

# Steven M. Tommasini

SUNY – Stony Brook  
Department of Biomedical Engineering  
Psychology A Building (3<sup>rd</sup> Floor)  
Stony Brook, NY 11794-2580  
Fax: (631) 632-8577

5 Emily Drive  
South Setauket, NY 11720  
Phone: (347) 837-4812

[steven.tommasini@gmail.com](mailto:steven.tommasini@gmail.com)

## Curriculum Vitae

### Education

- **Ph.D. in Biomedical Engineering, May 2008**
  - Thesis – Phenotypic Integration Contributes to Skeletal Functionality and Fragility.
  - City University of New York Graduate Center, The City College of New York, NY.
- **M.S. in Biomedical Engineering, 2002**
  - Thesis – Whole Bone Mechanical Function Defined by the Relation Between Morphologic Traits in Inbred Mice Vertebrae.
  - The City College of New York, NY.
- **B.S. in Biomedical Engineering, 2000**
  - Columbia University, Fu Foundation School of Engineering and Applied Science, New York, NY.

### Research Experience

- **2002 to 2008: Doctoral Research**

Orthopaedic Research Laboratory, Leni and W. Peter May Department of Orthopaedics, Mount Sinai School of Medicine, New York, NY.  
Research Advisor: Dr. Karl J. Jepsen (MSSM)  
CCNY Advisor: Dr. Susannah P. Fritton (CCNY)

  - Applied mathematical, engineering, and custom network theory-based approaches to systematically understand the biological and genetic basis of corticocancellous bone quality and fracture risk.
  - Successfully demonstrated that morphological and compositional adaptation observed in murine skeleton translated to human skeleton by analyzing cross-sectional morphology and tissue-level mechanical properties and quality in young adult human tibiae.

### **Skills**

- Mathematical and computational modeling (MATLAB), systems biology, statistical analysis (Minitab, GraphPad Prism, Statistica), path analysis (LISREL), mechanical testing (Instron), and finite element modeling (COMSOL).
- Mineralized and soft tissue histology techniques (paraffin and plastic), microscopy (visible/fluorescent/confocal), and histomorphometry (custom software and OsteoMeasure).
- Advanced image processing and analysis including Micro-CT (GE Medical Systems) software design and validation (custom software, IMAQ Vision Builder, and Adobe Photoshop).

▪ **2001 to 2002: Master's Research**

Orthopaedic Research Laboratory, Leni and W. Peter May Department of Orthopaedics, Mount Sinai School of Medicine, New York, NY.

Research Advisor: Dr. Karl J. Jepsen

- Analyzed genetic variation in function-structure relationships of inbred mouse vertebrae by developing optical strain measuring system that improved accuracy of mechanical testing of vertebrae.

**Skills**

- Statistical analysis (Minitab, GraphPad Prism) mechanical testing (Instron), optical strain measurements (LabView), small shop machining, and CAD design.

▪ **1999: Summer Undergraduate Research**

Rehabilitation Engineering Research Center, New York University School of Medicine, New York, NY.

Research Advisor: Carl P. Mason, MSBE

- Assisted in acquisition of data collection for the VA NYHHCS Lower Limb Prosthetics-Orthotics Optical Digitizer research and development project including optical scans of test subjects' feet and orthopedic shoe Lasts, gait data collection, and digital analysis.

**Research Interests**

- Application of engineering, mathematical, and biological based approaches to the investigation of complex diseases and their underlying genetics.
- Identification of the roles variability in functional adaptation and cellular biology play in the regulation of skeletal fragility during aging and osteoporosis.
- Development of novel, network theory-based paradigms for the early detection of complex diseases such as osteoporosis.
- Development of novel and minimally invasive methodologies for the prophylactic treatment of complex disease.
- Application of advanced imaging techniques (micro-CT, digital microscopy, etc.) and analysis algorithms for the high-throughput phenotyping of large experimental cohorts.

**Instructional and Training Experience**

- Instruction and guidance of 5 M.D., 4 M.Sc., and 3 undergraduate level students in multiple, long-term, directed research projects.
- Mentored 2 undergraduate NIH Scholars in CCNY Biomedical Engineering Department.
- Protocol writing and editing, along with technical education, guidance, and support for users of advance imaging and analysis equipment, mechanical testing equipment, and computer programming.

**Awards and Funded Grants**

- 2008 Harold Shames Award for Graduate Academic Excellence, CCNY, New York, NY
- Young Investigator Travel Award 2007, ASBMR 29<sup>th</sup> Annual Meeting, Honolulu, HI

- CUNY Doctoral Student Research Grant, February 1, 2007 – January 31, 2008
- CUNY – Sue Rosenberg Zalk Student Travel & Research Fund 2007-2008
- CUNY – Sue Rosenberg Zalk Student Travel & Research Fund 2006-2007
- Plenary Poster Presentation 2006, ASBMR 28<sup>th</sup> Annual Meeting, Philadelphia, PA
- Young Investigator Travel Award 2005, NIAMS-ASBMR Bone Quality Meeting, Bethesda, MD
- CUNY – Sue Rosenberg Zalk Student Travel & Research Fund 2004-2005

### **Professional Memberships**

- The American Society for Bone and Mineral Research (2004 – Present)

### **Publications and Presentations**

#### ***Scientific Journal Publications:***

- 1) Williams JC, **Tommasini SM**, Schaffler MB, Levy RN, Ghillani R, Terranova CJ, Jepsen KJ (in preparation) Characterizing patterns of bone loss in the proximal femur using network theory.
- 2) Jepsen KJ, Hu B, **Tommasini SM**, Courtland HW, Price C, Cordova MA, Nadeau JH 2008 Phenotypic integration of skeletal traits during ontogeny buffers genetic variants affecting the slenderness of inbred mouse femora (in press: Mamm Genome).
- 3) **Tommasini SM**, Hu B, Nadeau JH, Jepsen KJ 2008 Phenotypic integration among trabecular and cortical bone traits establishes mechanical functionality of inbred mouse vertebrae. *J Bone Miner Res* (Epub ahead of print December 8, 2008).
- 4) **Tommasini SM**, Price C 2008 Micro-CT and the mouse skeleton: A detailed look. *J Mammal Evol.* Published online August 22, 2008; doi:10.1007/s10914-008-9096-4.
- 5) Wiren KW, Semirale AA, Zhang XW, Woo A, **Tommasini SM**, Price C, Schaffler MB, Jepsen KJ 2008 Targeting of androgen receptor in bone reveals a lack of androgen anabolic action and inhibition of osteogenesis: A model for compartment-specific androgen action in the skeleton. *Bone* 43(3):440-51.
- 6) **Tommasini SM**, Wearne SL, Hof PR, Jepsen KJ 2007 Percolation theory relates corticocancellous architecture to mechanical function in vertebrae of inbred mouse strains. *Bone* 42(4):743-50.
- 7) **Tommasini SM**, Nasser P, Hu B, Jepsen KJ 2008 Biological co-adaptation of morphological and composition traits contributes to mechanical functionality and skeletal fragility. *J Bone Miner Res* 23(2):236-46.
- 8) Jepsen KJ, Hu B, **Tommasini SM**, Courtland HW, Price C, Terranova CJ, Nadeau JH 2007 Genetic randomization reveals functional relationships among morphological and tissue-quality traits that contribute to bone strength and fragility. *Mamm Genome* 18(6-7):492-507.

- 9) **Tommasini SM**, Nasser P, Jepsen KJ 2007 Sexual dimorphism affects tibia size and shape but not tissue-level mechanical properties. *Bone* 40:498-505.
- 10) **Tommasini SM**, Nasser P, Schaffler MB, Jepsen KJ 2005 Relationship between bone morphology and bone quality in male tibias: implications for stress fracture risk. *J Bone Miner Res* 20(8):1372-80.
- 11) **Tommasini SM**, Morgan TG, van der Meulen MCH, Jepsen KJ 2005 Genetic variation in structure-function relationships for the inbred mouse lumbar vertebral body. *J Bone Miner Res* 20(5):817-27.

***Invited Lectures and Presentations:***

- 1) 2008 The City College of New York, Department of Biomedical Engineering Seminar. Six Degrees of Julius Wolff: Linking Genetics and Skeletal Fragility.
- 2) 2008 University of Pennsylvania School of Medicine, Cell and Molecular Biology Graduate Group Seminar. Six Degrees of Julius Wolff: Linking Genetics and Skeletal Fragility.
- 3) 2008 Washington University School of Medicine, Department of Orthopaedic Surgery Seminar. Six Degrees of Julius Wolff: Linking Genetics and Skeletal Fragility.
- 4) 2008 SUNY-Stony Brook, Department of Biomedical Engineering Seminar. Six Degrees of Julius Wolff: Linking Genetics and Skeletal Fragility.
- 5) 2007 29<sup>th</sup> Annual Meeting of the American Society of Bone and Mineral Research, Honolulu, HI. Coadaptation among trabecular and cortical traits contribute to genetic variation affecting bone size in recombinant inbred mouse vertebrae.
- 6) 2007 53<sup>rd</sup> Annual Meeting of the Orthopaedic Research Society, San Diego, CA. Of mice, men, and women: The relationship between bone morphology and tissue quality.
- 7) 2006 Plenary Poster Presentation, 28<sup>th</sup> Annual Meeting of the American Society for Bone and Mineral Research, Philadelphia, PA. Sexual dimorphism affects bone size and shape but not tissue-level mechanical properties.
- 8) 2003 49<sup>th</sup> Annual Meeting of the Orthopaedic Research Society, New Orleans, LA. Genetic variation in vertebral mechanical properties determined by the relationship between morphological and compositional bone traits.

***Peer Reviewed Abstracts:***

- 1) **Tommasini SM**, Boronikolas V, Titan A, Pamon T, Lublinsky S, Miller LM, Judex S 2009 Short-term, high-dose ALN treatment has a greater effect on bone quality compared to PTH. *Trans. 55<sup>th</sup> Annual Meeting of the Orthopaedic Research Society (Vol. 34)*, Las Vegas, NV.
- 2) Terkhorn SP, **Tommasini SM**, Price C, Ruberte-Thiele RA, Combs JA, Jepsen KJ, Hankenson KD 2008 Changes in marrow cell dynamics and bone geometry with aging in Thrombospondin-2 null mice. *J Bone Miner Res* 23(S1), 30<sup>th</sup> Annual Meeting of the American Society of Bone and Mineral Research, Montreal, Quebec, Canada.

- 3) **Tommasini SM**, Hu B, Nadeau JH, Jepsen KJ 2008 Functional interactions among trabecular, cortical, and compositional bone traits contribute to genetic variation in mechanical functionality of adult recombinant inbred mouse vertebrae. Trans. 54<sup>th</sup> Annual Meeting of the Orthopaedic Research Society (Vol. 33), San Francisco, CA.
- 4) Williams JC, **Tommasini SM**, Schaffler MB, Levy RN, Ghillani R, Terranova CJ, Jepsen KJ 2008 Characterizing patterns of bone loss in the proximal femur using network theory. Trans. 54<sup>th</sup> Annual Meeting of the Orthopaedic Research Society (Vol. 33), San Francisco, CA.
- 5) Jepsen KJ, Hu B, Cordova MA, **Tommasini SM**, Courtland HW, Price C, Nadeau JH 2008 Co-adaptation of bone traits during post-natal growth buffers genetic variants affecting bone size and mass. Trans. 54<sup>th</sup> Annual Meeting of the Orthopaedic Research Society (Vol. 33), San Francisco, CA.
- 6) Fritton JC, Li CY, Zhang X, Roth H, **Tommasini SM**, Laudier D, Mann R, Schaffler MB 2008 Bisphosphonate and PTH treatments adversely affect cortical bone adaptation to restored weight-bearing. Trans. 54<sup>th</sup> Annual Meeting of the Orthopaedic Research Society (Vol. 33), San Francisco, CA.
- 7) **Tommasini SM**, Hu B, Nadeau JH, Jepsen KJ 2007 Coadaptation among trabecular and cortical traits contribute to genetic variation affecting bone size in recombinant inbred mouse vertebrae. J Bone Miner Res 22(S1), 29<sup>th</sup> Annual Meeting of the American Society of Bone and Mineral Research, Honolulu, HI.
- 8) Jepsen KJ, Hu B, Cordova MA, **Tommasini SM**, Price C, Courtland HW, Nadeau JH 2007 Genetic variation in post-natal skeletal growth defines functional interactions among adult bone traits and fragility. J Bone Miner Res 22(S1), 29<sup>th</sup> Annual Meeting of the American Society of Bone and Mineral Research, Honolulu, HI.
- 9) **Tommasini SM**, Nasser P, Hu B, Schaffler MB, Jepsen KJ 2007 Of mice, men, and women: The relationship between bone morphology and tissue quality. Trans. 53<sup>rd</sup> Annual Meeting of the Orthopaedic Research Society (Vol. 32), San Diego, CA.
- 10) **Tommasini SM**, Nasser P, Jepsen KJ 2006 Sexual dimorphism affects bone size and shape but not tissue-level mechanical properties. J Bone Miner Res 21(S1), 28<sup>th</sup> Annual Meeting of the American Society for Bone and Mineral Research, Philadelphia, PA.
- 11) **Tommasini SM**, Wearne SL, Hof PR, Jepsen KJ 2006 Quantifying bone topology as random and scale-free networks. Trans. 52<sup>nd</sup> Annual Meeting of the Orthopaedic Research Society (Vol. 31), Chicago, IL.
- 12) **Tommasini SM**, Wearne SL, Hof PR, Jepsen KJ 2006 Six degrees of Julius Wolff: Finding the link between genetics and skeletal fragility. Trans. 52<sup>nd</sup> Annual Meeting of the Orthopaedic Research Society (Vol. 31), Chicago, IL.
- 13) **Tommasini SM**, Munyoki M, Nasser P, Schaffler MB, Jepsen KJ 2005 Bone quality is related to bone morphology in young adult male tibiae. NIAMS-ASBMR Scientific Meeting, Bone Quality: What Is It and Can We Measure It? Bethesda, MD.

- 14) **Tommasini SM**, Jepsen KJ 2005 Bone quality is related to bone morphology in young adult male tibiae. Einsteins in the City, The City College of New York, NY.
- 15) **Tommasini SM**, Nasser P, Munyoki M, Jepsen KJ 2005 Relationship between bone morphology and quality: Implications for stress fracture risk. Trans. 51<sup>st</sup> Annual Meeting of the Orthopaedic Research Society (Vol. 30), Washington, DC.
- 16) **Tommasini SM**, Nasser P, Jepsen KJ 2004 The relationship between bone morphology and bone quality: Implications for stress fracture risk in young adult male tibiae. J Bone Miner Res 19(S1), 26<sup>th</sup> Annual Meeting of the American Society for Bone and Mineral Research, Seattle, WA.
- 17) Bird JF, Nasser P, **Tommasini SM**, Casagrande D, Jepsen KJ 2004 The relationship between continued periosteal apposition and bone fragility. J Bone Miner Res 19(S1), 26<sup>th</sup> Annual Meeting of the American Society for Bone and Mineral Research, Seattle, WA.
- 18) **Tommasini SM**, Nasser P, Jepsen KJ 2004 Gender differences in bone slenderness are not related to material properties. Trans. 50<sup>th</sup> Annual Meeting of the Orthopaedic Research Society (Vol. 29), San Francisco, CA.
- 19) **Tommasini SM**, Morgan TG, van der Meulen MCH, Jepsen KJ 2003 Genetic variation in vertebral mechanical properties determined by the relationship between morphological and compositional bone traits. Trans. 49<sup>th</sup> Annual Meeting of the Orthopaedic Research Society (Vol. 28), New Orleans, LA.
- 20) Clement MO, Hernandez CJ, Akkus O, **Tommasini SM**, Bloomfield SA, Allen MR, Schaffler MB 2003 Can adult long bones recover their mechanical integrity after long-term disuse osteoporosis? Trans. 49<sup>th</sup> Annual Meeting of the Orthopaedic Research Society (Vol. 28), New Orleans, LA.

### **Additional Work Experience**

- The Depository Trust and Clearing Corporation, New York, NY  
1995-2000. Summer Intern – IT Support. Assisted in software rollouts, technical support, and the development of contingency back-up site.
- WKCR 89.9FM-New York  
1999-2000. Publicity Director. Oversaw coordination of promotions, fund-raising, program schedule, and web-site.  
1997-2000. Engineer/Broadcaster – Sports Department. Hosted and broadcast various Columbia Athletics sporting events including football, basketball, soccer, and baseball.
- Comprehensive Pediatrics, PC, Staten Island/Brooklyn, NY  
1996. Consultant – Medical Billing. Organized billing records and updated record system technology saving office money and improving productivity.

**References available upon request.**