Mohamad Motaz (Mo) Al Samman, M.D., Ph.D.

Senior Consultant

1225 Broken Sound Parkway NW, Suite E
Boca Raton, FL 33487

(954) 428-1422

ExpertWitness@rimkus.com

Background

Dr. Mo Al Samman holds B.S. and Ph.D. degrees in Bioengineering with a focus on Biomechanics. He also earned an M.D. degree from overseas.

Dr. Al Samman is a bioengineer, physician, and researcher whose vision is to apply medical and biomedical engineering knowledge and skills in forensic biomechanics and bioengineering. The unique and diverse background of Dr. Al Samman enables him to visualize medical problems from multiple perspectives. His primary areas of expertise include forensic biomechanical investigation of personal injury; work-related injury; motor vehicle accidents; slip, trip, and fall; falling objects; and others.

Throughout his Ph.D., Dr. Al Samman utilized state-of-the-art magnetic resonance imaging (MRI) sequences available only in a few research institutions in the world to investigate the biomechanics of the brain, spinal cord, and cerebrospinal fluid (CSF) in subjects with Chiari malformation type I (CMI) as well as healthy volunteers. Dr. Al Samman has published peer-reviewed journal articles and presented at numerous national science conferences.

Professional Engagements

- **Research and Development**
  - Harvard University - Boston, MA (2022-2024), Conducted research using MRI to study CSF flow alterations due to physiological activities in CMI patients.
  - Northeastern University - Boston, MA (2022-2024), Conducted research to study the biomechanical environment of the brain in CMI patients non-invasively.
  - The University of Akron - Akron, OH (2020-2021), Conducted research in collaboration with Emory University on investigating the relationship between brain tissue strain and imbalance symptoms in CMI patients.
  - Innovative Delta Technology - Cleveland, OH (2019-2020), Evaluated and improved the design of spinal implants and surgical instruments through simulated mechanical testing and failure mode analyses.

- **Teaching and Technical Support**
  - The University of Akron - Akron, OH (2020-2021), Provided teaching assistance for numerous biomedical engineering classes, such as the Biomechanics of Biological Tissues.

Forensic Engagements

- **Biomechanical Investigations**
  - Robards, KY (2025), Provided forensic engineering investigation of a worker fatality case due to exposure to hydrogen sulfide gas.
  - Chicago, IL (2024), Evaluated the effect of exposure to excessive vibration on triggering the onset of symptoms in a worker with CMI.

- **Expert Witness and Testimony**
  - Provided expert testimony in a state court of Illinois.

Professional Experience

- **Rimkus** **2025 – Present**
  - Senior Consultant
    Apply biomedical and biomechanical engineering principles to evaluate injury consistency in various incidents such as vehicular collisions; slip, trip, and fall; and/or falling objects. Provide subject matter expertise in consultation, professional reports, and legal proceedings.

- **Genuine Engineering Group** **2024 – 2025**
  - Consultant Forensic Biomechanical Engineer
    Applied biomedical and biomechanical engineering concepts to investigate the biomechanics of injuries or death. Conducted engineering and scientific assessments to aid in legal investigations. Provided subject matter expertise in consultation, professional reports, and legal depositions.

- **Harvard University** **2022 – 2024**
  - Ph.D. Student Researcher
    Designed in vivo imaging protocol to study CSF flow using dynamic MRI sequences such as real-time pencil beam (PB) and phase contrast (PC). Recruited healthy subjects for a clinical MRI study. Designed controlled flow phantom studies to study how PB-derived fluid velocity measurement is deviated from that of PC. Wrote a user-friendly MATLAB code to analyze PB-derived CSF flow rate in the frequency domain during resting and Valsalva maneuver.

- **Northeastern University** **2022 – 2024**
  - Research Assistant
    Used real-time PB to calculate CSF flow stroke volume in the cervical canal in CMI patients at rest and before and after coughing and/or Valsalva maneuver. Used phase contrast MRI to calculate the compliance of the cervical canal in CMI and controls. Wrote MATLAB codes to process PC MRI acquired on Philips and Siemens scanners. Wrote a MATLAB interactive code to locate and process PB. Investigated atlanto-occipital joint instability in CMI patients and its relationship to symptoms and other morphometrics.

- **The University of Akron** **2020 – 2021**
  - Research Assistant
    Employed displacement encoding with stimulated echoes (DENSE) MRI to calculate cardiac-induced strain on tracts responsible for balance in CMI patients to investigate balance disturbances that CMI patients have. Wrote MATLAB codes to process DENSE MRI.

- Teaching Assistant
  Assisted in teaching students in numerous biomedical engineering classes that include Introduction to Design (BME 111), Senior Design (BME 492), Mechanics of Biological Tissues (BME 365), and Advanced Biomaterials (BME 440). Assisted students by explaining and simplifying materials through worked-out problems. Prepared additional materials to serve as a review and complementary guide for homework. Provided rubrics and graded assignments, quizzes, and exams. Provided technical mentorship and served as a committee member to critique students' prototypes.

- **Innovative Delta Technology** **2019 – 2020**
  - Biomechanical Engineer
    Evaluated failure modes of in-house designed surgical instruments through accurate analysis and calculation. Studied implants under simulated mechanical testing such as ASTM F2077 (static compress and static shear). Utilized finite element analysis (FEA) data to improve implants' designs and wrote a professional FEA report. Analyzed a complex multilevel fusion (rods, bone screws, and implants) vs. ASTM F1717 to meet EU MDR. Designed and conducted in-house testing (e.g., snap-on force) and wrote proposed test protocols (PTPs). Wrote illustrative, easy-to-follow standard operation procedures (SOPs). Worked with a team creating 3D CAD models and technical drawings neatly and accurately using SolidWorks. Accommodated machineabilities and manufacturability of technical drawings of implants and instruments. Prepared illustrative and persuasive PowerPoints to demonstrate to clients one design change vs another. Maintained periodically and troubleshooted any malfunction of the MakerGear 3D printer.

- **The University of Pittsburgh Medical Center** **2011 – 2012**
  - Research Fellow
    Investigated, along with an interdisciplinary team, long-term survival, graft function, and quality of life of recipients of multi-visceral as well as isolated small bowel transplants. Performed data gathering, data analysis and accuracy check, and reviewed the manuscript.

- **Emergency and Medical Services Agency** **2007 – 2010**
  - General Practitioner
    Provided medical care to employees of foreign and local petroleum companies operating in the Syrian desert. Enforced health and safety standards by performing inspections and taking action. Identified hazards and educated workers on anticipated possible scenarios, along with first aid actions. Provided full documentation of work injuries, date and time, and tasks involved during the event. Stabilized injured workers, ordered work-up, and referred them to the regional hospital and/or specialists.

- **Medical Care Center (Al-Shami Hospital)** **2006 – 2007**
  - Hospitalist
    Applied medical knowledge and clinical skills as a hospitalist and coordinated between specialists. Supervised a small group of nurses on a daily basis in a patient-centered environment.

Education and Certifications

- **Bioengineering, Ph.D.:** Northeastern University (2024)
- **Biomedical and Health Sciences Engineering, B.S.:** North Carolina State University (2019)
- **Medicine, M.D.:** University of Aleppo School of Medicine (2006)
- **Educational Commission for Foreign Medical Graduates (ECFMG) Certificate:** Certified

- **Registered Polysomnographic Technologist (RPSGT):** Registered (Registry # 23119)
- **Certified SolidWorks Professional (CSWP):** Certified
- **American Society of Biomechanics (ASB):** Member
- **American Society of Mechanical Engineers (ASME):** Member

Graduate Coursework and Continuing Education

- **Northeastern University Graduate Courses:** Biomedical Imaging, Biomedical Optics, Bioinstrumentation and Signal Processing, Continuum Mechanics, Principles of Bioengineering, Advanced Mathematics
- **The University of Akron Graduate Courses:** FEA, Biomechanics, Medical Physiology, Advanced Biomaterials, Robotics, Tissue Engineering and Regenerative Medicine, Statistics, Technology & Entrepreneurship
- **Other Continuing Education Course:** Bosch Crash Data Retrieval Technician; At-Scene Traffic Crash/Traffic Homicide Investigation

Publications

- **"Cardiac-induced brain tissue motion in Chiari Malformation type 1 subjects and its relationship to symptomatology, morphometrics, and surgical outcomes."** JMRI, 2025.
- **"Measurement of CSF flow and brain motion in Chiari malformation type I subjects undergoing posterior fossa decompression surgery."**, J Neurosurg, 2025.
- **"Correlation of anterior CSF space in the cervical spine with Chicago Chiari Outcome Scale score in adult females."**, J Neurosurg Spine, 2024.
- **"Transient Decrease in Cerebrospinal Fluid Motion Is Related to Cough-Associated Headache in Chiari I Malformation."**, World Neurosurg Spine, 2024.
- **"The Relationship Between Imbalance Symptom and Cardiac Pulsation Induced Mechanical Strain in the Brainstem and Cerebellum for Chiari Malformation Type I."**, J Biomech Eng, 2023.
- **"The Effect of Posterior Fossa Decompression Surgery on Brainstem and Cervical Spinal Cord Dimensions in Adults with Chiari Malformation Type 1."**, World Neurosurgery, 2023.
- **"Relationship of Morphometrics and Symptom Severity in Female Type I Chiari Malformation Patients with Biological Resilience."**, Cerebellum, 2023.
- **"Association between resistance to cerebrospinal fluid flow and cardiac-induced brain tissue motion for Chiari malformation type I."**, Neuroradiology, 2023.
- **"Long-Term Survival, Nutritional Autonomy and Quality of Life after Intestinal and Multivisceral Transplantation."**, Annals of Surgery, 2012.