Elizabeth D. Dimbath

PhD

Staff Consultant

Dr. Elizabeth (Liz) Dimbath is a biomechanical engineer at Engineering Systems Inc. (ESi) in the North Carolina office. Dr. Dimbath has related expertise in spinal and pulmonary biomechanics, injury risk development, computational modeling, statistic analysis, and biomechanical testing (cadaver and animal).

Prior to joining the team at ESi, Dr. Dimbath earned her Ph.D. in Biomedical Engineering from Duke University while conducting research in the Injury Biomechanics Laboratory. Her doctoral research focused on lumbar spine mechanics due to repeated loading and recovery, lumbar spine injury risk, and characterization of lumbar spine mechanical properties in loading and recovery. She also holds an M.S. in Biomedical Engineering from East Carolina University, where she developed computational models to predict lung tissue damage.

Dr. Dimbath has presented her research at international conferences and is published in peer-reviewed scientific journals and conference proceedings, including *Annals of Biomedical Engineering* and the *International Research Council on Biomechanics of Injury (IRCOBI).*

Education

PhD, Biomedical Engineering. Duke University. 2026

MS, Biomedical Engineering. East Carolina University. 2022

BS, Bioengineering Engineering (Summa Cum Laude). Miami University. 2016

Licenses & Certifications

- Graduate Certificate in Biostatistics. UC San Diego Extension. 2020

Positions Held

Engineering Systems Inc., Charlotte, North Carolina

- Staff Consultant, 2026 - Present

Contact Information

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Areas of Specialization

- Chronic Spinal Injury
- Computational Modeling
- Diagnostic Imaging
- Experimental Testing
- Failure Analysis
- Fatigue Loading
- Human Injury Analysis
- Injury Mechanisms
- Injury Risk Analysis
- Lumbar Spine Injury
- Material Property Characterization
- Statistical Analysis

Duke University, Durham, North Carolina

- Graduate Research Assistant, Injury Biomechanics Laboratory, Department of Biomedical Engineering, 2022-2026

East Carolina University, Greenville, North Carolina

- Graduate Research Assistant, Material, Modelling, and Mechanics Laboratory, Department of Biomedical Engineering, 2020-2022

Onslow Memorial Hospital, Jacksonville, North Carolina

- Rehabilitation Technician, Rehabilitation Department, 2019-2020

Miami University, Oxford, Ohio

- Undergraduate Researcher, 2014-2016

Professional Affiliations/Honors

Biomedical Engineering Society (BMES)

- Member

Tau Beta Pi Engineering Honor Society

- Member

International Research Council on Biomechanics of Injury (IRCOBI) Travel Grant, 2023, 2024

Rhodes Graduate Fellowship for Interdisciplinary Research Award, Duke University, 2023

National Defense Science and Engineering Graduate (NDSEG) Fellowship – Honorable Mention, 2023

Biomedical Engineering Society (BMES) Conference Travel Award, 2023

Graduate Research Achievement Award, East Carolina University, 2021

Provost Student Academic Achievement Award, Miami University, 2015

President's List, Miami University, 2012-2016

Publications

1. **Dimbath, E. D.,** Morino, C., Middleton, S., Kait, J., Ortiz-Paparoni, M., Slotkin, T. A., Luck, J. F., & Bass, C. R. (2026). Cyclic Mechanism Affects Lumbar Spine Creep Response. *Annals of Biomedical Engineering*.
2. Abrams, M. Z., Venkatraman, J., Sherman, D., Ortiz-Paparoni, M., Bercaw, J. R., MacDonald, R. E., Kait, J., **Dimbath, E.D.,** Pang, D. Y., Gray, A., Luck, J. F., Bir, C. A., & Bass, C. R. (2024). Biofidelity and Limitations of Instrumented Mouthguard Systems for Assessment of Rigid Body Head Kinematics. *Annals of Biomedical Engineering*.

3. Venkatraman, J., Abrams, M.Z., Sherman, D., Ortiz-Paparoni, M., Bercaw, J.R., MacDonald, R.E., Kait, J.R., **Dimbath, E.D.,** Pang, D.Y., Gray, A., Luck, J.F., Bass, C.R., Bir, C.A., (2024). Accuracy of Instrumented Mouthguards During Direct Jaw Impacts Seen in Boxing. *Annals of Biomedical Engineering* **52**, 3219–3227.
4. Morino, C., Middleton, S., Op't Eynde, J., **Dimbath, E.**, Kait, J., Luck, J., & Bass, C. (2024). Primary Creep Characterization in Porcine Lumbar Spine Subject to Repeated Loading. Annals of Biomedical Engineering.
5. Morino, C. F., Schmidt, A. L., **Dimbath, E.**, Middleton, S. T., Shridharani, J. K., Kait, J. R., Ortiz-Paparoni, M. A., Klinger, J., Op 't Eynde, J., & Bass, C. R. (2024). Human and Porcine Lumbar Endplate Injury Risk in Repeated Flexion-Compression. Annals of Biomedical Engineering.
6. **Dimbath, E.**, George, S., Bras, L.D., Vadati A. (2023). Comparing The Mesoscale and Microscale Mechanical Properties of Rat Lung Tissue Using Computational Modeling. Journal of Mechanics in Medicine and Biology, 23 (07).
7. **Dimbath, E.**, Pant, A., & Vahdati, A. (2023). Digital twins for understanding the mechanical adaptation of bone in disease and post-surgery. In Digital Human Modeling: The Digital Twin. Elsevier.
8. Middleton, S., **Dimbath, E.**, Pant, A., George, S. M., Maddipati, V., Peach, M. S., Yang, K., Ju, A. W., & Vahdati, A. (2022). Towards a multi-scale computer modeling workflow for simulation of pulmonary ventilation in advanced COVID-19. Computers in biology and medicine, 145, 105513.
9. **Dimbath, E.**, Maddipati, V., Stahl, J., Sewell, K., Domire, Z., George, S., & Vahdati, A. (2021). Implications of microscale lung damage for COVID-19 pulmonary ventilation dynamics: A narrative review. Life Sciences, 274, 119341.
10. Bootsma, K., Fitzgerald, M. M., Free, B., **Dimbath, E.,** Conjerti, J., Reese, G., Konkolewicz, D., Berberich, J. A., & Sparks, J. L. (2017). 3D printing of an interpenetrating network hydrogel material with tunable viscoelastic properties. Journal of the Mechanical Behavior of Biomedical Materials, 70, 84–94.
11. Bootsma, K., **Dimbath, E.**, Berberich, J., & Sparks, J. L. (2016). Materials Used as Tissue Phantoms in Medical Simulation (pp. 1–48). Springer, Berlin, Heidelberg.

Presentations

1. **Dimbath E.**, Morino, C.F., Luck J.F., Bass C.R. (2026). Strain-Based Interpretation of Lumbar Endplate Injury Risk Incorporating Creep Loading and Recovery Behavior. *In IRCOBI Conference Proceedings*. Munich, Germany.
2. **Dimbath, E.**, Robertson B., Turpin N., Kait J., Abraham A., Grunkemeyer A., Dalton L.E., Luck J.F, Bass C.R. (2026). Recovery of the lumbar intervertebral disc revealed by coupled mechanical testing and high-contrast soft tissue cryogenic microCT. *World Congress of Biomechanics*. Vancouver, BC.
3. Morino, C.F., **Dimbath E.**, Middleton, S.T., Kait, J.R., Luck J.F., Bass C.R. (2026). High-resolution Computed Tomography (microCT) Technique for Capturing Soft Tissue Intervertebral Disc Changes After Repeated Loading**.** *In IRCOBI Conference Proceedings*. Munich, Germany.

4. **Dimbath, E.,** Morino, C., Middleton, S., Kait, J., Ortiz-Paparoni, M., Slotkin, T. & Bass, C. R. (2024). Analysing Biomechanical Response Curves and How Statistics Expose Physiology. *In IRCOBI ConferenceProceedings*. Stockholm, Sweden.
5. Sirhan K, Morino CF, Middleton ST, **Dimbath E,** Kait JR, Bass CR. (2024). "Unexpected Behaviour of Water in Lumbar Discs Under Repeated Flexion-Compression." International Research Council on Biomechanics of Injury. Stockholm, Sweden.
6. **Dimbath, E.**, Morino, C., Middleton, S., Kait, J., Sirhan, K., Ortiz-Paparoni, M., Slotkin, T., Luck, J. & Bass, C. R. (2024). Connection between phasic creep and water flow threshold of the porcine lumbar disc. *In Biomedical Engineering Society Annual Meeting*. Baltimore, Maryland, United States.
7. **Dimbath E**, Morino CF, Middleton S, Kait J, Bass CR. (2023). Role of cyclic loading in porcine lumbar intervertebral disc behavior: a preliminary study. *Poster presentation at BMES Annual Meeting.* Seattle, Washington, United States.
8. **Dimbath, E.**, Morino, C., Middleton, S., Kait, J., Bass, C. (2023). Lumbar response to flexion-compression in cyclic and quasi-static loading in intervertebral discs. In IRCOBI Conference Proceedings. Cambridge, UK.
9. Morino, C.F, Schmidt, A.L., **Dimbath, E.,** Middleton, S.T., Kait, J.R., Shridharani, J., Ortiz-Paparoni, M.A., Klinger, J., Op't Eynde, J., Bass, C.R. (2023). Human and Porcine Lumbar Endplate Injury Risk in Repeated Flexion-compression. *In IRCOBI Conference Proceedings*. Cambridge, UK.
10. **Dimbath, E.,** de Castro Bras, L., George, S., Vadati, A. (2023). Virtual tensile test experiments to reconcile the meso- and micro-scale mechanical properties of lunch parenchyma. *In Summer Biomechanics, Bioengineering, and Biotransport Conference Proceedings.* Lake Geneva, WI, United States.
11. Abrams, M.Z., Venkatraman, J., Sherman, D., Ortiz-Paparoni, M.A., Bercaw, J.R., MacDonald, R.E., Kait, J., **Dimbath, E.,** Pang, D., Gray, A., Luck, J.F., Bir, C.A., Bass, C.R. (2023). Biofidelity and Limitations of Instrumented Mouthguard Systems for Assessment of Rigid Body Head Kinematics. *In IRCOBI Conference Proceedings*. Cambridge, UK.
12. Morino CF, Middleton ST, **Dimbath E**, Op't Eynde J, Kait JR, Bass CR. (2023). Modelling viscoelastic creep response of porcine lumbar spinal units exposed to repeated flexion-compression loading. Full peer-reviewed paper published for *International Research Council on Biomechanics of Injury* Proceedings. Cambridge, UK.
13. Morino CF, **Dimbath E**, Middleton ST, Pang D, Kait J, Ortiz-Paparoni MA, Bass CR. (2023). Identifying incipient injury in porcine lumbar intervertebral disc from flexion-compression with high-resolution computed tomography. Poster presentation at *Military Health System Research Symposium*. Kissimmee FL, United States.
14. Morino CF, **Dimbath E**, Middleton ST, Kait J, Ortiz-Paparoni MA, Bass CR. (2023). Identifying incipient injury from flexion-compression loading of porcine lumbar intervertebral disc. Poster presentation at Ohio State Injury Biomechanics Symposium. Columbus, OH, United States.

15. Middleton, S.T., **Dimbath, E.,** Pant, A., George, S.M., Maddipati, V., Peach, M.S., Yang, K., Ju, A.W., Vahdati, A. (2022). A Physics-Based Multi-Scale Modeling Pipeline for Simulation of Ventilation in Advanced Covid-19. *In Summer Biomechanics, Bioengineering, and Biotransport Conference Proceedings.* Eastern Shore, MD, United States.
16. **Dimbath, E**., George, S., & Vahdati, A. (2021). Reconciling the Mechanical Properties of Lung Tissue at the Meso- and Microscale. *In Biomedical Engineering Society Annual Meeting*. Orlando, FL, United States.