My Fulbright Experiences at Rosario University and in Colombia

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2016-17 US Fulbright Scholar - Universidad del Rosario, Bogota, Colombia

Professor and Director of Biomechanics/Sports Medicine Lab

Department of Kinesiology, Recreation, & Sport Studies
The University of Tennessee, Knoxville

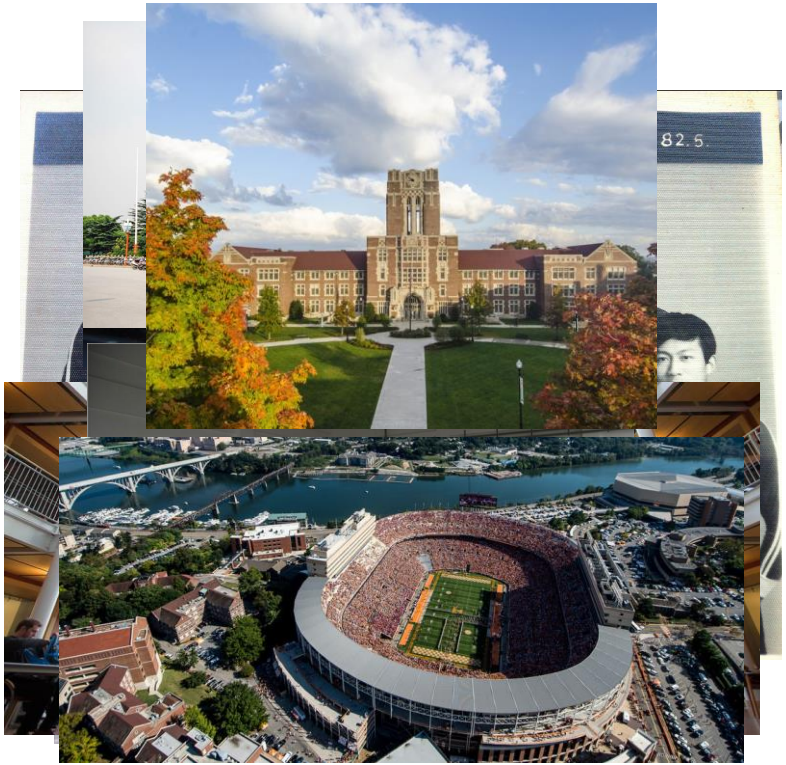
THE UNIVERSITY OF
TENNESSEE
KNOXVILLE

Acknowledgement

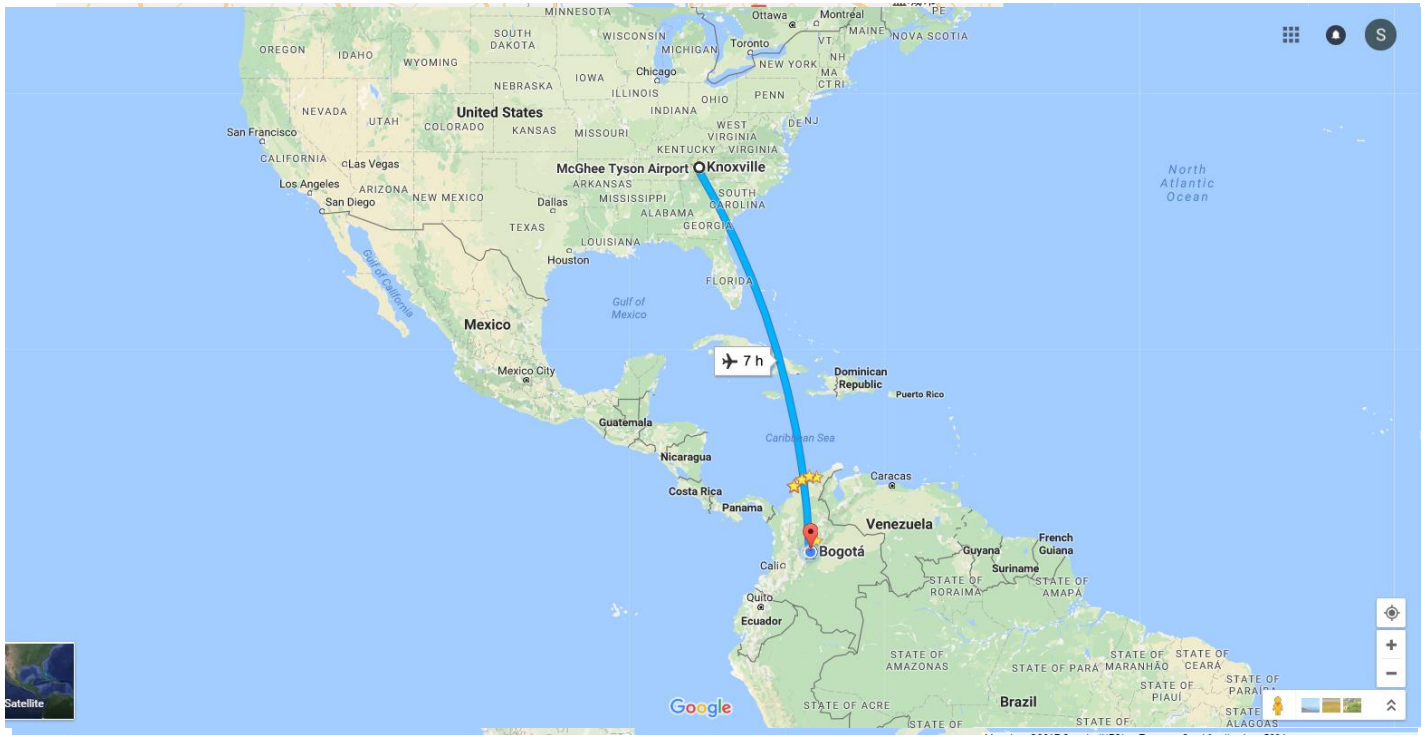
- Fulbright Program
  - The Council for International Exchange of Scholars (CIES)
- Fulbright Colombia Commission
  - Fulbright-Colciencias Innovation and Technology Award
- Universidad del Rosario
- The University of Tennessee

Songning Zhang

- Nanjing, China
- BS - Nanjing Normal University
- MA – Shanghai University of Sport
- PhD – University of Oregon
- Work at University of Tennessee



My long journey to Bogota!



9700km

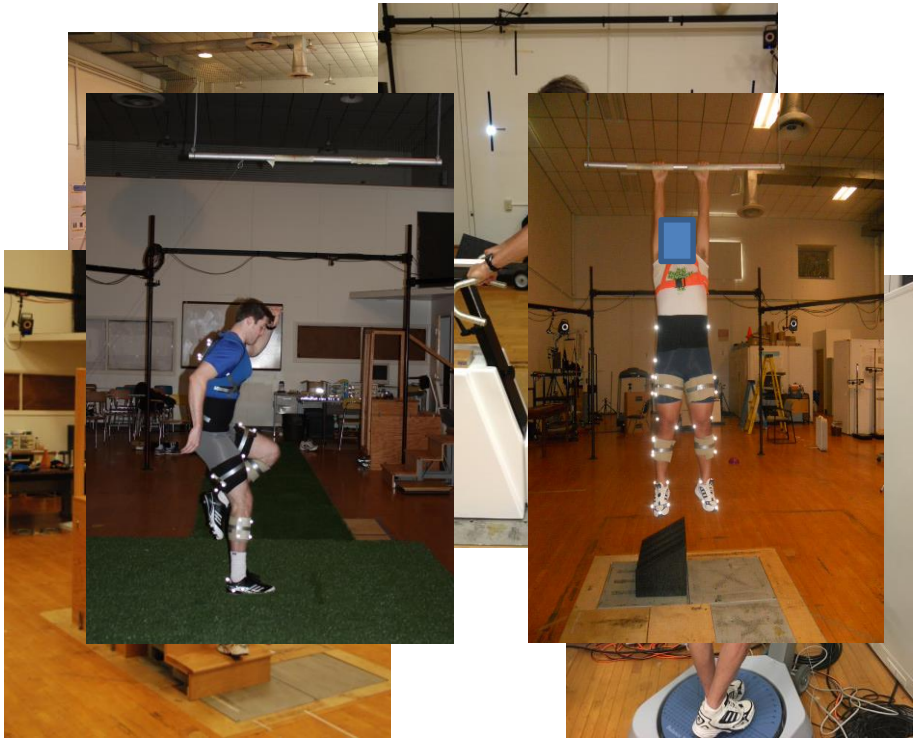
Rosy Paola Cardenas Sandoval

Research Interests

- Clinical biomechanics
  - Knee osteoarthritis
  - Total knee replacement
- Sport related biomechanics
  - Sport surface
  - Footwear
  - Sports injury and prevention

UT Biomechanics/Sports Medicine Laboratory

- Established in 1996
- Moved in current location in 2006
- Major Equipment
  - 12-camera high-speed infrared motion capture
  - 3 force platforms
  - Wireless and wired EMG
  - Muscle strength dynamometer
  - Balance testing system
  - Instrumented pedals for cycling
  - Instrumented staircases
  - Instrumented ramps
  - Plantar pressure systems



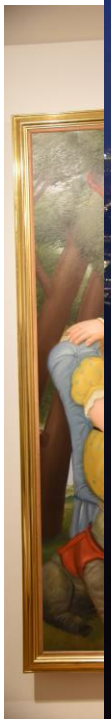
The University of Tennessee

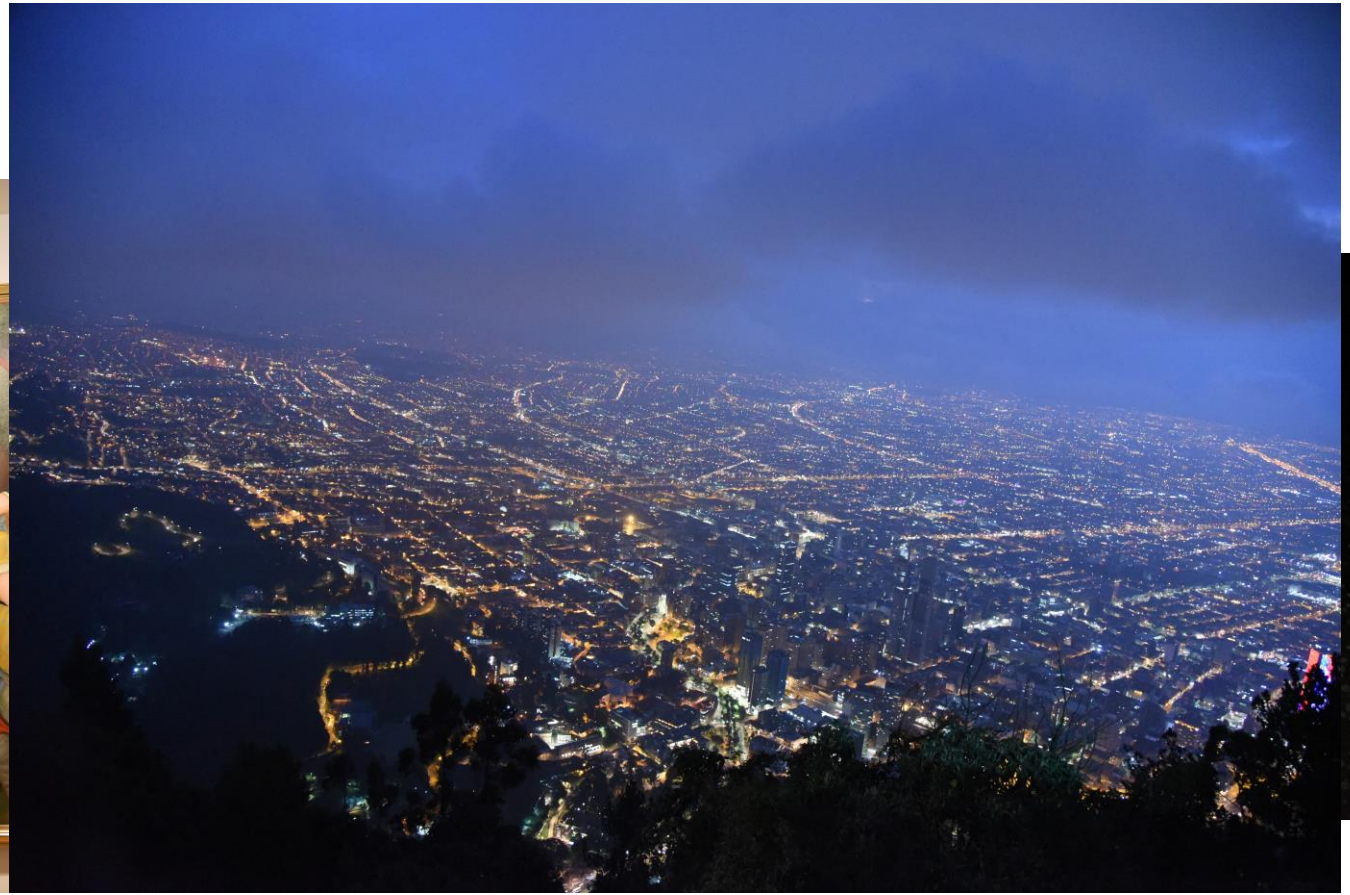
- Knoxville campus
- Founded in 1794
- 28,052 students
  - 22,139 undergraduate students
  - 5,913 graduate students
  - 1,700 faculty
- 13 colleges
- College of Education, Health and Human Sciences

THE UNIVERSITY OF TENNESSEE KNOXVILLE

DEPARTMENT OF KINESIOLOGY, RECREATION & SPORT STUDIES

Bogota





FULBRIGHT COLOMBIA #BeFulbright —60 years—

THE UNIVERSITY OF TENNESSEE KNOXVILLE

Lectures 3D biomechanics in the hospital

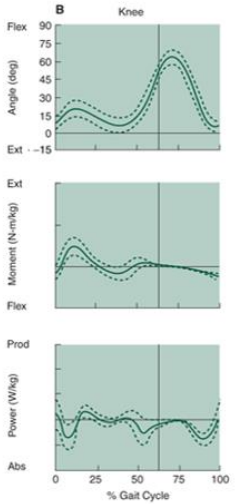
Gait Biomechanics

- Professors and students in the hospital

Inverse dynamics

- Paola's biomechanics classes

Knee Joint



- Knee Angle
  - Flexion, extension, flexion
- Knee moment
  - Extension moment, flexion moment, extension moment
- Knee power
  - Energy absorption, generation, absorption

Balance and COP

- Eliana's biomechanics class

Biomechanics applications

- Footwear Related Studies
- Studies about Ankle Brace and Inversion Sprains
- Sport Surface Related Studies

Discussion forum: rehabilitation science with Stockton University

Talk at the XXV Congreso National De Fisiotherapia

Discussion forum at Congress

Coastal trip

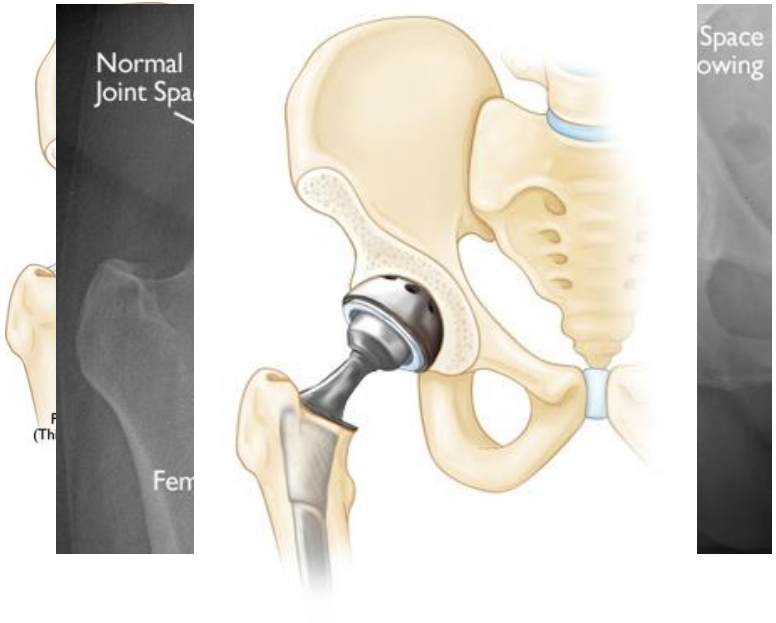
Medellin

Functional training and ultrasound treatments on hip osteoarthritis

- Faculty in physiotherapy
  - Rosy Paola Cardenas Sandoval
  - Luisa Fernanda Garcia Salazar
  - Eliana Isabel Rodriguez Grande

Functional training and ultrasound treatments on hip osteoarthritis

- Arthritis: leading cause of disability
- Hip Osteoarthritis: most common form



Research Documents

Subject Data Collection

Date: Session: Pre(0) Post(16)

Subject :_____

Date of birthday D/M/Y _____ Weight: _____ (kg) Height: _____(m)
BMI:

OA Hip: Right[0] _____ Left[1] _____, Dominant side: Right[0] _____ Left[1] _____

Severity OA II[0] _____ Severity OA III[1]_____ OA unilateral[0]_____OA bilateral[1]_____

Sex: W[0]_____M[1]_____ Analgesics Yes[1]_____ Analgesics NO[0]_____

AINES[1]_____No AINES[0]_____Opioids[2]_____

Level of physical activity Mild[0]_____ Moderate[1]_____
Vigorous[2]_____

INTENSITY OF PAIN

VAS at the rest_____(mm)

VAS to palpation (mm)

VAS after TUG_____(mm)

FUNCTIONAL TEST

Timed Up and go _____(s)

Chair rise _____(s)

Order and Results of Strength Tests:

_____(Order) Psoas (N) Trial 1____; Trial 2____; Trial 3____; mean_____VAS____

_____(Order) gluteus medius (N) Trial 1____; Trial 2____; Trial 3____; mean_____VAS____

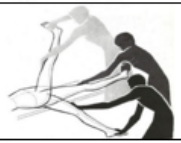
_____(Order) Hamstrings (N) Trial 1____; Trial 2____; Trial 3____; mean_____VAS____

_____(Order) Gluteus Max (N) Trial 1____; Trial 2____; Trial 3____; mean_____VAS____

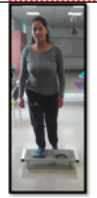
Proyecto: Efecto de un entrenamiento funcional y ultrasonido en OA de cadera WEEKLY LOG subjetc #:_____

WEEK	DATE	Treadmill/stationary bike		Strength							Comments
		Mode	FC	Excercise (#)	Level	Weight (kg)	Reps	Sets	Borg Scale	Pain level	

Functional Training Program

Excercise	*Demostration*	*Level 1*	*Level 2*	*Level 3*	*Level 4*	*Level 5*
Knee flexion in prone		Red Thera-band 2 - 3 sets 10 - 12 reps	Red Thera-band 2 - 3 sets 13 - 15 reps	Red Thera-band 4 sets 10 - 12 reps	Green Thera-band 2 - 3 sets 10 - 12 reps	Green Thera-band 2 - 3 sets 13-15 reps
Hip extension in prone		Ankle weight 1 kg 2 - 3 sets 10 - 12 reps	Ankle weight 1 kg- 2 kg 2 - 3 sets 13 - 15 reps	Ankle weight 2 kg- 3 kg 2 - 3 sets 13 - 15 reps	Ankle weight 4 kg 2-3 sets 10 – 12 reps	Ankle weight 4 kg 4 sets 13 - 15 reps
Seated knee extension		Ankle weight 2 kg 2 - 3 sets 10 - 12 reps	Ankle weight 2 kg- 3 kg 2 - 3 sets 13 - 15 reps	Ankle weight 3 kg- 4 kg 2 - 3 sets 10 - 12 reps	Ankle weight 3 kg- 4 kg 2 - 3 sets 13 - 15 reps	Ankle weight 4 kg- 5 kg 4 sets 10 - 12 reps
Kabat diagonal (D1 and D2- abd + add +ext +flex hip)		10- 12 reps	13-15 reps	2 sets 10-12 reps	2 sets 13-15 reps	3 sets 10-12 reps
Unilateral bridge		2 -3 sets 8 - 10 reps	2 - 3 sets 10 - 12 reps	Trunk weight 2kg 2 - 3 sets 8 - 10 reps	Trunk weight 2 kg 2 - 3 sets 10- 12 reps	Trunk weight 3 kg- 4 kg 2 - 3 sets 8 - 10 reps

Functional Training Program

Excercise	*Demostration*	*Level 1*	*Level 2*	*Level 3*	*Level 4*	*Level 5*
Steps		2 - 3 sets 10 - 12 reps Step height 10-20 cm	2 - 3 sets 13 - 15 reps Step height 10-20 cm	Ankle weight 2 kg- 3 kg 2 - 3 sets 10 - 12 reps Step height 10-20 cm	Ankle weight 2 kg- 3 kg 2 - 3 sets 13 - 15 reps Step height 10-20 cm	Ankle weight 3 kg -4 kg 2 - 3 sets 10 - 12 reps Step height 10-20 cm
Walk with raised knees (Forward lunge walking)		2 - 3 sets 10 - 12 reps	2 - 3 sets 13 - 15 reps	4 sets 10 - 12 reps	Ankle weight 2 kg- 3 kg 2 - 3 sets 10 - 12 reps	Ankle weight 3 kg -4 kg 2 - 3 sets 13 - 15 reps
Squats With arms next to thrunk		2 - 3 sets 10 - 12 reps	2 - 3 sets 13 - 15 reps	Arms weight 3 kg -4 kg 2 - 3 sets 10 - 12 reps	Arms weight 3 kg- 4 kg 2 - 3 sets 13 - 15 reps	Arms weight Ankle weight 4 kg- 5 kg 2 - 3 sets 10 - 12 reps

Ultrasound

- The therapeutic ultrasound will be applied before the functional training
  - An intensity of 2.2 W / cm^2
  - A frequency of 1 MHz and application time of 4 minutes
  - Mean spatial temporal intensity will correspond to 0.44 W/cm^2

Patient Assessments

- Comprehensive clinical function and strength assessments
- Survey assessment
- Gait biomechanics assessment

Escala de cadera de Oxford (OHS)

PROBLEMAS CON SU CADERA

Marque (x) una casilla para cada pregunta.

1. Durante las últimas 4 semanas...
¿Cómo describiría el dolor que tiene normalmente debido a la cadera?

Ninguno	Muy leve	Leve	Moderado	Grave
☐	☐	☐	☐	☐

2. Durante las últimas 4 semanas...
¿Ha tenido algún problema para lavarse y secarse (todo el cuerpo) debido a su cadera?

Ningún problema	Muy pocos problemas	Problemas moderados	Dificultad extrema	Imposible hacerlo
☐	☐	☐	☐	☐

3. Durante las últimas 4 semanas...
¿Ha tenido algún problema para subir y bajar de un coche o para usar el transporte público debido a su cadera? (sea cual sea el que suela utilizar)

Ningún problema	Muy pocos problemas	Problemas moderados	Dificultad extrema	Imposible hacerlo
☐	☐	☐	☐	☐

4. Durante las últimas 4 semanas...
¿Se ha podido poner un par de calcetines, medias o pantis?

Sí, fácilmente	Con poca dificultad	Con dificultad moderada	Con extrema dificultad	No, imposible
☐	☐	☐	☐	☐

5. Durante las últimas 4 semanas...
¿**Podría** hacer la compra para su casa usted solo/a?

Sí, fácilmente	Con poca dificultad	Con dificultad moderada	Con extrema dificultad	No, imposible
☐	☐	☐	☐	☐

6. Durante las últimas 4 semanas...
¿Durante cuánto tiempo ha podido andar antes de que el dolor debido a su cadera se volviera **grave** (con o sin bastón)?

Sin dolor/Más de 30 minutos	16 a 30 minutos	5 a 15 minutos	Solo por casa	Nada/dolor grave al caminar
☐	☐	☐	☐	☐

7. Durante las últimas 4 semanas...
¿Ha podido subir un tramo de escaleras?

Sí, fácilmente	Con poca dificultad	Con dificultad moderada	Con extrema dificultad	No, imposible
☐	☐	☐	☐	☐

8. Durante las últimas 4 semanas...
Tras una comida (sentado/a a una mesa), ¿en qué medida le ha resultado doloroso levantarse de la silla debido a su cadera?

Nada doloroso	Ligeramente doloroso	Moderadamente doloroso	Muy doloroso	Insoportable
☐	☐	☐	☐	☐

9. Durante las últimas 4 semanas...
¿Ha estado cojeando al andar debido a su cadera?

Rara vez/nunca	A veces, o solo al principio	Con frecuencia, no solo al principio	La mayoría del tiempo	Todo el tiempo
☐	☐	☐	☐	☐

10. Durante las últimas 4 semanas...
¿Ha tenido algún dolor grave y repentino: "fulgurante", "punzante" o "espasmos", debido a la cadera afectada?

Ningún día	Solo 1 o 2 días	Algunos días	La mayoría de días	Todos los días
☐	☐	☐	☐	☐

11. Durante las últimas 4 semanas...
¿En qué medida ha interferido su dolor debido a la cadera con su trabajo habitual (incluidas las tareas domésticas)?

Nada	Un poco	Moderadamente	Mucho	Totalmente
☐	☐	☐	☐	☐

12. Durante las últimas 4 semanas...
¿Le ha molestado el dolor debido a la cadera en la cama por la noche?

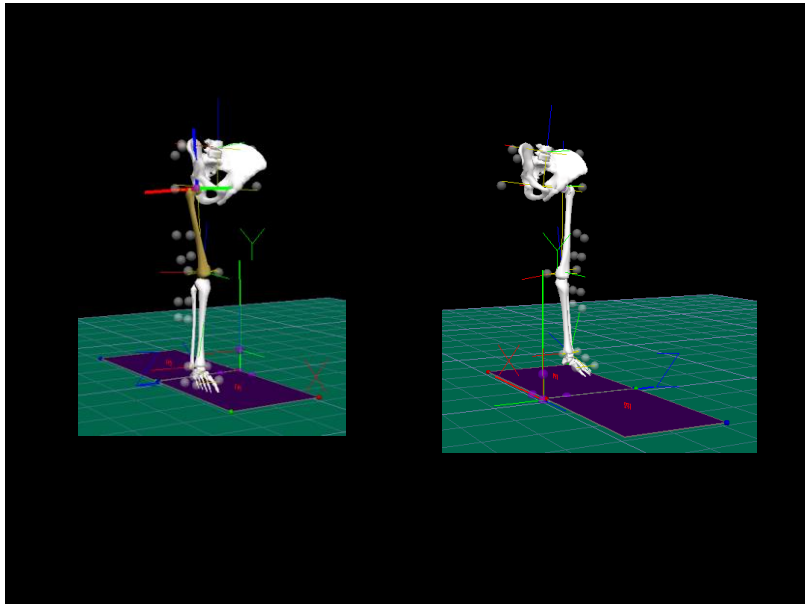
Ninguna noche	Solo 1 o 2 noches	Algunas noches	La mayoría de noches	Todas las noches
☐	☐	☐	☐	☐

Por último, compruebe que haya respondido a todas las preguntas.

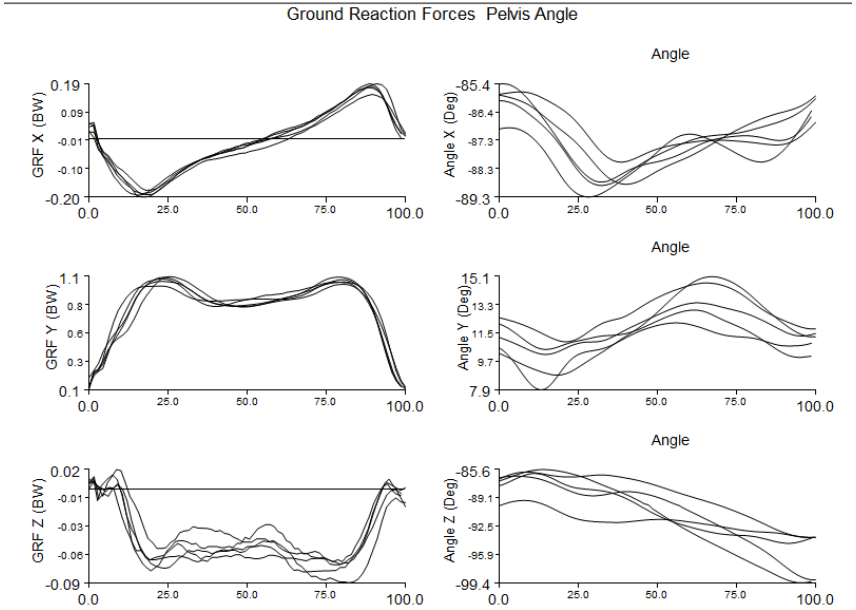
Muchas gracias.

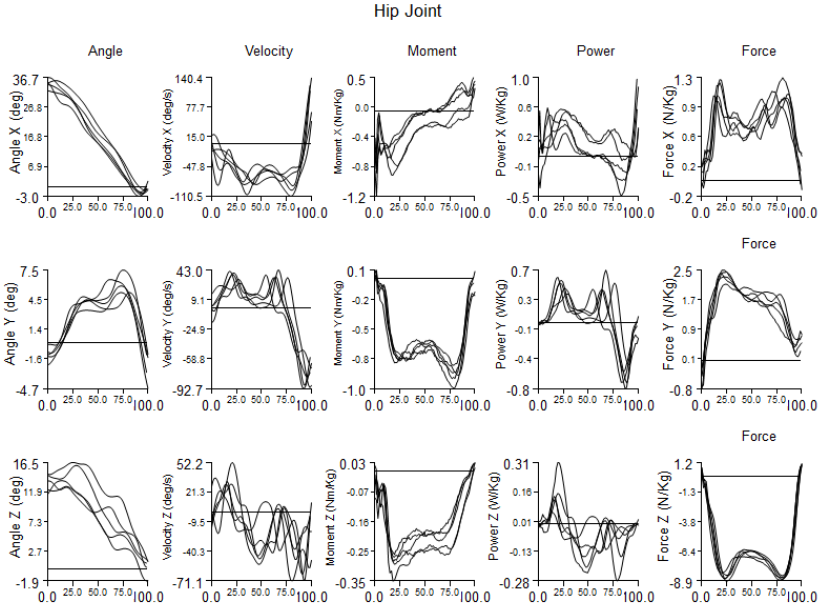
Gait Biomechanics Assessments

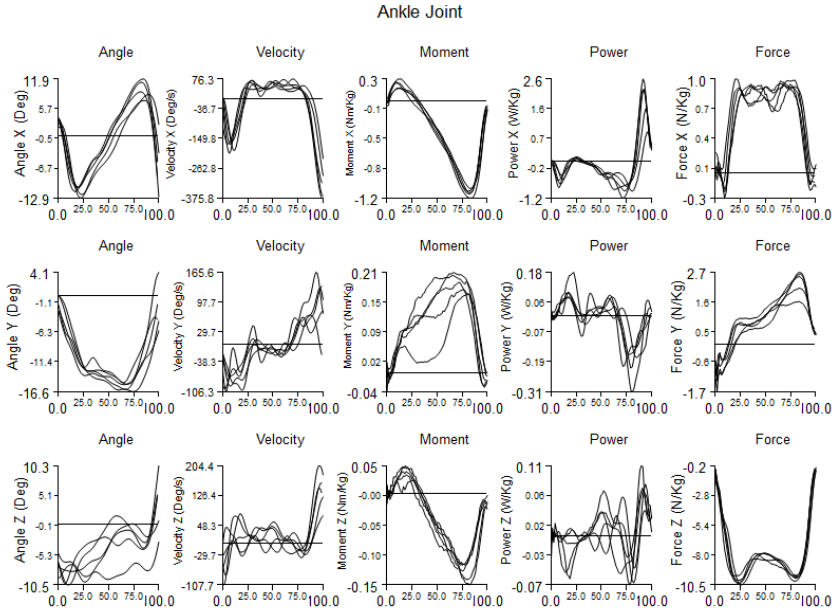
- BTS system
  - 3D kinematics: 100 Hz
  - Force platform: 100 Hz

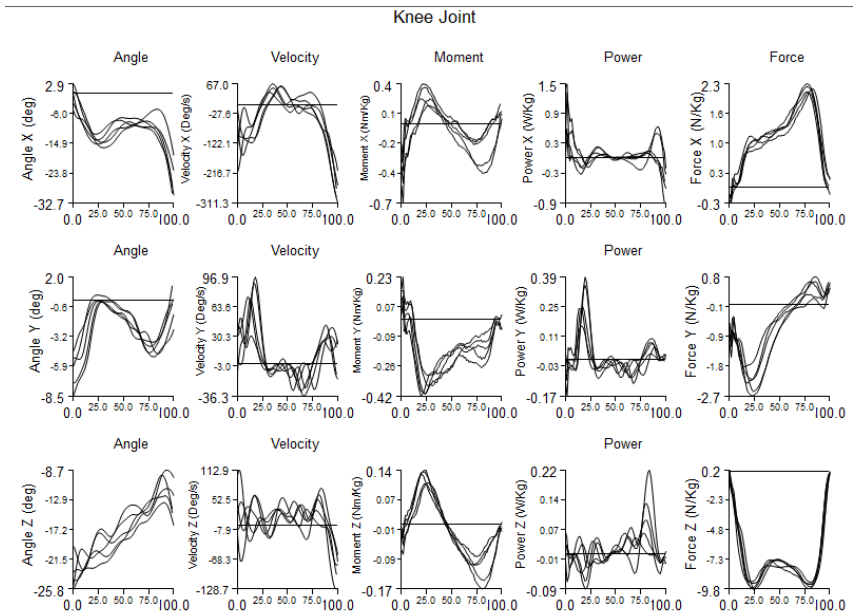


Prelim Results





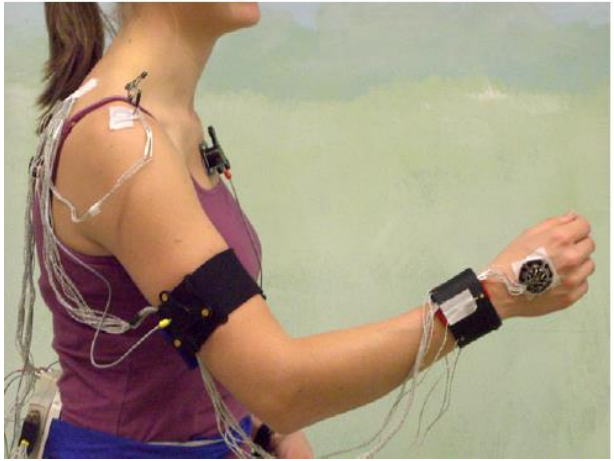




Gait Biomechanics Assessment

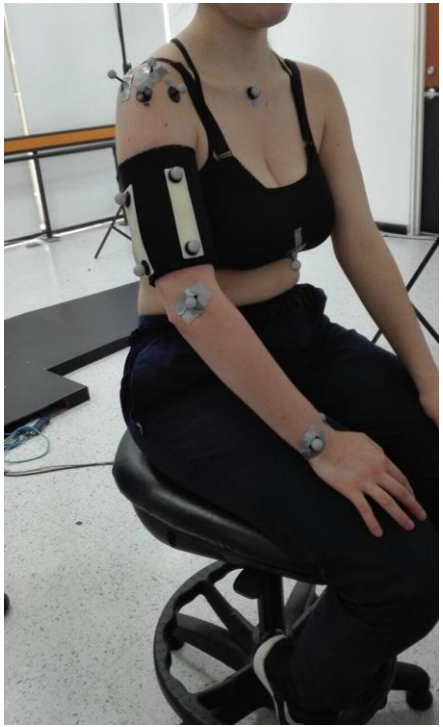
Research on upper limb biomechanics in stroke patients

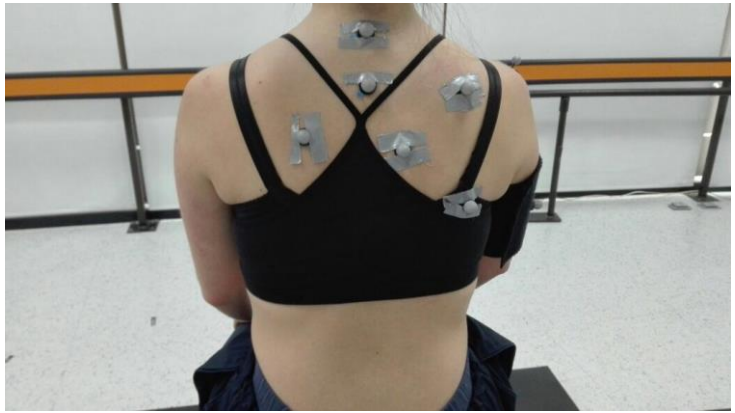
- Stroke: leading cause of disability in developed countries
- Luisa Fernanda Garcia Salazar and Upper limb model
  - Van Andel (2008)
  - ISB definitions and conventions

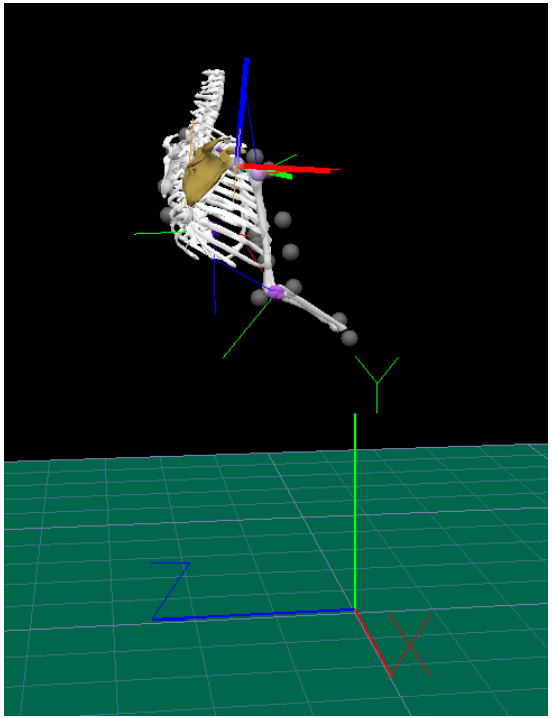


van Andel CJ, Wolterbeek N, Doorenbosch CA, Veeger DH, Harlaar J. Complete 3D kinematics of upper extremity functional tasks. *Gait Posture*. 2008;27(1):120-7.
Wu G, van der Helm FC, Veeger HE et al. ISB recommendation on definitions of joint coordinate systems of various joints for the reporting of human joint motion--Part II: shoulder, elbow, wrist and hand. *J Biomech*. 2005;38(5):981-92.

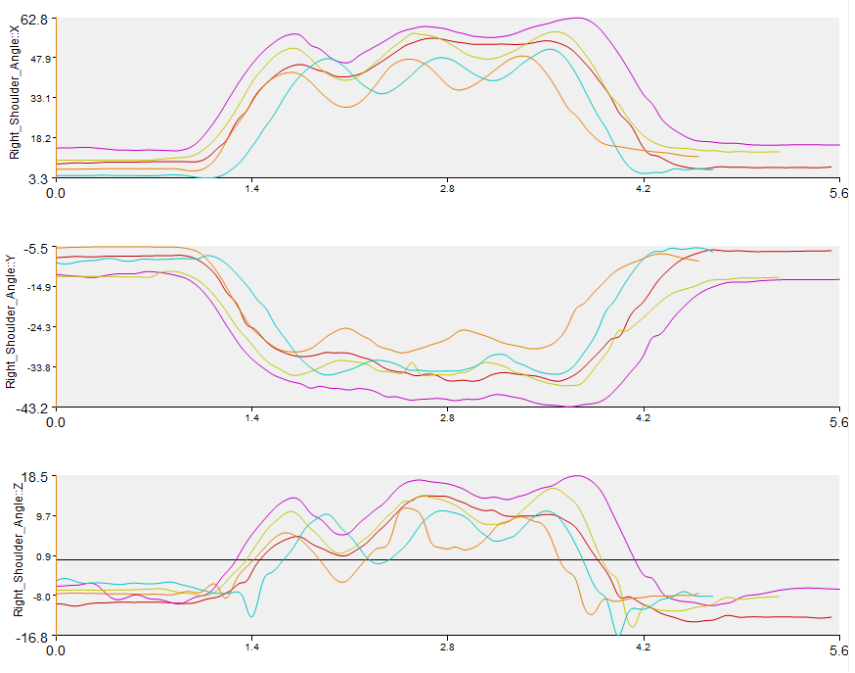
Upper limb model and stroke







Upper limb model and stroke



Potential collaborations

- Clinical assessments of Parkinson patients
- Upper limb applications
- Coldeportes

Award ceremony of college of medicine

Fulbright Colombia 2017 Award

Thank you for your attendance!