



## Andrew Basilio, Ph.D.

Consultant

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## Background

Dr. Andrew Basilio received a Bachelor of Science (B.S.) and a Master of Science (M.S.) in Bioengineering from the University of California, San Diego (UCSD), and a Master of Philosophy (M.Phil.) and a Doctor of Philosophy (Ph.D.) in Biomedical Engineering from Columbia University. His primary areas of consulting expertise include injury biomechanics and occupant motion in motor vehicle accidents.

Dr. Basilio's doctoral research was in brain injury biomechanics focusing on modeling cerebral edema (brain swelling) following traumatic brain injury (TBI) to better predict injury outcomes and facilitate biomechanical vehicle safety measures. He used various mathematical and experimental techniques to determine the mechanical properties of different regions of the human brain and has also designed experiments to help elucidate the mechanism of brain swelling after TBI. Through his research, Dr. Basilio has experience in collecting, processing, and analyzing experimental data, as well as simulating and analyzing a variety of computational models.

## Professional Experience

- **Rimkus** **2024 – Present**
  - Consultant  
Evaluates and analyzes human injury from vehicle accidents, bicycle accidents, pedestrian accidents, slips/trips/falls, workplace accidents, and other accidental events. Analyzes human occupant motion and injury potential from vehicle accidents based on seatbelt use, occupant seating position, and effects of occupant interaction with vehicular structures and safety systems such as airbags. Performs vehicle accident reconstruction using analytical techniques and modeling to determine the forces arising from the accident and their injury potential. Downloads and analyzes EDR data from vehicles. Scans vehicle damage. Performs slip testing, inspections, and gait biomechanical analyses on walkways, stairs, and ramps. Perform drop testing to determine head acceleration and evaluate TBI mechanisms.
- **Semper Scientific** **2023 – 2024**
  - Biomechanical Consultant  
Reviewed and analyzed depositions, medical records, photos and videos, and other discoverable documents in human biomechanical assessments of work and recreational injuries. Assisted with injury site inspections by taking photographs, videos, and measurements. Scanned regions and objects of interest using 3D laser

scanners and linked scan data using Cyclone Register 360 to model incident scenes. Performed injury consistency analyses in various events including, motor vehicle accidents, workplace accidents, and recreational activities.

- **Columbia University in the City of New York** **2017 – 2023**
  - Graduate Student Researcher (Ph.D.)  
Led product development efforts to design and construct a finite element computational model of TBI using FEBio (febio.org) to predict delayed fatality following car accidents and assist Honda in automotive safety engineering research and development efforts. Designed and constructed a novel hardware device and protocol to measure the confined swelling pressure of injured brain tissue for the first time.
  
- **University of California, San Diego (UCSD)** **2016 – 2017**
  - Graduate Student Researcher (M.S.)  
Constructed a computational model of metabolism in phytoplankton using in-house tools and used the constructed model to conduct systems-level analysis.
  
- **University of California, San Diego (UCSD)** **2016 – 2017**
  - Fellow  
Completed a 1-year lab-to-market business program between the UCSD Jacobs School of Engineering and UCSD Rady School of Management. Completed relevant coursework with MBA students and other engineering graduate students. Conducted market research, determined market fit, and pitched product and business plan to investors. Collaborated with three other engineering graduate students to implement startup methodology.
  
- **Illumina** **2014 – 2015**
  - Systems Integration Test Engineer  
Communicated across various company departments (software engineering, mechanical engineering, electrical engineering, and chemistry) to conduct tests and troubleshoot potential mechanisms of instrument failure.
  
- **La Jolla Bioengineering Institute** **2013 – 2014**
  - Intern  
Designed and constructed a shock tube using aluminum extrusions to assist in research efforts studying TBI in mice.
  
- **UCSD Cellular Biophotonics Laboratory** **2010 – 2012**
  - Research Assistant  
Used a laser to induce DNA damage in cells. Used fluorescent antibodies to bind to the DNA repair protein of interest following laser-induced damage. Used ImageJ to quantify the concentration of protein of interest.
  
- **Oak Crest Institute of Science** **2010**
  - Research Assistant  
Determined the degradation rate of various polymers and medical sutures to facilitate the development of a sustained drug-releasing mechanism.

## Education, Certifications, and Awards

- **Biomedical Engineering, Ph.D.:** Columbia University in the City of New York (2023)
- **Biomedical Engineering, M.Phil.:** Columbia University in the City of New York (2023)
- **Bioengineering, M.S.:** University of California, San Diego (UCSD) (2017)
- **Bioengineering, B.S.:** University of California, San Diego (UCSD) (2013)
- **Society of Automotive Engineers:** Member (2023-Present)

## Continuing Education

- **Institute of Police Technology and Management (IPTM):** At-Scene Traffic Crash / Traffic Homicide Investigation, Online-Accelerated (2024); Bosch© CDR Tool Technician Training, Online (2024)

## Presentations

- **“Simulating Cerebral Edema and Delayed Fatality After Traumatic Brain Injury Using Triphasic Swelling Biomechanics”**, Enhanced Safety of Vehicles (ESV), Eindhoven, Netherlands, June 10-13, 2019.
- **“Simulating Cerebral Edema and Delayed Fatality After Traumatic Brain Injury Using Triphasic Swelling Biomechanics”**, Computer Methods in Biomechanics and Biomedical Engineering (CMBBE), New York, New York, August 14-16, 2019.
- **“Human Biomechanics in Low-Speed Vehicle Collisions”** Pleasanton, California, November 22, 2024.

## Publications

- Basilio A.V., P. Xu, Y. Takahashi, T. Yanaoka, H. Sugaya, G.A. Ateshian, B. Morrison III, (2019). **“Simulating Cerebral Edema and Delayed Fatality After Traumatic Brain Injury Using Triphasic Swelling Biomechanics”**, Traffic Injury Prevention, Volume 20, Issue 8, Pages 820-825.
- Basilio A.V., D. Zeng, L.A. Pichay, S.A. Maas, S.N. Sundaresh, J.D. Finan, B.S. Elkin, G.M. McKhann, G.A. Ateshian, B. Morrison III, (2024). **“Region-Dependent Mechanical Properties of Human Brain Tissue Under Large Deformations Using Inverse Finite Element Modeling”**, Annals of Biomedical Engineering, Volume 52, Issue 3, Pages 600-610.
- Basilio A.V., D. Zeng, L.A. Pichay, G.A. Ateshian, P. Xu, S.A. Maas, B. Morrison III, (2024). **“Simulating Cerebral Edema and Ischemia After Traumatic Acute Subdural Hematoma Using Triphasic Swelling Biomechanics”**, Annals of Biomedical Engineering, Online ahead of print.
- Basilio A.V., D. Zeng, L.A. Pichay, G.A. Ateshian, O.S. Hansen, A. Romanov, B. Morrison III, (2024). **“Experimental Measurement and Mathematical Quantification of Fixed-Charge Density in Rat and Pig Brain Tissue”**, Online ahead of print.
- Takahashi Y., T. Yanaoka, H. Sugaya, A.V. Basilio, P. Xu, G. Ateshian, B. Morrison III, (2019). **“Prediction of Probability of Fatality Due to Brain Injury in Traffic Accidents”**, Traffic Injury Prevention, Volume 20, Issue sup1, Pages S27-S31.
- Sundaresh S.N., J.D. Finan, B.S. Elkin, A.V. Basilio, G.M. McKhann, B. Morrison III, (2022). **“Region-Dependent Viscoelastic Properties of Human Brain Tissue Under Large Deformations”**, Annals of Biomedical Engineering, Volume 50, Issue 11, Pages 1452-1460.