

**BIOGRAPHICAL SKETCH**

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NAME Stefan Judex, Ph.D		POSITION TITLE <b>Associate Professor of Biomedical Engineering</b>	
eRA COMMONS USER NAME SJUDEX			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Technical University Munich, Germany	B.Sc./M.Sc.	1993	Mechanical Engineering
University of Calgary, Canada	Ph.D.	1999	Biomechanics
SUNY Stony Brook, NY	Post-Doc	1999-2001	Molecular Biology

**A. Positions and Honors****Positions**

- 2006 – Associate Professor, Department of Biomedical Engineering, State University of New York (SUNY), Stony Brook, NY
- 2004 – Adjunct Assistant Professor, Department of Preventive Medicine and Community Health, The University of Texas Medical Branch.
- 2001 – 2006 Assistant Professor, Department of Biomedical Engineering, State University of New York (SUNY), Stony Brook, NY
- 2001 – Director, Integrative Skeletal Adaptation and Genetics Laboratory (ISAG), SUNY Stony Brook, NY

**Honors and Awards**

- 2007 *Best Academic/Pre-Professional Advisor and Mentor*, SUNY Stony Brook, The Student Choice Award
- 2007 NIH Scientific Review Group Skeletal Biology Structure and Regeneration (SBSR) February Meeting
- 2006 NIH Special Emphasis Panel/Scientific Review Group Skeletal Biology Structure and Regeneration (SBSR) June Meeting
- 2006 *New York City Research Initiative Achievement Award*, NASA
- 2006 *FASEB MARC Travel Award*, Federation of American Societies for Experimental Biology (FASEB)
- 2005 *Early Career Translational Research Award*, Wallace H. Coulter Foundation
- 2004 *Award for Outstanding Teacher*, Department of Biomedical Engineering, SUNY Stony Brook
- 2004 National Science Foundation, Major Research Instrumentation (MRI) Review Panel
- 2002 *Promising Young Scientist Award*, International Society of Biomechanics
- 2002 *Orthopaedic Biomechanics Award*, IV World Congress of Biomechanics (Calgary)
- 2001 *Young Investigator Award*, American Society for Bone and Mineral Research (ASBMR)
- 2001 *John Haddad Young Investigator Award*, Advances in Mineral Metabolism (AIMM) and the American Society for Bone and Mineral Research (ASBMR)
- 1999-2001 *Post-doctoral Fellowship*, Alberta Heritage Foundation for Medical Research
- 1996 *New Investigator Award* (Open level) of the Canadian Society for Biomechanics
- 1996 *URGC Graduate Travel Grant*, University of Calgary
- 1995-1999 *Full-Time Studentship*, Alberta Heritage Foundation for Medical Research

**B. Selected peer-reviewed full-length papers**

- Judex, S., Gross, T.S., Bray, R.C., Zernicke, R.F. (1997) Adaptation of bone to physiological stimuli. *Journal of Biomechanics* 30(5): 421-429.
- Judex, S., Gross, T.S., Zernicke, R.F. (1997) Strain gradients correlate with sites of exercise-induced bone forming surfaces in the adult skeleton. *Journal of Bone and Mineral Research* 12(10): 1737-1745.
- Banes, A.J., Horesovsky, G., Larson, C., Tsuzaki, M., Judex, S., Archambault, J., Zernicke, R., Herzog, W., Kelly, S., Miller, L. (1999) Mechanical load stimulates expression of novel genes in vivo and in vitro in avian flexor tendon cells. *Osteoarthritis and Cartilage* 7(1): 141-153.
- Gross, T.S., Damji, A.A., Judex, S., Bray, R.C., Zernicke, R.F. (1999) Bone hyperemia precedes disuse-induced intracortical bone resorption. *Journal of Applied Physiology* 86(1): 230-235.
- Judex, S., Whiting, W.C., Zernicke R.F. (1999) Exercise induced bone adaptation: considerations for designing an osteogenically effective exercise program. *International Journal of Industrial Ergonomics* 24: 235-238.

6. Judex, S., Zernicke, R.F. (2000) Does the mechanical milieu associated with high-speed running lead to adaptive changes in diaphyseal growing bone? *Bone* 26(2): 153-159.
7. Srinivasan, S., Keilin, S.A., Judex, S., Bray, R.C., Zernicke, R.F., Gross, T.S. (2000) Age induced osteopenia in avian cortical bone. *Bone* 26(4): 361-365.
8. Wohl, G., Boyd, S., Judex, S., Zernicke, R.F. (2000) Functional adaptation of bone to exercise and injury. *Journal of Exercise and Medicine in Sport* 3, 313-324.
9. Judex, S., Wohl, G.R., Wolff, R.B., Leng, W., Gillis, A.M., Zernicke, R.F. (2000) Dietary fish oil supplementation adversely affects cortical bone morphology and biomechanics in growing rabbits. *Calcified Tissue International* 66(6): 443-448.
10. Judex, S., Zernicke, R.F. (2000) High-impact exercise and growing bone: relation between high strain rates and enhanced bone formation. *Journal of Applied Physiology* 88(6), 2183-2191.
11. Zernicke, R.F., Wohl, G.R., Boyd, S.K., Judex, S. (2001) Functional adaptation of bone. *Journal of Medical and Biological Engineering* 21(2), 75-78.
12. Rubin, C.T., Sommerfeldt, D.W., Judex, S., Qin, Y.X. (2001) Inhibition of osteopenia by low magnitude, high frequency mechanical stimuli. *Drug Discovery Today* 6(16), 848-858.
13. Rubin, C.T., Xu, G., Judex, S. (2001) The anabolic activity of bone tissue, suppressed by disuse, is normalized by brief exposure to extremely low magnitude mechanical stimuli. *The FASEB Journal* 15, 2225-2229.
14. Judex, S., Donahue, L.R., Rubin, C.T. (2002) Genetic predisposition to low bone mass is paralleled by an enhanced sensitivity to signals anabolic to the skeleton. *The FASEB Journal* 16(10), 1280-1282. Reference for full-length article: *The FASEB Journal* 10.1096/fj.01\_0913fje (<http://www.fasebj.org/cgi/doi/10.1096/fj.01-0913fje>).
15. Rubin, C.T., Judex, S., Hadjiargyrou, M. (2002) Skeletal adaptation to mechanical stimuli in the absence of formation or resorption of bone. *The Journal of Musculoskeletal and Neuronal Interactions* 2(3), 264-267.
16. Judex, S., Boyd, S.K., Qin, Y.X., Turner, S., Ye, K., Müller, R., Rubin, C.T. (2003) Adaptations of trabecular bone to low magnitude vibrations result in more uniform stress and strain under load. *Annals of Biomedical Engineering* 31(1), 12-20.
17. Judex, S., Boyd, S., Qin, Y-X, Miller, L., Müller, R., Rubin, C. (2003) Combining high-resolution microCT with material composition to define the quality of bone tissue. *Current Osteoporosis Reports* 1(1). 11-19.
18. Judex, S., Garman, R.A., Squire, M.E., Donahue, L.R., Rubin, C.T. (2004) Genetically based influences on the site-specific regulation of trabecular and cortical bone morphology. *Journal of Bone and Mineral Research* 19(4), 600-606.
19. Judex, S., Garman, R.A., Squire, M.E., Busa, B., Donahue, L.R., Rubin, C.T. (2004) Genetically linked site-specificity of disuse osteoporosis. *Journal of Bone and Mineral Research* 19(4), 607-613.
20. Squire, M., Donahue, L.R., Rubin, C.T., Judex, S. (2004) Genetic variations that regulate bone morphology in the male skeleton do not influence its susceptibility to mechanical unloading. *Bone* 35(6), 1353-1360.
21. Judex, S., Zhong, N., Squire, M., Ye, K., Donahue, L.R., Hadjiargyrou, M., Rubin, C.T. (2005) Mechanical modulation of molecular signals which regulate anabolic and catabolic activity in bone tissue. *Journal of Cellular Biochemistry* 94(5), 982-94.
22. Zhong, N., Garman, R., Squire, M., Donahue, L.R., Rubin, C.T., Hadjiargyrou, M., Judex, S. (2005) Gene expression patterns in bone after 4 d of hind-limb unloading in two inbred strains of mice. *Aviation, Space, and Environmental Medicine* 76, 530-535.
23. Murfee, W.L., Hammett, L.A., Evans, C., Xie, L., Squire, M., Rubin, C., Judex, S., Skalak, T.C. (2005) High-frequency low-magnitude vibrations suppress the number of blood vessels per muscle fiber in mouse soleus muscle. *Journal of Applied Physiology* 98, 2376 - 2380.
24. Busa, B., Miller, L.M., Rubin, C.T., Qin, Y.X., Judex, S. (2005) Rapid establishment of chemical and mechanical properties during lamellar bone formation. *Calcified Tissue International* 77, 386-394.
25. Rubin, C.T., Judex, S., Qin, Y.X. (2006) Low-level mechanical signals and their potential as a non-pharmacologic intervention for osteoporosis. *Age and Ageing* 35 (S2), 26-30.
26. Gilsanz, V., Wren, T.A., Sanchez, M., Dorey, S., Judex, S., Rubin, C.T (2006) Low level, high frequency mechanical signals enhance musculoskeletal development of young women with low bone density. *Journal of Bone and Mineral Research* 21(9), 1464-1474.
27. Xie, L.Q., Jacobson, J., Choi, E., Busa, B., Donahue, L.R, Rubin, C.T., Miller, L.M., Judex, S. (2006). Low-level mechanical vibrations can influence bone resorption and bone formation in the growing skeleton. *Bone* 39(5), 1059-1066.
28. Judex, S., Lei, X., Han, D., Rubin, C. (2007) Low-magnitude mechanical signals that stimulate bone formation in the ovariectomized rat are dependent on the applied frequency but not on the strain magnitude. *Journal of Biomechanics* 40, 1333–1339.
29. Garman, R.A., Gaudette, G., Donahue, L.R, Rubin, C.T., Judex, S. (2007) Oscillatory motions applied in the absence of weightbearing can increase bone formation. *Journal of Orthopaedic Research* 25(6), 732-740.
30. Bastie, C., Zong, H., Xu, J., Busa, B., Judex, S., Kurland, I.J., Pessin, J.E. (2007) The Src family member fyn suppresses peripheral tissue fatty acid oxidation through tonic inhibition of AMP kinase signaling. *Cell Metabolism* 5(5), 371-81.
31. Miller, L.M, Little, W.B., Schirmer, A., Busa, B., Judex, S. (2007) Accretion of bone quantity and quality in the developing mouse skeleton. *Journal of Bone and Mineral Research* 22(7), 1037-45.
32. Garman, R., Rubin, C., Judex, S. (2007) Small oscillatory accelerations, independent of matrix deformations, increase osteoblast activity and enhance bone morphology. *PLoS ONE* 2(7), e653. doi:10.1371/journal.pone.0000653.
33. Ozcivici, E., Garman, R., Judex, S. (2007) High-frequency oscillatory motions enhance the simulated mechanical properties of non-weight bearing trabecular bone. *Journal of Biomechanics*, doi:10.1016/j.jbiomech.2007.05.015.
34. Karlson, K.J., Judex, S. (2007) Increased non-linear locomotion alters diaphyseal bone shape. *The Journal of Experimental Biology* 210, 3117-3125.
35. Lublinsky, S., Ozcivici, E., Judex, S. (2007) An automated algorithm to detect the trabecular-cortical bone interface in microCT images. *Calcified Tissue International* 81(4), 285-293.
36. Rubin, C.T., Capilla, E., Luu, Y.K., Busa, B., Crawford, H., Nolan, D.J., Mittal, V., Rosen, C., Pessin, J.E., Judex, S. (2007) Adipogenesis is inhibited by brief, daily exposure to high-frequency, extremely low-magnitude mechanical signals. *Proceedings of the National Academy of Sciences* 104(45), 17879–17884.
37. Chen, X., Nasiri, A., Judex, S., Broadus, A.E. (2007) Mechanical regulation of PTHrP expression in entheses. *Bone* 41(5), 752-759.

38. Hishmeh, S., Judex, S., Cardoz, H., Jaggi, S. (2007) Oral supplementation of chondroitin sulfate to facilitate fracture healing: a pilot study. *Journal of Orthopaedics* 4(4), e2 (<http://www.jortho.org/2007/4/4/e2/index.htm>).
39. Squire, M., Brazin, A., Keng, Y., Judex, S. (2008) The influence of baseline bone morphometry on the gender- and site-specific dependency of disuse osteopenia. *Bone* 42(2):341-349.
40. Xie, L., Rubin, C., Judex, S. (2008) Enhancement of the adolescent murine musculoskeletal system using low-level mechanical vibrations. *Journal of Applied Physiology* 104(4):1056-62.
41. Carlson, K.J., Lublinsky, S., Judex, S. (2008) Do different locomotor modes during growth modulate trabecular architecture in the murine hind limb? *Integrative and Comparative Biology* 48: 385-393.
42. Ozcivici, E., Ferreri, S., Qin, Y.X., Judex, S. (2008) Determination of bone's mechanical matrix properties by nanoindentation. *Methods in Molecular Biology* (Osteoporosis: Methods and Protocols) 455, 323-34.
43. Luu, Y.K., Lublinsky, S., Ozcivici, E., Capilla, E., Pessin, J.E., Rubin, C.T., Judex, S. (2009) In vivo quantification of subcutaneous and visceral adiposity by micro computed tomography in a small animal model. *Medical Engineering & Physics* 31(1), 34-41.
44. Luu, Y., Capilla, E., Rosen, C., Gilsanz, V., Pessin, J., Judex, S., Rubin, C.T. (2009) Mechanical stimulation of mesenchymal stem cell proliferation and differentiation promotes osteogenesis while preventing dietary induced obesity. *Journal of Bone and Mineral Research* 24(1), 50-61.
45. Hwang, S.J., Lublinsky, S., Seo, Y.K., Kim, I.S., Judex, S. (2009) Extremely small-magnitude accelerations enhance bone regeneration. *Clinical Orthopaedics and Related Research* 467(4), 1083-1091.
46. Judex, S., Gupta, S., Rubin, C.T. (2009) Regulation of mechanical signals in bone. *Orthodontics and Craniofacial Research* 12, 94-104.
47. Luu, Y.K., Pessin, J.E., Judex, S., Rubin, J., Rubin, C.T. (2009) Mechanical signals as a non-invasive means to influence mesenchymal stem cell fate, promoting bone and suppressing the fat phenotype. *IBMS BoneKEy* 6(4): 132-149.
48. Lublinsky, S., Luu, Y.K., Rubin, C., Judex, S. (2009) An automated algorithm to separate visceral from subcutaneous fat in micro computed tomographies. *Journal of Digital Imaging* 22(3), 222-231.
49. Holguin, N., Muir, J., Rubin, C., Judex, S. (2009) Short applications of high-frequency mechanical signals attenuate swelling of the intervertebral disc during bed rest. *The Spine Journal*.
50. Judex, S., Luu, Y.K., Ozcivici, E., Lublinsky, S., Rubin, C.T. (in press) Quantification of adiposity in small rodents using micro-CT. *Methods*.
51. Judex, S., Carlson, K.J. (in press) Is bone's response to mechanical signals dominated by gravitational loading? *Medicine and Science in Sports and Exercise*.
52. Bandstra, E.R., Thompson, R.W., Nelson, G.A., Judex, S., Cairns, M.A., Benton, E.R., Willey, J.S., Vazquez, M.E., Carson, J.A., Bateman, T.A. (in press). Changes in bone and muscle in skeletally mature mice in response to simulated galactic cosmic rays. *Radiation Research*.
53. Lee, B.J., Cox, G., Maddatu, T., Judex, S., Rubin, C.T. (in press) Devastation of bone tissue in the appendicular skeleton parallels the progression of neuromuscular disease. *Journal of Musculoskeletal and Neuronal Interactions*.

## C. Research Support

### Ongoing Research Support

#### **Source and identifying #: NIH/NIAMS 1R01AR052778 - 01A2**

S. Judex, PI

Dates: 09/15/2007-8/31/2011

Title: Modulation of Bone's Mechanical Behavior by Bone Quality

*The strength of bone is a not only related to the quantity of the tissue but also to its quality. In this project, we will determine the specific material components that determine the mechanic quality of bone. Identification of these potential chemical targets will provide critical information for improved diagnostic, prophylactic, and therapeutic means of addressing bone quality defects in disease.*

#### **Source and identifying #: NASA**

S. Judex, PI

Dates: 09/1/2008-08/31/2011

Title: Recovery of Musculoskeletal Quantity and Quality upon Multiple Microgravity Exposure

*In this project, the response of the skeleton to repetitive changes in its loading environment will be identified.*

#### **Source and identifying #: SUNY Stony Brook, School of Medicine TRO FUSION Award**

S. Judex, PI

Dates: 11/15/2007-11/14/2009

Title: A Non-Pharmacological Prophylaxis for Obesity

*Efficacy and mechanisms by which subtle low-level vibrations reduce adipogenesis are examined.*

#### **Source and identifying #: American Diabetes Association**

S. Judex, Co-I; R.Z. Lin, PI

Dates: 02/01/2008-01/31/2011

Title: PI 3-kinase and Muscle Atrophy

*The role of PI 3-kinase in sensing the loss of functional weightbearing is investigated.*

#### **Source: NIH/NIAMS R01AR-43498**

S. Judex, Co-I; C.T. Rubin, PI

Dates: 7/01/08 - 6/30/13

Title: Augmentation of Trabecular Bone by Low Amplitude Strains

*Animal based study to identify the molecular and physical means of using mechanical signals to promote bone formation in animal models of osteoporosis.*

**Source and identifying #: NASA NAG91433**

C. Rubin, PI; S. Judex, Co-I

Dates: 03/01/2002-02/29/2012

Title: A low-intensity mechanical countermeasure to prohibit osteoporosis in astronauts during long-term space flight.

*This proposal tests the hypothesis that very low-level mechanical vibrations applied for as little as 10min/d can prevent the bone loss accompanying space flight.*

**Source and identifying #: NIH DK62722**

S. Judex, Co-I; R. Lin, PI

Dates and cost of entire project: 09/01/2008-06/30/2013, \$1,600,000.

Title: Gq-coupled Receptors Inhibit PI 3-kinase/Akt Signaling

*The role of PI 3-kinase in regulating muscle mass will be examined.*

### **Recently Completed Research Support (as PI)**

**Source and identifying #: Wallace H. Coulter Foundation**

S. Judex, PI

Dates of entire project: 08/01/2005-07/31/2008, \$236,917

Title: Development of a Low-Magnitude and Safe Biophysical Signal Anabolic to Bone

*This proposal is focused on the development of a novel and clinically safe mechanical stimulus to increase bone formation and to reduce the incidence of osteoporotic fractures*

**Source and identifying #: NASA NAG 9-1499**

S. Judex, PI

Dates and cost of entire project: 01/27/2003-07/26/2007, \$764,073.

Title: The Genetic Basis of the Loss of Musculo-Skeletal Tissue during Weightlessness: Towards the Identification of Individuals that are at Greatest Risk

*Genetic analyses are utilized for the identification of quantitative trait loci that are responsible for genetically dependent bone loss during simulated weightlessness.*

**Source and identifying #: National Science Foundation, BES-0321085**

S. Judex, PI

Dates and cost of entire project: 07/15/2003-06/30/2006, \$277,954.

Title: High Resolution Micro-Computed Tomography Scanning of Biologic Tissues.

*This proposal provides funds for the purchase and operation of an in-vivo micro-computed tomography scanner that allows high-resolution (10  $\mu$ m) scanning of hard and soft tissues in vivo.*

**Source and identifying #: National Space Biomedical Research Institute NSBRI**

S. Judex, PI

Dates and cost of entire project: 9/01/2005-8/31/2006, \$99,974.

Title: Assessment of a Non-Pharmacologic Countermeasure of Altered Intervertebral Disc Morphology

*The goal of this proposal is to test the hypothesis that detrimental changes in the intervertebral discs induced by extended bedrest can be ameliorated by the application of short periods of high-frequency mechanical stimuli.*

**Source and identifying #: US Army Medical Research and Materiel Command, DAMD17-03-1-0777**

S. Judex, PI

Dates and cost of entire project: 09/29/2003-09/30/2006, \$282,505.

Title: Enhancing Bone Accretion Using Short Duration, Low-Level Mechanical Vibrations.

*The anabolic and anti-catabolic potential of very small magnitude stimuli applied to the skeleton as whole body vibrations for as little as 15 min/d is tested. Changes in cellular activity induced by the mechanical intervention will be related to changes in candidate genes.*

### **Pending Research Support (as PI)**

**Source and identifying #: NIH S10 RR026859-01**

S. Judex, PI

Dates and cost of entire project: 04/01/2010-03/31/2011, \$379,000.

Title: Ultra High-Resolution Microcomputed Tomography Scanner

*Funds to purchase a new-generation micro-CT scanner are requested.*