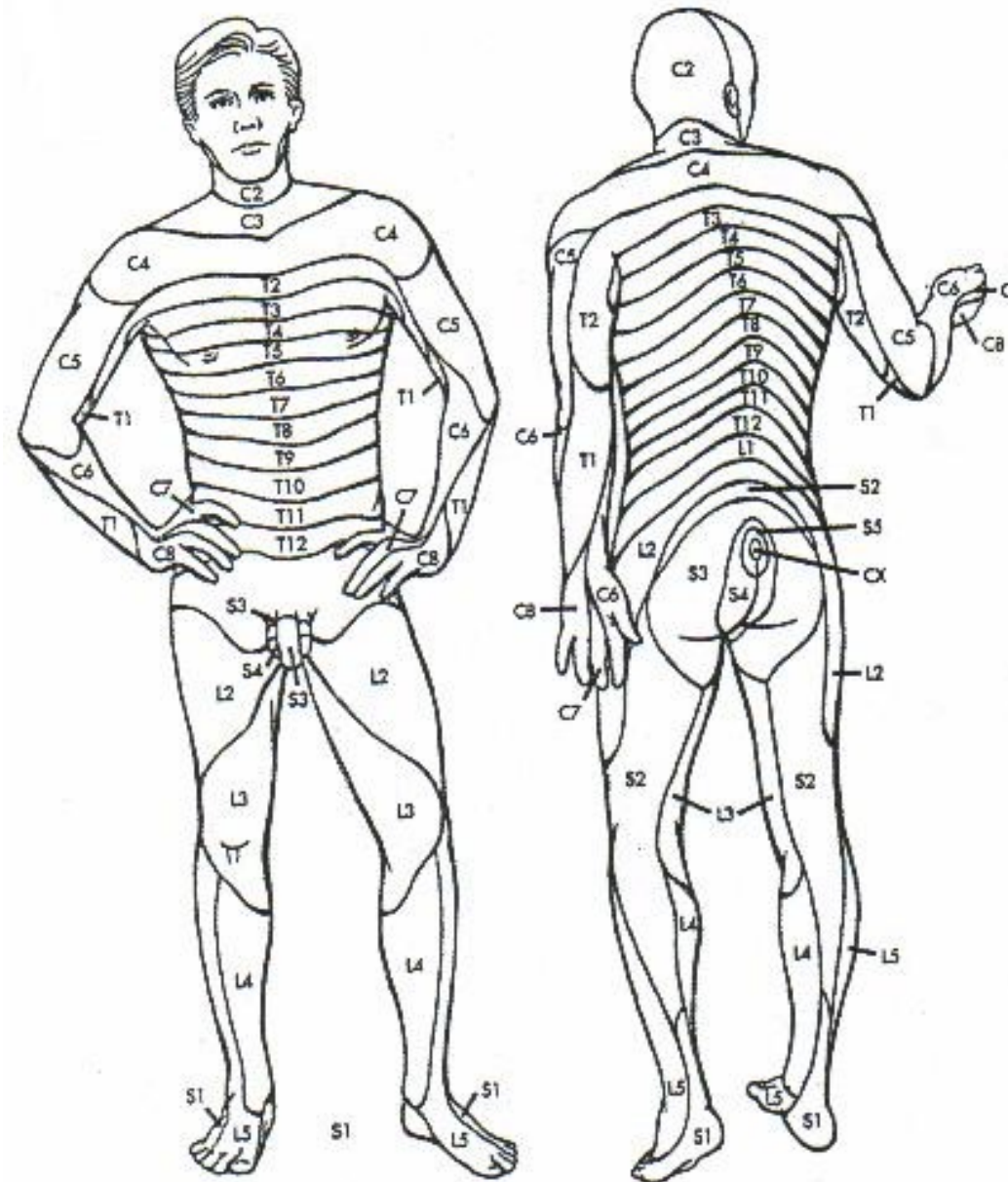


2003/ 2004 clinical termography

Alexey Ovechkin y la compañía italiana EDP



RAYAN (1982), WEINBAUM, JIJÍ o LEMONS (1984), y ZHU et al (2002) demostraron ampliamente que el calor transmitido por la piel es 100% el reflejo de la microcirculación.



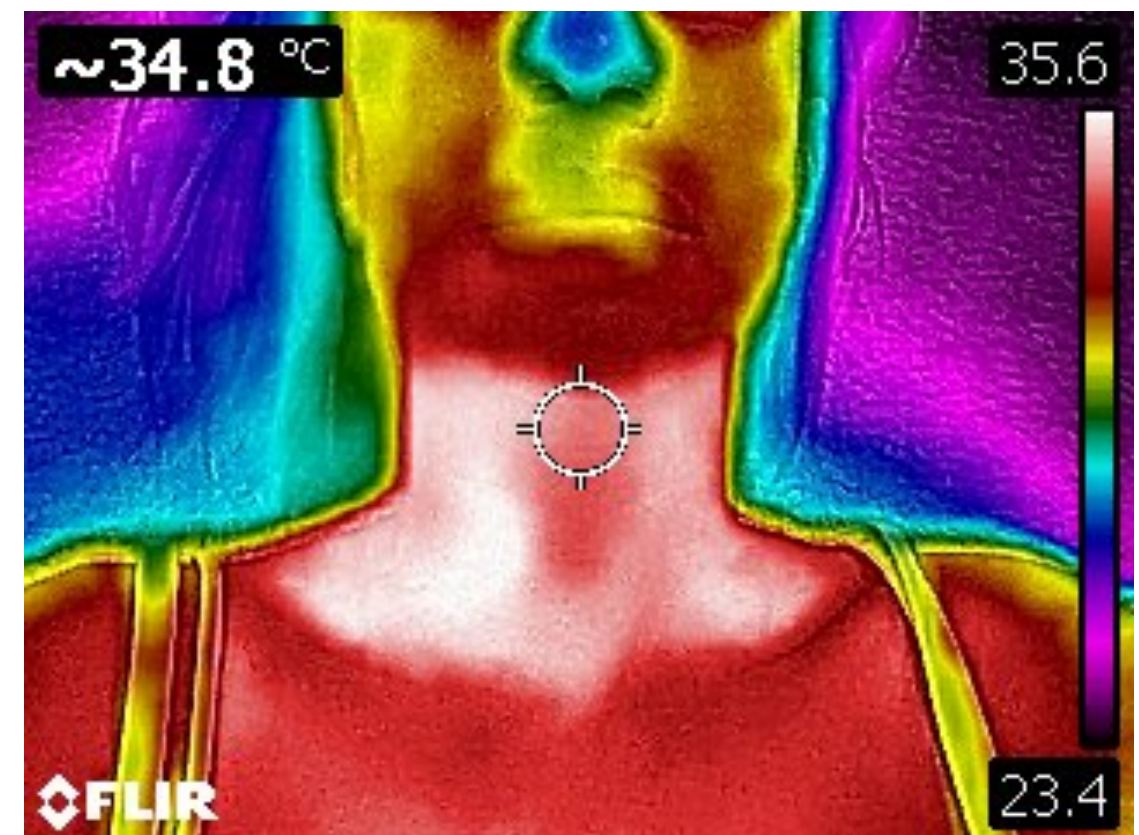
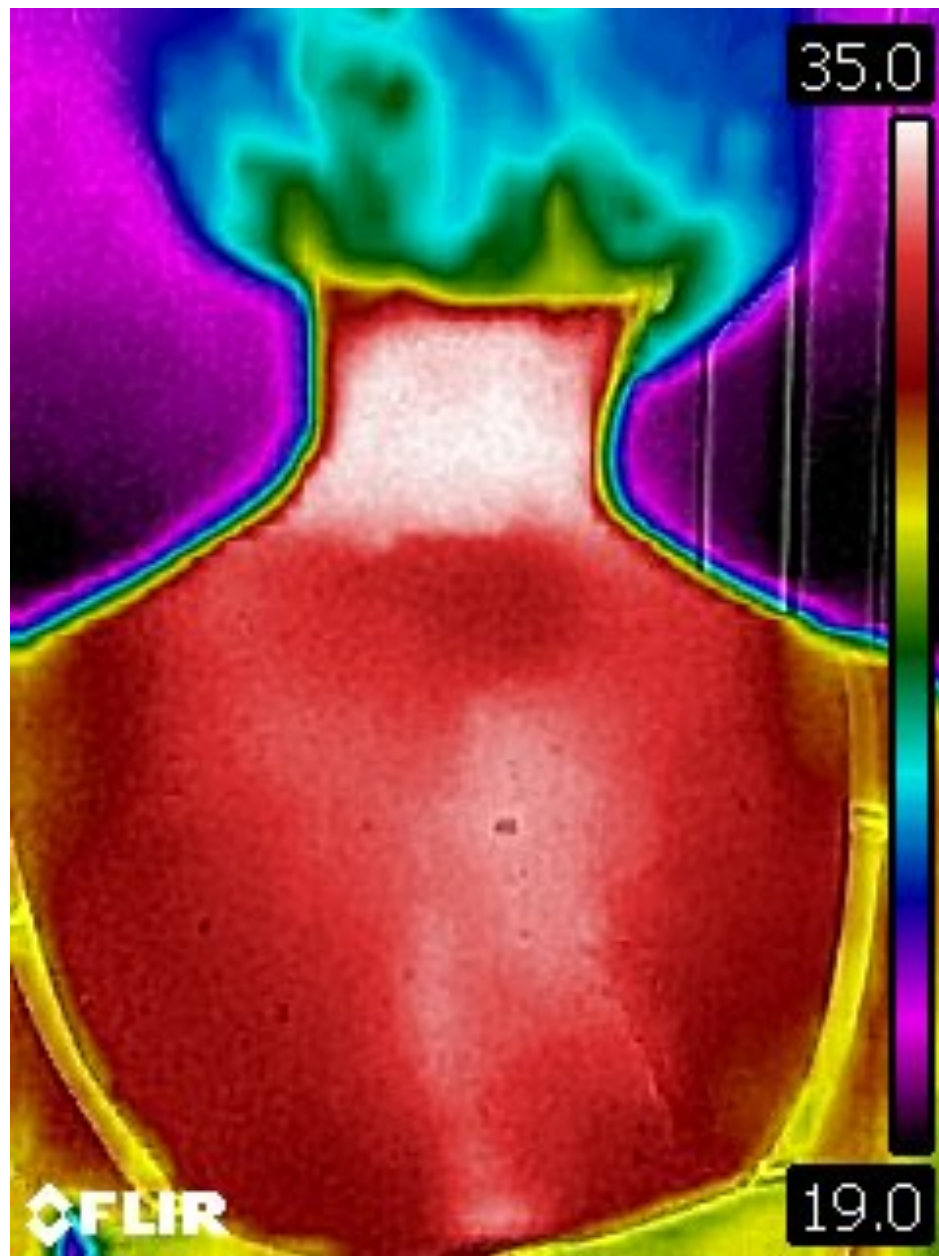
MAPA DOS DERMATOMAS As letras e números indicam os nervos raquidianos que inervam uma dada região da pele.

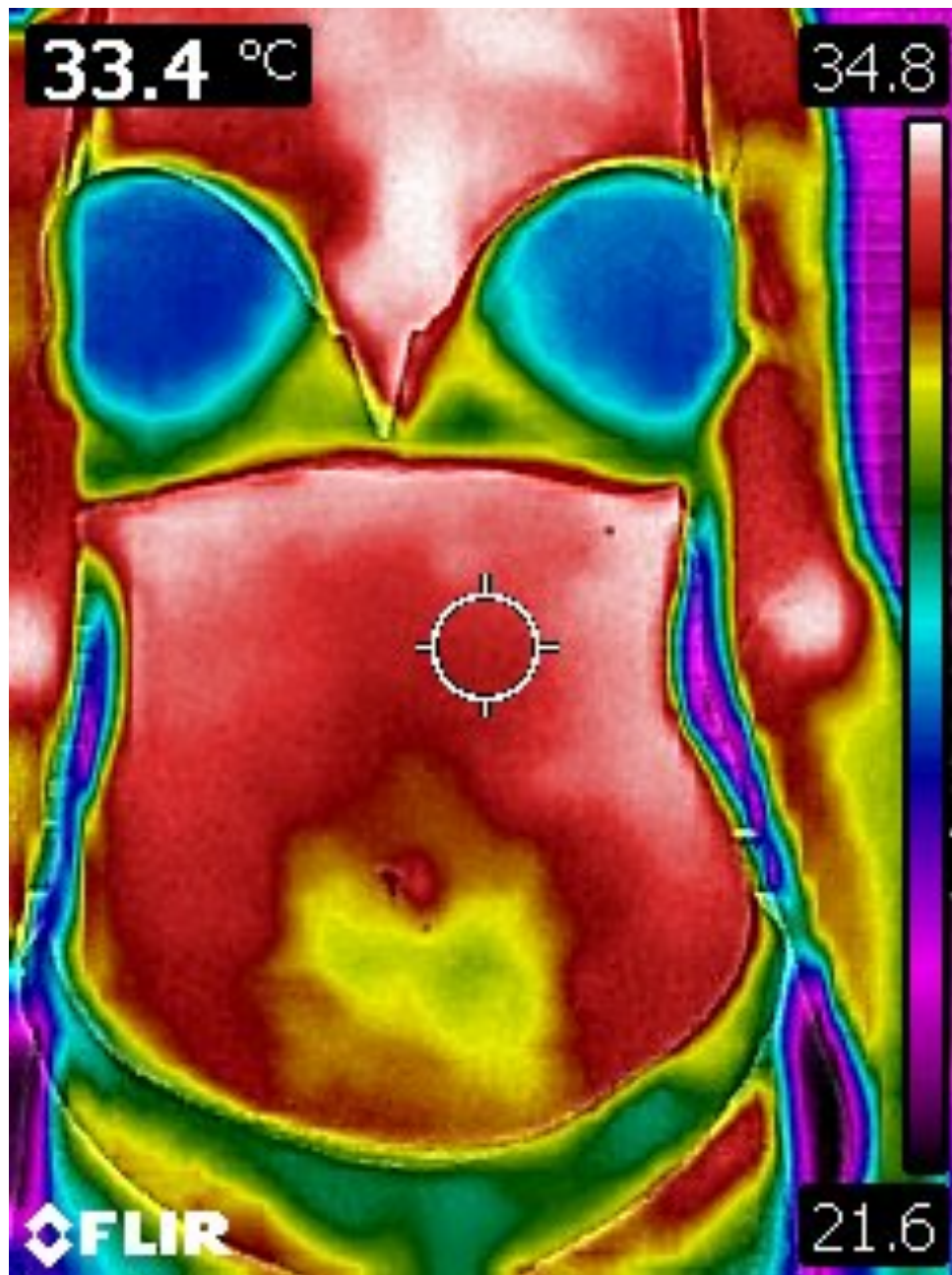


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TERMOGRAPHY





Conclusión.

La respuesta termo cutánea en la presencia de dolor puede ayudar en el diagnóstico diferencial en cuanto a su origen. La estimulación anormal del sistema nervioso autónomo modificará la imagen térmica del segmento cutáneo. La termografía puede entonces documentar gráficamente el dolor, bien como cualquier exacerbación posterior que se presente. El dolor debe estar presente durante el momento del examen o entonces una respuesta falsa negativa podría documentarse.

La disfunción visceral, independientemente de la causa, será evidenciada por el sistema nervioso autónomo que produce el dolor y cambios térmicos en el área del dolor referido. Cada órgano tiene su propia área de dolor referido y la termografía permite documentar gráficamente cada área de dolor referido.

La termografía puede objetivamente documentar el dolor en las áreas de dermatomo corporal.

- Bragos, R. (1997) Contribució a la caracterització de teixits i sistemes biològics mitjançant tècniques d'espectrocòpia d'impedància elèctrica. Departament d'enginyeria electrònica. Universitat Politècnica de Catalunya, Barcelona, España.
- Bragos, R., Casas, O., Rosell, J., Warren, M., Tresanchez, M., Carreño, A., Rodriguez-Sinovas, A. and Cinca, J. (1999) In vivo detection of healed myocardium scar in pigs measuring the electrical impedance spectrum with an intracavitary catheter. 5th Conference of the European Society for Engineering and Medicine, Barcelona, Spain, pp. 487-488.
- Bragos, R., Povill, R. and Riu, P. (1994) Applicability of the three coefficiente calibration technique in EIT. 6th European Community Workshop on Electrical Empedance Tomography, Ankara, Turkey, pp. 49-50.
- Casas, O. (1998) Contribución a la obtención de imágenes paramétricas en tomografía de impedancia eléctrica para la caracterización de tejidos biológicos. Ingeniería Electrónica. Universidad Politécnica de Cataluña, Barcelona.
- Foster, K. and Schwan, H.P. (1996) Dielectric properties of tissues. In Polk, C.a.P., E. (ed.), Handbook of Biological Effects of electromagnetic Fields. Boca Raton: CRC Press, pp. 25-102.
- Geddes, L.A. (1989) Detection of physiological events by impedance. In Principles of Applied Biomedical Instrumentation. Wiley Interscience, New York, Vol. 1, pp. 276-410.
- Grimnes, S. and Martinsen, O.G. (2000) Bioimpedance and Bioelectricity Basics. Academic Pres.
- Martinsen, O.G., Grimnes, S. and Karlsen, J. (1995) Electrical Methods for Skin Moisture Assessment. Skin Pharmacology, 8, 237-245.
- Morucci, J.P. and Rigaud, B. (1996) Bioelectrical impedance techniques in medicine .3. Impedance imaging - Third section: Medical applications. Critical Reviews in Biomedical Engineering, 24, 655-677.