



Exponent[®]
Engineering & Scientific Consulting

Vincent Casey, Ph.D.

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Professional Profile

Dr. Casey's expertise includes evaluating the performance of medical devices with ex-vivo benchtop experimentation and computational modelling. Dr. Casey has extensive experience with energy-based surgical instrumentation such as high-speed burs and saws, ultrasonic cutting, and electrosurgery. Additionally, he has a wide set of skills that includes multiphysics simulation using finite element modelling, sensor based computational model validation, thermal damage analysis of biological tissue, histology, microscopy, and image analysis, and is proficient in commercial and open-source software associated with the aforementioned techniques. Dr. Casey has worked within the medical device and pharmaceutical industries in R&D, manufacturing, and quality roles, and has experience in maintaining design history files, investigating product complaints, and the implementation of quality improvement initiatives in accordance with ISO 13485.

Prior to joining Exponent, Dr. Casey was a researcher at the Science Foundation Ireland Research Centre for Medical Devices (CÚRAM) where he carried out ex-vivo experiments and computational simulations of thermal effects in biological tissue during energy-based surgical cutting. He obtained his Ph.D. in Biomedical Engineering from the University of Galway (previously named the National University of Ireland Galway) where his doctoral research focused on investigating the aerosol by-product created during the use of energy-based surgical instruments known as "surgical smoke". A highlight of this research was the development of a novel experimental technique which utilized electrostatic precipitation for the capture and analysis of surgical smoke particulates.

Academic Credentials & Professional Honors

Ph.D., Engineering, University of Galway, Ireland, 2021

B.Eng., Biomedical, University of Galway, Ireland, 2016

Prior Experience

Postdoctoral Researcher, University of Galway, 2020–2022.

Lecturer – BME3134/BME5105 Biomedical Engineering Design I, University of Galway, 2022.

Lecturer – BME200 Introduction to Biomaterials, University of Galway, 2022.

R&D Engineering Intern, Stryker Innovation Centre, 2016.

Engineering Intern, Boston Scientific, 2015.

Engineering Intern, Astellas Pharma, 2013

Professional Affiliations

Orthopaedic Research Society (ORS)

Publications

Casey VJ, McNamara LM. Instrumental in Surgery: A Narrative Review on Energy-Based Surgical Cutting Devices and Surgical Smoke. *Annals of Surgery* 2023.

Casey VJ, Martin C, Curtin P, Buckley K, McNamara LM. Comparison of Surgical Smoke Generated During Electrosurgery with Aerosolized Particulates from Ultrasonic and High-Speed Cutting. *Annals of Biomedical Engineering* 2021; 49: 560–572.

Presentations

Casey VJ, Ewertowska E, Burke M, Frey L, Sheridan P, Row B, Deeny B, McNamara LM. Tissue Thermal Damage is Reduced When Using Insulated Electrodes in Comparison to Standard Electrodes During Electrosurgery: An Ex-Vivo and Computational Investigation. Podium Presentation, 27th Annual Conference of the Section of Bioengineering of the Royal Academy of Medicine in Ireland, Galway, Ireland, 2022.

Casey VJ, Ewertowska E, Burke M, Frey L, Sheridan P, Row B, Deeny B, McNamara LM. Tissue Thermal Damage is Reduced When Using Insulated Electrodes in Comparison to Standard Electrodes During Electrosurgery: A Computational Investigation. Podium presentation, 9th International Conference on Computational Bioengineering (ICCB), Lisbon, Portugal, 2022.

Casey VJ, Martin C, Curtin P, Buckley K, McNamara LM. Comparison of Surgical Smoke Generated During Electrosurgery with Aerosolized Particulates from Ultrasonic and High-Speed Cutting. Podium Presentation, Biomedical Engineering Society (BMES) Annual Meeting, San Diego, CA, 2020.

Casey VJ, Martin C, Curtin P, Buckley K, McNamara LM. Tissue Cutting By-product Surgical Smoke Contains Particles of Respirable Size with No Viable Biological Activity by Bone Saw and Ultrasonic Cutting of Bone Tissue. Orthopaedic Research Society (ORS) Annual Meeting, Phoenix, AZ, 2020.

Casey VJ, Martin C, Curtin P, Buckley K, McNamara LM. Particulate Analysis of Smoke By-Product from Surgical Cutting. Podium Presentation, 25th Annual Conference of the Section of Bioengineering of the Royal Academy of Medicine in Ireland, Limerick, Ireland, 2019.

Casey VJ, Martin C, Curtin P, Buckley K, McNamara LM. Particulate analysis of surgical smoke created during cutting of soft tissues and bone using electrosurgery, ultrasonic cutting and high-speed saws. Podium Presentation, 8th World Congress of Biomechanics (WCB), Dublin, Ireland, 2018.