



BACKGROUND

Dr. Kefala earned a Bachelor of Science degree in Physics and a Master of Science degree in Medical Physics from the University of Patras in Greece. She continued her studies with a second Master of Engineering degree and a Ph.D. degree in Mechanical and Materials Engineering with expertise in Biomechanics from the University of Denver.

Dr. Kefala has over eight years of experience in a dynamic research environment dedicated to advancing orthopaedic biomechanics, biomechanics laboratory testing, verification and validation techniques and three years of clinical experience as a medical physics assistant with a solid background in engineering, science, and physics gained through research and coursework. She is skilled in performing data acquisition, analysis, and has published several studies to facilitate research into diverse topics.

Dr. Kefala has completed research projects in accurately measuring joint kinematics during activities of daily living for informing diagnosis, helping design of treatments, and improving the design of prosthetic devices. The end-result of her Ph.D. research was to obtain healthy data from the hip and knee joint during different activities of daily living based on laboratory testing on human subjects with a dual fluoroscopy system that was synchronized with a motion capture system. The collected data was used as a reference for comparing the effectiveness of different prosthetic devices, and by accessing data that support computer models. The results, obtained from Dr. Kefala's research work have been published in well established and high impact factor journals.

Furthermore, Dr. Kefala has conducted inspections in residential and commercial environments in relation to injury biomechanics, applicable codes/standards, and premise liability. Overall, Dr. Kefala's expertise spans several avenues, including but not limited to gait analysis, human movement, injury mechanisms, human reaction and human factors, slip resistance testing, and applicable code compliance. Dr. Kefala's academic (in physics, engineering, and biomechanics) as well as her professional experience represents a unique combination of knowledge in slips, trips, and falls, biomechanics, human factors, live subject kinematic and kinetic testing, human anatomy, slip resistance testing, and applicable code compliance. Currently, she specializes in slip/trip/fall analysis, human factors, premises liability, code compliance, biomechanical and injury causation analysis.

AREAS OF EXPERTISE

- Human Kinematic Analysis and testing
- Joint Biomechanics
- Injury Causation Biomechanics
- Human Injury Mechanisms
- OSHA General Industry Certified (2023)
- Building Codes Compliance and Standards
- Gait Analysis
- Human Factors
- Human Injury Tolerance Thresholds

EDUCATION

- Ph.D., Biomechanics, University of Denver, CO, 2021
 - *Dissertation: "Accurate Measurement of Healthy Joint Kinematics to Inform Diagnosis and Treatment"*
- Master of Engineering, Biomechanics, University of Denver, CO, 2015
 - *Thesis: "Assessment of Normal Knee Kinematics using High-Speed Stereo-Radiography System"*

- Master of Science, Physics, University of Patras, Greece, 2009
 - Thesis: "Radiobiological models-based evaluation of the consequences of potential systematic catheter shifts in the HDR brachytherapy of prostate cancer"
- Bachelor of Science, Physics, University of Patras, Greece, 2007
 - Thesis: "Dose and Radiobiological Danger during Mammography"

PROFESSIONAL EXPERIENCE

February 2022 – Present | ARCCA, LLC | Senior Biomechanist

- Applies the principles of human factors and biomechanics to the anatomy and physiology of the human body to explore the cause, nature, and severity of injuries.
- Performs analysis of building codes associated with personal injuries and premises liability Building Codes and Standards.
- Provides instruction in the area of human factors, and biomechanical and injury causation analysis.

January 2013 – March 2021 | University of Denver | Research Assistant

- 8 years of experience in biomechanics laboratory testing on human subjects.
- Implemented and applied concepts on dual plane fluoroscopy system, 3-D motion capture and EMG for in vivo accurate joint kinematic measurements.
- Developed test methods in support of dual plane fluoroscopy hardware system for system level calibration and validation.
- Collected research data to create representative graphs and charts highlighting results for presentations.
- Performed statistical, qualitative, and quantitative analyses.

August 2009 – March 2011 | Klinikum Offenbach & University of Patras, Offenbach (Germany) & Patras (Greece) | Medical Physics Assistant-Trainee

- Part of commissioning and basic dosimetry after installation of linear accelerators.
- Worked on external radiation treatment planning and brachytherapy treatment planning.
- Part of clinical and quality control procedures for CT scanner.
- Attended training courses to build understanding of processes, techniques, and industry.

ACCOMPLISHMENTS

- Developed a calibration methodology for a dual plane fluoroscopy system.
- Part of the validation and application of a dual plane fluoroscopy system.
- Implemented and applied concepts on dual plane fluoroscopy system and 3-D motion capture system for measure in vivo knee and hip joint kinematics with a high degree of accuracy, during activities of daily living for informing diagnosis and helping design of treatments.

SELECTED PUBLICATIONS

Kefala, V., Mantilla, C., Levitan, A., & Joganich, T. (2023, September). The Importance of Understanding Foot Posture Strategies during Stair Descent for Forensic Incident Investigations. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 67, No. 1, pp. 2437-2440).

Kefala, V., Shelburne, K. B., Mannen, E. M., Dennis, D. A., Haas, B. D., & Rullkoetter, P. J. (2021). In vivo comparison of rotating platform and fixed bearing knee replacements during lunge and pivot activities. Pub. Date: January 11, 86-94.

Kefala, V., Ali, A. A., Mannen, E. M., & Shelburne, K. B. (2020). Patellofemoral kinematics in healthy older adults during gait activities, Pub. Date: December 8.

Hume, D. R., **Kefala, V.**, Harris, M. D., & Shelburne, K. B. (2018). Comparison of marker-based and stereo radiography knee kinematics in activities of daily living. Pub. Date: January 14, 1806-1815.

Kefala, V., Cyr, A. J., Harris, M. D., Hume, D. R., Davidson, B. S., Kim, R. H., & Shelburne, K. B. (2017). Assessment of knee kinematics in older adults using high-speed stereo radiography. Pub. Date: October 31, 2260-2267.

Navacchia, A., **Kefala, V.**, & Shelburne, K. B. (2016). Dependence of muscle moment arms on in vivo three-dimensional kinematics of the knee. Pub. Date: September 12, 789-798.

PEER-REVIEWED CONFERENCE PROCEEDINGS

ORS 2021 Annual Meeting, "Differences in 3D Functional Pelvic Orientation between Static and Dynamic Activities in THA", **Kefala V.**, Shelburne KB., Rullkoetter PJ., Myers CA., 2021

American College of Sports and Medicine, "Assessment Of Normal Knee Kinematics During Activities Of Daily Living In Older Adults" **Kefala V.**, Cyr AJ., Hume DR., Shelburne KB., 5. Med Sci Sports Exerc. 2015.

American College of Sports and Medicine, "Comparison of Marker-Based and Stereo Radiography Knee Kinematics In Assessment of Activities of Daily Living" Hume DR., Cyr AJ., **Kefala V.**, Gaffney BM., Shelburne KB., 213. Med Sci Sports Exerc. 2015.

7th World Congress of Biomechanics, "Implant Tracking Using a High-Speed Stereo Radiography System" A. J. Cyr, M. D. Harris, **V. Kefala**, M. H. Gordon, P. J. Rullkoetter, B. S. Davidson, K. B. Shelburne, Boston, 06/07/14-11/07/14

4th annual regional meeting of Rocky Mountain American Society of Biomechanics, "Implant Tracking Using a High-Speed Stereo Radiography System", **V. Kefala**, A. J. Cyr, M. D. Harris, M. H. Gordon, P. J. Rullkoetter, B. S. Davidson, K. B. Shelburne, Estes Park, Colorado, 11/04/14-12/04/14

World Congress on Medical Physics and Biomedical Engineering, "Influence of Modulation Restriction in Inverse Optimization with HIPO of Prostate Implants on Plan Quality: Analysis Using Dosimetric and Radiobiological Indices". Baltas D, Katsilieri Z, **V. Kefala**, Papaioannou S, Karabis A, Mavroidis P, Zamboglou N. 2009.25/XI:283-286

GEC ESTRO Europe Conference Porto Portugal "Results of an error simulation study for HDR Brachytherapy implants of prostate" D. Baltas, Z. Katsilieri, **V. Kefala**, S. Papaioannou, N. Zamboglou, 2009 Paper No 38

GEC ESTRO Europe Conference in London, UK winner of the GEC-ESTRO Best Poster Award at the ESTRO Anniversary Conference, from 8/5/11-12/5/11 "Effect Of using Different U/S Probe Standoff materials in image geometry" S. Diamantopoulos, S. Butt, N. Milickovic, Z. Katsilieri, **V. Kefala**, P. Zogal, G. Sakas, D. Baltas

PROFESSIONAL PRESENTATIONS

Kefala V., Ali A.A., Mannen EM, Shelburne KB. "Patellofemoral kinematics of older adults during activities of daily living," ORS Annual Meeting March 19-22, 2017

Kefala V., Ali, A.A., Mannen, E.M., Shelburne, K.B., "Natural Tibiofemoral and Patellofemoral kinematics of the Knee in Older Adults during High Knee Flexion Activities of Daily Living", Proc of ISTA, 2016.