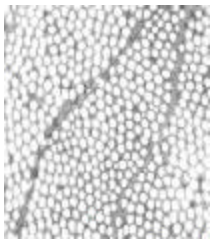
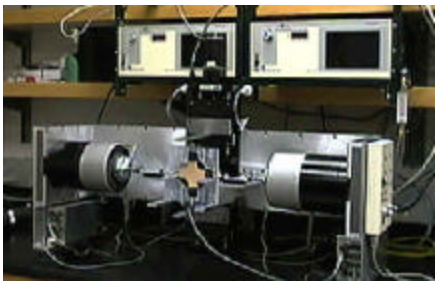
Tissue Sciences and Biomaterials Laboratory

Department of Bioengineering





The Tissue Sciences and Biomaterials Laboratory at the University of Washington is committed to the characterization of skin biological response to mechanical stress, the design of implantable biomaterials that support the body's natural healing mechanisms, and the development of scientific tools to measure these behaviors. This research will allow the pursuit of therapeutic treatments strategies that encourage load tolerance in skin that would otherwise be susceptible to breakdown and the development of biomaterials that work with the body's healing physiology rather than undergoing the normal rejection process typical of many biomaterials.

Joan E. Sanders, Ph.D.
Associate Professor
Department of Bioengineering
University of Washington
Box 357962
Bagley Hall, Room 461
Phone: 206-221-5872
Fax: 206-221-5874
jsanders@u.washington.edu

Thomas Neumann, Ph.D.
Post Doctoral Fellow
tneumann@u.washington.edu

Yak-Nam Wang, Ph.D.
Post Doctoral Fellow
ynwang@u.washington.edu

Stuart B. Mitchell
Graduate Student
sbmitch@u.washington.edu

Robert E. Ledger
Graduate Student
ledgerr@u.washington.edu

Additional Staff:
Research Scientists
Research Engineers

Tissue Sciences: In many rehabilitation treatments (e.g. use of a prosthesis or a wheelchair), the skin is subjected to pressures and shear stresses far greater than normal, a circumstance that can lead to discomfort, pain, and in some cases skin ulceration and a worsened disability. The purpose of this research is to better understand bioprocesses of skin adaptation so as to develop therapeutic methods to enhance the tolerance of skin to repetitive mechanical loading. Current research involves both *in vivo* and an *in vitro* models investigating skin adaptation.

Biomaterials: The Biomaterials effort is part of the UWEB (University of Washington Engineered Biomaterials) Program, an Engineering Research Center in the Bioengineering Department supported by the National Science Foundation. The goal of UWEB is to pursue a new approach to biomaterials design, to engineer "biomaterials that heal," i.e. materials that the body recognizes as natural tissue rather than as foreign entities that it encapsulates with a fibrous layer. Current research includes investigation of the mechanical effects on cell signaling and receptors, the design of non-woven fibro-porous biomaterials for soft tissue applications, and a creation of a method for facilitating angiogenesis into porous biomaterials.

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Selected Publications

Sanders JE, Stiles CE, and Hayes CL: Tissue response to single polymer fibers of varying diameters: Evaluation of fibrous encapsulation and macrophage density. *Journal of Biomedical Materials Research* vol. 52(1), pp. 231-237, 2000

Baker AB and Sanders JE: Angiogenesis stimulated by mechanical loading. *Journal of Microvascular Research* vol. 60(2), pp. 177-181, 2000

Goldstein B and Sanders J: Skin response to mechanical stress: A new experimental model in pig. *Archives of Physical Medicine and Rehabilitation*, vol. 79(3), pp. 265-272, 1998

Sanders JE, Goldstein BS, and Leotta DF: Skin response to mechanical stress: Adaptation rather than breakdown. *Journal of Rehabilitation Research and Development* vol. 32(3), pp. 214-226, 1995