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Sajal Chirvi, Ph.D.

Senior Engineer

Principia Engineering, Inc.
1917 Oak Park Boulevard
Pleasant Hill, Ca 94523
(415) 398-3018
(415) 398-3088 facsimile

Experience

Dr. Sajal Chirvi is a Biomedical Engineer with expertise in human injury mechanisms, causation, and tolerance; occupant kinematics; and accident reconstruction. She has a robust background in experimental design, medical record analysis, and simulation tools. In conjunction with biomechanics, she performs accident reconstruction to determine the configuration and severity of accidents. She has extensively published on human injury risk curves for the cervical spine, lumbar spine, and lower extremities for under-body loading. Additionally, she has studied and published the effects of age, sex, and padding (e.g., boots, helmets) on injury tolerance.

Before transitioning to forensic sciences, Sajal led impactful research initiatives at the Medical College of Wisconsin, where she advanced the understanding of musculoskeletal injury tolerance, developed injury risk curves, and contributed to the Army's Soldier Protection mission. Her expertise spans injury biomechanics, finite element modeling, statistical analysis, and human-material property definitions. Notably, she co-authored a grant to study the mechanism of cumulative damage from repetitive low-level insults to the head in traumatic brain injury (TBI) research. Her extensive research experience, combined with a track record of securing significant funding, has made her a key player in advancing scientific understanding of injury mechanisms, particularly in the context of under-body loading.

Education and Credentials

- Ph.D., Biomedical Engineering, University of Texas at Arlington, 2012
- M.S., Biomedical Engineering, University of Texas at Arlington, 2008
- B.E., Biomedical Engineering, University of Mumbai, India, 2004
- Tau Beta Pi, Engineering Honor Society, 2008
- Grant: Soldier lethality and protection: Experimental, analytical, and computational methods characterizing biological materials. Sponsor: Army contracting agency; PI: F. A. Pintar, Co-PD/ PI: S. Chirvi (2020- 2024)
- Journal Reviewer:
    - Annals of Biomedical Engineering
    - Clinical Biomechanics
    - PLOS ONE
    - ASME Journal of Biomechanical Engineering

- Biomedical Sciences Instrumentation (& Guest Editor 2019)
- Computer Methods in Biomechanics and Biomedical Engineering
- Journal of the Mechanical Behavior of Biomedical Materials

Continuing Education

- 2017 Stapp Car Crash Conference
- 2018 Stapp Car Crash Conference

Publications

"Comparison of Axial Force Attenuation Characteristics in Two Different Lower Extremity Anthropomorphic Test Devices," *Military Medicine,* PMID: 37552649, 2023 (with F. A. Pintar, N. Yoganandan, and B. J McEntire).

"Surface wave analysis of the skin for penetrating and non-penetrating projectile impact in porcine legs," *Forensic Science Medicine and Pathology*, PMID: 36100841, 2022 (with J. LeSueur, C. Hampton, J. Koser, and F. A. Pintar).

"Repeated measures analysis of projectile penetration in porcine legs as a function of storage condition," *Journal of Forensic and Legal Medicine*, PMID: 35863258, 2022 (with J. Koser, A. Banerjee, F. A. Pintar, C. Hampton, and M. Kleinberger).

"Calcaneus fracture pattern and severity: role of local trabecular bone density," *Journal of the Mechanical Behavior of Biomedical Materials*, PMID: 35987107, 2022 (with N. Pahapill, N. Yoganandan, W. Curry, B. Stemper, M. Kleinberger, and F. A. Pintar).

"Trabecular bone mineral density correlations using QCT: central and peripheral human skeleton," *Journal of the Mechanical Behavior of Biomedical Materials*, PMID: 32911222, 2020 (with F. A. Pintar, N. Yoganandan, B. Stemper, and M. Kleinberger).

"Injury risk curves for the human cervical spine from inferior-to-superior loading," *Stapp Car Crash Journal*, PMID: 30608997, 2018 (with N. Yoganandan, F. A. Pintar, A. Banerjee, and L. Voo).

"Preliminary female cervical spine injury risk curves from PMHS tests," *Journal of the Mechanical Behavior of Biomedical Materials*, PMID: 29709826, 2018 (with N. Yoganandan, F. A. Pintar, J. L. Baisden, and A. Banerjee).

"Biomechanical tolerance of whole lumbar spines in straightened posture subjected to axial acceleration," *Journal of Orthopedic Research*, PMID: 29194745, 2018 (with B. Stemper, N. Doan, J. Baisden, D. Maiman, W. Curry, N. Yoganandan, F. A. Pintar, G. Paskoff, and B. Shender).

"Role of age and injury mechanism on cervical spine injury tolerance from head contact loading," *Traffic Injury Prevention*, PMID: 28738168, 2018 (with N. Yoganandan, L. Voo, F. A. Pintar, and A. Banerjee).

"Human foot-ankle injuries and associated risk curves from under body blast loading conditions," *Stapp Car Crash Journal*, PMID: 29394438, 2017 (with F. A. Pintar, N. Yoganandan, A. Banerjee, M. Schlick, W. Curry, and L. Voo).

"Foot-ankle complex injury risk curves using calcaneus bone mineral density data," *Journal of the Mechanical Behavior of Biomedical Materials*, PMID: 28505593, 2017 (with N. Yoganandan, L. Voo, N. DeVogel, F. A. Pintar, and A. Banerjee).

"Foot-ankle fractures and injury probability curves from post-mortem human surrogate tests," *Annals of Biomedical Engineering*, PMID: 27052746, 2016 (with N. Yoganandan, F. A. Pintar, H. Uppal, M. Schlick, A. Banerjee, L. Voo, A. Merkle, and M. Kleinberger).

"Morphometric analysis of hind foot ankle bones," *Biomedical Sciences Instrumentation*, 55, 355-360, 2019 (with N. Pahapill, F. A. Pintar, B. Stemper, and M. Kleinberger).

"Morphomic and material properties of female human foot-ankle specimens," *Biomedical Sciences Instrumentation*, 55, 491-496, 2019 (with K. Dausman, F. A. Pintar, and M. Kleinberger).

"Effect of time on the mechanical properties of caprine organ tissue," *Biomedical Sciences Instrumentation*, 55, 299-303, 2019 (with J. Koser, S. Chirvi, A. Shah, F. A. Pintar, N. Yoganandan, and B. Stemper).

"Influence of trabecular density on calcaneus fracture in axial pendulum impacts," *Biomedical Sciences Instrumentation*, 55, 361-366, 2019 (with C. Hampton, and M. Kleinberger).

"Preliminary comparison of projectile size and material for penetration thresholds in porcine leg tissue," *Biomedical Sciences Instrumentation*, 55, 304-309, 2019 (with M. Paris, J. Koser, B. Stemper, F. A. Pintar, and M. Kleinberger).

"Human cervical spine responses under vertical dynamic loading," *International Research Council on Biomechanics of Injury Asia Conference*, 2018 (with N. Yoganandan, N. DeVogel, F. A. Pintar, J. L. Baisden, A. Banerjee, and L. Voo).

"Human surrogate leg response with and without military boots," *Personal Armor Systems Symposium*, 2016(with F. A. Pintar, and N. Yoganandan).

"Lower neck injury criteria from post-mortem human subject tests using an injury mechanism approach," *International Research Council on Biomechanics of Injury*, 2016 (with N. Yoganandan, F. A. Pintar, V. C. Chancey, and B. J McEntire).

"An examination of isolated and interaction-based biomechanical metrics for potential lower neck injury criteria," *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, 3, 52108. 2015 (with F. A., Pintar, and N. Yoganandan)

"Hybrid III lower leg injury assessment reference curves under axial impacts using matched-pair rests," *Biomedical Sciences Instrumentation*, PMID: 25996722, 2015 (with N. Yoganandan, F.A. Pintar, A. Banerjee, M. Schlick, H. Uppal, A. Merkle, L. Voo, and M. Kleinberger).

"Injury mechanisms in traffic accidents." *In: Müller B, Wolf S, Eds. Handbook of Human Motion*. *Springer: Amsterdam*, 1-37, 2017 (with B. Goodwin, and F. A. Pintar).

Presentations

"Human surrogate leg response with and without military boots," *Military Health System Research Symposium*, 2022.

"Human neck injury tolerance: role of sex and age." *Center for the Advancement of Women in Science and Medicine Conference*, Milwaukee, 2020.

"Regional susceptibility of calcaneus BMD explains injuries from axial loading," *Biomedical Engineering Society*, 2019.

"Do clinical hip and lumbar bone mineral density measures predict foot-ankle injury risk?" *Military Health System Research Symposium*, 2018.

"Injury risk curves for the human cervical spine from inferior-to-superior loading," *62nd Stapp Car Crash Conference*, 2018.

"Human foot-ankle injuries and associated risk curves from under body blast loading conditions." *61st Stapp Car Crash Conference*, 2017.

"Foot-ankle injury patterns & severity during under-body blast loading conditions," *The Inaugural Annual Meeting for the Joining Forces Program, from the Community to the Battlefield, Medical College of Wisconsin*, 2017.

"Foot-ankle response with and without military boot after plantar surface impact," *World Congress of Biomechanics*, 2014.