

**Tack Lam, M.D., Ph.D.**  
**Senior Manager**

**Professional Profile**

Dr. Lam is a physician-engineer consultant in Exponent's Biomechanics practice. He is consulted on both medical and biomechanical issues involving injuries and fatalities in occupants involved in vehicular accidents (frontal, rear-end, side and rollover vehicle impacts, motorcycle, and pedestrian impacts), recreational activities (bicycling, water-boarding, snow sports, and aircraft crashes as well as issues of helmet use), and in the workplace (e.g., construction-related injuries, railroad-related injuries, burns of thermal, chemical and/or electrical origins, slip or trip and falls, high voltage electrical injuries, traumatic amputations, hearing loss, and repetitive stress disorders).

Dr Lam has expertise in the areas of human tolerance to forces applied to the head and the spine, and to the rest of the musculo-skeletal system including shoulders, hands, knees, and ankles. He has worked on injury analysis involving medical devices such as orthopaedic implants, cold therapy units, and ambulatory blood pressure cuffs. His research activities have included helmet impact studies, rear impact vehicle studies, ligament failure mechanics in the knee, orthopaedic implant design, and health effects of pollution on the cardio-pulmonary system. As a result of his experience and research in injury causation and analysis, Dr. Lam is very interested in developing safe designs in the automotive and aviation industry, and promote safety programs in the workplace.

In addition to his PhD in engineering, Dr Lam is a practising, residency-trained, board certified physician specializing in occupational and environmental medicine, and toxicology. With this expertise, he has been consulted on cases where he has addressed the effect of various substances (e.g. alcohol, marijuana, cocaine, methamphetamine) and carbon monoxide on human performance. He has also addressed health effects of mold exposure. With his background in clinical medicine and engineering, Dr. Lam brings a unique perspective into investigating injury causation since he can reconstruct how an injury could have occurred in a person, in light of what is known in the scientific literature and his engineering training. His medical training further allows him to address the issue of whether the particular injury did occur to the person, given the details in the medical record, and relying on his clinical training and experience.

**Academic Credentials and Professional Honors**

M.Sc., Toxicology, University of California, Irvine, 2005  
M.D., University of Toronto, School of Medicine, 1995  
Ph.D., Civil Engineering (Biomechanics), University of Calgary, 1988  
B.A.Sc., Civil Engineering, University of Ottawa, 1984

Resident in Occupational Medicine, University of California, Irvine, 2003–2005; Resident in Orthopedic Surgery, McMaster University, 1995–96

### **Licenses and Certifications**

American Board of Preventive Medicine (Occupational Medicine) certification (2005)  
American Board of Independent Medical Examiners certification (2006)

State of California Medical License, No. A62794 (current)  
Medical Review Officer (recertified to 2015)

### **Courses Taken**

“Accident Investigation” and “Accident Reconstruction,” Northwestern University.

“Human Factors in Aviation” and “Aircraft Accident Investigation,” University of Southern California.

“Biomechanics of High Impact Injuries,” National Transportation Safety Board (NTSB).  
“PC-CRASH Users course,” McInnis Engineering seminar.

### **Publications**

Lam T, Gates D. Repeated impacts on a motorcycle helmet: What happens after a significant impact? Society of Automotive Engineers (SAE) Technical Paper 2010-01-1016.

Gates D, Bridges A, Welch T, Lam T, Scher I, Yamaguchi G. Lumbar loads in low to moderate speed rear impacts. Society of Automotive Engineers (SAE) Technical Paper 2010-10B-0285.

Scher I, Richards D, Carhart M, Thomas R, Hurlen N, Lam T. Pediatric head and neck injuries: Evaluating the influence of helmets. Journal of ASTM International 2008; 5(4):1–10.

Villarraga ML, Guerin HL, Lam T. Medical device recalls from 2004–2006: A focus on Class I recalls. Food Drug Law 2007; 62(3):581–591.

Lam T. The effect of concentrated ambient fine particles on aged rats. M.Sc. Thesis in Toxicology, University of California, Irvine, 2005.

Lam T, Frank C, Shrive N. Variation in rupture site and surface strains at failure in the maturing medial collateral ligament complex. Biomechanical Engineering 1995; 117(455–446).

Dillon M, Lam T, Beardy N. Maternal serum screening in the Sioux Lookout Zone: complicated test for an unspecified need. Can Fam Phys 1994; 40(1766–1771).

Lam T, Frank C, Shrive N. Changes in the static and cyclic relaxation of the rabbit bone medial collateral ligament during maturation. Journal of Biomechanics 1993; 26(1):9–17.

Lam T, Frank C, Shrive N. Calibration characteristics of a video dimension analyzer. *Journal of Biomechanics* 1992; 25(10):1227–1231.

Sabiston P, Lam T, Frank C, Shrive N. Transplantation of the rabbit medial collateral ligament. I. Biomechanical evaluation of fresh autografts. *Journal of Orthopaedic Research* 1990; 8(1):35–45.

Sabiston P, Lam T, Frank C, Shrive N. Transplantation of the rabbit medial collateral ligament. II. Biomechanical evaluation of frozen/thawed allografts. *Journal of Orthopaedic Research* 1990; 8(1):46–56.

Sabiston P, Lam T, Frank C, Shrive N. Allograft ligament transplantation. A morphological and biochemical evaluation of a medial collateral ligament complex in a rabbit model. *American Journal of Sports Medicine* 1990; 18(2):180–196.

Lam T, Thomas C, Shrive N, Frank C. The effect of temperature on the viscoelastic properties of the rabbit medial collateral ligament. *Journal of Biomechanical Engineering* 1990; 112(2):147–152.

Lam T. Mechanics of the knee meniscus: a review. Ontario Centre for Materials Research Internal Report, University of Toronto, 1990.

Kiefer GN, Sundby K, McAllister D, Shrive N, Frank CB, Lam T, Shachar NS. The effect of cryopreservation on the biomechanical behaviour of bovine articular cartilage. *Journal of Orthopaedic Research* 1989; 7(4):494–501.

Lam T, Rorabeck C, Bourne R, Finlay J. Effect of different total hip replacement cup designs on the pattern of surface strain in periacetabular bone. PSI Report, 1989.

Lam T. The mechanical properties of the maturing medial collateral ligament. PhD Thesis, University of Calgary, 1989.

Lam T, Shrive N, Frank C. Comment on the influence of specimen length on the failure properties of tendon collagen. *Journal of Biomechanics* 1988; 1:67.

Shrive N, Lam T, Damson E, Frank C. A new method of measuring the cross-sectional area of soft tissues. *Journal of Biomechanical Engineering* 1988; 110:104–109.

### **Presentations and Published Abstracts**

Lucas S, McGowan J, Lam T, Yamaguchi G. Assessment of the TASER XREP impact injury potential using cadaveric testing. American Association of Forensic Sciences Conference, 2010.

Lam, T. The health effects of Carbon Monoxide Exposure. Continuing Legal Education seminar at Sempra Utilities, Los Angeles and San Diego, 2009.

Lam T. Pilot spatial disorientation. Aviation safety seminar given to Squadron 129, Civil Air Patrol, USAF-Aux, California, 2009.

Lam T. Effect of fatigue in aviation safety. Aviation safety seminar given to Squadron 129, Civil Air Patrol, USAF-Aux, California, 2008.

Scher I, Richards D, Carhart M, Thomas R, Lam T. Pediatric head and neck injuries in snow sports: evaluating the influence of helmets. ASTM International Conference, Glasgow, Scotland, 2006.

Lam T, Hamade A, Kleinman M. Heart rate changes in 24 month old Fischer 344 rats exposed to concentrated particulate matter close to a freeway in Diamond Bar, California. Society of Toxicology 44<sup>th</sup> Annual Meeting, New Orleans, LA, 2005.

Lam T, Hamade A, Kleinman M. Concentrated fine ambient particulates paradoxically increase heart rate variability in aged rats. 90<sup>th</sup> American Occupational Health Conference, Vol. 90, p. 18, 2005.

Lam T, Shrive N, Frank C. Ligament viscoelastic behaviour changes with maturation. 35<sup>th</sup> Orthopaedic Research Society, Atlanta, GA, Vol. 14, p. 187, 1989.

Walsh S, Lam T, Frank C, Chimich D, Hart D. Immobilization inhibits biomechanical maturation of growing ligament. 35<sup>th</sup> Orthopaedic Research Society, Atlanta, GA, Vol. 14, p. 253, 1989.

Lam T, Frank C, Shrive N. Effect of maturation on viscoelastic behaviour of ligaments. 45<sup>th</sup> Canadian Orthopaedic Research Society, Vol. 45, p. 69, 1989.

Lam T, Frank C, Shrive N. Mechanical behaviour of an extra-articular ligament autograft. 45<sup>th</sup> Canadian Orthopaedic Research Society, Vol. 45, p. 70, 1989.

Lam T, Thomas, C., Shrive N, Frank C. Importance of a 'Ligament Zero' in determining temperature effects. 34<sup>th</sup> Orthopaedic Research Society, San Francisco, CA, No. 13, p. 208, 1988.

Sabiston P, Lam T, Frank C, Shrive N. Allograft ligament transplantation: a multidisciplinary study in a rabbit model. 34<sup>th</sup> Orthopaedic Research Society, San Francisco, CA, Vol. 13, p. 104, 1988.

Forbes I, Lam T, Frank C, Shrive N. The biomechanical effects of combined ligament injuries on the medial collateral ligament. 34<sup>th</sup> Orthopaedic Research Society, San Francisco, CA, Vol. 13, p. 186, 1988.

Lam T, Frank C, Shrive N. Strain constancy during ligament maturation: a potential homeostatic mechanism? 44<sup>th</sup> Canadian Orthopaedic Research Society, Vol. 44, p. 40, 1988.

Lam T, Shrive N, Frank C. Strain heterogeneity at failure in maturing rabbit ligaments. 44<sup>th</sup> Canadian Orthopaedic Research Society, Vol. 44, p. 39, 1988.

Sabiston P, Frank C, Shrive N. Allograft ligament transplantation: a multidisciplinary study using the a rabbit model. Canadian Orthopaedic Research Society, Vol. 43, p. 51, 1987

Lam T, Thomas C, Shrive N, Frank C. Temperature effects on ligament properties. Canadian Medical and Biological Engineering Society, Halifax, No. 13, p. 191, 1987.

Sabiston P, Frank C, Lam T, Shrive, N. Allograft ligament transplantation: A multidisciplinary study in a rabbit model. American Orthopaedic Society for Sports Medicine (AOSSM) Basic Science Award Paper, Miami, FL, 1987.

Sabiston P, Lam T, Frank C, Shrive N. Biomechanical analysis of allograft ligament transplantation. Proceedings, Alberta Heritage for Medical Research Foundation, Vol. 6, p. 52, 1986.

### **Professional Affiliations**

- American College of Occupational and Environmental Medicine
- Association for the Advancement of Automotive Medicine
- Society of Automotive Engineers
- American Society of Safety Engineers
- American College of Medical Toxicology
- Wilderness Medical Society