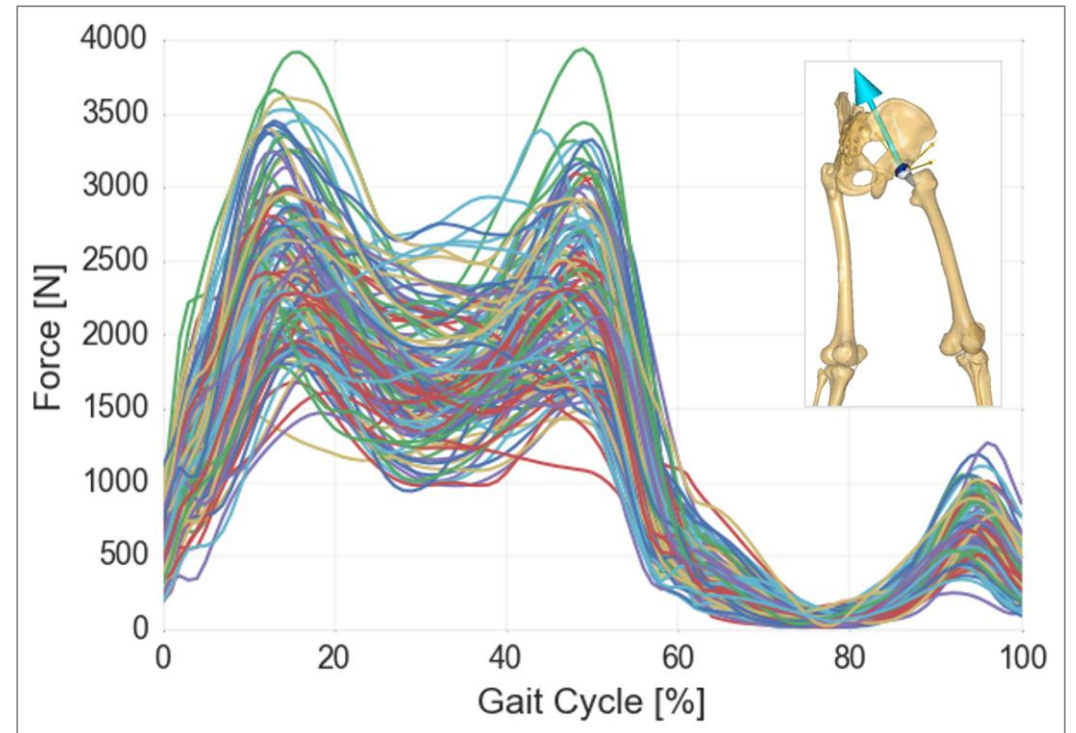


Motion capture dataset of 137 post-operative total hip replacement patients: Current and future applications

The webcast will begin shortly...



Outline

- Introduction to the AnyBody Modeling System
- Presentation
- Resources and upcoming AnyBody events
- Question and answer session

Presenter

Dr David Lunn, Ph.D.,
Senior Lecturer
Leeds Beckett University, UK
Carnegie School of Sport



Host

Divyaksh S. Chander
Sales Engineer
AnyBody Technology
dsc@anybodytech.com



Outlin

- Intro

ing System

vents

scientific data

OPEN

DATA DESCRIPTOR

Motion capture dataset of 137 post-operative total hip replacement patients performing activities of daily living

David E. Lunn^{1,2,3*}, Enrico De Pieri¹, Graham J. Chapman⁴, Morten E. Lund⁵, Stephen J. Ferguson¹ & Anthony C. Redmond⁶

Three-dimensional motion capture is a powerful tool in clinical and engineering applications, but it can be time consuming, expensive, and difficult to access patient populations. Here, we present an open access dataset comprising 3D motion capture and ground reaction force data from 137 post-operative total hip replacement patients performing eight activities of daily living (ADLs): normal walking, fast walking, stair ascent, stair descent, sit-to-stand, stand-to-sit, lunge, and squat. Data were collected using a 10-camera Vicon system and two AMTI force plates and are provided in C3D and txt file format, compatible with inverse dynamic analysis platforms (e.g. Visual 3D, MOXA) and musculoskeletal modelling platforms (e.g. OpenSim, AnyBody). Each file includes synchronised marker trajectories, analog force data, and participant metadata (e.g. age, sex, BMI, operated limb, time since surgery). This dataset offers a unique opportunity to study functional biomechanics across a range of ADLs, enabling applications in musculoskeletal modelling, rehabilitation assessment, and the development of machine learning algorithms.

Check for updates

Background & Summary

Three-dimensional motion capture data has a wide range of applications including clinical evaluation of movement, improving sports performance, and medical device testing. However, performing high quality marker-based motion capture requires expertise, can be time-consuming, expensive, and sometimes it can be difficult to access patient populations. Datasets of 3D motion capture for walking and walking a variety of human gait are available and for most clinical questions and engineering solutions, where an understanding of human joint activity and is required for humans to be well-functioning and the ability to perform other ADLs is also relevant. These ADLs include self-selected walking speed, and therefore eliciting a higher demand on the person, develops a greater understanding of a person's position and lunging require larger joint excursions, increased motor control, and altered loading patterns. Furthermore, researchers and clinicians better understand how patient function during these activities. Here we present a unique dataset of 137 post-operative total hip replacement (THR) patients performing eight activities of daily living. These ADLs include self-selected normal walking speed, self-selected fast walking, stair ascent, stair descent, lunge, sit-to-stand and stand-to-sit. The selected ADLs, although formed by everyone, are representative of activities commonly undertaken in daily life and previous to as activities of daily living^{1,2,3}. Additional tasks, such as the lunge, were included to represent that increase joint excursion toward the end range of motion and replicate elements of

Presenter

Dr David Lunn, Ph.D.,
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Carnegie School of Sport



Host

Divyaksh S. Chander

Sales Engineer

AnyBody Technology

dsc@anybodytech.com



¹Carnegie School of Sport, Leeds Beckett University, Leeds, UK; ²NH&R Leeds Biomed
UK; ³Institute for Biomechanics, ETH Zurich, Zurich, Switzerland; ⁴Allied Health
Lancashire, Preston, UK; ⁵AnyBody Technology, Aalborg, Denmark; ⁶Institute for
Medicine, University of Leeds, Leeds, UK *e-mail: David.e.lunn@leedsbeckett.ac.uk

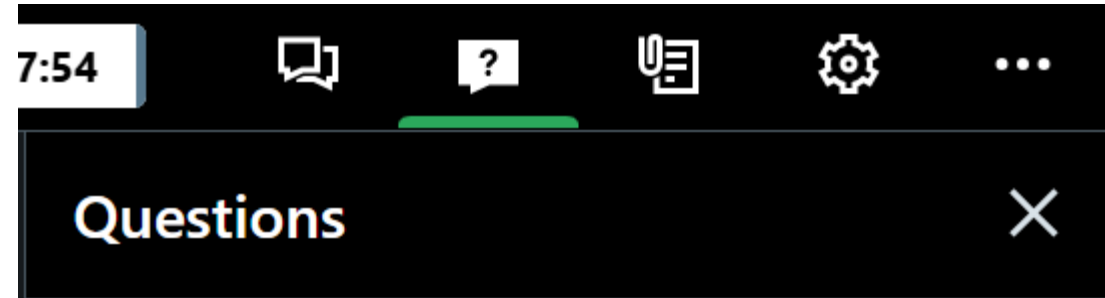
(2020) 1:3616 | https://doi.org/10.1038/s41597-020-06925-w

Control Panel

The Control Panel appears on the **top-right** side of your screen.

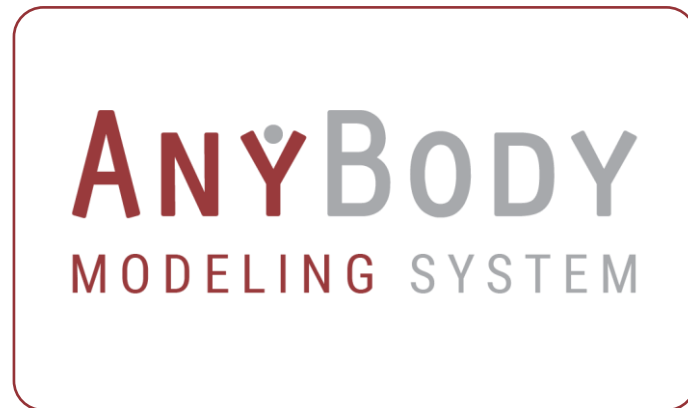
Submit questions and comments via the Questions panel.

Questions will be addressed at the end of the presentation. If your question is not addressed, we will do so by email.



Musculoskeletal simulations

INPUT • Motion data



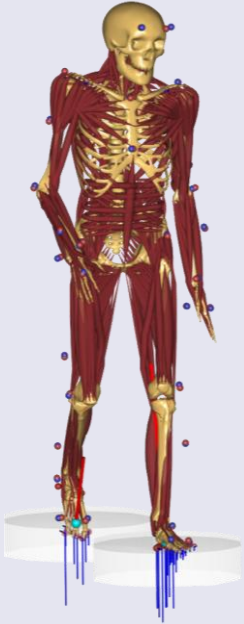
OUTPUT • Internal Body Loads

Joint reaction forces

Muscle forces

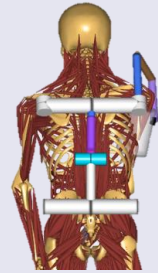
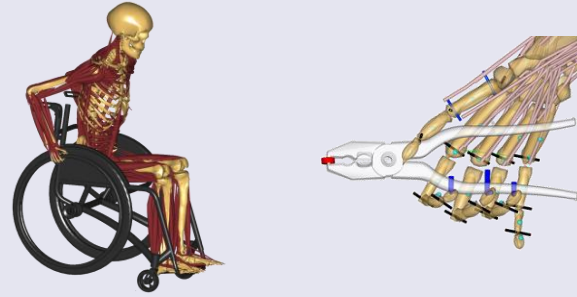
Muscle activity

Metabolic energy + fatigue



Motion analysis

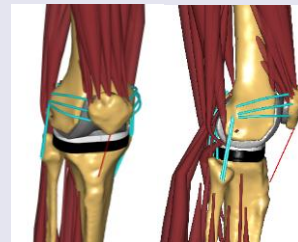
Product design and optimization



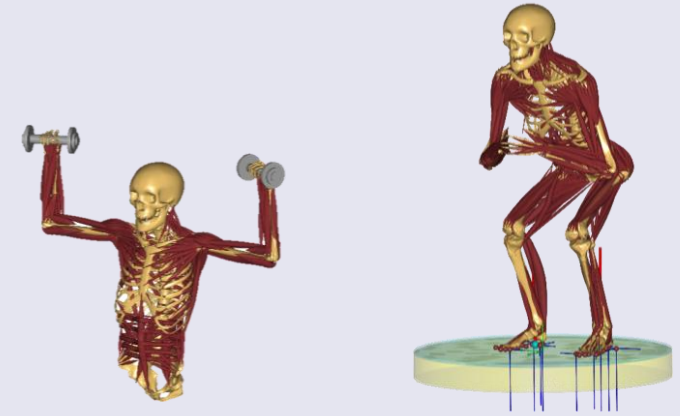
Ergonomics with/without exoskeletons



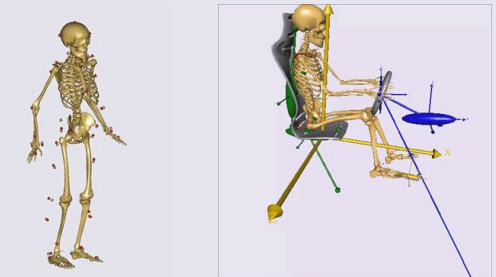
ANYBODY
MODELING SYSTEM



Orthopedics and Rehabilitation

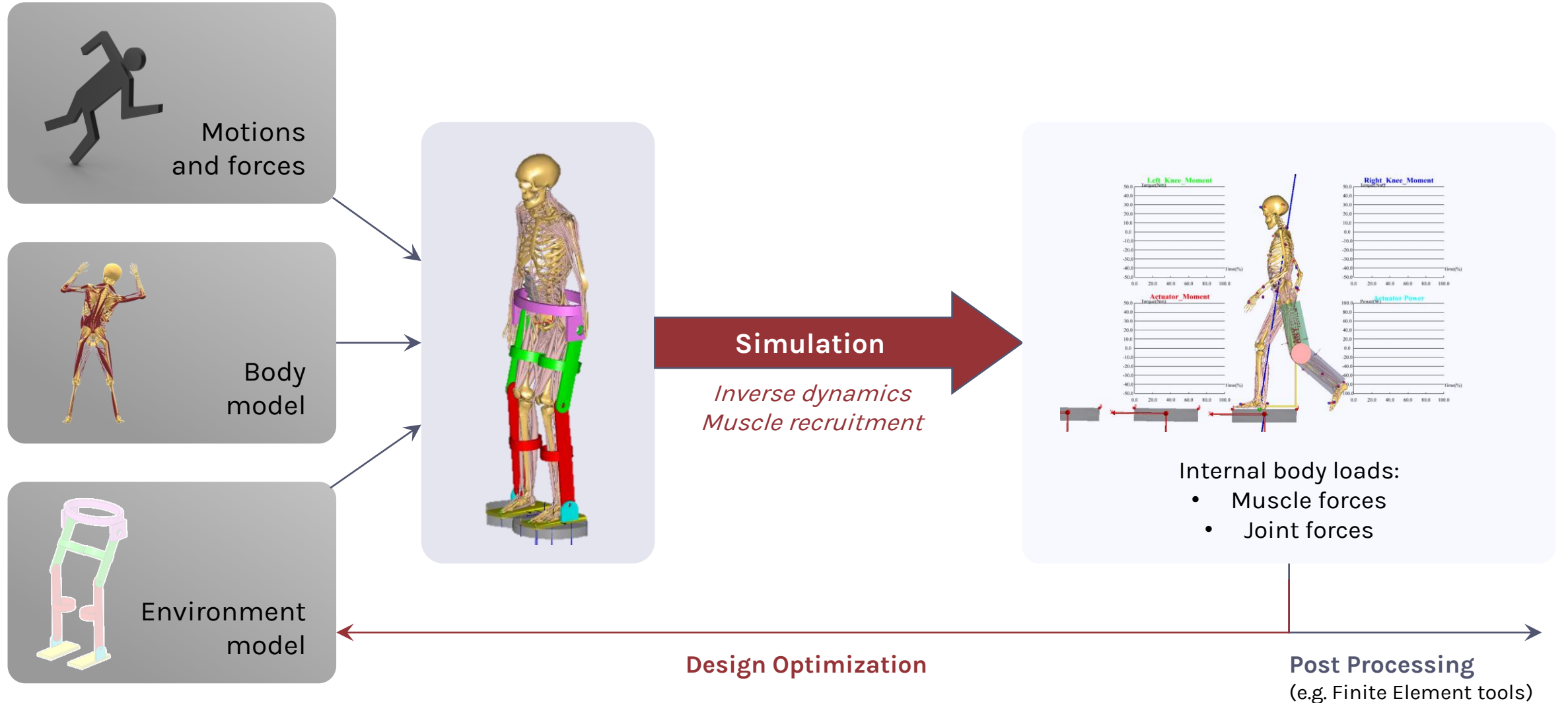


Sports

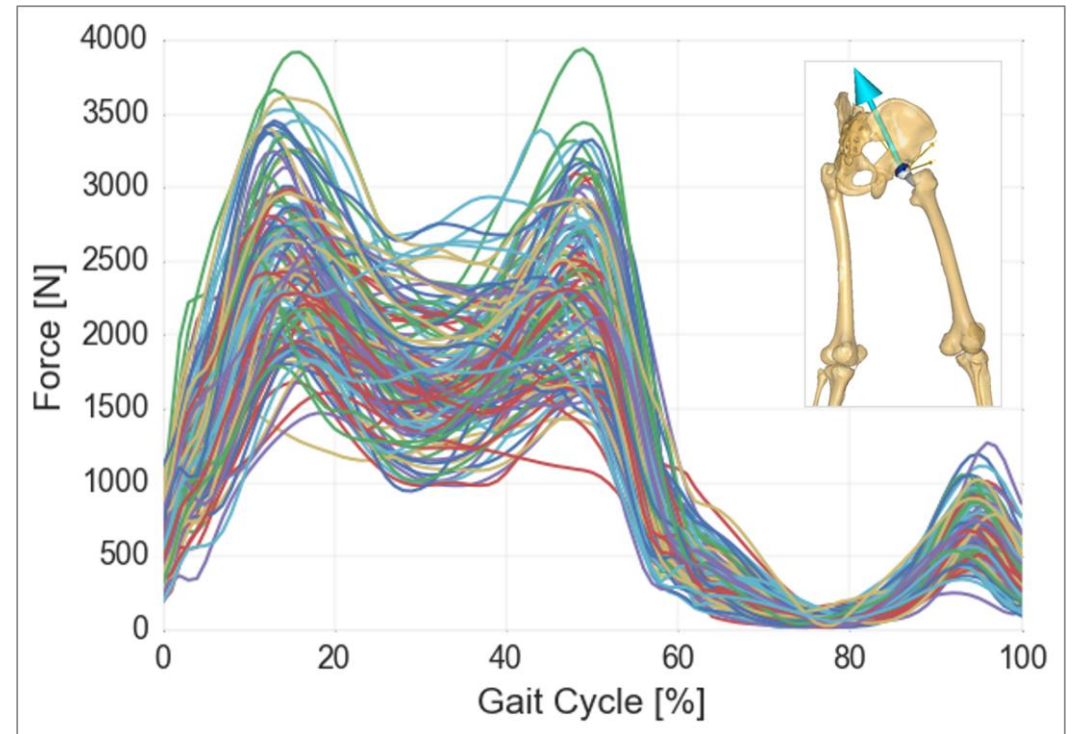


Automotive

Workflow



Motion capture dataset of 137 post-operative total hip replacement patients: Current and future applications





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Motion capture dataset of 137 post-operative total hip replacement patients: current and future applications

Dr. David Lunn

Senior Lecturer in Musculoskeletal Biomechanics






scientific **data**

 Check for updates

OPEN

DATA DESCRIPTOR

Motion capture dataset of 137 post-operative total hip replacement patients performing activities of daily living

David E. Lunn^{1,2} [✉], Enrico De Pieri³, Graham J. Chapman⁴ , Morten E. Lund⁵ , Stephen J. Ferguson³ & Anthony C. Redmond^{2,6}

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Motion capture dataset of 137 post-operative total hip replacement patients performing activities of daily living

Citation

Lunn, David, de Pieri, Enrico, Chapman, Graham, Ferguson, Stephen and Redmond, Anthony (2025) *Motion capture dataset of 137 post-operative total hip replacement patients performing activities of daily living*. University of Leeds. [Dataset] <https://doi.org/10.5518/1701>



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NIHR | Leeds Biomedical
Research Centre

The Data

Data

+ C3D_and_text_files.zip [1GB] ↓

+ Participant_Demographics.xlsx [30kB] ↓

+ Trial_information.xlsx [71kB] ↓

<https://archive.researchdata.leeds.ac.uk/1521/>

<https://doi.org/10.5518/1701>

Related resources:

<https://doi.org/10.5518/319>

Dataset

<https://doi.org/10.1038/s41597-026-06925-w>

Publication

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Date deposited: 24 Feb 2026 12:36

URI: <https://archive.researchdata.leeds.ac.uk/id/eprint/1521>

+ Additional details

Files

Documentation

+ readme_Lunn_et_al_2025.txt [2kB] ↓

+ file_manifest.txt [232kB] ↓

Data

+ C3D_and_text_files.zip [1GB] ↓





















+ Participant_Demographics.xlsx [30kB] ↓

+ Trial_information.xlsx [71kB] ↓



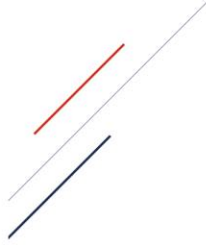
C3D Files and Text files

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LLJ_002_v1.0	06/02/2026 12:13	File folder
LLJ_003_v1.0	06/02/2026 12:13	File folder
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LLJ_005_v1.0	06/02/2026 12:13	File folder
LLJ_006_v1.0	06/02/2026 12:13	File folder
LLJ_008_v1.0	06/02/2026 12:13	File folder
LLJ_009_v1.0	06/02/2026 12:13	File folder
LLJ_010_v1.0	06/02/2026 12:13	File folder
LLJ_011_v1.0	06/02/2026 12:13	File folder
LLJ_013_v1.0	06/02/2026 12:14	File folder

Name	Date modified	Type	Size
▼ Today			
 ascent_01_c3d	16/06/2026 21:36	C3D File	710 KB
 ascent_01_txt	16/06/2026 21:36	Text Document	2,653 KB
 ascent_02_c3d	16/06/2026 21:36	C3D File	610 KB
 ascent_02_txt	16/06/2026 21:36	Text Document	2,257 KB
 ascent_03_c3d	16/06/2026 21:36	C3D File	581 KB
 ascent_03_txt	16/06/2026 21:36	Text Document	2,153 KB
 descent_01_c3d	16/06/2026 21:36	C3D File	538 KB
 descent_01_txt	16/06/2026 21:36	Text Document	2,010 KB
 descent_02_c3d	16/06/2026 21:36	C3D File	590 KB
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 descent_03_c3d	16/06/2026 21:36	C3D File	734 KB
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 fast_07_c3d	16/06/2026 21:36	C3D File	287 KB
 fast_07_txt	16/06/2026 21:36	Text Document	854 KB
 fast_08_c3d	16/06/2026 21:36	C3D File	367 KB
 fast_08_txt	16/06/2026 21:36	Text Document	1,106 KB



Participant Demographics and Trial Information



	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q
1	Study_ID	Collection Date	Mass (Kg)	Height (cm)	BMI	Operated Limb	Sex	Age (years)	Time since THR (years)	Walk	Fast	STS	Ascent	Descent	Lunge	Squat
93	LLJ_102	02/07/2015	61.5	159.5	24.18	Both	Female	70	1	4	5	3				
94	LLJ_105	03/07/2015	86.2	174.0	28.47	right	Male	68	3	4	3	3				
95	LLJ_106	06/07/2015	63.3	157.5	25.52	right	Female	80	5	7		3				
96	LLJ_108	09/07/2015	78.2	171.5	26.58	left	Male	67	2	4	3	3	3	3	3	3
97	LLJ_109	09/07/2015	99.6	166.0	36.13	left	Female	57	4	4	5	3	3	3		
98	LLJ_110	10/07/2015	64.6	154.0	27.24	right	Female	84	4	6		3				
99	LLJ_111	15/07/2015	65.9	158.5	26.24	Both	Female	79	2	4	4	3	3	3		
100	LLJ_112	15/07/2015	75.4	176.0	24.35	right	Male	71	2	4	4	3				
101	LLJ_114	21/07/2015	76.5	177.0	24.40	right	Male	60	5	3	3	3	3	3	3	3
102	LLJ_115	23/07/2015	71.0	163.0	26.73	Both	Male	80	4	4	3	3	3	3		
103	LLJ_116	24/07/2015	112.3	182.0	33.91	right	Male	62	1	3	3	3	3	3		
104	LLJ_117	24/07/2015	81.5	172.5	27.38	right	Male	91	2	6	4	3	3	3		
105	LLJ_118	03/08/2015	116.1	180.0	35.84	right	Male	62	2	4	5	3	3	3		
106	LLJ_119	03/08/2015	86.6	161.5	33.19	Both	Female	83	5	5		3				
107	LLJ_120	04/08/2015	77.8	173.0	25.99	left	Male	65	2	3	5	3	3	3	3	3
108	LLJ_121	05/08/2015	106.0	170.0	36.68	left	Male	68	5	3	3	3	3	3		3
109	LLJ_123	13/08/2015	96.1	174.0	31.73	Both	Male	67	3	4	5	3	3	3		3
110	LLJ_124	13/08/2015	87.4	165.0	32.12	left	Male	69	5	4	3	3	3	3		



Participant Demographics and Trial Information



Data

+ [C3D_and_text_files.zip \[1GB\]](#)

+ [Participant_Demographics.xlsx \[30kB\]](#)

+ [Trial_information.xlsx \[71kB\]](#)

	A	B	C	D	E	F
1	subject	trial	number	c3dfile	static	
54	LLJ_004	fast	1	fast_01_.c3d	static_01	
55	LLJ_004	fast	3	fast_03_.c3d	static_01	
56	LLJ_004	fast	4	fast_04_.c3d	static_01	
57	LLJ_004	static	1	static_01_.c3d		
58	LLJ_004	walk	7	walk_07_.c3d	static_01	
59	LLJ_004	walk	10	walk_10_.c3d	static_01	
60	LLJ_004	walk	14	walk_14_.c3d	static_01	
61	LLJ_005	fast	1	fast_01_.c3d	static_01	
62	LLJ_005	fast	3	fast_03_.c3d	static_01	
63	LLJ_005	fast	5	fast_05_.c3d	static_01	
64	LLJ_005	fast	6	fast_06_.c3d	static_01	
65	LLJ_005	static	1	static_01_.c3d		
66	LLJ_005	sts	1	sts_01_.c3d	static_01	
67	LLJ_005	sts	2	sts_02_.c3d	static_01	
68	LLJ_005	sts	4	sts_04_.c3d	static_01	
69	LLJ_005	walk	4	walk_04_.c3d	static_01	
70	LLJ_005	walk	6	walk_06_.c3d	static_01	
71	LLJ_005	walk	7	walk_07_.c3d	static_01	
72	LLJ_006	fast	4	fast_04_.c3d	static_03	
73	LLJ_006	fast	7	fast_07_.c3d	static_03	
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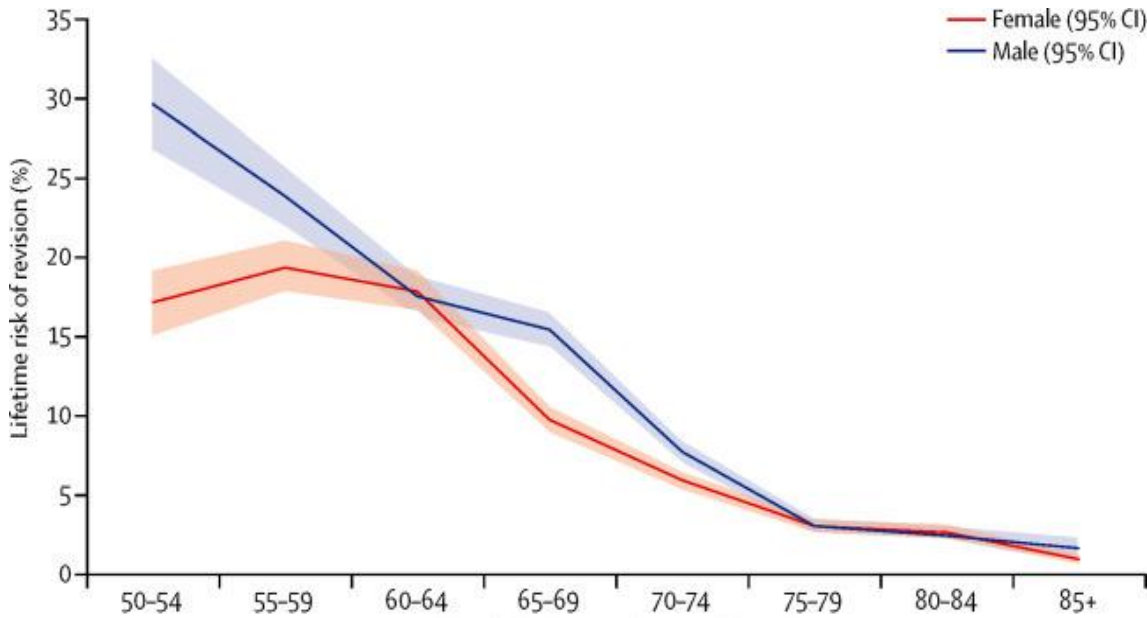


THR & Revision Rates

- 116,901 primary total hip replacements took place in the UK (National Joint Registry, 2025)
- THR revision rates at 5% at 15 years and this increases at 20 years
- Revision rates are linked with patient characteristics



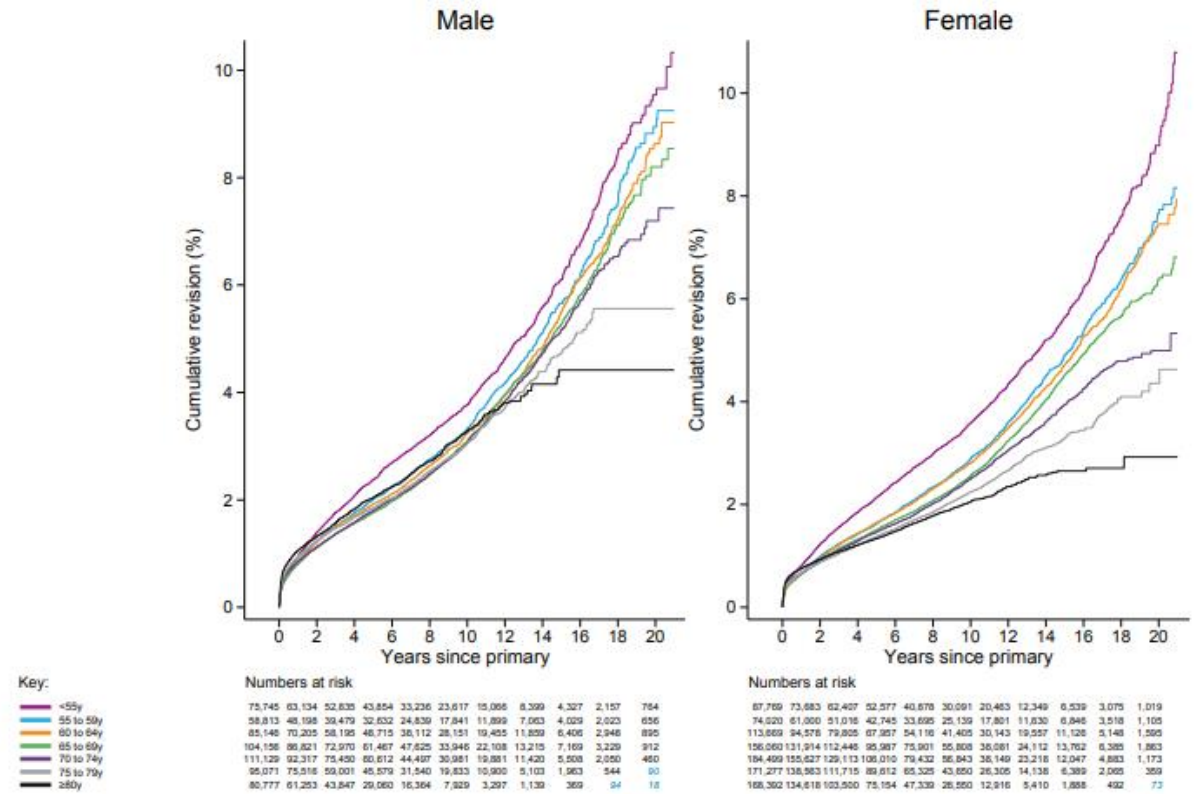
THR & Revision Rates



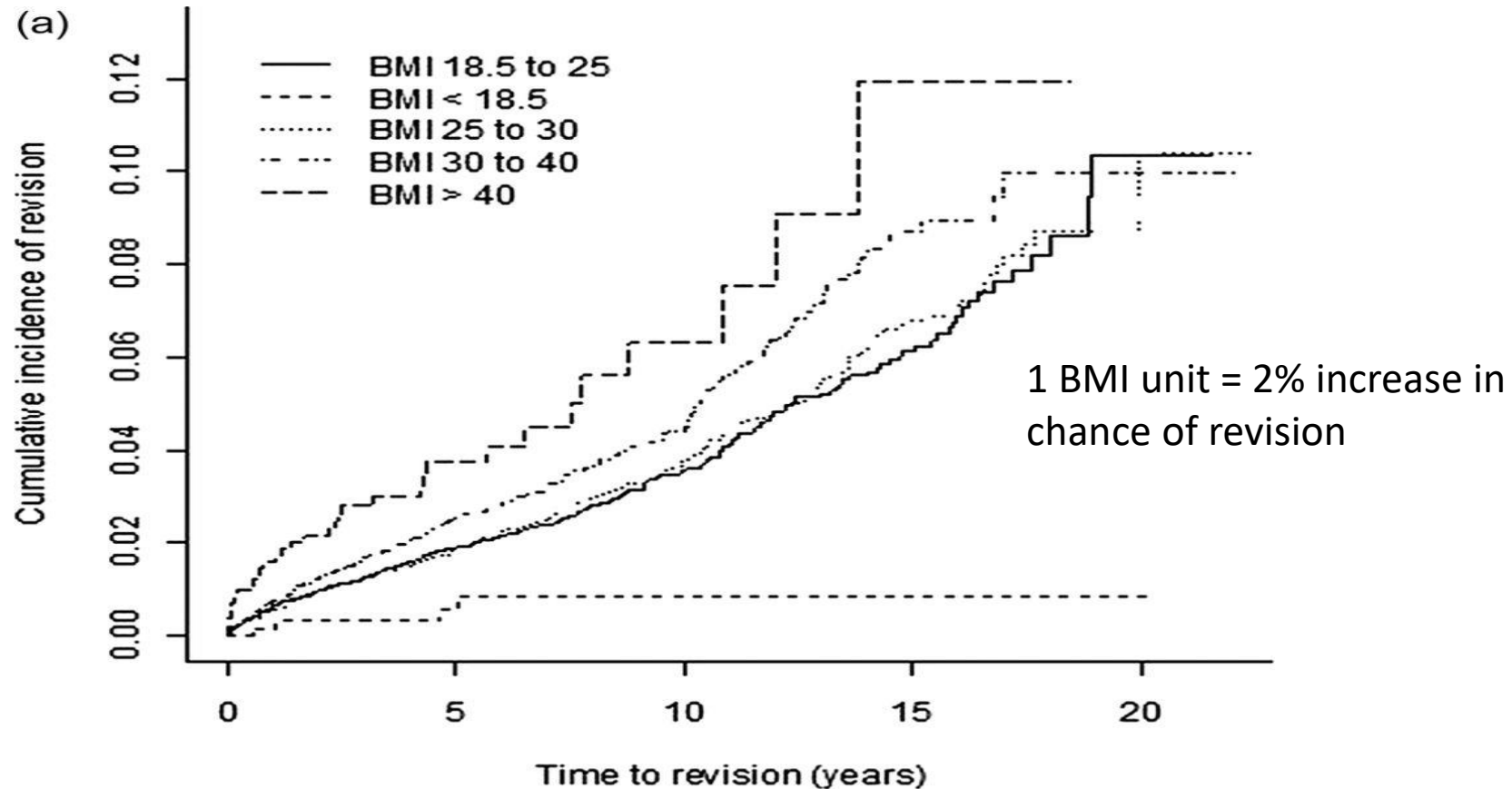
35% chance of revision in 50 year old males; 20% in females

Bayliss LE, et al. (2017)The Lancet.389:1424-30.

Figure 3.H9 (b) KM estimates of cumulative revision in all primary hip replacements by sex and age, excluding metal-on-metal hip replacement, unclassified replacements, and resurfacing. *Blue italics in the numbers at risk table signify that 250 or fewer cases remained at risk at these time points.*



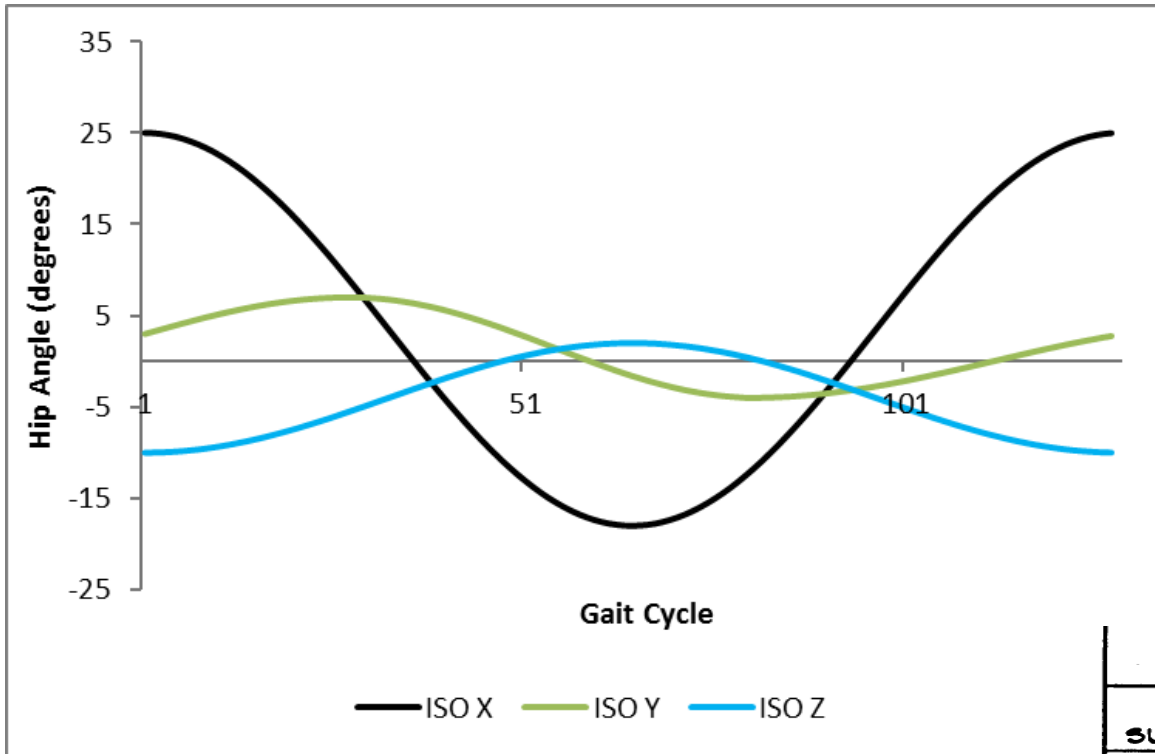
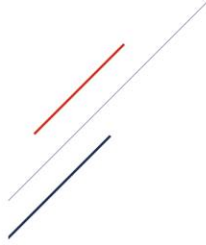
Revision Rates and BMI



Culliford D, et al BMJ Open. 2013;3.



Current Preclinical Testing



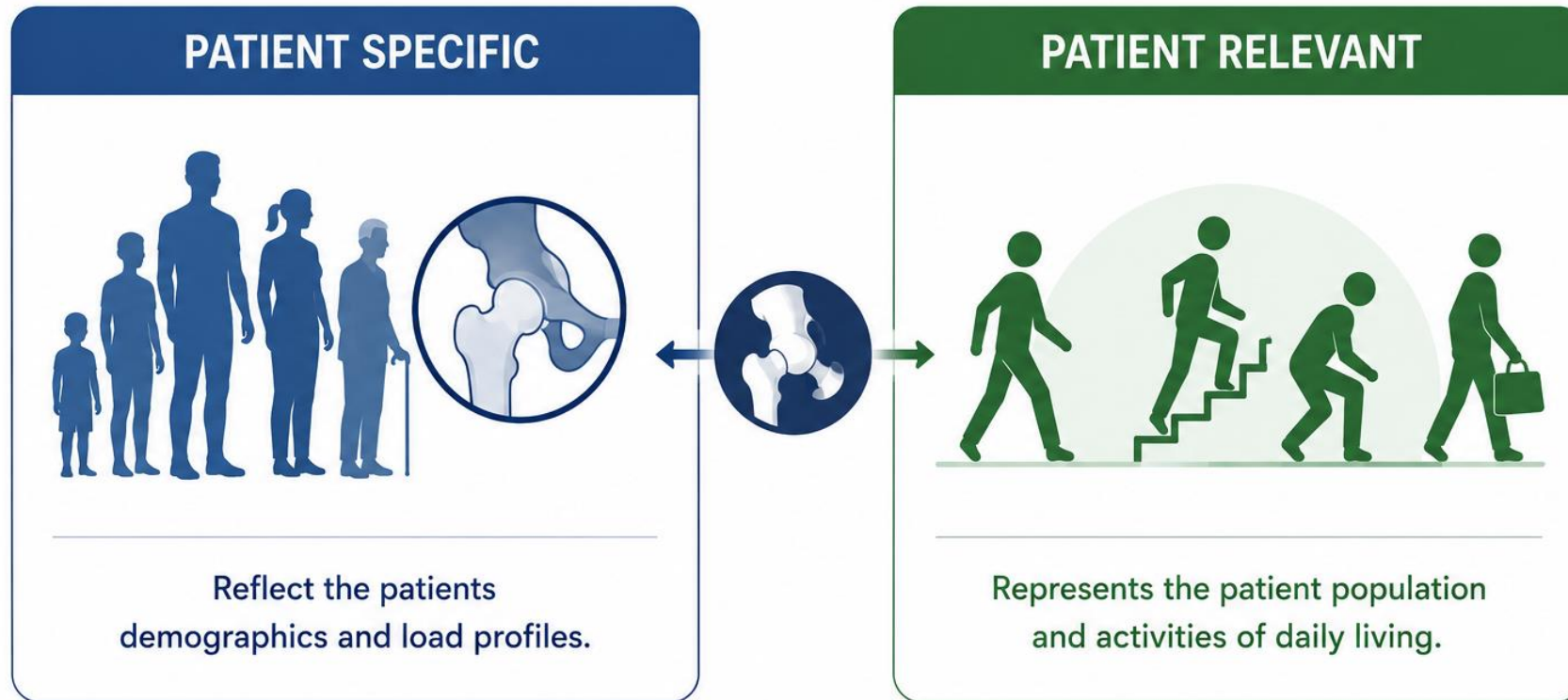
- 3 KN axial force
- Only walking
- 5 million cycles= 45mins walking/day for 1.5 years
- Not THR patients

PARAMETER		MAXIMUM	MINIMUM	AVERAGE	Average
SUBJECT'S	HEIGHT - IN.	72.5	62.5	68.2	5ft 6in
	WEIGHT- LB	180	127	140.7	10st 5lbs
	AGE - YR.	36.9	18.5	21.6	21.6 years

Paul (1967)




Improved Preclinical Testing



Our Task- Develop new, more representative waveforms, which could be used for preclinical testing.




SUBJECT-SPECIFIC MODELS



- Patient-specific musculoskeletal models
- Scalable from analytical to detailed
- Personalized geometry and properties

ANYBODY TECHNOLOGY

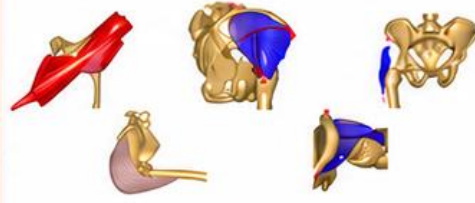
DATA ACQUISITION



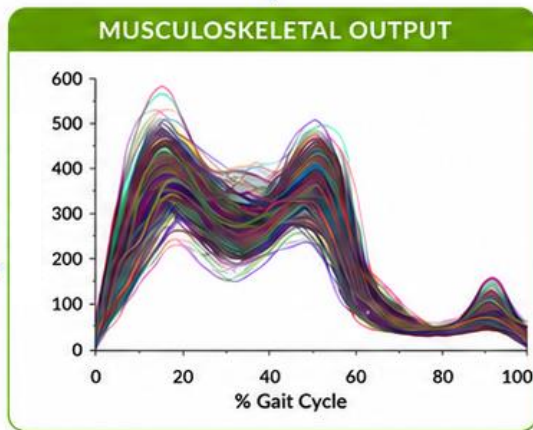
MOTION CAPTURE FORCE MEASUREMENT

MODEL REFINEMENT


- Accurate wrapping of: Gluteus Maximus, Gluteus Medius and Minimus, and Tensor Fasciae Latae



ETH zürich

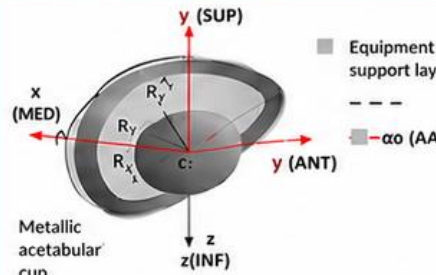


EXPERIMENTAL VALIDATION



IN VITRO TESTING MATERIAL VALIDATION

MATERIAL & GEOMETRIC PROPERTIES



Equipment support layers

-α (AA)

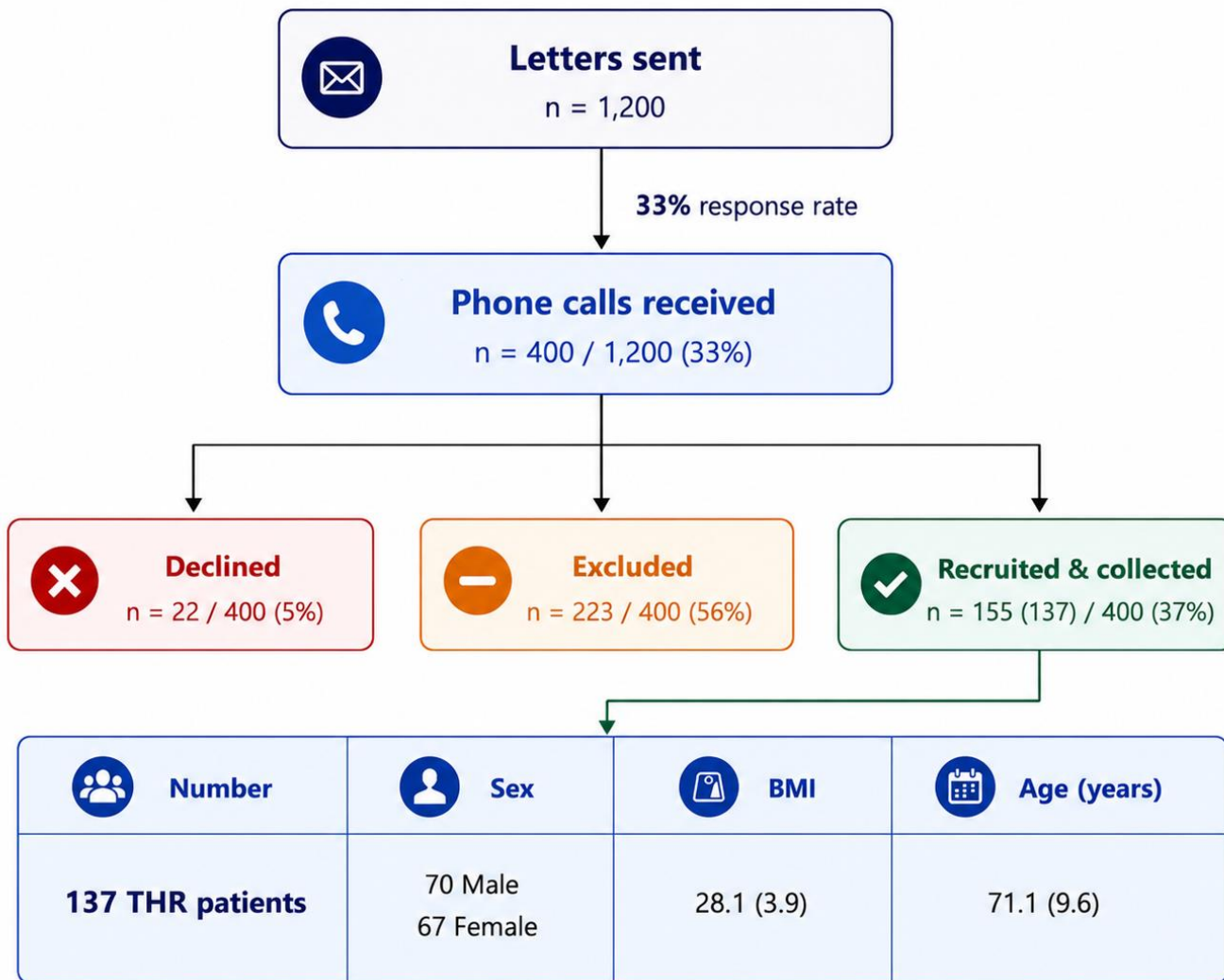
Metallic acetabular cup

x (MED) y (ANT) z (INF)

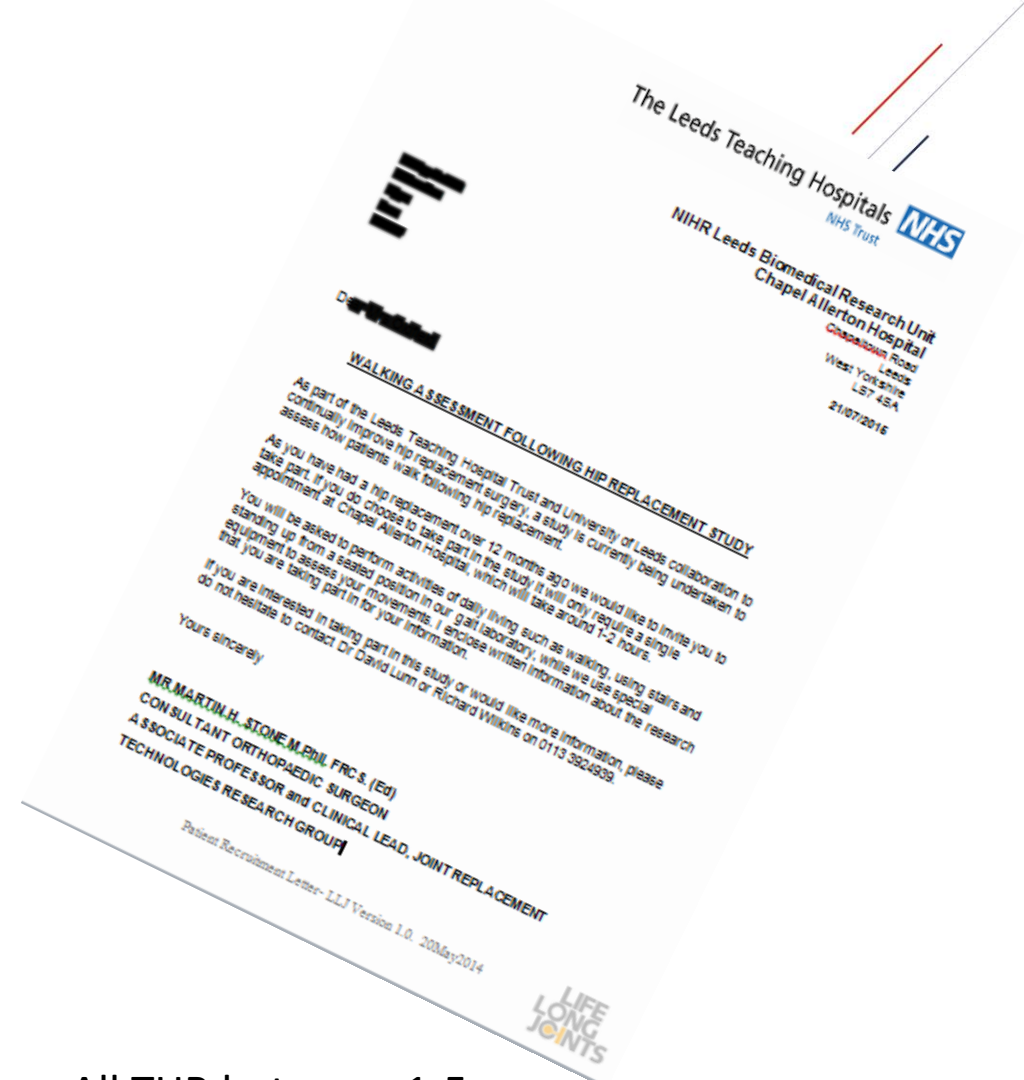
R_x R_y R_z

c



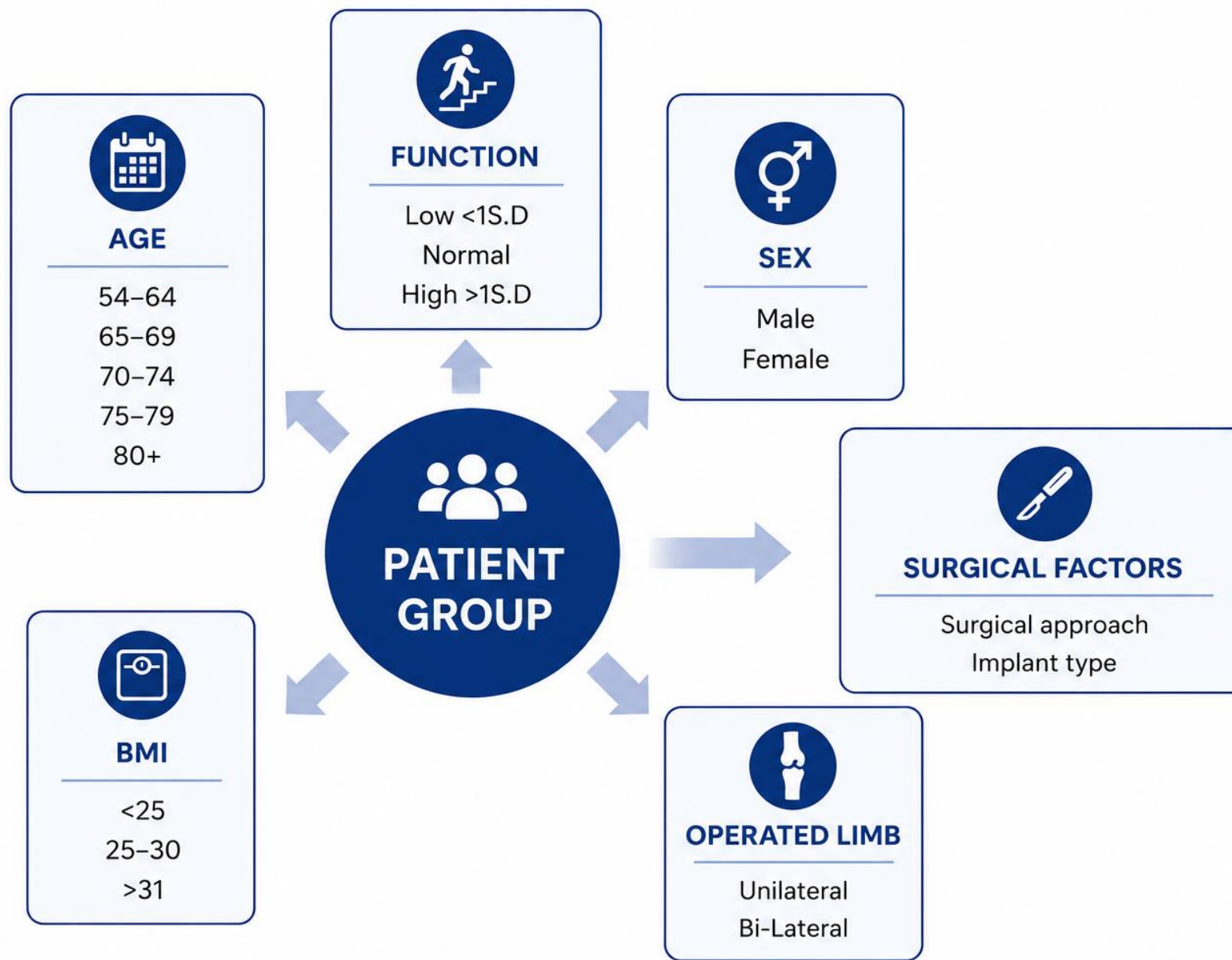


Values: mean (SD)



All THR between 1-5 years
No other joint replacements
No pain or other conditions affecting mobility



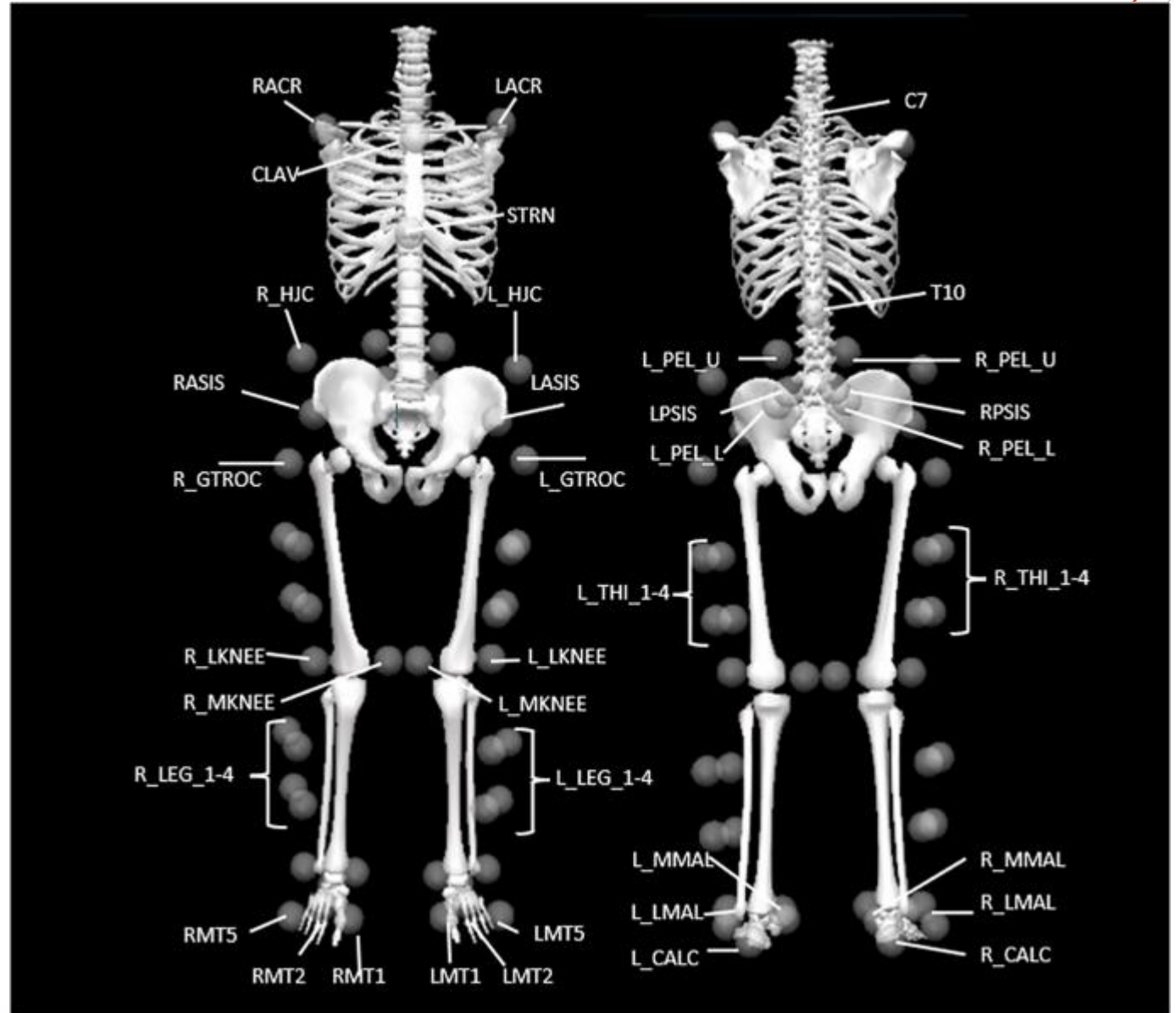


Data Collection

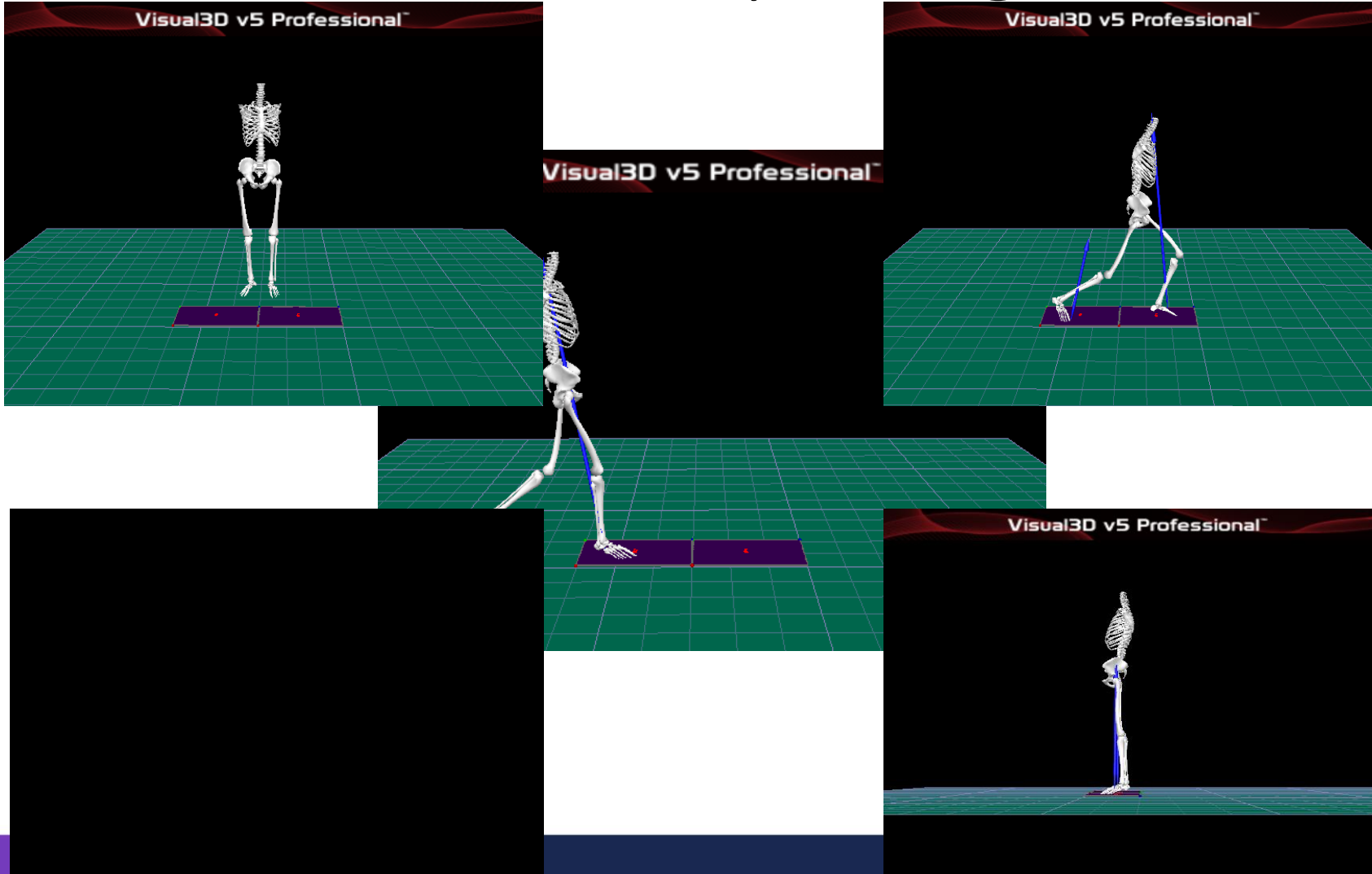
Gait Laboratory

- 10 camera Vicon system (100hz)
- 2 AMTI force plates (1000hz)
- Force plate mounted stairs

- CAST marker set (Cappozzo et al 1995)
 - Anatomical markers
 - Tracking clusters
 - 3 markers per segment required
- 6 upper body markers
- Additional Calcaneus markers



Activities of Daily Living



ADL's	Total number of trials
Walk	582
Fast	472
Sit to Stand	405
Stairs Ascent	140
Stair Descent	136
Lunge	115
Squat	102





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www.JBiomech.com



Hip kinematics and kinetics in total hip replacement patients stratified by age and functional capacity



David E. Lunn^{a,b}, Graham J. Chapman^{a,b,c,*}, Anthony C. Redmond^{a,b,d}

^a Institute for Rheumatic and Musculoskeletal Medicine, University of Leeds, Leeds, UK

^b NIHR Leeds Biomedical Research Centre, Leeds, UK

^c Arthritis Research UK Experimental Arthritis Centre, Leeds, UK

^d Arthritis Research UK Centre for Sports, Exercise and Osteoarthritis, Nottingham, Oxford, Loughborough, Leeds, UK

HIP

FULL ACCESS

AN EXPLORATORY STUDY EXAMINING THE FUNCTIONAL OUTCOMES OF DIRECT LATERAL AND POSTERIOR APPROACHES FOR TOTAL HIP ARTHROPLASTY

British Hip Society meeting (BHS) March 2017

D.T.S.F. Tadross ▾ D.E. Lunn ▾ A.C. Redmond ▾ D. Macdonald ▾ M.H. Stone ▾ G.J. Chapman ▾

Open Access Article

Dynamic Acetabular Cup Orientation during Gait: A Study of Fast- and Slow-Walking Total Hip Replacement Patients

by Ksenija Vasiljeva¹ , David Lunn^{2,3}, Graham Chapman² , Anthony Redmond^{2,3} , Lin Wang^{1,4} , Jonathan Thompson^{1,4}, Sophie Williams¹ , Ruth Wilcox¹ and Alison Jones^{1,*}

Orthopaedic Proceedings

Current issue Archive ▾ About ▾

GENERAL ORTHOPAEDICS

FULL ACCESS

PELVIC MOTIONS PLAY AN IMPORTANT ROLE IN CONTACT LOCATION IN TOTAL HIP ARTHROPLASTY BEARINGS

International Society for Technology in Arthroplasty (ISTA) 31st Annual Congress, London, England, October 2018. Part 2.

K. Vasiljeva ▾ M. Al-Hajjar ▾ D. Lunn ▾ G. Chapman ▾ A. Redmond ▾
I. Flatters ▾ J. Thompson ▾ A. Jones ▾

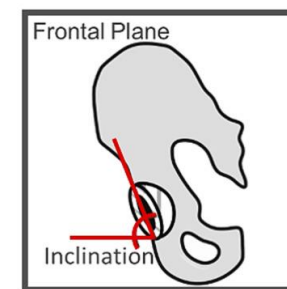
INFORMATION

Journal
Orthopaedic Proceedings

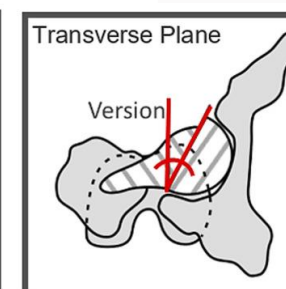
Volume
101-B No.SUPP_5 | Pages 76 - 76

Section
General Orthopaedics

Published
01 April 2019



(a)



(b)



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Hip kinematics and kinetics in total hip replacement patients stratified by age and functional capacity



David E. Lunn^{a,b}, Graham J. Chapman^{a,b,c,*}, Anthony C. Redmond^{a,b,d}

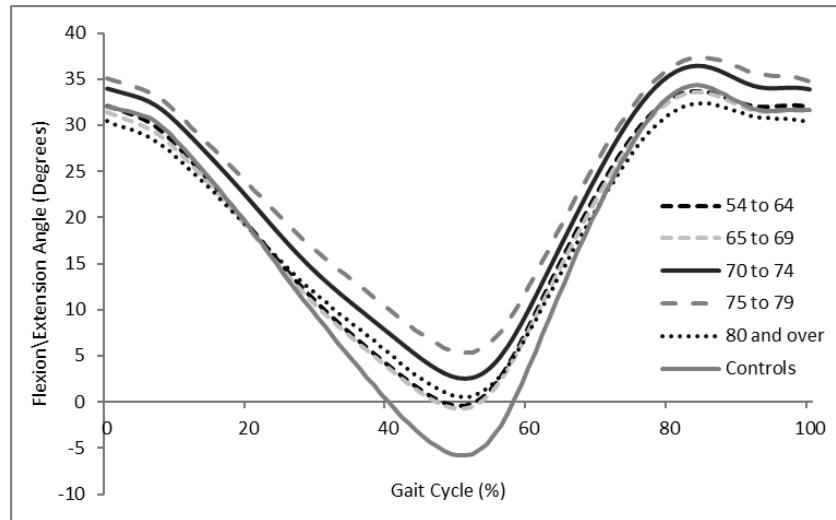
^aInstitute for Rheumatic and Musculoskeletal Medicine, University of Leeds, Leeds, UK

^bNIHR Leeds Biomedical Research Centre, Leeds, UK

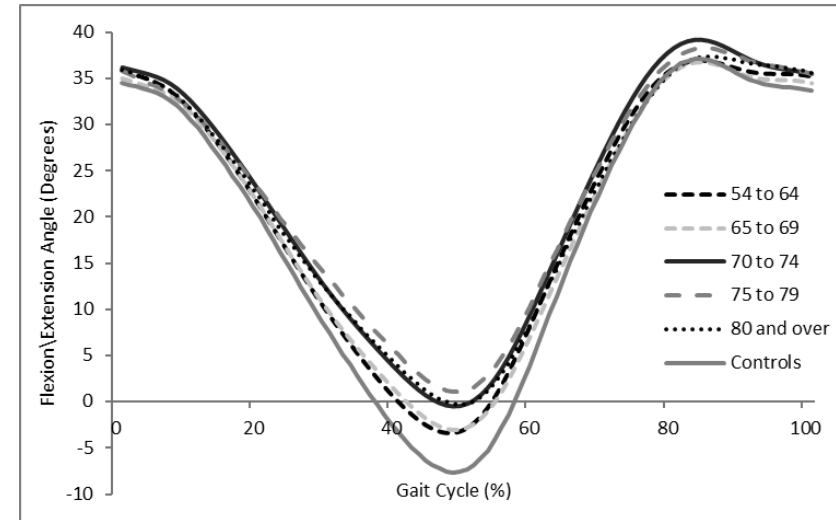
^cArthritis Research UK Experimental Arthritis Centre, Leeds, UK

^dArthritis Research UK Centre for Sports, Exercise and Osteoarthritis, Nottingham, Oxford, Loughborough, Leeds, UK

Normal Walk



Fast Walk



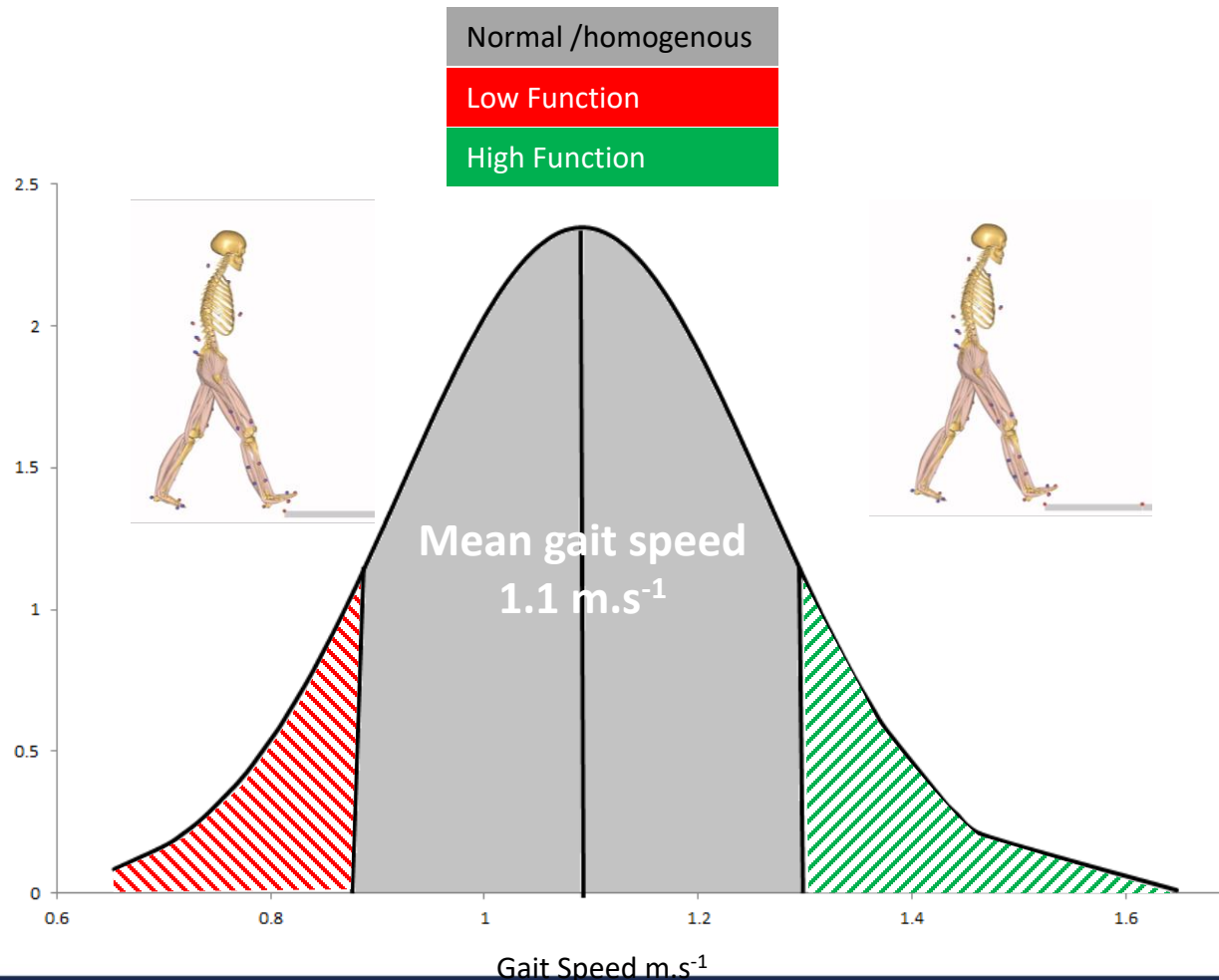
Older patients



- Gait speed,
- Peak abduction moment
- Reduced peak extension

In fast walking differences were less clear

Better indication of function?



Low Function Group (LF)

- -1SD ($\geq 0.93 \text{ m.s}^{-1}$)
- N=19 (6male)
- Age 77.0 ± 5.9 years
- BMI- 28.3 ± 4.8

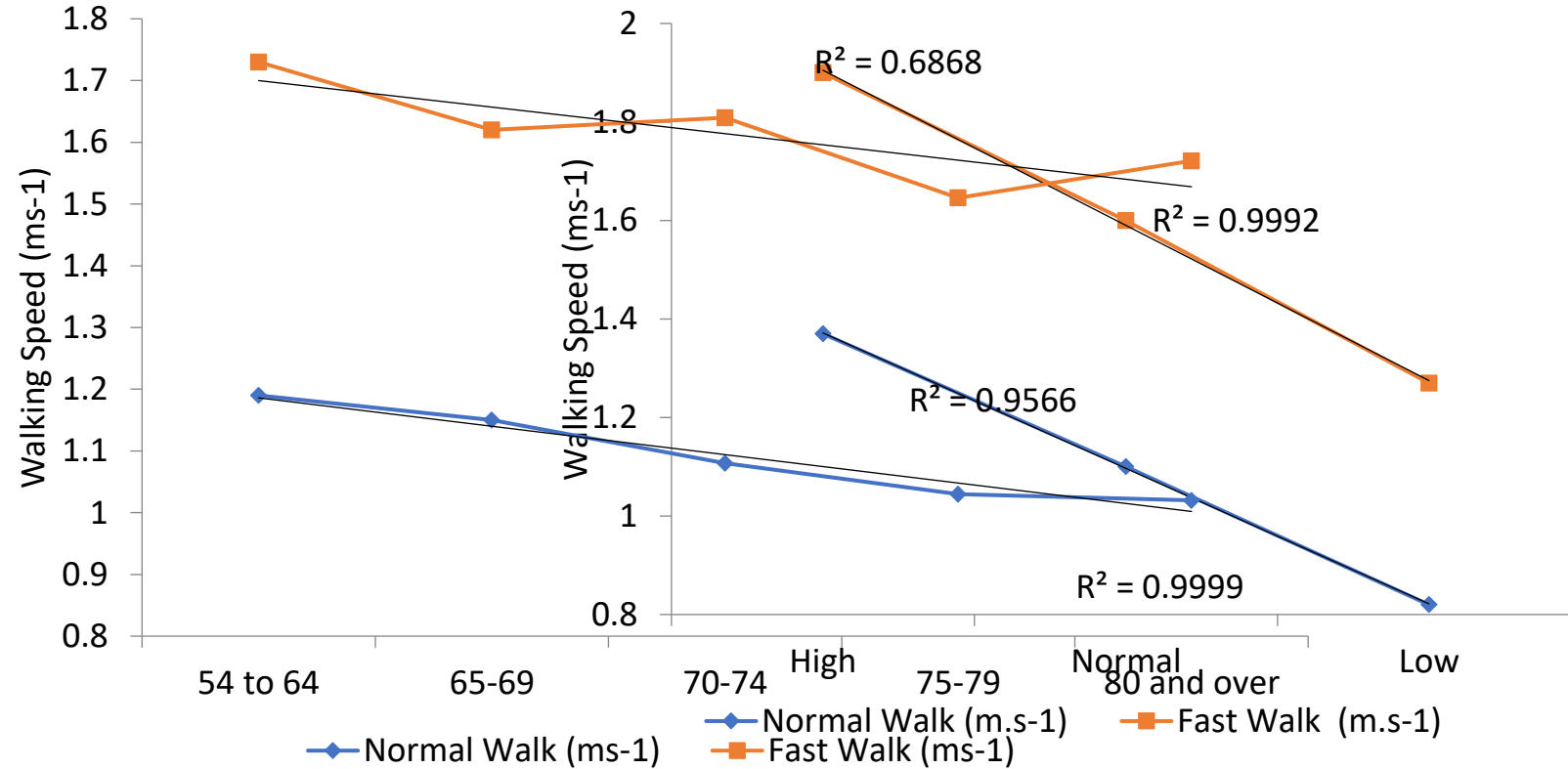
High Function Group (HF)

- $+1\text{SD}$ ($\geq 1.26 \text{ m.s}^{-1}$)
- N=19 (10male)
- Age- 68.7 ± 6.7 years,
- BMI- 27.3 ± 3.0

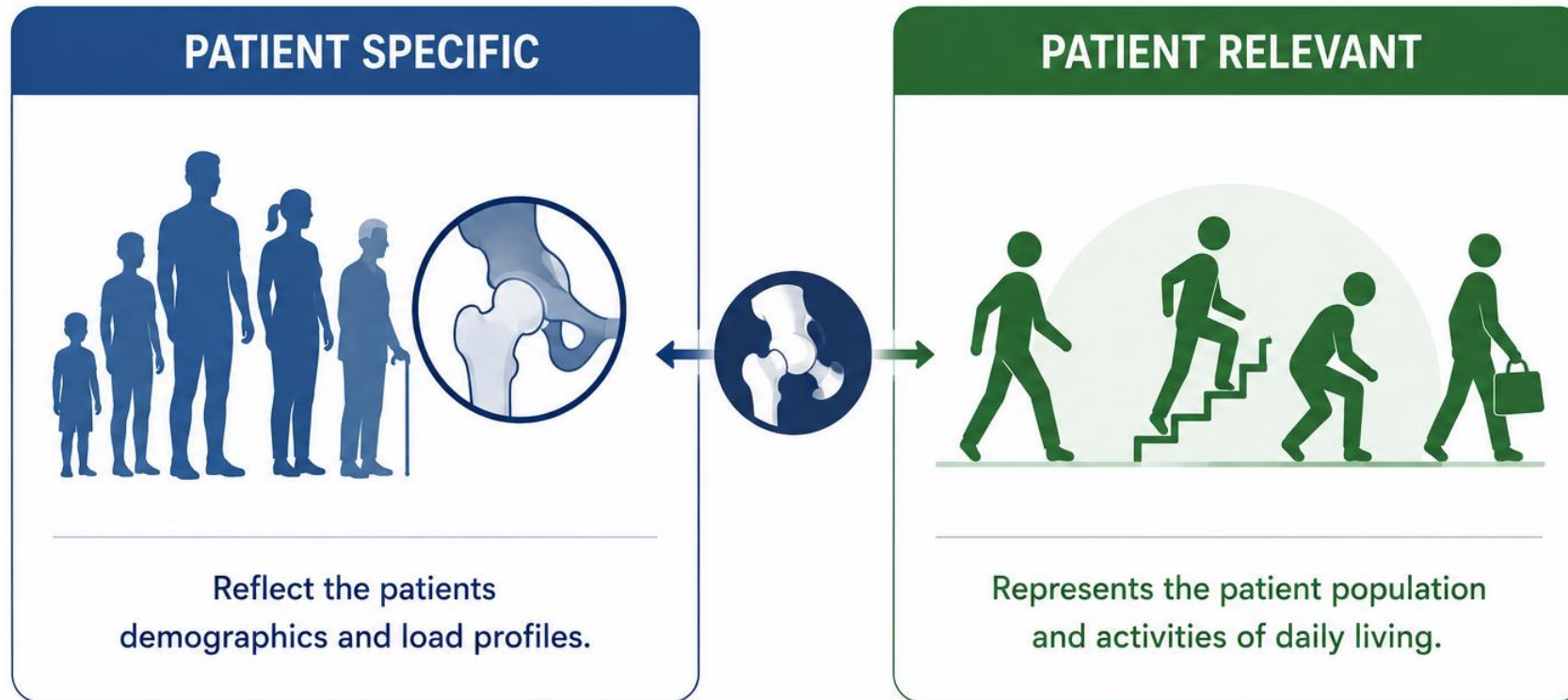
Healthy Control Group (CG)

- N=27 (5male)
- Age- 71.2 ± 6.9 years,
- BMI- 25.63 ± 4.2

Age & Function Results



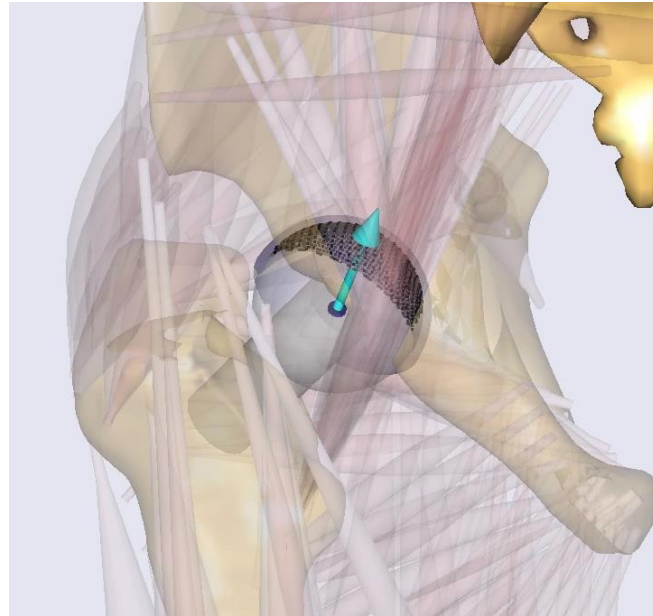
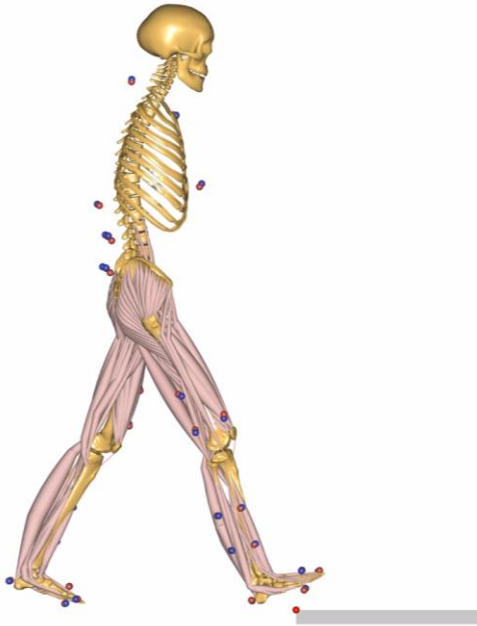
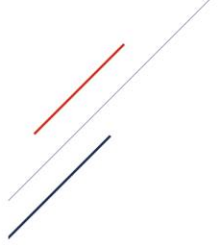
Improved Preclinical Testing



Our Task- Develop new, more representative waveforms, which could be used for preclinical testing.



Joint contact forces



Model Development



RESEARCH ARTICLE

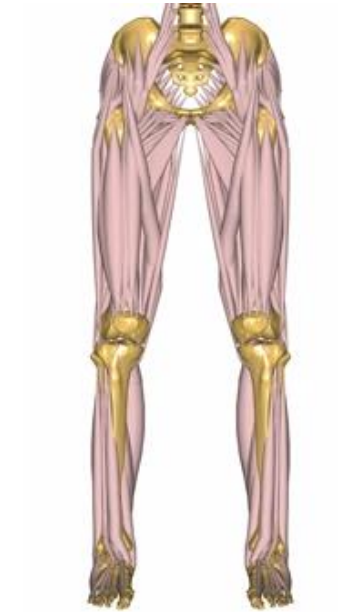
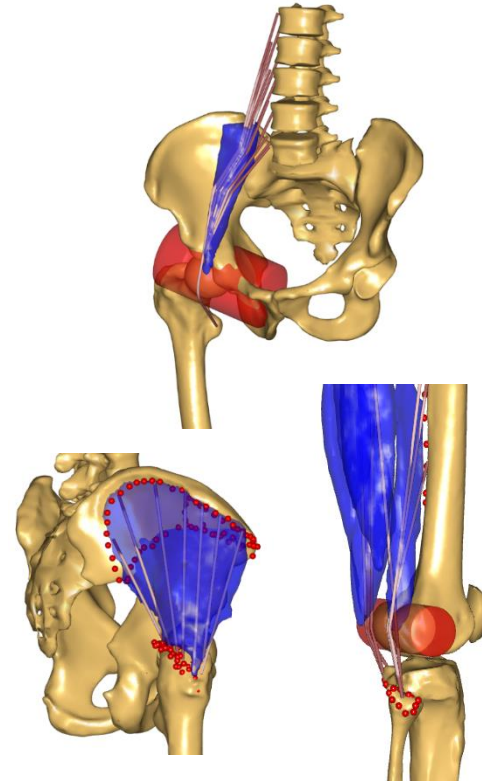
Refining muscle geometry and wrapping in the TLEM 2 model for improved hip contact force prediction

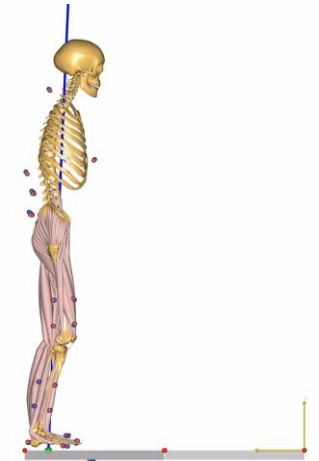
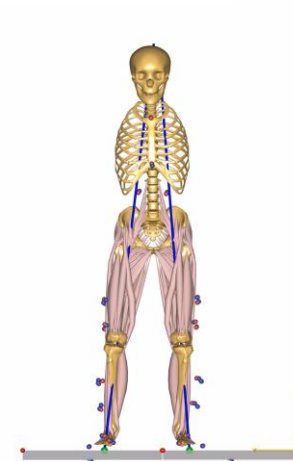
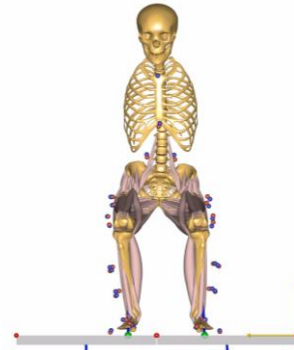
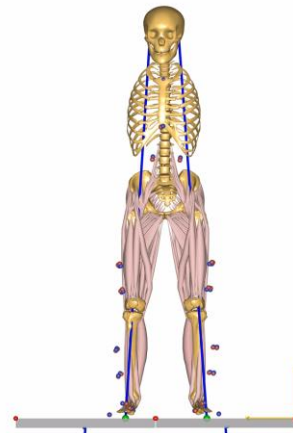
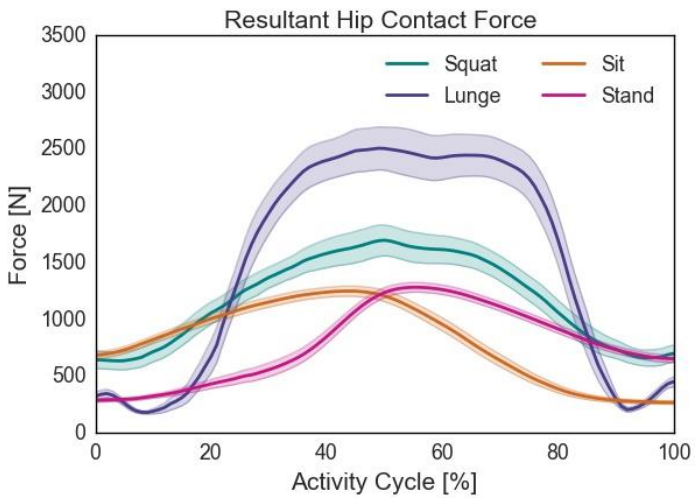
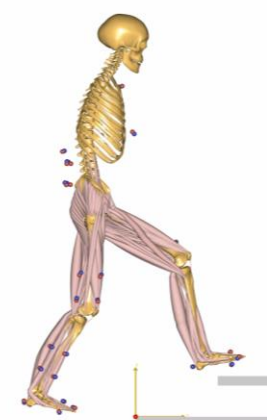
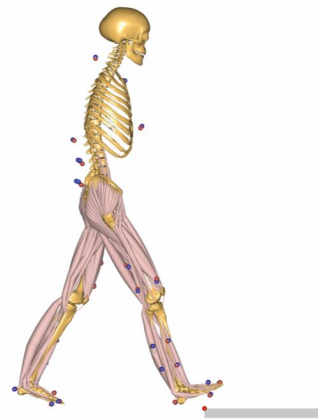
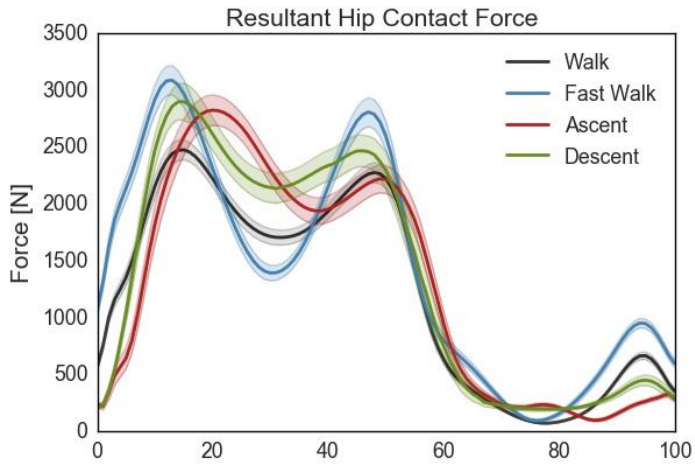
Enrico De Pieri^{1*}, Morten E. Lund², Anantharaman Gopalakrishnan², Kasper P. Rasmussen², David E. Lunn³, Stephen J. Ferguson¹

Dataset TLEM 2.0



Carbone, V et al, J Biomechanics, 2015





Osteoarthritis and Cartilage



Patient characteristics affect hip contact forces during gait

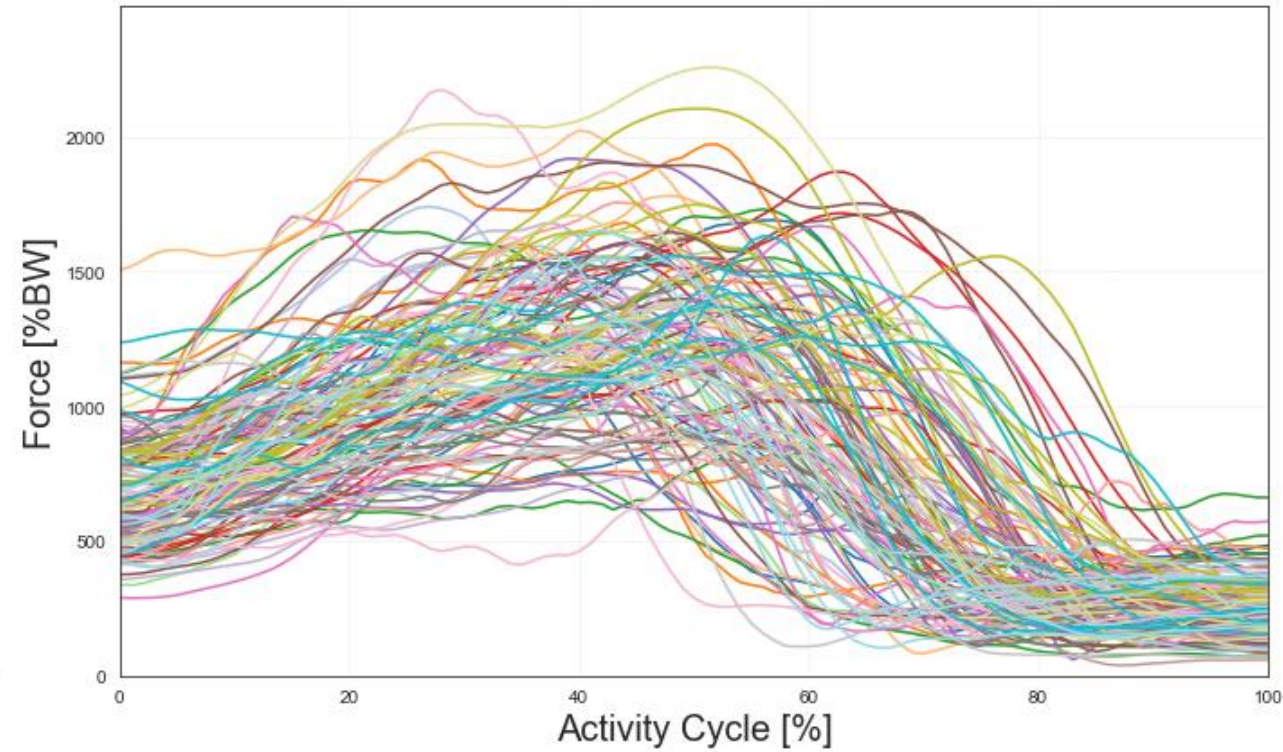
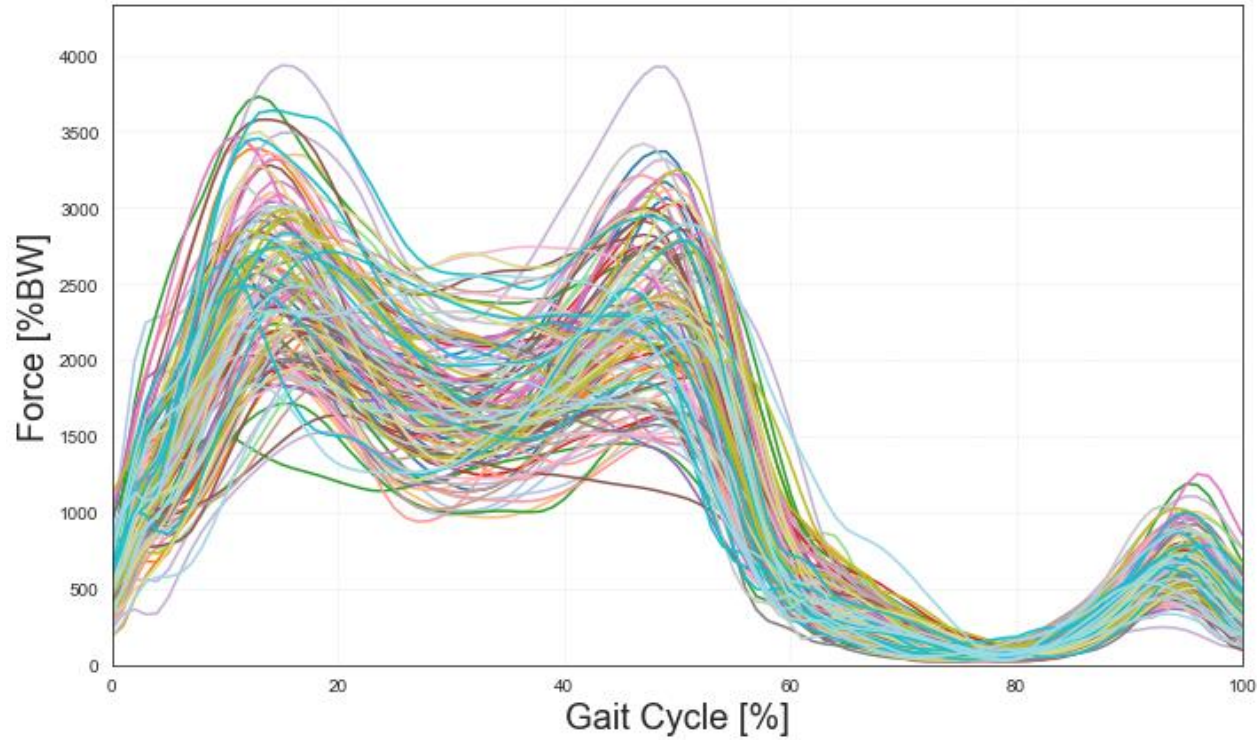
E. De Pieri ^{1,2}, D.E. Lunn ^{1,2,3,4}, G.J. Chapman ^{1,2}, K.P. Rasmussen ¹, S.J. Ferguson ^{1,2}, A.C. Redmond ^{1,2}

¹ Institute for Biomechanics, ETH Zurich, Zurich, Switzerland
² Institute for Rheumatic and Musculoskeletal Medicine, University of Leeds, Leeds, UK
³ NIHR Leeds Biomedical Research Centre, Leeds, UK
⁴ AnyBody Technology A/S, Aalborg, Denmark

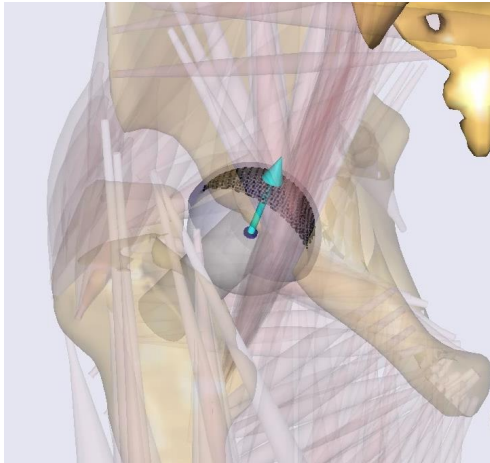
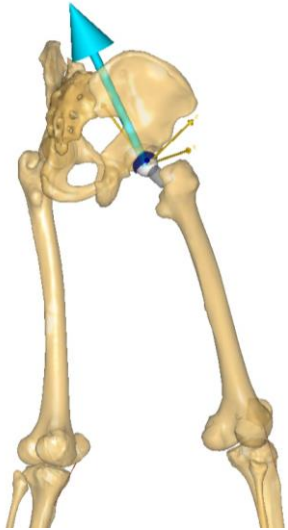


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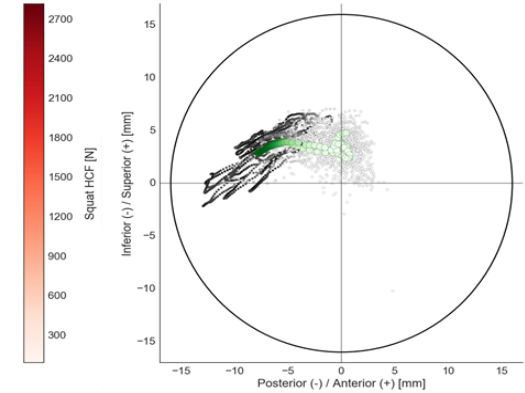
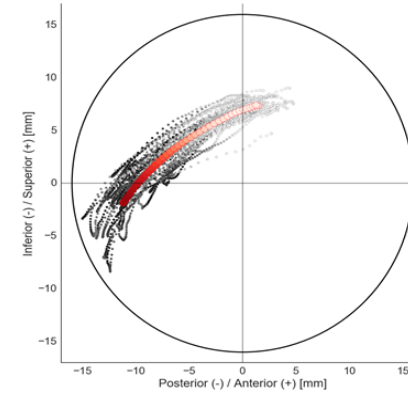
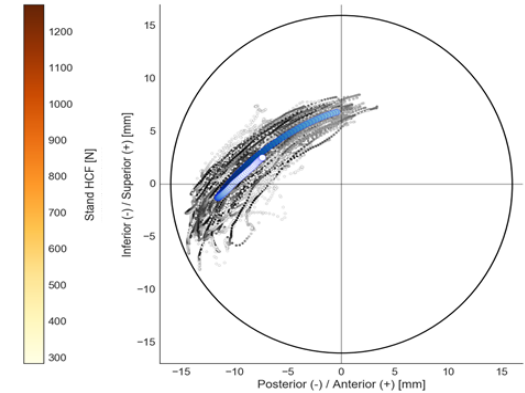
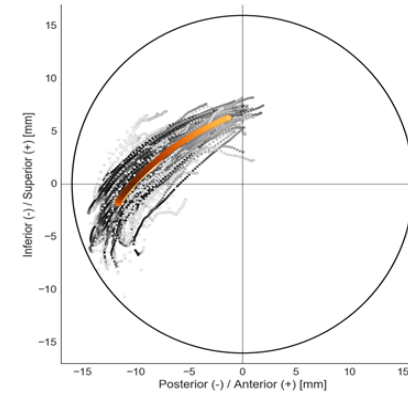
Joint Contact Force- Patient Variability



Individualised Modelling of Contact Force Pathways



Journal of Biomechanics 176 (2024) 112309



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Journal of Biomechanics

journal homepage: www.elsevier.com/locate/jbiomech




Hip contact force pathways in total hip replacement differ between patients and activities of daily living

David E. Lunn^{a,b,*}, Anthony C. Redmond^{b,c}, Graham J. Chapman^d, Morten E. Lund^e, Stephen J. Ferguson^f, Enrico De Pieri^f



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AnyBody Model Compatibility

Leeds LifeLongJoints Model

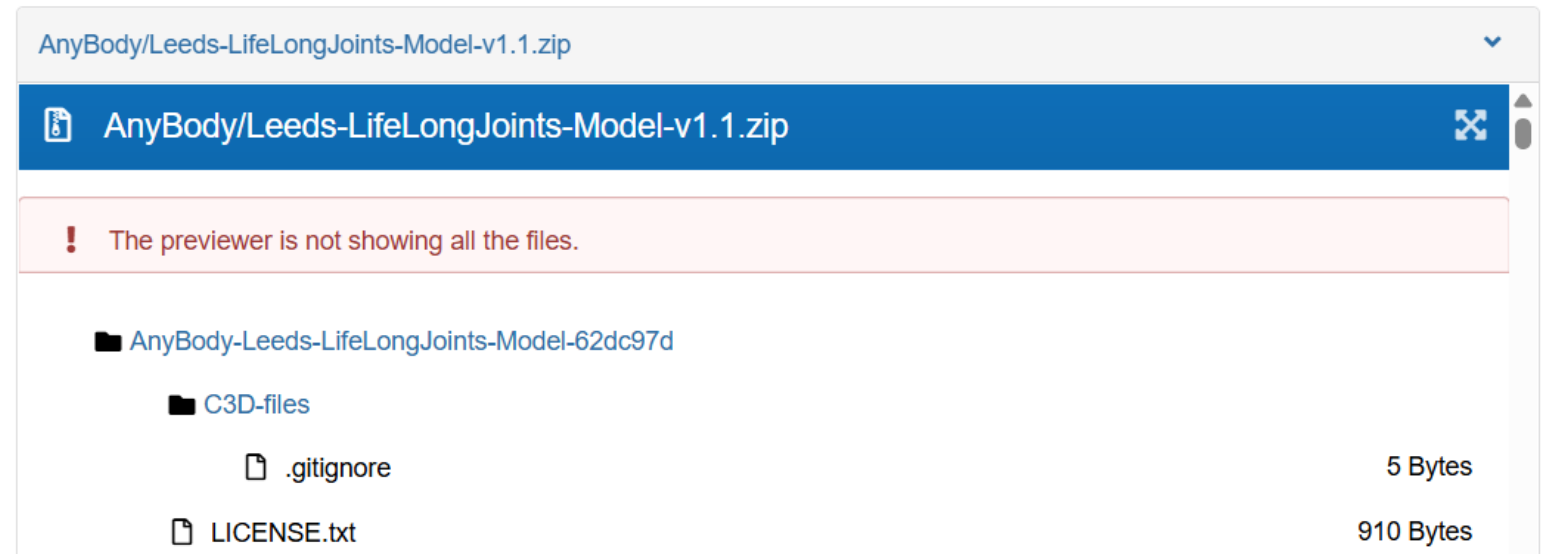
Lund, Morten Enemark¹ ; Rasmussen, Kasper Pihl¹ ; Pieri, Enrico De² ; Lunn, David³ 

Show affiliations



This is the model used in an FP7 European Commission project called Lifelongjoints (<https://lifelongjoints.eu/>). The model was used to investigate hip loads using a large dataset collect at Leeds Teaching Hospital NHS Trust.


Files



<https://zenodo.org/records/12592455>



AnyBody/Leeds-LifeLongJoints-Model-v1.1.zip


 AnyBody/Leeds-LifeLongJoints-Model-v1.1.zip 

 The previewer is not showing all the files.

- AnyBody-Leeds-LifeLongJoints-Model-62dc97d
 - C3D-files
 -  .gitignore 5 Bytes
 -  LICENSE.txt 910 Bytes



How Patients' Lifestyle Affects the Wear of Hip Implants: An In-Silico Study

Lorenza Mattei  | Andrea Di Pietro | Francesca Di Puccio






Department of Civil and Industrial Engineering, Largo Lucio Lazzarino 2, Pisa, Italy

Correspondence: Lorenza Mattei (lorenza.mattei@unipi.it)

Received: 2 January 2025 | Revised: 19 March 2025 | Accepted: 2 May 2025

Article

Effects of Physiological Loading from Patient-Derived Activities of Daily Living on the Wear of Metal-on-Polymer Total Hip Replacements

Benjamin A. Clegg ^{1,*} , Samuel Perry ², Enrico De Pieri ³ , Anthony C. Redmond ^{4,5} , Stephen J. Ferguson ³, David E. Lunn ^{4,6}, Richard M. Hall ² , Michael G. Bryant ², Nazanin Emami ^{1,*}  and Andrew R. Beadling ²

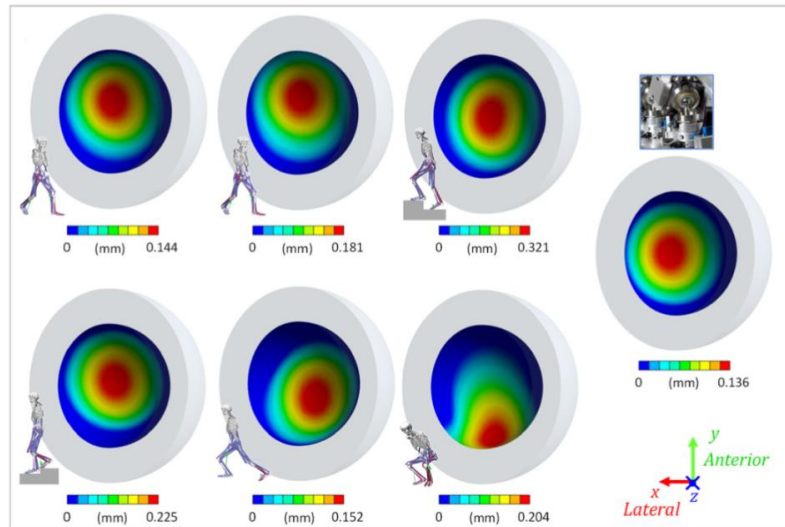




FIGURE 4 | Wear maps predicted per single motor task, compared to the ISO 14242 one (on the right), projected in the transversal plane, at 1 Mc corresponding to 1 year of walking.

Special Issue: Homage to Prof. Duncan Dowson

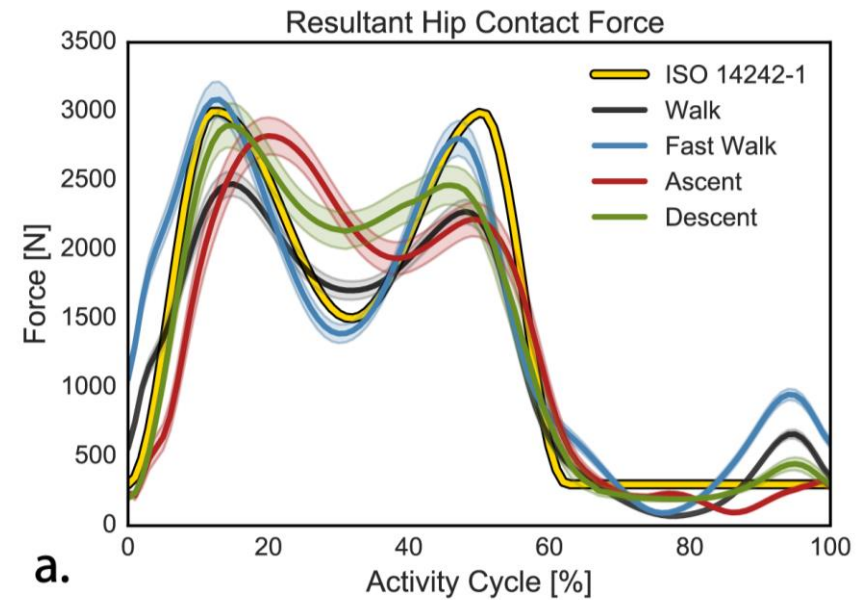


Combination of musculoskeletal and wear models to investigate the effect of daily living activities on wear of hip prostheses

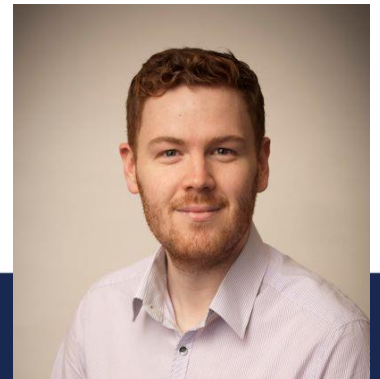
Lorenza Mattei ¹ , Matilde Tomasi ¹, Alessio Artoni ¹ , Enrico Ciulli ¹ and Francesca Di Puccio ¹

Proc IMechE Part J:
J Engineering Tribology
2021, Vol. 235(12) 2675–2687
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Improved Pre-Clinical Testing

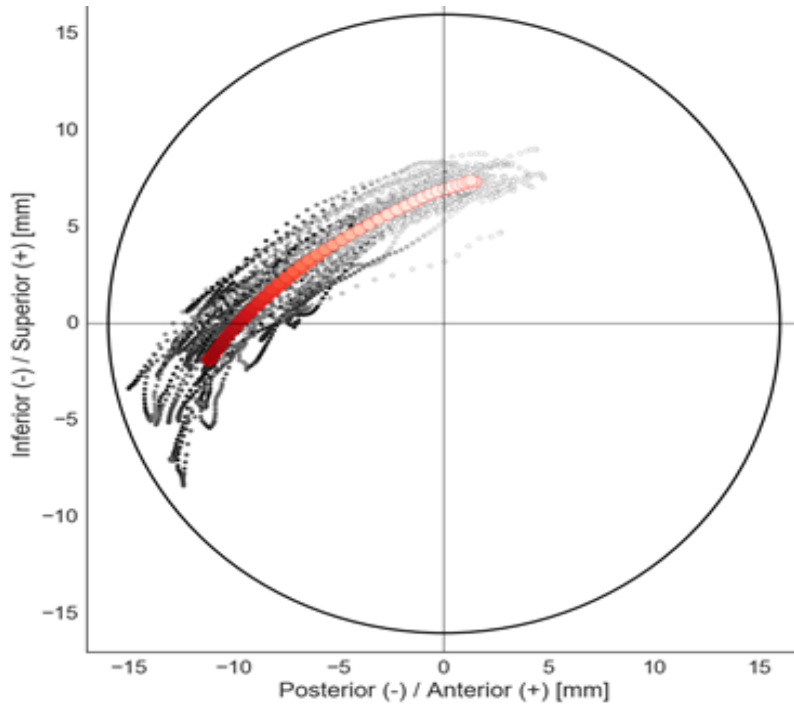


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Contact pathways for pre-surgical planning



PS[®] Optimized Positioning System

OPST[™] Dynamic Hip Analysis (DHA)

Patient name: _____ Side analysed: **Right** Case ID: _____
 Date of birth: 1953 Date of surgery: _____
 Surgeon: _____ Date of CT: _____

Notes: *Native Femoral Anteversion is 15° - OPS Team - 05-Dec-2017

Impingement assessed for:	Impingement assessed at:
#3 Lat TriFit 32 +0	40° Internal Rotation @ 90° Flexion
Planned Stem Anteversion: 15°	10° External Rotation @ 10° Extension

Warnings (see Page 4 for clarification)

- Pelvis rotates anteriorly by 24° from stand to seated (Z)
- All 9 orientations show risk of Posterior edge loading

PS[®] Optimized Positioning System

OPST[™] Plan

Patient name: _____ Side analysed: _____
 Date of birth: 1953 Date of surgery: _____
 Surgeon: _____ Date of CT: _____

Notes

Overall change in hip joint
Lengthen by 0mm

Warnings (see page 3 for reference)

- 46mm Cup size planned

Standing AP X-ray

Native femoral anteversion: 15°
 Stem anteversion: 15°

Cup orientation with
Cup: 46 Trin
Stem: #3 Lat
Head: 32 +0

The default stem reproduces the native transverse plane, unless page 2 for details.

Section in osteotomy plane

Supine Cup Inclination

Supine Cup Anteversion

No Prosthetic Impingement (Green)
 Prosthetic Impingement in Flexion and Extension (Red)

OPT-FRM-MF-11 Rev 9 Page 1 of 4

OPT-FRM-MF-44 Rev 6 Page 1 of 4



ML Training and Benchmarking



TRAIN MODELS

- ✓ Predict patient outcomes
- ✓ Identify movement patterns
- ✓ Develop digital biomarkers



BENCHMARK ALGORITHMS

- ✓ Compare ML approaches
- ✓ Test generalisability
- ✓ Evaluate robustness



UNDERSTAND VARIATION

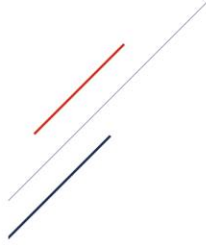
- ✓ Quantify between-patient differences
- ✓ Characterise recovery variability
- ✓ Establish normative ranges



Dataset and Research Enquires

✉ David.e.lunn@leedsbeckett.ac.uk

🔗 [linkedin.com/in/david-lunn54](https://www.linkedin.com/in/david-lunn54)



We welcome enquiries regarding the dataset and collaboration

ACHILLES TENDON RUPTURES- PATIENT FUNCTION FOLLOWING TWO DIFFERENT UK CONSERVATIVE MANAGEMENT STRATEGIES

Mason L. Stolycia¹, Josh Walker¹, Richard A. Wilkins^{2,3,4}, David E. Lunn^{1,4}

¹ Carnegie School of Sport, Leeds Beckett University, Leeds, United Kingdom

² Leeds Institute of Rheumatic and Musculoskeletal Medicine, University of Leeds, Leeds, United Kingdom

³ Podiatry Department, Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom

⁴ NIHR Leeds Biomedical Research Centre, Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom

PRE- AND POST-OPERATIVE GAIT ANALYSIS IN ADOLESCENTS UNDERGOING TOTAL HIP ARTHROPLASTY

David E. Lunn^{1,2}, C. Holton³, V. Giannoudis³

¹ Carnegie School of Sport, Leeds Beckett University, Leeds, United Kingdom

² NIHR Leeds Biomedical Research Centre, Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom

³ Leeds Teaching Hospitals NHS Trust, Leeds, UK.





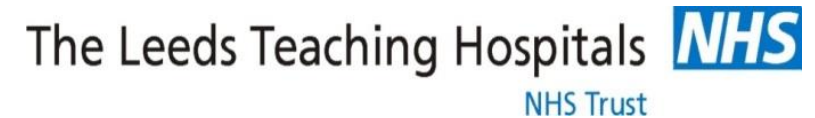
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TECHNOLOGY



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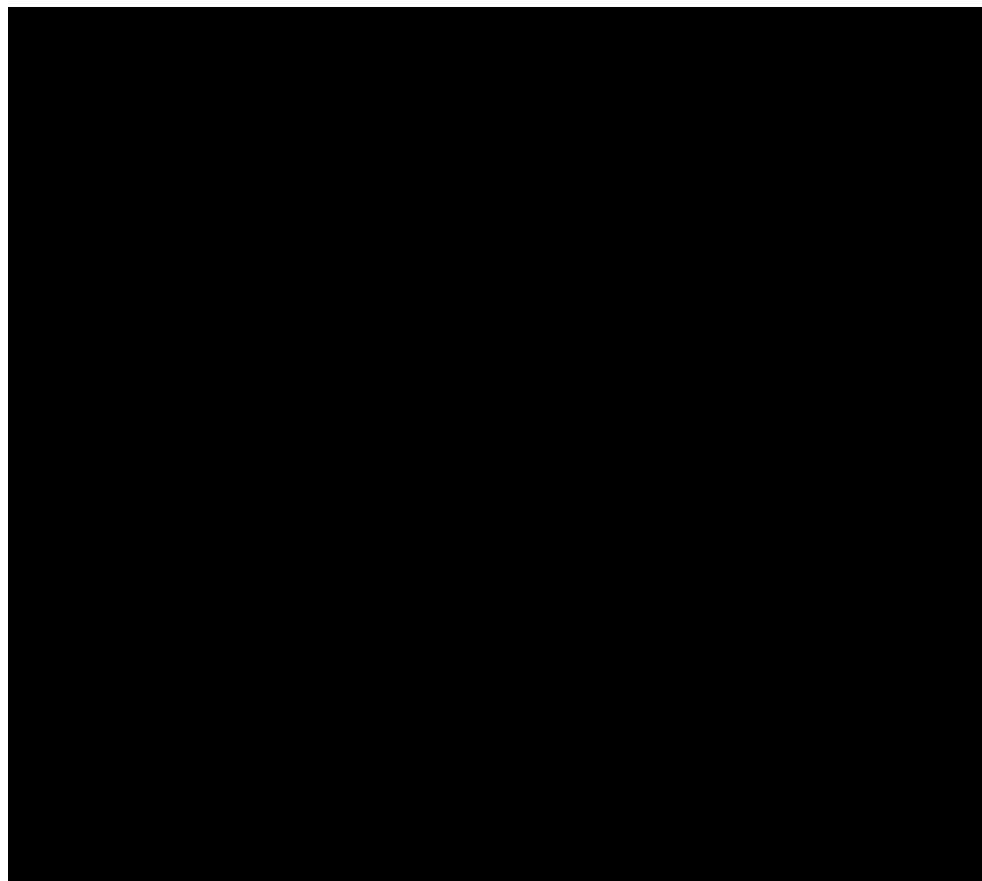
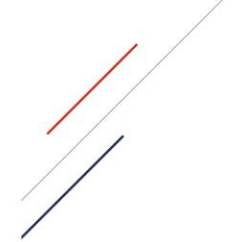
This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no NMP-310477- <http://www.lifelongjoints.eu/>



I would also like to acknowledge Leeds NIHR Biomedical Research Centre for supporting this work.



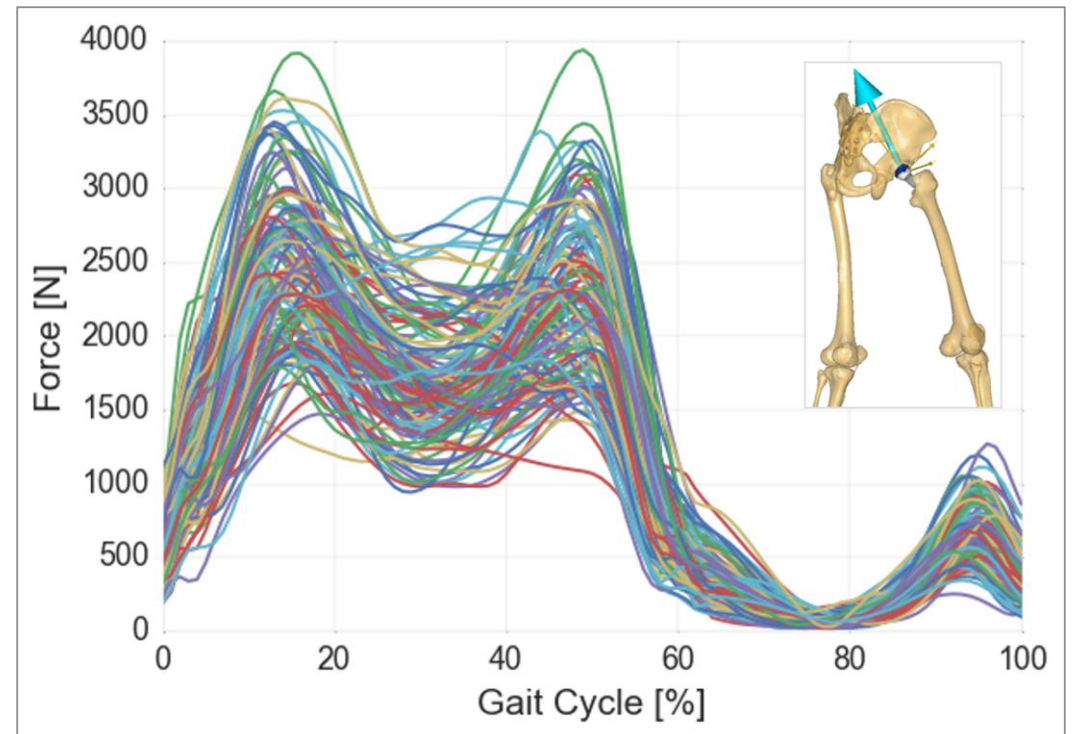
Thank you for listening



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Motion capture dataset of 137 post-operative total hip replacement patients: Current and future applications



Resources

- www.anybodytech.com
 - Events, Webcast library, Publication list, ...
- www.anyscript.org
 - Wiki, Blog, Repositories, Forum
- **Events**
 - AnyBody Solution Days
 - June 24 - 25, 2026; Online
 - WCB 2026 (10th World Congress of Biomechanics)
 - July 11 - 15, 2026; Vancouver Canada


AnyBody Solution Days
Date: June 24-25, 2026
Location: Online

On June 24-25, 2026 we are hosting the online AnyBody Solutions Days.

If you need help with your AnyBody modeling task or have some specific questions to your work, feel free to book a free 30 minutes online support session with one of our engineers.

Note: Valid AnyBody Modeling System maintenance subscription is required

[Book time](#)




WCB 2026 – 10th World Congress of Biomechanics
Date: July 11 – 15, 2026
Location: Vancouver, Canada

We are excited to exhibit at WCB 2026, taking place July 11–15 in Vancouver, Canada.

Visit our booth to explore our latest technologies and innovations designed for the biomechanics community.

If you want to book a dedicated meeting time, please reach out to us prior to the conference.

[Read more on the official website](#)



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Research area
gait methods validation animal sensitivity analysis rehab seating fea AnyBody Tech selected

Body part
knee lower extremity foot spine upper extremity hand shoulder hip mandible wrist trunk elbow ankle leg

NEW

Year 1293 Publications

2026	Zhao Y, Zhang Y, Gao Y, Li R, (2026), "Study on the rehabilitation performance of 2-SPS-RRR adjustable hip exoskeleton". Mech., vol. 32, pp. 140-151. [DOI, WWW]	NEW	exoskeleton
2026	Yamagata M, Tateuchi H, Okumura K, Ichihashi N, (2026), "Independent influences of increased step length and step frequency on Lower-Limb Joint Loading During Fast Walking". Ann. Biomed. Eng., [DOI]	NEW	leg lower ext
2026	Rubio JE, Canales F, Subramanian M, Arif MA, Padhye A, Meardon S, Willson J, Reifman J, (2026), "Effect of exertion on the biomechanics of walking with load carriage and running in young, healthy women". Sci. Rep., [DOI, WWW]	NEW	defense sports lower extremity gait
2026	Jayasuriya J, Bazzocchi MC, Fite K, Martinez M, (2026), "Modeling and analysis of firefighter musculoskeletal biomechanics for lower-extremity exoskeletons". J. Safety Res., vol. 97, pp. 696-711. [DOI, WWW]	NEW	exoskeleton v lower extremity
2026	Califano R, Riva L, Russo A, Campanile G, Meglio G, Guacchi M, Laiola N, Naddeo A, (2026), "Human Digital Biomechanical Twin-driven ergonomic optimization of bass-guitar support systems: Predictive design and experimental validation". Appl. Sci. (Basel), vol. 16, pp. 5224. [DOI, WWW]	NEW	consumer prod work place ergonom
2026	Hwang C, Kim J, Bae J, Lim D, Jang GW, (2026), "Real-time prediction of lumbar spine stress and displacement using a proof-of-concept digital twin biomechanical model". Ann. Biomed. Eng., [DOI, WWW]	NEW	spine trunk
2026	Rey Vilches J, Puthusserypady S, Biering-Sørensen B, Thomsen TH, Tolu S, (2026), "Toward future diagnostics of Parkinson's disease: a perspective on multimodal motor assessment and personalized digital twins". Front. Aging Neurosci., vol. 18. [DOI, WWW]	NEW	methods reh
2026	Jayasuriya J, Bazzocchi MC, Fite K, Martinez M, (2026), "Modeling and analysis of firefighter musculoskeletal biomechanics for lower-extremity exoskeleton". J. Safety Res., vol. 97, pp. 696-711. [DOI, WWW]	NEW	exoskeleton v lower extremity
2026	Khan JS, Mohammadi M, Ammitzbøll AL, Hagen EM, Blicher J, Obál I, Cardoso AS, Kirtas O, Kæseler RL, Rasmussen J, Struijk LN, (2026), "A tendon-driven wrist abduction-adduction joint improves performance of a 5 DoF upper limb exoskeleton — implementation and experimental evaluation". arXiv [cs.RG]. [DOI, WWW]	NEW	exoskeleton U
2026	Skubich J, Piszczatowski S, (2026), "Influence of musculoskeletal model implemented in the AnyBody Modeling System on calculated loadings acting in the lower extremity during gait". Acta Bioeng. Biomech., vol. 28. [DOI, WWW]	NEW	leg lower ext

Publications list

Webcast library

Resources / Webcast library

All Aerospace All use cases Animal Assistive devices Automotive Consumer Ergonomics Exoskeleton
Product presentations Sports Universities Workplace ergonomics

29. May 2026

Age-related changes in the human musculoskeletal system: A modeling-based approach

Assistant Professor Katarzyna Nowakowska-Lipiec, Ph.D. Eng.

17. March 2026

Reverse Total Shoulder Arthroplasty: Medial Lateralization

Donghwan Lee, Ph.D. Candidate, Department of Engineering, Sogang University, Republic of Korea

16. January 2026

Webcasts list

Questions

Meet us

- Send email to sales@anybodytech.com

Trial version

- Send email to sales@anybodytech.com

Presentation questions

- Send email to dsc@anybodytech.com

Thank you for your attention!

