

Janet Rubin, MD

Current Titles and Affiliations:

Professor, Department of Medicine, *with tenure*, 2006 -
Professor, *joint appointment*, Department of Pharmacology 2007-
Professor, *joint appointment*, Department of Pediatrics, 2008-
Professor, *adjunct appointment*, Department of Bioengineering, 2010 -
University of North Carolina at Chapel Hill

Birth: Los Angeles, California

Family: Married (J. Larry Klein, Cardiologist)
2 children (Ben- Stanford '07, Georgetown Law '13, Klara- Stanford '09, MD-PhD
candidate UNC)

Citizenship: USA

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Licensures/Boards:

American Board of Internal Medicine, Internal Medicine 9-14-83 #91709
American Board of Internal Medicine, Endocrinology & Metabolism 11-19-85 #91709
North Carolina Medical License 2006-00018

Education:

1976 BA cum laude: Bryn Mawr College, Bryn Mawr, PA
1980 MD: Brown University School of Medicine, Providence RI

Postgraduate Training:

1980-83 Internal Medicine Residency: Northwestern School of Medicine, Chicago, Ill
1983-85 Endocrinology & Metabolism Fellowship, University of California, San Diego, Ca

Previous Academic and Professional Appointments:

1985-86 Instructor in Medicine, University of California, San Diego, CA
1985-86 Associate Investigator, Veterans Affairs, San Diego, Ca
1986-94 Assistant Professor, Department of Medicine, Emory University
1986-06 Staff Physician, Veterans Affairs Medical Center, Decatur, GA
1987-90 Research Associate, Veterans Affairs, Decatur, GA
1994-00 Associate Professor *with tenure*, Department of Medicine, Emory University
2000-06 Professor, Department of Medicine, Emory University

Committee Memberships:

National:

National Institutes of Health

- NIH DRG Study Section, Oral Biology and Medicine 2, Regular Member 1997-2001

- NIAMS Long Range Planning Panel, summer 1999
- NIH DRG Study Section, Oral Biology and Medicine 2, Ad Hoc 2002, 2003
- NIH Special Study Section (NIAMS), August 2002
- NIH Study Section- Program Project review (NIA), October 2002
- NIH Study Section- Program Project review (NIAID), August 2003
- NIH Study Section Ad Hoc, SBDD , October 2005
- NIH Study Section, RO3 ZAR EHB-M, July 2006
- NIH Study Section Permanent Member, SBSR , February 2009-2013
 - Chair, July 2011-

American Society of Bone & Mineral Research

- Councilor, 2005-2008
- Advocacy committee, 2002- 2005, Chairman 2004-2005
- ASMBR representative to FASEB Federal Funding Consensus Committee, 2000-2003
- Bone Coalition Evaluation Panel, Chairman, 2001

Veterans Affairs

- Atlanta Research and Education Fund, Board of Directors, 1995- 2006; Treasurer, 1999-2006
- VA Endocrinology Research Advisory Group, 2000-2003
- VA Career Development Review, October 2003

Council member: Society for Physical Regulation in Biology and Medicine 1996 -1999

Institutional:

University of North Carolina

- Aging TRAB Subcommittee, UNC-CH, 2008-2010
- K12 Multidisciplinary Advisory Committee, CTSA, UNC-CH, 2006-
- Director T32 Endocrinology/Metabolism program, 2008-
- Faculty-At-Large Committee, 2010-2013
- MD/PhD Executive Committee, 2010-
- SOM Strategic Plan Task Force 2011

Emory University

- VAMC Research and Development Committee, member 1990-2004, Chairman 1995-1997
- Emory University Research Advisory Council, 2003-
- Emory University Department of Medicine: Faculty Development Committee 2003-2006
- Emory University Committee on the Status of Women, 2000-2003
- Emory University Infrastructure/Implementation Committee 2003
- Faculty Committee for Medical Student Research, 1989-1997
- NIH Institutional Training Grant on Endocrinology, Emory, 1991- current
- VA Quality Assurance Advisory Board, 1994 - 1996

Consultantships:

Program Selection Committee, American Society Bone Mineral Research 1997-current
Journal of Bone and Mineral Research 1990-
National Osteoporosis Foundation, 1991-
VA Regional Advisory Group, 1990-2000
Ad Hoc reviewer VA Endocrinology Review Board, 1990

Ad Hoc Reviewer, NIH Study Section: Oral Biology Medicine Spring 1994
NIH Special Study Section: Orthopaedics Spring 1995
Ad Hoc Reviewer, NIH Study Section: Oral Biology Medicine Winter 1997
NIH Special Study Section: Orthopaedics Spring 1997
Ad Hoc Reviewer, NIH Study Section: Oral Biology Medicine Spring 1997
Ad Hoc Reviewer, American Cancer Society, 1995
Skeletech, Inc: Consultant, 1999-2000
Novartis Oncology Advisory Panel, August 2003
Marodyne, Inc, June 2010-

Editorial Boards:

Bioelectromagnetics 1996- 2003
Journal of Bone and Mineral Research 2004 – 2009
Journal of Clinical Endocrinology and Metabolism 2011-2014

Guest Editor:

American Journal of the Medical Sciences, "Cell Deformation: Mechanics and Mechanisms of Physiological Response", September 1998
Bone Biology, Volume II: Bone Resorption; Springer-Verlag, 2005

Manuscript Reviewer, Ad Hoc - partial list

American Journal Physiology, Bioelectromagnetics, Journal of Bone & Mineral Research, Bone, Calcified Tissue, Endocrinology, Journal Biomechanics, Journal Cell Physiology, Journal Clinical Endocrinology and Metabolism, Journal Clinical Investigation, Journal of Orthopaedic Research, European J Endocrinology, Proceedings National Academy Sciences, PLOS One

Honors and Awards:

1976 BA, cum laude
1983 Associate Investigator, VA
1985 Norwich-Eaton Young Investigator Award of ASBMR
1987 Research Associate, VA
1994 Robert I. Goodman Award, Society for Physical Regulation in Biology and Medicine
2000 Excellence in Teaching as Clinical Preceptor, Emory University Dept of Medicine
2006 Endowed Professorship in Medicine, University of North Carolina
2008-on Best Doctors in America
2011 UNC School of Medicine Academy of Educators

Society Memberships (current):

American Society for Bone and Mineral Research (83)
Endocrinology Society (87)
American Association for the Advancement of Science (87)
International Society of Clinical Densitometry (06)

Organization of National Conferences

Co-Organizer (with Drs. W.R.Taylor and M. Gray) of "Cell Deformation: Mechanics and Mechanisms of Physiological Response"
October 23-24, 1997, Emory University Conference Center
Co- Organizer (with Dr. C. Rubin): "Mechanical effects on bone mass and morphology"
Symposium, American Society of Bone and Mineral Research
September 22, 2000, Toronto, Canada

Chair Duties:

American Society Bone and Mineral Research, 1994, 1996, 2000, 2001, 2002, 2004, 2006, 2009, 2011
Society for Physical Regulation in Biology and Medicine, 1996, 1997
World Congress of Biomechanics, Sapporo Japan 1998

Research focus:

Our cell and molecular biological investigations are aimed at understanding the control of bone remodeling. In particular, we focus on the role of physical forces, which the skeleton experiences during normal exercise in controlling bone remodeling and lineage allocation.

Grant Support:

Active (Federally Funded):

National Institutes of Health, RO1 (3/10-2/15), *Principal Investigator*
Biophysical regulation of mesenchymal stem cell lineage allocation
National Institutes of Health, RO1 (renewal through yr 19, 6/09-5/14), *Principal Investigator*
Biophysical regulation of bone remodeling
National Institutes of Health, RO3 (9/08-8/11), *Co-Investigator*
PI: Dr Margaret Gourlay
Role of FSH in bone quality of the early menopausal transition
National Institutes of Health, CTSA, *educational component*
PI: Dr Marschall Runge
My role: Director of K2R program

Previous Grant Support:

Associate Investigator Career Development Award, VA, 2/85-6/86
1,25 dihydroxyvitamin D regulation of adenylate cyclase in leukocytes
Research Associate Career Development Award, VA 7/87-6/91
cAMP and 1,25 dihydroxyvitamin D mediated differentiation of monocytic cells
Merit Review, VA 4/88-3/91, *Principal Investigator*
cAMP and 1,25 dihydroxyvitamin D mediated differentiation of monocytic cells
Merit Review Renewal, VA 4/91-3/94, *Principal Investigator*
1,25 D and cAMP control of monocytic and osteoclastic differentiation
Merit Review Renewal, VA 9/94-8/98, *Principal Investigator*
The role of MCSF in 1,25(OH)₂D₃ stimulated osteoclast formation
Merit Review, VA, 10/98 – 9/03
The role of MCSF in glucocorticoid induced osteoporosis
NovoNordisk, Pharmaceutical 1998, *Principal Investigator*
Effects of levomelexifene on bone stromal cells
American Federation for Aging Research, 7/91-9/92, *Principal Investigator*
The effect of electric fields on bone resorption and formation
National Institutes of Health, RO-1, 4/93-3/97, *Principal Investigator*
Electric field attenuation of osteoclast recruitment
National Institutes of Health, RO-1, 4/97-8/01, *Principal Investigator*
Biophysical inhibition of osteoclast formation (renewal)
Emory-Georgia Tech Alliance: 2000-2001 PI: Iwona Jasiuk, Co-PI: JR
Multiscale analysis of bone
FRIMCORE-Emory Vascular Biology; 2001 PI: Rubin
Role of superoxides in bone cells
VA Research Enhancement Award (REAP), *Program Director* 10/98 – 10/04

Genetic engineering of marrow cells to promote bone formation
 Merit Review, VA, (10/04 – 9/08), *Principal Investigator*
 The role the IGF axis in prostate carcinoma metastases to bone
 National Institutes of Health, RO1 (9/05-8/10), *Principal Investigator*
 Organization of mechanical signals via membrane scaffolding
 National Institutes of Health, T32 (current), *Director*, A1 in review
 Training Program in Endocrinology and Metabolism (joint Pediatric/IM)

Formal Teaching:

UCSD School of Medicine, San Diego, CA

- Lecturer, Pathophysiology, 1984 (Pituitary)

Emory University School of Medicine

- Course Director, Endocrine Pathophysiology 1992-1997
- Lecturer, Endocrine Pathophysiology 1988 – 2006
 (Calcium metabolism, Adrenal hypertension, Pituitary disorders)
- Lecturer, Molecular Endocrinology, 1993- 2006
 (Glucocorticosteroid Action, Catecholamines)
- Lecturer, Advances in Internal Medicine, 1990- 2006
 (Lipids, Calcium metabolism)
- Faculty, NIH Institutional Training Grant on Endocrinology, Emory, 1991-2006

UNC-Chapel Hill SOM

- Course Director (and developer), Topics in Molecular Endocrinology (monthly seminar) 2006-
- Lecturer, Endocrine Pathophysiology MS2, Calcium metabolism 2006-

UNC-Chapel Hill, CTSA

- Course Director (and developer), K2R transition, 2008-2010
- As above, title change 2011: R-Grant Working Group

Supervisory Teaching

Postdoctoral fellows directly supervised

1. Diane Biskobing, MD 1991-1994, NIH K08, 1995-2000:
 Dr. Biskobing is Associate Professor with tenure at the Medical College of Virginia.
2. Christy Richardson, MD 1994, in Endocrinology practice in Kansas City, MI
3. Scott Isaacs, MD 1996-1997, now Assistant Professor, Medical College of Georgia
4. Clare Lynn Royce, PhD 1999-2001
 Dr. Royce was a REAP Associate Investigator
5. Co-mentor for Dr. Darin Olson studying Insulin Gene Therapy 2002-2004; Dr. Olson was awarded a VISN scholar grant in 2003, and a Associate Investigator of the VA career award in 2004.
6. Co-mentor for Dr. Ken Kokko studying T-cell mediated implant rejection 2002-2003, now Assistant Professor of Nephrology at Emory University
7. Co-mentor for Dr. Tim Yoon, 2002-2003. Dr. Yoon was awarded a MREP 2003-2005 and is now Assoc Prof Orthopaedics, Emory.
8. Dr. Natasha Case (PhD Georgia Tech) PhD post-doc 5/05 - 2011
9. Dr. Shenon Badre (MD, Emory Endocrinology Fellow) Endocrinology post-doc 7/05, practicing
10. Dr Margaret Gourlay (MD Asst Prof UNC-CH)- K23 mentor 2006-2011
11. Dr. Kristine Patterson (MD Asst Prof UNC-CH) – K23 mentor 2007 –2011
12. Dr. Meiyun Ma (PhD, University of Miami) PhD post-doc 10/2006-2008
13. Dr. Maya Styner (MD, UNC) post-doctoral Endocrine fellow 3/2008-
14. Dr. James Meeker MD, orthopaedics resident, research year 6/07-08

15. Dr Emily Neely (MD), post-doctoral Endocrine fellow 6/2010-2011
16. Dr. William Thompson PhD, post-doctoral fellow 9/2011 -

Co-investigator grants/Mentoring

1. Dr. Margaret Goulay, Asst Prof Family, Practice, K23, R03
2. Dr. Terri Tarrant, Ass't Prof, Medicine, RO3
3. Dr Maya Styner, Ass't Prof, Medicine, BIRCWH 2010-2013, KO8 submission

Medical and graduate student mentoring/ thesis committees

Andrew Wade, Emory class of '01, summer 1998: "Role of NFkB in MCSF gene transcription".
Paper won First Prize (Helen Miller Award) at Annual Emory Medical Student Research Day
Frederic Bougye, Thesis Committee 4/14/00 at Georgia Tech
"A multiscale analysis of cancellous bone"
Julia Musiker, University of Delaware: SURE Howard Hughes fellow, summer 2000. "Regulation of
ODF by estrogen and MAPK" Work won First Prize at the SURE poster presentation
Matt Rubin, Thesis Committee 12/15/01 at Georgia Tech
"Multiscale characterization of the ultrastructure of trabecular bone in osteoporotic and healthy
humans and in two inbred strains of mice"
Steve Pardo, Thesis Committee 2003 at Georgia Tech
"Zero vector systems for simulating microgravity in bone cell cultures"
Mampta Patel, PhD Thesis Committee, 2006-7 Bioengineering, Georgia Tech
Kevin Wong, PhD Thesis Committee, 2007 Bioengineering, Georgia Tech
Marnisa Sricholpech, PhD Thesis Committee 2008-2010 UNC School of Dentistry
Joao Ferriera, UNC School of Dentistry PhD Thesis Committee 2010-
Gunes Uzer, PhD Bioengineering, SUNY NY Thesis Committee 2010-
Chris O'Conor, UNC Bioengineering, MD PhD candidate, thesis advisor 6/10 -
Jacob Thomas, BS, NC State University Masters Student in Physiology, 2/10-

Residency Program

Attending physician, Medical Service and Endocrine Section, VAMC, 1986- 2006
Attending Physician, Medical Service and Endocrine Section, Grady Hospital 1986-2001
Attending Physician, Medical Service and Endocrine Section, UNC Hospitals 2006-

Invitations to national or international conferences:

Advances in Bioengineering, San Diego, October 1997
"Biophysical inhibition of osteoclast recruitment"
3rd World Congress in Biomechanics, Sapporo Japan August 5 – 8, 1998
"Strain decreases osteoclast recruitment and bone cell expression of osteoclastogenic proteins in
vitro"
Joint BMES/EMBS meeting, Atlanta, October 13-16, 1999
"Strain reduces osteoclast recruitment by targeting gene expression"
First Annual Lectureship of the Yale Musculoskeletal Core, New Haven, March 2000
"Role of MCSF in osteoclastogenesis"
American Society of Bone and Mineral Research, Toronto, September 2000: Symposium Mechanical
Effects on bone mass and morphology
"Osteoblast and osteoclast responses to mechanical signals"
Maine Osteoporosis Conference, Sugarloaf, Maine, January 2001
"The structurally sufficient skeleton"
Joint BMES/EMBS meeting, Orlando, February 2001
"Cellular response of skeletal tissue to mechanical signals"
Bone Summit 2002, Waldorf-Astoria NY, October 2002

“Biomechanical control of gene expression”
 AAOS/NIH Workshop on “Physical Regulation of Skeletal Repair”,
 September 4-6, 2003 Maryland
 “Coordinate mechanical regulation of eNOS and RANKL”
 ASBMR Molecular and Pathology Working Group, September 2003, Minneapolis
 “Turning mechanical signals into cellular signals”
 AAOS/NIH Workshop on “Gender effects in Musculoskeletal Disease”,
 April 22-25, 2004 Maryland
 “How does gender affect the biomechanical response of the skeleton?”
 American Society of Bone and Mineral Research, Seattle, September 2004
 Plenary Session: “Mechanical Effects on Skeletal Structure”
 Maine Osteoporosis Conference, Sugarloaf, Maine, January 2005
 “Diseases of Bone Resorption: Osteoclasts Gone Wild”
 International Symposium on Vibration Therapy, Hong Kong, China December 2006
 “Molecular signaling pathways transmitting mechanical signals in bone cells”
 National Leadership Workshop on Mentoring, NIH, November 2007
 Women in Biomedical Careers
 Speaker in session on mentoring teams
 Mentoring Women’s careers in Science: NIH conference 11/07, NIH campus
 “Linear mentoring evolves into networks of scientists”
 Maine Osteoporosis Conference, Sugarloaf, Maine, January 2008
 “Mechanical activation of canonical β -catenin signaling: effects in bone”
 Emory Division of Endocrinology and Metabolism: The Catherwood Lecture, November 3 2008
 “MSC lineage selection”
 International Society of Fracture Repair, International Symposium on Biophysical Stimulation on
 Bone and Fracture Healing, Kyoto, Japan, November 26, 2008
 “Mechanical control of MSC lineage fate”
 Symposium: Biomechanics and Biology of Bone Regeneration, Berlin November 19, 2009
 “Mechanical signaling controlling MSC lineage allocation”
 University of Alabama Center for Metabolic Bone Disease, Symposium, March 31, 2010
 “Biomechanical control of mesenchymal lineage allocation”
 American Society of Bone and Mineral Research – Webinar July 22, 2010
 “Mechanical signals as anabolic agents to bone”
 American Association of Clinical Endocrinologists – Atlanta GA Dec 5 2010
 “C’est si bon”
 Endocrine Society – Boston MA National Meeting, June 2011
 “Mechanical signaling in bone”
 Duke University – October 24, Endocrine Grand Rounds

Bibliography

Peer Reviewed

1. **Rubin J** and Catherwood BD 1984 1,25 dihydroxyvitamin D causes attenuation of cAMP response in monocyte-like cells. *Biochem Biophys Res Comm* 123:210-216
2. **Rubin J**, Chenoweth DE, Catherwood BD 1986 1,25 dihydroxyvitamin D and cAMP agonists synergistically promote differentiation of a human monocyte cell line. *Endocrinology* 118:2540-2545

3. Catherwood BD and **Rubin J** 1985 Interaction of 1,25(OH)₂D₃ with the cAMP class of biological signals. In: AW Norman, D Schaefer, HG Grigoleit and DR Herrath (eds). Vitamin D 1985: Chemical, Biochemical and Clinical Update. Walter de Gruyter, Berlin. p.229-230.
4. **Rubin J** and Catherwood BD 1987 1,25 dihydroxyvitamin D attenuates cAMP response in cultured human lymphocytes. *Molecular and Cellular Endocrinology* 52:213-218.
5. Titus FL, **Rubin J**, Lorang M, Catherwood B 1988 Glucocorticoids and 1,25 dihydroxyvitamin D₃ regulate parathyroid hormone stimulation of adenosine 3',5'-monophosphate-dependent protein kinase in rat osteosarcoma cells. *Endocrinology* 123 1526-1531.
6. **Rubin J**, Carney M, Catherwood BD 1988 Expression of C5a anaphylatoxin receptor in monoblastic cells involves facilitation of an adenosine 3',5'-monophosphate-dependent process. *Endocrinology* 123:2424-2431.
7. Titus FL, **Rubin J**, Nanes MS, Catherwood B 1989 Glucocorticoid and 1,25 dihydroxyvitamin D modulate the degree of cAMP-dependent protein kinase isoenzyme I and II activation by PTH in rat osteosarcoma cells. *Endocrinology* 125:2806-2811.
8. Nanes MS, **Rubin J**, Titus L, Hendy G, Catherwood B 1990 Interferon gamma inhibits 1,25 dihydroxyvitamin D₃-stimulated synthesis of bone GLA protein in rat osteosarcoma cells by a pretranslational mechanism. *Endocrinology* 127:588-594.
9. **Rubin J**, Titus L, Nanes MS 1991 PGE₂ induction of monoblastic differentiation utilizes both cAMP and non-cAMP dependent signaling systems. *Biochim Biophys Acta* 1091:87-95.
10. Titus L, Jackson L, Nanes M, **Rubin J**, Catherwood B 1991 Opposing effects of 1,25 dihydroxyvitamin D and glucocorticoid on parathyroid hormone receptor number in ROS 17/2.8 cells. *J Bone and Mineral Research* 6:631-637.
11. Nanes M, **Rubin J**, Titus L, Hendy G, Catherwood BD 1991 Tumor necrosis factor alpha inhibits 1,25 dihydroxyvitamin D-stimulated bone gla protein synthesis in rat osteosarcoma cells (ROS 17/2.8) by a pretranslational mechanism. *Endocrinology* 128:2577- 2582.
12. **Rubin J**, Titus L, Nanes M 1991 Regulation of complement 5a receptor expression by phorbol ester. *J Leukocyte Biology* 50(5):502-408.
13. **Rubin J**, Titus L, Nanes M 1992 cAMP promotion of osteoclast-like cell development from mouse bone marrow cells requires a permissive action of 1,25(OH)₂D₃. *J Bone Mineral Research* 7:611-617.
14. Biskobing D & **Rubin J** 1993 1,25(OH)₂D₃ and phorbol myristate acetate produce divergent phenotypes in a monomyelocytic cell line. *Endocrinology* 132:862-866.
15. Titus L, Marzilli L, **Rubin J**, Nanes M, Catherwood B 1993 Rat osteoblasts and ROS 17/2.8 cells contain similar protein tyrosine phosphatases. *Bone and Mineral* 23:267-284.
16. **Rubin J**, Borchardt R, Biskobing D, Bell R, Nanes M 1994 Cell permeable ceramides upregulates osteocalcin secretion. *Trans Orthop* 19:9.

17. Rubin CT, Donahue H, **Rubin J**, McLeod KJ 1994 Optimization of electric field parameters for the control of bone remodeling: Exploitation of an indigenous mechanism for the prevention of osteopenia. *J Bone Mineral Research* 8:S573-581.
18. Biskobing D, Nanes MS, **Rubin J** 1994 1,25(OH)₂D₃ is required for protein kinase C upregulation of carbonic anhydrase II in a human monomyelocytic cell line. *Endocrinology* 134:1493-1498.
19. Nanes MS, Kuno H, Demay M, Kurian M, Hendy GN, Titus L, **Rubin J** 1994 A single upstream element confers responsiveness to tumor necrosis factor- α in the rat osteocalcin gene. *Endocrinology* 134:113-1120.
20. Catherwood B, Titus L, Evans C, **Rubin J**, Boden S, Nanes M 1994 Increased expression of tissue plasminogen activator mRNA is an immediate response to parathyroid hormone in neonatal rat osteoblasts. *Endocrinology* 134:1429-1436.
21. Biskobing D, Fan X, **Rubin J** 1995 Characterization of MCSF-induced proliferation and subsequent osteoclast formation in murine marrow culture. *J Bone Min Research* 10:1025-1032.
22. **Rubin J**, Rubin CT, McLeod K 1995 Biophysical Modulation of Cell and Tissue Structure and Function. *Current Reviews in Eukaryotic Gene Expression* 5(2):177-191.
23. **Rubin J**, McLeod K, Titus L, Catherwood B, Nanes M, Rubin C 1996 Formation of osteoclast-like cells is suppressed by low frequency, low intensity electric fields. *J Ortho Research* 14: 7-15.
24. **Rubin J**, Biskobing D, Titus L, Thornton DL, Catherwood BD, Nanes MS 1996 1,25(OH)₂D₃ and cAMP synergistically induce C5a receptor mRNA. *Am J Med Sci* 311(2):73-79.
25. **Rubin J**, Fan X, Thornton D, Bryant R, Biskobing D 1996 Regulation of murine osteoblast macrophage colony-stimulating factor secretion by 1,25(OH)₂D₃. *Calcified Tissue International*, 59:291-296.
26. Fan X, Biskobing D, Bain S, **Rubin J** 1996 Ketoconazole and phorbol myristate acetate regulate osteoclast precursor fusion in primary marrow culture. *J Bone and Mineral Research*, 11:1274-1280.
27. Goad DL, **Rubin J**, Wang H, Tashjian AH, Patterson C 1996 Enhanced expression of vascular endothelial growth factor in human SaOS-2 osteoblast-like cells and murine osteoblasts induced by insulin-like growth factor 1. *Endocrinology* 137:2262-2268.
28. **Rubin J**, Fan X, Biskobing D, Rubin C, McLeod K, Taylor WR 1997 Pressure regulates osteoclast formation and MCSF expression in marrow culture, *J Cell Physiology* 170:81-87.
29. Fan X, Biskobing D, Fan D, Hofstetter W, **Rubin J** 1997 Macrophage colony stimulating factor downregulates MCSF receptor expression and entry of progenitors into the osteoclast lineage. *J Bone Mineral Research*, 12:1387-1395.
30. Biskobing DM, Fan D, **Rubin J** 1997 c-fms is regulated post-transcriptionally by 1,25(OH)₂D₃ in HL-60 cells, *Calcified Tissue International*, 61:205-209.

31. Biskobing DM, Fan D, Fan X, **Rubin J** 1997 Induction of carbonic anhydrase II expression in osteoclast progenitors requires physical contact with stromal cells. *Endocrinology*, 138:4852-4857.
32. **Rubin J**, Biskobing DM, Jadhav L, Nanes MS, Perkins S, Fan X 1998 Dexamethasone promotes expression of membrane bound macrophage colony stimulating factor, *Endocrinology*, 139:1006-1012.
33. Umpierrez MB, Fackler S, Umpierrez GE, **Rubin J** 1997 Adrenal myelolipoma associated with endocrine dysfunction: review of the literature. *Am J Med Sci*, 314:338-341.
34. **Rubin J**, Gray M, Taylor WR 1998 Cellular Deformation: Mechanics and Mechanisms of Physiological Response, *Am J Med Sci*, 316:153-157.
35. Isaacs SD, Fan X, Fan D, Gewant H, Murphy TC, Farmer P, Taylor WR, Nanes MS, **Rubin J** 1999 The role of NF κ B in the regulation of macrophage colony stimulating factor, *J Cell Physiology*, 179:193-200.
36. Austin GE, Wheaton R, Nanes MS, **Rubin J**, Mullins RE 1999 Usefulness of fructosamine for monitoring diabetic outpatients. *Amer J Med Sci*, 318(5):316-23.
37. **Rubin J**, Fan X, Biskobing D, Taylor WR, Rubin C 1999 Osteoclastogenesis is repressed by mechanical strain in an *in vitro* model, *J Orthop Res*, 17:639-645.
38. Iqbal F, Michaelson J, Thaler L, **Rubin J**, Roman J, Nanes M 1999 Declining bone mass in men with chronic obstructive pulmonary disease: contribution of glucocorticoid treatment, body mass index, and gonadal function. *Chest*, 116:1616-1624.
39. **Rubin J**, Fan D, Wade A, Murphy T, Gewant H, Nanes MS, Fan X, Moerenhout M, Hofstetter W 2000 Transcriptional regulation of the expression of macrophage colony stimulating factor. *Molecular and Cellular Endocrinology*, 160:193-202.
40. **Rubin J**, Murphy T, Nanes M, Fan X 2000 Mechanical strain inhibits expression of osteoclast differentiation factor (ODF/TRANCE) by murine stromal cells. *American Journal Physiology: Cell Physiology*, 278:1126-1132.
41. Farmer PK, He X, Schmitz L, **Rubin J**, Nanes MS Effect of NF κ B on 1,25-dihydroxyvitamin D3 and retinoid-X receptor dependent function. 2000 *American Journal Physiology: Endocrinology*, 279:E213-230.
42. Mori I, **Rubin J**, Fan X, Guest TM, Taylor WR Elastin upregulates expression of macrophage colony stimulating factor in cultured murine macrophages. *submitted*
43. Guest TM, **Rubin J**, Rengarajan K, Taylor WR Mechanoregulation of monocyte colony-stimulating factor in cultured rat vascular smooth muscle cells: differential roles of ERK1/2 and p38 mitogen-activated protein kinase. *submitted*
44. Fan X, Fan D, Gewant H, Royce CL, Nanes MS, **Rubin J** 2001 Increasing membrane-bound macrophage colony stimulating factor does not enhance OPGL-Driven osteoclastogenesis in marrow cells. *American Journal Physiology: Endocrinology* 280: E103- 111

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48. **Rubin J**, Ackert-Bicknell CL, Zhu L, Fan X, Murphy TC, Nanes MS, Marcus R, Holloway L, Beamer WG, Rosen CJ 2002 Insulin Like Growth Factor-I (IGF-I) regulates osteoprotegerin (OPG) and RANK Ligand (RANKL) *in vitro* and osteoprotegerin *in vivo*. *Journal of Clinical Endocrinology and Metabolism* 87:4273-4279.
49. Kleinhenz DJ, Fan X, **Rubin J**, Hart CM 2003 Detection of endothelial nitric oxide release with the 2,3-diaminonaphthalene assay. *Free Radical Biology and Medicine* 34(7): 856 – 861.
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51. Rubin MA, Jasiuk I, Taylor J, **Rubin J**, Ganey T, Apkarian R 2003 TEM analysis of the nanostructure of normal and osteoporotic human trabecular bone., *Bone*, 33(3): 270-282
52. **Rubin J**, Murphy TC, Zhu L, Roy E, Nanes MS, Fan X 2003 Mechanical strain differentially regulates eNOS and RANKL expression via ERK1/2 MAP kinase. *J Biol Chem* 278(36): 34018-34025.
53. Fan X, Zhu L, Roy E, Murphy TC, Hart CM, Nanes M, **Rubin J** 2004 Nitric oxide decreases RANKL and increases OPG expression in bone stromal cells. *Endocrinology* 145(2): 751-759
54. **Rubin J**, Chung LWK, Fan X, Zhu L, Murphy TC, Nanes MS, Rosen CJ 2004 Prostate carcinoma cells that have resided in bone have an upregulated IGF-I axis. *The Prostate* 58(1): 41-49
55. Rubin MA, **Rubin J**, Jasiuk I 2004 SEM and TEM study of the hierarchical structure of C57BL/6J and C3H/HeJ Mice trabecular bone. *Bone* 35(1):11-20.
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2004-2011 Abstracts

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- Lu X, He X, **Rubin J**, Nanes MS Tumor necrosis factor inhibition of the osterix promoter. ASBMR 2004
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- Fan X, Rahnert J, Murphy TC, Case N, Grassi F, Nanes MS, **Rubin J** A Role for Nitric Oxide in the Mechanical Regulation of RANKL in Bone Stromal Cells ASBMR 2006 Podium presentation
- Gross TS, Threet D, Poliachik SL, Fan X, Case N, Santos E, **Rubin J** H-Ras Is Required for the Full Response of Bone to Mechanical Loading. ASBMR 2006 Podium presentation
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- N Case, Z Xie, B Sen, M Ma, H Jo, **J Rubin** Fluid Shear Stress and Mechanical Strain Induce a Similar Osteogenic Gene Response via Divergent Signaling Pathways. ASBMR 2007
- M Ma, B Sen, N Case, Z Xie, H Jo, T Gross, **J Rubin**. Mechanical activation of β -catenin is enhanced after caveolin-1 knock-down. ASBMR 2007
- Case N, Ma, M, Sen B, Xie Z, Gross TS, **Rubin J** Mechanical loading of bone cells activates β -catenin through GSK3 β inactivation. Platform presentation at the ASBMR, Montreal September 2008
- Sen B, Xie Z, Case N, Ma, M, Rubin CT, **Rubin J** 2008 Mechanical strain prevents adipogenesis in mesenchymal stem cells by stimulating a durable β -catenin signal. presentation at the ASBMR, Montreal September 2008
- Rubin J**, Sen B, Xie Z, Case N, Styner M, C Rubin C Exposure to extremely low magnitude mechanical signals reduces MSC adipogenesis and promotes osteoblastogenesis in vitro. ASBMR, Denver September 2009
- Sen B, Styner M, Xie Z, Case N, **J Rubin** Mechanical loading regulates NFATc1 and β -catenin signaling through a GSK3 β control node. ASBMR, Denver September 2009
- Gourlay M, Preisser J, Hammett-Stabler C, **Rubin J** FSH correlates with estradiol but is not associated with pQCT measures in younger postmenopausal women. ASBMR, Denver September 2009
- Styner M, Sen B, Zou M, Xie Z, Case N, **Rubin J** Inhibitors of cyclooxygenase-2 enhance adipogenesis in mesenchymal stem cells via multiple mechanisms. ASBMR, Denver September 2009
- Case N, Sen B, Zou M, Xie Z, O'Conner C, Horowitz M, **Rubin J** Adult MSC respond to mechanical force with an anti-adipogenic and pro-osteoblastic program. ASBMR, Denver September 2009
- Buer Sen, Zhihui Xie, Natasha Case, Maya Styner, Clinton Rubin and **J Rubin** Mechanical inhibition of adipogenesis achieved via a regenerated β -catenin signal is amplified by incorporating a refractory period. ASBMR, Toronto October 2010
- JA Thomas, N Case, M Styner, B Sen, Z Xie, and **J Rubin** Integrin-linked Kinase Contributes to Mechanical Regulation of GSK3 β in Mesenchymal Stem Cells. ASBMR, Toronto October 2010
- M Styner, N Case, B Sen, JA Thomas, Z Xie, and **J Rubin** Attenuation of Adipogenesis by Mechanical Strain Involves Downregulation of C/EBP β ASBMR, Toronto October 2010
- Case N, Thomas J, Sen B, Xie X, Styner M, **Rubin J** Mechanical Regulation of GSK3 β in MSC is Dependent on Akt Activation via Rictor/mTORC2. ASBMR, San Diego October 2011

Gourlay M, Li C, Hammett-Stabler C, Renner J, **Rubin J** FSH is associated with lean mass and fat mass but not with BMD in younger postmenopausal women. ASBMR, San Diego October 2011
Chen X, Hausman B, **Rubin J**, Zhou G, Murakami S, Luo G, Greenfield EM The Protein Kinase Inhibitor (PKI) Gene Family Decreases Osteoblast Differentiation by Terminating Protein Kinase A (PKA) Signaling. ASBMR, San Diego October 2011
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Styner M, Galior K, Case N, Sen B, Xie Z, **Rubin J** Resistance to ER Stress Is Improved via Mechanical Input in MSC. ASBMR, San Diego October 2011

Invited lectures 1997 -

Advances in Bioengineering, San Diego, October 1997
"Biophysical inhibition of osteoclast recruitment"
Third World Congress in Biomechanics, Sapporo Japan, August 5, 1998
"Strain decreases osteoclast recruitment & bone expression of osteoclastogenic proteins in vitro"
Osteoporosis CME at Swiss Hotel, December 3, 1998
"Non-hormonal Causes of Osteoporosis"
"Calcitonin, Vitamin D and Exercise as Treatments for Osteoporosis"
Cardiology Grand Rounds at Emory, November 20, 1998
"Mechanical Regulation of Bone Resorption"
Renal Grand Rounds at Emory, January 19, 1999
"Control of Bone Resorption"
NASA Investigator Program at Morehouse, March 10, 1999
"Control of Bone Resorption"
BMES/EMBS Joint meeting, October 13-16, 1999
"Strain reduces osteoclast recruitment by targeting gene expression"
First Annual Lectureship of the Yale Musculoskeletal Core, New Haven, March 30 2000
"Role of MCSF in osteoclastogenesis"
Emory University Board Review Course July 11 2000
"Calcium Metabolism"
Emory University, Crawford Long Hospital Grand Rounds August 11 2000
"Regulation of bone resorption: Osteoclastogenesis"
American Society of Bone and Mineral Research, Toronto, September 22 2000:
Mechanical Signaling Symposium
"Cellular response to mechanical signals"
University of Maine, Department of Nutrition, January 24, 2001
"Osteoclastogenesis"
Maine Osteoporosis Society January 26 2001
"The structurally sufficient skeleton"
Joint BMES/EMBS meeting, Orlando, February 3 2001
"Biomechanical control of bone gene expression"
Emory University, Resident Conference, April 27 2001
"Exercise and the Skeleton"
Columbus Hospital (Day with Emory) May 14 2001
"Structurally Sufficient Skeleton" (Grand Rounds)
"Osteoclastogenesis 2001" (Noon Hospital Conference)
Endocrinology Division Research Conference July 5 2001
"Mechanical control of osteoclast recruitment"

VA/Atlanta Department of Medicine: Residents Conference July 16 2001
“Hyper and hypocalcemia”

Georgia Tech Bioengineering Program Seminar, September 13 2001
“Mechanical control of bone remodeling”

Emory University, Molecular Endocrinology Seminar September 17 2001
“Glucocorticoids”

Advances in Osteoporosis, Emory University CME, Atlanta Marriott, December 1 2001
“Exercise effects on the skeleton”

University of Michigan, Orthopaedics and Bone Related Research, September 30, 2002
“Biomechanical regulation of gene expression in the skeleton”

Emory University Department of Medicine Grand Rounds, January 28 2003
“Engineering a structurally sufficient skeleton”

Emory University Microchemical Facility and Associates, February 3 2003
“RNA silencing technology: A beginner’s primer”

Greater Atlanta Hadassah, 2nd Annual “Chai” Tea March 23 2003
“Gene Therapy”

Advances in Osteoporosis and Bone Densitometry, April 26, 2003, Swissotel Atlanta
“Exercise, physical forces and bone” & “PTH for anabolic therapy of osteoporosis”

Emory University Internal Medicine Review Course, Westin Atlanta, July 2003
“Hyper and hypocalcemia”

AAOS/NIH Workshop on “Physical Regulation of Skeletal Repair”, September 4-6, 2003, Wye River
Institute, Maryland
“Coordinate mechanical regulation of eNOS and RANKL”

American Society of Bone and Mineral Research: Molecular Biology Workshop, September 20 2003,
Minneapolis MN
“Biomechanical control of osteoclast formation”

Endocrinology Division Research Conference October 29 2003
“Turning mechanical information into clinical signals”

AAOS/NIH Workshop, April 22-25, 2004 Maryland
“How does gender affect the biomechanical response of the skeleton?”

Emory University Primary Care Grand Rounds, May 12 2004
“What is gene therapy?”

Emory University Gene Therapy Group, June 18, 2004
“Understanding lipid rafts”

Emory University Internal Medicine Review Course, Westin Atlanta, July 14 2004
“Hyper and hypocalcemia”

New York City Mineralized Tissue Seminar, City University of New York, Nov 16 2004
“Turning mechanical signals into biological effects”

New York University: Stony Brook, Department of Bioengineering, Stony Brook Nov 17 2004
“Mechanical input: the cell responds”

10th Annual Maine State Symposium on Osteoporosis, Sugarloaf Maine, January 30 2005
“Diseases of Bone Resorption: Osteoclasts Gone Wild”

Stanford University: Seminar in the Musculoskeletal Center at Stanford VA, Feb 29, 2005
“Biomechanical signaling in osteoblasts”

University of Washington: Urology Division, March 9, 2005
“Becoming an osteoclast”

Friends of VA Research, AAMC Headquarters, Washington DC, March 17, 2005
“Career development in the VA: a personal and global view”

Emory University Interdepartmental Endocrine Group Grand Rounds, March 30, 2005
“Biomechanical signaling in the skeleton”

University of Michigan, Metabolism-Endocrinology-Diabetes, April 5, 2005

- “Turning mechanical signals into intracellular events”
University of North Carolina, Endocrinology, August 27, 2005
- “Translation of the mechanical environment into intracellular signals in the skeleton”
University of Delaware, Department of Biological Sciences, October 19, 2005
- “Molecular pathways for mechanical signaling in bone”
Shearith Israel, Sunday with Patients, December 4, 2005
- “Osteoporosis for Patients”
American Association of Clinical Endocrinologists, Southeastern Meeting, Feb 19, 2006
- “What’s new in osteoporosis: Bone Quality”
University of Connecticut Health Sciences Center, Endocrine Scholar Feb 14, 2006
- “Biomechanical signals in bone cells”
University of North Carolina, Department of Biochemistry and Biophysics, May 11, 2006
- “Biomechanical signals in bone cells require activation of H-Ras”
University of North Carolina, Department of Family Medicine, July 24, 2006
- “What’s new in osteoporosis: Bone Quality”
University of North Carolina, Department of Orthopaedics, August 9, 2006
- “New concepts: Bone Quality”
University of North Carolina, Department of Pharmacology Seminar, September 26, 2006
- “Role of HRas-GTPase in mechanical signaling in bone”
Orthopaedics Research Rounds, UNC-CH, October 14, 2006
- “Biomechanical signaling in bone”
Shelby Hospital, North Carolina AHES lecture series, Dec 3, 2006
- “What’s new in osteoporosis”
Duke University, Department of Medicine, Endocrine Grand Rounds Feb 5 2007
- “Bone Quality”
Nash Hospital – Rocky Mount, North Carolina AHES lecture series, Feb 21, 2006
- “What’s new in osteoporosis”
University of North Carolina, Endocrinology Division, February 22, 2007
- “Mechanical control of bone remodeling”
University of North Carolina, Department of Medicine, Division of Geriatrics, March 9, 2007
- “What’s new in osteoporosis”
University of North Carolina, Department of Medicine, Grand Rounds, April 5, 2007
- “Bone Quality: how to make an old topic (osteoporosis) new”
University of Alabama @ Birmingham, Bone Center Scholar May 17, 2007
- “Mechanical induction of a pro-anabolic, anti-catabolic state in bone”
University of North Carolina, Endocrinology Division, September 27, 2007
- “Using the transgenic mouse to understand bone remodeling”
Maine Osteoporosis Conference, Sugarloaf, Maine, January 2008
- “Mechanical activation of canonical β -catenin signaling: effects in bone”
University of North Carolina, Holderness Distinguished Scholars Seminar, Feb 7 2008
- Osteonecrosis of the Jaw – Is it a real threat with bisphosphonates?
University of North Carolina, Medicine Grand Rounds, April 17, 2008
- “New paradigms in osteoporosis”
University of North Carolina, Nephrology Grand Rounds, June 18, 2008
- “A Bone remodeling potpourri”
University of North Carolina, Endocrine Pathophysiology. July 24, 2008
- “Bone structure”
University of North Carolina, MD/PhD Weekend Retreat, August 9, 2008
- “Combining work and life”
Duke University Osteoarthritis PPG, Seminar series

“Mechanical Control of mesenchymal stem cell lineage selection”, October 30, 2008
Emory Division of Endocrinology and Metabolism: The Catherwood Lecture, November 3 2008
“MSC lineage selection”
University of North Carolina, Department of Medicine, Resident Grand Rounds, Feb 23, 2009
“Understanding Osteoporosis”
University of North Carolina, Rheumatology Division, March 20, 2009
“Mechanical Control of Stem Cell Fate”
Wake-Medical Center, AHEC lecture, March 24, 2009
“What’s new in osteoporosis”
University of North Carolina, Department of Medicine Grand Rounds, Sep 3, 2009
“C’est si bon”
Biomechanics and Biology of Bone Regeneration, Wolff Institute, Berlin, November 28, 2009
“Mechanotransduction in bone remodelling.”
University of North Carolina, Department of Medicine, Morbidity and Mortality, Dec 10 2009
“Treatment of Osteoporosis”
University of Alabama Birmingham Center for Metabolic Bone Disease, Symposium, March 31, 2010
“Biomechanical Control of mesenchymal lineage allocation”
University of North Carolina, Department of Medicine, Morbidity and Mortality, April 8 2010
“A perioperative death: HPTH surgery”
Yale University, Musculoskeletal Core Program, April 14, 2010
“Biomechanical regulation of cell fate”
Medical College of Georgia, Regenerative Medicine, May 27 2010
“Biomechanical regulation of MSC lineage allocation”
American Society of Bone and Mineral Research – Webinar July 22, 2010
“Mechanical signals as anabolic agents to bone”
University of North Carolina, Department of Biochemistry, September 7 2010
“Biomechanical regulation of MSC lineage allocation”
American Association of Clinical Endocrinologists – Atlanta GA Dec 5 2010
“C’est si bon”
The Endocrine Society – Boston, National Meeting, June 2011 – Plenary Session
“Anabolic mechanical signaling in bone”

Outstanding Invitations

Duke Endocrinology Grand Rounds, October 2011
Osteoimmunology Society – Corfu, June 2012 – invitation as major speaker