

SRINIDHI NAGARAJA, Ph.D.

1708 Belvedere Blvd, Silver Spring MD 20902
srinidhi.nagaraja@g-rau.com | 404-822-7079

Professional Profile

- Mechanical engineering professional with over 15 years of experience in biomedical field
 - Expertise in regulatory mechanical and corrosion testing requirements of implantable medical products
 - Author of over 90 scientific publications and presentations
 - Principal or co-principal investigator of numerous medical device research grants
 - Faculty appointments at University of Maryland (Department of Bioengineering) and Uniformed Services University of the Health Sciences (Department of Surgery)
 - Supervisor/advisor for post-doctoral fellows, Ph.D. candidates, and graduate/undergraduate students
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Education

Ph.D. in Mechanical Engineering Georgia Institute of Technology – Atlanta, GA <ul style="list-style-type: none">▪ Major: Bioengineering▪ Minor: Solid Mechanics	December 2006
M.S. in Mechanical Engineering Georgia Institute of Technology – Atlanta, GA	May 2004
B.S. in Mechanical Engineering University of Michigan - Ann Arbor, MI	December 1999

Professional Experience

G. Rau Incorporated , <i>Technical Fellow</i>	◆Nov. 2017-Present◆
US Food and Drug Administration , <i>Research Mechanical Engineer</i>	◆June 2007-Nov. 2017◆

Regulatory Experience

- Senior consultant for the mechanical safety of pre-market medical device submissions (IDE, PMA, and 510(k)) with expertise in cardiovascular and orthopaedic devices
- Lead reviewer for orthopaedic spinal devices (2013)
- Consultant for mechanical failure issues in post market medical devices
- Liaison for international/national standards organizations

Research Experience

Spinal Devices

1. Improving Assessment of Spinal Device Subsidence by Incorporating Female Anatomy and Density
 - FDA Office of Women's Health competitive grant (2016-17)
2. Development of Regulatory Grade Computational Models of Pediatric Growing Rod Devices to Predict Clinical Failure
 - FDA Critical Path Initiative competitive grant (2016-17)
3. Effects of Bone Quality in Adverse Events for Integrated Fixation Spinal Cages

- FDA Office of Women's Health competitive grant (2013-15)
- 4. Impingement Susceptibility of Spinal Total Disc Replacement Devices
 - FDA Critical Path Initiative competitive grant (2012-13)
- 5. Influence of Vertebroplasty Devices on Adjacent Level Fractures in Elderly Women
 - FDA Office of Women's Health competitive grant (2009-10)

Cardiovascular Devices

- 6. In-vitro to In-vivo Correlation of Corrosion in Nitinol Stents
 - FDA Critical Path Initiative competitive grant (2012-15)
- 7. Effects of Mechanical Loading on Bioabsorbable Medical Implants
 - FDA Critical Path Initiative competitive grant (2009-13)
- 8. Effects of Crimp Strains on Fatigue Life of Nitinol Wire Based Devices
 - FDA Commissioner's Fellowship Program (2010-12)

Partnerships

- Created research collaborative agreements with orthopaedic device industry (Depuy Synthes and Lanx)
- Created research collaborative agreements with cardiovascular device industry (Cordis Corporation, Nitinol Devices and Components, Medical Device Testing Services, and Medical Implant Mechanics)
- Formed partnerships with clinical research foundations (Growing Spine Foundation and Chest Wall and Spine Deformity Foundation)
- Orthopaedics working group member in Medical Device Innovation Consortium, a public-private partnership between industry, academia, and government

University of the Health Sciences, *Assistant Professor* ◆Nov. 2017-Present◆
University of Maryland, *Affiliate Faculty* ◆Nov. 2010-Present◆
Georgia Institute of Technology, *Ph.D. Candidate* ◆Aug. 2000-Dec. 2006◆

Dissertation: Microstructural Stresses and Strains Associated with Trabecular Bone Microdamage

Elucidated age-related changes in local stresses/strains that initiate microcracking in trabecular bone through development of novel methods incorporating experimental mechanics, finite element analysis, histology, and high-resolution imaging

- Spatial correlations of trabecular bone damage with local stresses/strains from computational modeling (FEA) using custom developed image registration algorithm
- Three-dimensional detection of local bone fracture by designing micro-compression loading system to interface with high resolution Computed Tomography (CT) imaging
- Viscoelastic characterization of microcrack accumulation in trabecular bone
- Development of relationships between bone damage and local microstructure and density

Publications

1. Li L., **Nagaraja S.**, Washington J., Lebrun A., Fowler D., Li L., Topoleski L. "The use of MicroCT to Evaluate the Hyoid Bone Strength: Does Fusion of Synchronose Predicts Hyoid Susceptibility to Fracture?" in preparation, 2018.

2. Hill G., **Nagaraja S.**, Bridges A., Vosoughi A.S., Goel V.K., Dreher M.L., “Mechanical Performance of Traditional Distraction-Based Dual Growing Rod Constructs” *The Spine Journal*, submitted, 2018.
3. **Nagaraja S.**, Sullivan S.J., Stafford P.R., Lucas A.D., Malkin E. “Local and Systemic Effects of Nickel Release from Nitinol Stents in a Porcine Model” *Acta Biomaterialia*, 72:424-433, 2018.
4. Palepu V., Helgeson M., Molyneaux-Francis M., **Nagaraja S.**, “The Effects of Bone Microstructure on Subsidence Risk for ALIF, LLIF, PLIF, and TLIF Spine Cages” *Journal of Biomechanical Engineering*, submitted, 2018.
5. Palepu V., Rayaprolu S.D., **Nagaraja S.**, “Morphological Evaluation of Human Lumbar Vertebral Trabecular Bone, Cortex, and Endplates” *International Journal of Spine Surgery*, submitted, 2018.
6. Marrey R., Baillargeon B., Dreher M.L., Weaver J.D., **Nagaraja S.**, Rebelo N., Gong X-Y. “Validating Fatigue Safety Factor Calculation Methods for Cardiovascular Stents” *Journal of Biomechanical Engineering*, 140(6):061001, 2018.
7. Palepu V., Molyneaux-Francis M., Helgeson M., **Nagaraja S.**, “Impact of Bone Quality on the Performance of Integrated Fixation Cage Screws” *The Spine Journal*, 18(2):321-329, 2018.
8. Sullivan S.J., Madamba D., Sivan S., Miyashiro K., Dreher M.L., Trepanier C., **Nagaraja S.** “The Effects of Surface Processing on In-vivo Corrosion of Nitinol Stents in a Porcine Model” *Acta Biomaterialia*, 62:385-396, 2017.
9. Weaver J.D., Gutierrez E.J., **Nagaraja S.**, Stafford P.R., Sivan S., Di Prima M., “Sodium Hypochlorite Treatment and Nitinol Performance for Medical Devices” *Journal of Materials Engineering and Performance*, 26(9): 4245-4254, 2017.
10. Hill G., **Nagaraja S.**, Akbarnia B., Sponseller P., Sturm P., Emans J., Pawelek J., Growing Spine Study Group, Cockrum J., Kane W., Dreher M.L., “Retrieval Analysis of Traditional Distraction-Based Growing Rod Constructs for Early Onset Scoliosis” *The Spine Journal*, 17(10): 1506-1518, 2017.
11. Dreher M.L., **Nagaraja S.**, Bergstrom J., Hayman D., “Development of a Flow Evolution Network Model for the Stress-Strain Behavior of Poly(L-lactide)” *Journal of Biomechanical Engineering*, 139(9):091002, 2017.
12. Wear K.A., **Nagaraja S.**, Dreher M.L., Sadoughi S., Zhu S., Nawathe S., Keaveny T., “Relationships among Ultrasonic and Mechanical Properties of Cancellous Bone in Human Calcaneus In vitro” *Bone*, 103:93–101, 2017.
13. Peck J.H., Sing D.C., **Nagaraja S.**, Peck D., Lotz J.C., Dmitriev A.E., “Mechanical Performance of Cervical Intervertebral Body Fusion Devices: A Systematic Analysis of Data Submitted to the Food and Drug Administration” *Journal of Biomechanics*, 54(7): 26-32, 2017.
14. Morrison T., Dreher M., **Nagaraja S.**, Angelone L., Kainz W., “The Role of Computational Modeling and Simulation in the Total Product Life Cycle of Peripheral Vascular Device” *Journal of Medical Devices*, 11(2):024503, 2017.
15. Klosterhoff B.S., **Nagaraja S.**, Dedania J.J., Guldberg R.E., Willett N.J., "Material and Mechanobiological Considerations for Bone Regeneration" *Materials and Devices for Bone*

Disorders, 2016 (**Book Chapter**)

16. Sullivan S.L., Stafford P.R., Malkin E., Dreher M.L., and **Nagaraja S.**, “The Effects of Tissue Digestion Solutions on Surface Properties of Nitinol Stents” *Journal of Biomedical Materials Research Part B*, 106(1):331-339, 2018.
17. **Nagaraja S.**, Palepu V. “Integrated Fixation Cage Loosening Under Fatigue Loading” *International Journal of Spine Surgery*, 11(3):160-166, 2017.
18. Palepu V., Peck J.H., Simon D., Helgeson M., **Nagaraja S.**, “Biomechanical Evaluation of an Integrated Fixation Cage during Fatigue Loading: A Human Cadaver Study” *The Journal of Neurosurgery - Spine*, 26(4): 524-531, 2017.
19. **Nagaraja S.**, Di Prima M., Saylor D., Takai E. “Current Practices in Corrosion, Surface Characterization, and Nickel Leach Testing of Cardiovascular Metallic Implants” *Journal of Biomedical Materials Research Part B*, 105(6):1330-1341, 2017.
20. **Nagaraja S.**, Palepu V., “Comparisons of Anterior Screw Pullout Strength between Polyurethane Foams and Cadaver Vertebrae” *Journal of Biomechanical Engineering*, 138(10):104505, 2016.
21. Dreher M.L., **Nagaraja S.**, Batchelor B., “Effects of Fatigue on the Chemical and Mechanical Degradation of Model Stent Sub-Units” *Journal of the Mechanical Behavior of Biomedical Materials*, 59:139-145, 2016.
22. Sullivan S.J., Dreher M.L., Zheng J., Chen L., Madamba D., Miyashiro K., Trepanier C., **Nagaraja S.**, “Effects of Oxide Layer Composition and Radial Compression on Nickel Release in Nitinol Stents” *Shape Memory and Superelastic Technologies*, 1(3):319-327, 2015.
23. **Nagaraja S.**, Palepu V., Peck J.H., Helgeson M., “Impact of Screw Location and Endplate Preparation on Pullout Strength for Anterior Plates and Integrated Fixation Cages” *The Spine Journal*, 15:2425-2432 2015.
24. Lucas A.D., **Nagaraja S.**, Gordon E.A., Hitchins V.M., “Evaluating the Influence of Device Design and Cleanability of Model Orthopedic Devices Contaminated with a Clinically Relevant Bone Test Soil” *Biomedical Instrumentation Technology*, 49(5):354-362, 2015.
25. **Nagaraja S.**, Awada H.K., Dreher M.L., “Vertebroplasty Increases Trabecular Microfractures in Elderly Female Spines” *Osteoporosis International*, 26:2029-2034, 2015.
26. Gupta S., Weaver J.D., Pelton A.R., Gong X-Y., **Nagaraja S.**, “High Compressive Prestrain Reduces the Bending Fatigue Life of Nitinol Wire” *Journal of the Mechanical Behavior of Biomedical Materials*, 44:96-108, 2015.
27. Dreher M.L., **Nagaraja S.**, Li J., “Creep Loading During Degradation Attenuates Mechanical Property Loss in PLGA” *Journal of Biomedical Materials Research Part B*, 103(3):700-708, 2015.
28. **Nagaraja S.**, Awada H.K., Dreher M.L., Bouck, J., Gupta, S., “Effects of Vertebroplasty on Endplate Subsidence in Elderly Female Spines” *Journal of Neurosurgery – Spine*, 22(3):273-282, 2015.
29. Hariharan P., Dibaji S., Banerjee R., **Nagaraja S.**, Myers M., “Localization of focused-

ultrasound beams in a tissue phantom, using remote thermocouple arrays” *IEEE: Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, 61(12):2019-2031, 2014.

30. Dreher M.L., **Nagaraja S.**, Bui H. Hong, D., “Characterization of Load Dependent Creep Behavior in Medically Relevant Absorbable Polymers” *Journal of the Mechanical Behavior of Biomedical Materials*, 29:470-479, 2014.
31. **Nagaraja S.**, Awada H.K., Dreher M.L., Gupta S, Miller SW, “Vertebroplasty Increases Strain in Adjacent Superior IVDs and Vertebrae in Osteoporotic Spines” *The Spine Journal*, 13:1872-1880, 2013.
32. Calvo M.S., Babu U.S., Garthoff L.H., Woods T.O., Dreher M.L., Hill G., **Nagaraja S.**, “Vitamin D₂ from light exposed edible mushrooms is safe, bioavailable and effectively supports bone growth in rats” *Osteoporosis International*, 24(1):197-207, 2013.
33. Wear K.A., **Nagaraja S.**, Dreher M.L., Gibson S.L., “Relationships of quantitative ultrasound parameters with cancellous bone microstructure in human calcaneus *in vitro*” *Journal of the Acoustical Society of America*, 131(2): 1605-1612, 2012.
34. O’Neal J.M., **Nagaraja S. (co-first author)**, Diab T., Vidakovi B., Boskey A., Guldborg R.E., “Age-related Changes in Human Trabecular Bone: Relationship between Microstructural Stress and Strain and Damage Morphology” *Journal of Biomechanics*, 44(12): 2279-2285, 2011.
35. **Nagaraja S.**, Skrinjar O., Guldborg R.E., “Spatial Correlations of Trabecular Bone Microdamage with Local Stresses and Strains using Rigid Image Registration” *Journal of Biomechanical Engineering*, 133(6): 064502, 2011.
36. **Nagaraja S.**, Lin A.S.P., Guldborg R.E., “Age-related Changes in Trabecular Bone Microdamage Initiation” *Bone*, 40(4): 973-980, 2007.
37. **Nagaraja S.**, Ball M.D., Guldborg R.E., “Time-Dependent Damage Accumulation Under Stress Relaxation Testing of Bovine Trabecular Bone” *International Journal of Fatigue*, 29(6): 1034-1038, 2007.
38. **Nagaraja S.**, Couse T., Guldborg R.E., “Trabecular Bone Microdamage and Microstructural Stresses Under Uniaxial Compression” *Journal of Biomechanics*, 38(4):707-716, 2005.
39. Stock S.R., **Nagaraja S.**, Barss J., Dahl T., Veis A. “X-ray micro-CT study of pyramids of the sea urchin *Lytechinus variegates*” *Journal of Structural Biology*, 141:9-21, 2003.
40. Cartmell S.H., Huynh K., Lin A., **Nagaraja S.**, Guldborg R.E., “Quantitative Microcomputed Tomography Analysis of Mineralized Matrix Formation on Natural and Synthetic 3D Scaffolds In Vitro” *Journal of Biomedical Materials Research A*, 69(1):97-104, 2004.
41. Guldborg R.E., Ballock R.T., Boyan B.D., Duvall C.L., Lin A.S.P., **Nagaraja S.**, Oest M., Phillips J., Porter B.D., Robertson G., Taylor W.R., “Microcomputed Tomography Imaging and Analysis of Bone, Blood Vessels, and Biomaterials” *Engineering in Medicine and Biology*, 22(5): 65-70, 2003.

Professional Presentations

1. Horner M., **Nagaraja S.**, Baumann A., Loughran G., Kartikeya K., Inzana J., Gandhi A. Interlaboratory Simulations of Compression-Bending Testing of Spinal Rods. *ASME Verification*

and Validation Symposium (2018).

2. **Nagaraja S.**, Chandrasekar V., Pelton A., Hickey H., Ormonde D., Lipschultz K., Chao C., Vilendrer K. The Impact of Surface Processing and Fatigue Testing on Nickel Release in Nitinol Stents. *North American Corrosion Engineers Conference* (2018).
3. **Nagaraja S.** In-vitro to In-vivo Correlation of Corrosion in Nitinol Cardiovascular Stents. *Biointerface Annual Symposium* (2017). **Invited Talk**
4. **Nagaraja S.** FDA's Medical Device Approval Process and Spine Research Program. *Pittsburgh Spine Summit* (2017). **Invited Talk**
5. **Nagaraja S.**, Baumann A., Loughran G., Verma G., Inzana J., Dreher M.L., Gandhi A., Horner M. Interlaboratory Simulations of Compression-Bending Testing of Spinal Rods. *BMES Frontiers in Medical Devices Conference* (2017).
6. **Nagaraja S.**, Sullivan S. In-vitro to In-vivo Correlation of Corrosion in Nitinol Cardiovascular Stents. *North American Corrosion Engineers Conference* (2017). **Keynote Speaker**
7. Palepu V., Helgeson M., **Nagaraja S.** Bone Quality Variations at the Screw-Bone Interface of Integrated Fixation Cages. *International Society for the Advancement of Spine Surgery Conference* (2017).
8. **Nagaraja S.** FDA Medical Device Approval Process and Regulatory Research. *California State Polytechnic University - Pomona* (2017). **Invited Talk**
9. **Nagaraja S.**, Ormonde D., Lipschultz K., Chandrasekar V., Chao C., Vilendrer K. Effects of Fatigue Testing on Nickel Release in Nitinol Stents. *Shape Memory and Superelastic Technologies Conference* (2017).
10. Sullivan S.J., Madamba D., Sivan S., Dreher M.L., Trepanier C., **Nagaraja S.** Correlation of In-vitro Corrosion to In-vivo Corrosion in Nitinol Stents. *Shape Memory and Superelastic Technologies Conference* (2017).
11. Dreher M.L., Nagaraja S., Navarro J., Wang M., Din M., Fisher J.P. Towards Standardization of MicroCT as a Tool for Characterizing Tissue Engineered Scaffolds, *Annual Meeting of the Society for Biomaterials* (2017). **Invited Talk**
12. **Nagaraja S.** Correlation of *In-vitro* Corrosion Assessments to *In-vivo* Corrosion in Nitinol Stents. *North American Corrosion Engineers Conference* (2016). **Invited Talk**
13. Wear K.A., Sadoughi S., Zhu S., Nawathe S., **Nagaraja S.**, Dreher M.L., Keaveny T.M. Relationships among Quantitative Ultrasound Parameters and Linear and Nonlinear Mechanical Properties of Cancellous Bone. *International Ultrasonic Symposium* (2016).
14. Palepu V., Peck J., Simon D., Helgeson M., **Nagaraja S.** Biomechanical Stability of Lumbar Integrated Fixation Spinal Cages under Fatigue Loading. *International Society for the Advancement of Spine Surgery Conference* (2016).
15. Palepu V., Peck J., Helgeson M., **Nagaraja S.** Screw Loosening of Lumbar Integrated Fixation Cages under Fatigue Loading. *International Society for the Advancement of Spine Surgery Conference* (2016).

16. Palepu V., Peck J., Helgeson M., **Nagaraja S.** The Effects of Bone Density on Lumbar Integrated Fixation Cage Biomechanics. *International Society for the Advancement of Spine Surgery Conference* (2016).
17. Dreher M.L., **Nagaraja S.**, Bergstrom J., Hayman D. Application of a Flow Evolution Network Model for Stress-Strain Predictions in Absorbable Coronary Stents. *World Congress of Biomaterials Conference* (2016).
18. Dreher M.L., **Nagaraja S.**, Bergstrom J., Hayman D. Development of a Flow Evolution Network Model for Predicting the Viscoplastic Behavior of Poly(L-lactide). *World Congress of Biomaterials Conference* (2016).
19. Gutierrez E.J., **Nagaraja S.**, Sivan S., Weaver J.D., Di Prima M. Effect of Sodium Hypochlorite on the Fatigue Performance and Corrosion Resistance of Nitinol Devices. *Summer Biomechanics, Bioengineering and Biotransport Conference* (2016).
20. **Nagaraja S.**, Palepu, V., Peck J., Helgeson, M.D. Evaluation of pullout strength of spinal screws used in lumbar integrated fixation cages compared to anterior plates. *International Society for the Advancement of Spine Surgery Conference* (2015).
21. Hill G., **Nagaraja S.**, Akbarnia B., Sponseller P., Sturm P., Emans J., Pawelek J., Growing Spine Study Group, Dreher M.L., Retrieval Analysis of Traditional Distraction-Based Growing Rod Constructs for Early Onset Scoliosis. *Scoliosis Research Society Conference* (2015).
22. Wear K.A., Sadoughi S., **Nagaraja S.**, Dreher M.L., Keaveny T.M. Relationships among Ultrasonic and Mechanical Properties of Cancellous Bone. *Ultrasonic Imaging and Tissue Characterization Symposium* (2015).
23. **Nagaraja S.**, Dreher M.L., Gandhi A., Horner M., Verma G. Validation of Finite Element Analysis for Spinal Implant Constructs in a Vertebrectomy Model. *BMES Frontiers in Medical Devices Conference* (2015).
24. Wear K.A., Sadoughi S., **Nagaraja S.**, Dreher M.L., Keaveny T.M. Relationships among Ultrasonic and Mechanical Properties of Cancellous Bone. *Acoustical Society of America Conference* (2015).
25. Dreher M.L., **Nagaraja S.**, Batchelor B. Dependence of Absorbable Stent Sub-Unit Degradation on Fatigue Loading. *Society for Biomaterials Conference* (2015).
26. Dreher M.L., **Nagaraja S.**, Lu Q., Malinauskas R., Batchelor B. Degradation of PLLA Tubes in a Pulsatile Flow Loop as a Model for Cardiovascular Stent Degradation. *Society for Biomaterials Conference* (2015).
27. Gupta S., Weaver, J., Gong X-Y., Pelton A.R., **Nagaraja S.** High Compressive Pre-strain Reduces the Fatigue Life of Nitinol Wire. *Shape Memory and Superelastic Technologies Conference* (2015).
28. **Nagaraja S.**, Dreher M.L., Bouck J., Zheng J., Chen L., Miyashiro K., Trepanier C., Saffari P., Pelton A.R. Correlation of in-Vitro Assessments of Pitting Corrosion to Uniform Corrosion in Nitinol Stents. *Shape Memory and Superelastic Technologies Conference* (2014). **Invited Talk**
29. **Nagaraja S.** Validation of Fatigue Safety Factor Calculations for Cardiovascular Stents. *Medical Device Innovation Consortium Executive Fellows Meeting* (2014). **Invited Talk**

30. **Nagaraja S.**, Morrison T. A Strategy for Assessing the Credibility of Models and Simulations for Regulatory Decision Making. *Pre-ORS Computational Biomechanics Symposium* (2014). **Invited Talk**
31. **Nagaraja S.**, Bouck J., Awada H.K., Gupta S., Dreher M.L. The Effects of Vertebroplasty on Endplate Subsidence in Elderly Female Spines. *Orthopaedic Research Society Conference* (2014).
32. **Nagaraja S.**, Bouck J., Gupta S., Dreher M.L. The Effects of Vertebroplasty on Endplate Deformation and Fracture in Elderly Female Spines. *International Society for the Advancement of Spine Surgery Conference* (2013)
33. Miyashiro K., Trepanier C., Saffari P., Pelton A.R., **Nagaraja S.**, Dreher M.L., Di Prima M. Is Resistance to Localized Corrosion Per ASTM F2129 A Good Indicator of Resistance to Crevice Corrosion and Uniform Corrosion Rate of Nitinol Implantable Devices? *Shape Memory and Superelastic Technologies Conference* (2013).
34. Li Q., Gavrielides M.A., Hagen M.J., **Nagaraja S.**, Zeng R., Myers K.J., Sahiner B., Petrick N. A micro CT based tumor volume reference standard for phantom experiments. *Quantitative Medical Imaging Conference* (2013).
35. Gupta S., Weaver, J., **Nagaraja S.**, Gong X-Y., Pelton A.R. High Compressive Prestrain Reduces the Fatigue Life of Electropolished Nitinol Wire. *Shape Memory and Superelastic Technologies Conference* (2013).
36. Dreher M.L., **Nagaraja S.**, Bui H. Load Dependent Creep Behavior & Its Relationship to Molecular Organization in Absorbable Materials. *Society for Biomaterials Conference* (2013)
37. **Nagaraja S.**, Awada H.K., Gupta S., Dreher M.L. Vertebroplasty Increases Strain in Adjacent Vertebrae and IVDs in Osteopenic Female Spines. *International Society for the Advancement of Spine Surgery Conference* (2012)
38. **Nagaraja S.** Effects of Vertebroplasty on Adjacent Intervertebral Discs and Vertebrae in Elderly Females. *University of Maryland - Department of Biomedical Engineering* (2010). **Invited Talk**
39. **Nagaraja S.**, Awada H.K., Kaplan SJ, Gupta S., Dreher M.L. Vertebroplasty Increases Trabecular Microfractures in Adjacent Vertebrae of Osteoporotic Spines. *Spineweek* (2012).
40. Dreher M.L., Hong D, **Nagaraja S.** Preclinical Creep and Recovery of Absorbable Medical Devices. *Design of Medical Devices Conference* (2012).
41. **Nagaraja S.** Overlapping Dissimilar Stents Increases Corrosion and Fracture In-Vivo. *George Washington University - Department of Mechanical Engineering* (2010). **Invited Talk**
42. **Nagaraja S.**, Harper J., Hall A., Woods T.O., Chiesa O.A., Pritchard W., Karanian J., Dreher M.L. Corrosion and Fracture of Overlapped Stents in a Swine Model. *ASTM International Workshop on Fretting Fatigue of Metallic Medical Devices and Materials* (2009).
43. **Nagaraja S.** Demonstrating Safety and Efficacy of Medical Devices: The Medical Device Approval Process. *Micro-Manufacturing Workshop – Indian Institute Technology - Mumbai* (2009). **Invited Talk**

44. O'Neal J.M., **Nagaraja S.**, Vidakovic B., Guldberg R.E., Von Mises Stress Threshold for Microdamage Initiation Decreases in Post-menopausal Women. *Orthopaedic Research Society Conference* (2010).
45. **Nagaraja S.**, O'Neal J.M., Boskey A.L., Guldberg R.E., Age-Related Alterations in Mineral/Matrix Ratio in Test-induced Microdamaged Trabeculae. *Orthopaedic Research Society Conference* (2009).
46. **Nagaraja S.**, Ball M.D., Guldberg R.E., Age and Time Dependent Effects on Trabecular Bone Microdamage. *Orthopaedic Research Society Conference* (2006).
47. **Nagaraja S.**, Guldberg R.E. Local Stresses, Architecture, and Mineralization Initiating Trabecular Bone Microdamage. *2006 ASME Bioengineering Conference* (2006).
48. **Nagaraja S.**, Guldberg R.E., Age-Related Changes in Local Stresses Initiating Microdamage in Bovine Trabecular Bone. *International Conference on the Mechanics of Biomaterials and Tissues* (2005). **Invited Talk**
49. **Nagaraja S.**, Williams J.S., Guldberg R.E., Microstructural Stresses and Strains that Initiate Trabecular Bone Microdamage. *Orthopaedic Research Society Conference* (2005).
50. **Nagaraja S.**, Guldberg R.E., Tissue-Level Stresses Associated with Trabecular Bone Microdamage. *Biomedical Engineering Society Conference* (2005).
51. **Nagaraja S.**, Guldberg R.E., Trabecular Bone Microdamage and Microstructural Stresses Under Uniaxial Compression. *Orthopaedic Research Society Conference* (2004).
52. **Nagaraja S.**, Laib A, Guldberg R.E. Assessment of Trabecular Bone Microdamage and Microfracture. *2003 ASME Bioengineering Conference* (2003).
53. Cartmell S, Huynh K, Lin A, **Nagaraja S**, Guldberg R. Quantitative Micro-CT Analysis of Mineralized Matrix Formation on 3D Scaffolds In-Vitro. *Orthopaedic Research Society Conference* (2002).
54. Guldberg R.E., Cartmell S., Case N., Coleman R., Duty A., Duvall C., Huynh K., Lin A., **Nagaraja S.**, Oest M., Porter B.D., Robertson G. Tissue Engineering Applications of Microcomputed Tomography Imaging. *International Congress on Biological and Medical Engineering* (2002).

Supervisory Experience

- FDA/CDRH Leadership Program (2012-2013)
- Advisor for 6 PhD candidates or Postdoctoral Fellows (2010-2017)
- Supervisor for 8 post bachelors students (2006-2017)
- Supervisor for 16 undergraduate students (2004-2017)
- Chair for Georgia Tech Educational Outreach– directed and implemented outreach mentoring programs to K-12 students in the Atlanta community (2001-2003)
- President of Asha for Education Atlanta Chapter - coordinated a 30 member non-profit service organization aimed at education of underprivileged children (2005-2006)

Professional Service

- FDA Liaison for ASTM Orthopaedic Spinal Components Standards (2011-2017)

- FDA Liaison for ISO Retrieval and Analysis of Implants Standards (2011-2017)
- Member of the International Society for the Advancement of Spine Surgery (2012-2017)
- Steering Committee Member for ASM Medical Materials Database (2012-2015)
- Member of the American Society for Mechanical Engineers (2013-2014)
- Working Group Member for ASTM Cardiovascular Stent Standards (2007-2011)
- Manuscript reviewer for biomedical engineering journals such as Journal of Medical Devices, Journal of Biomechanics, The Spine Journal, Journal of Biomedical Materials Research, Biomechanics and Modeling in Mechanobiology, Bone, Biomaterials, Journal of Orthopaedic Research, and Biomechanical Engineering (2005-present)
- Panelist at *Shape Memory and Superelastic Technologies Conference* (2014)
- Co-Organizer and Panelist for *FDA Cardiovascular Metallic Implants: Corrosion, Surface Characterization, and Nickel Leaching Workshop* (2012)
- Panelist for *FDA Computational Modeling workshops* (2010-2012)
- Panelist for pre-clinical testing of percutaneous heart valve devices sessions. *Cardiovascular Research Therapies (CRT) conference* (2008-2009)
- Panelist *FDA ICD Leads Best Practices workshop* (2008)

Honors

- FDA Regulatory Recognition Award, 2017 (absorbable stent)
- CDRH Excellence in Scientific Research Award (spinal devices), 2016
- CDRH Customer Service Initiative Award, 2015
- FDA Outstanding Service Award (corrosion workshop organizer), 2013
- FDA Outstanding Inter-Center Science Collaboration Award (bone imaging study), 2012
- FDA Research Recognition Award (absorbable devices), 2012
- Director's Special Citation Award (stent corrosion research), 2010
- FDA Regulatory Recognition Award (spinal devices), 2010
- FDA Performance Awards, 2007-2016
- ASME Bioengineering Conference Doctoral Paper Competition Award, 2006
- Georgia Tech Presidential Fellowship, 2000-2005
- Pi Tau Sigma Mechanical Engineering Honor Society, 1998-99
- University of Michigan Engineering Dean's List, 1997-1999