

LANCE EDWARD LANYON

CBE, BVSc, PhD, DSc, FRCVS, F Med Sci.

Biographical data

University appointments

Societies, External Appointments, Committees,
Teaching Responsibilities, Grants, etc.

Funding

Publications - original research articles
- chapters and invited reviews
- published proceedings and abstracts

LANCE EDWARD LANYON

Born London, England, January 4, 1944

Education

1954-1961 Christ's Hospital, Horsham
1961-1966 University of Bristol

Degrees and qualifications.

1966 Bachelor of Veterinary Science, with Honours.
Member of Royal College of Veterinary Surgeons.
1970 Doctor of Philosophy, University of Bristol.
1991 Doctor of Science, University of Bristol.

Current Appointments

Professor Emeritus at the Royal Veterinary College, University of London
Visiting Professor, University of Bristol

Administrative Appointments.

1989-2004 Principal, The Royal Veterinary College, University of London
1997-1999 Pro Vice Chancellor, University of London.
1987-1989 Head of Department of Veterinary Basic Sciences,
The Royal Veterinary College, University of London
1984-1987 Head of Department of Veterinary Anatomy,
The Royal Veterinary College, University of London

Full time Academic Appointments

1989-2004	Professor of Veterinary Anatomy at The Royal Veterinary College, University of London, (personal chair).
1984-1988	Professor of Veterinary Anatomy at The Royal Veterinary College, University of London, (established chair).
1983-1984	Professor, Department of Anatomy and Cellular Biology, Tufts University, Boston, Schools of Medicine, Dental Medicine and Veterinary Medicine and Sackler School of Biomedical Sciences and Department of Veterinary Surgery.
1979-1984	Associate Professor, Department of Anatomy and Cellular Biology, Tufts University, Boston, Schools of Medicine, Dental Medicine and Veterinary Medicine and Sackler School of Biomedical Sciences and Department of Veterinary Surgery.
1979	Reader in Anatomy, University of Bristol.
1967-1979	Lecturer in Veterinary Anatomy, University of Bristol.

Other Academic Appointments

2002-	University College London, Institute of Orthopaedics and Musculo-skeletal Science, Visiting Professor.
1981-1985	Harvard University, Associate in Zoology.
1979&1980	Harvard University, Alexander Agassiz Visiting Lecturer in Zoology
1977-1979	Harvard Medical School, Childrens Hospital Center, Research Fellow in Orthopaedic Surgery.

Miscellaneous

1995	Cabinet Office: Top Management Programme, (TM36),
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Prizes, Honours and Recognition

Royal College of Veterinary Surgeons, Fellowship, 2011.
SunValley Annual Workshop, Bone Remodeling (RIB) Award, 2008.
American Society of Bone and Mineral Research, 2007, William F Neuman Award.
University of Glasgow, Willaim Weipers Memorial Lecturer, 2005.
University of Bristol, Doctor of Science, honoris causa, 2004
Order of the British Empire: Commander; for services to veterinary education and to science, 2001.
Academy of Medical and Biological Sciences: Founder Fellow, 1998
Royal College of Physicians: Bertram Abrams Lecture, 1996.
British Veterinary Association: Wooldridge Lecture, 1996.
British Equine Veterinary Association: Sir Frederick Smith Lecture, 1989.
Royal College of Veterinary Surgeons: Share Jones Lecture, 1989

Committees served

Royal College of Veterinary Surgeons

Council.

Education Committee

Visitations Committees to Universities; Chairman to Glasgow, Liverpool, Edinburgh, Bristol, Cambridge, Pretoria, Nottingham.

Heads of UK Veterinary Schools. 1989- 2004 ,Chairman 1992-1998

University of London

Committee for the External System, Chairman, 1997-1999.

University Council

Executive Committee

Medical Committee

Medical Executive Committee

Institute of Zoology – Management Committee 1989-2000, Chairman 1992-2000.

Wye College - Governing Body -2001.

University of London Union Committee on Student Activities & Management - Chairman, 1996-1999.

London School of Hygiene & Tropical Medicine

- Council

- Board of Governors.

CVCP /Universities UK

Animal Health Trust, Newmarket

Council, 2002 – 2006, 2007-2012

Academy of Medical and Biological Sciences Council, co-opted member 2002-2005

Imperial Cancer Research Foundation

Council, 1990-2000.

Committee on Animal Experimentation and Ethics.

Christ's Hospital, Almoner and Governor, Council 1999-2010

Education Committee, Chairman 2002- 07

Chairman of Governing Body 2007 - 2010

Scientific Societies

British Orthopaedic Research Society

Orthopaedic Research Society (U.S.A)

Bone and Tooth Society.

American Society for Bone and Mineral Research

Doctoral Candidates, Supervised.

- 1975 AE Goodship BVSc (Bristol) PhD MRCVS currently professor, UCL/RVC
- 1978 DG Baggott BVSc (Bristol) PhD MRCVS currently director pharmaceutical co.
- 1981 JA O'Connor BVSc (Bristol) PhD MRCVS currently in general practice
- 1982 CT Rubin (Harvard) AB PhD currently professor, Stony Brook, NY.
- 1989 TM Skerry (London) BVetMed PhD MRCVS currently professor, Univ. Sheffield
- 1989 N Goode (Sydney) BVSc MRCVS currently senior lecturer, RVC
- 1990 S Minter (Bristol) BSc currently Assoc. Professor
- 1992 MJ Pead (London) BVetMed PhD MRCVS currently senior lecturer, RVC
- 1993 A D Torrance (Cambridge) MA VetMB PhD currently commercial pathologist
- 1995 Mingzhao Cheng (Beijing) MD PhD currently lecturer, University Middlesex
- 1995 J Mosley BVM&S PhD currently senior lecturer, University Edinburgh
- 1998 SCF Rawlinson BSc currently postdoc, QMC, Univ. London
- 2000 E Damien BVSc (Kerala, India) currently lecturer, UCL
- 2002 Paula Ehrlich DVM (USA), currently in pharma
- 2003 Karla Lee (Cambridge) MA VetMB, currently lecturer, University Cambridge
- 2007 Victoria Armstrong BSc (University of East Anglia), currently post-doc, RVC
- 2013 Lee Meakin, MA VetMB (Cambr) currently Clinical Resident University Bristol, jointly with Jo price
- 2013 Gabriel Galea currently veterinary undergraduate, jointly with Jo Price.

PROGRAMME GRANTS.

The Wellcome Trust.

2005-2011. £1,560,959. Adaptive control of bone strength, common pathways for the effects of loading, estrogen and PTH.

1999-2005. £1,139,968. Bone's adaptive responses to mechanical loading: mechanisms, objectives and potential for amplification.

1993-1998. £390,328. Study of the control of osteogenesis by mechanical loading; the influence of oestrogen and the significance to postmenopausal women.

1988-1993. £214,112. Load-bearing control of cell behaviour in bone tissue. The mechanism for functionally adaptive control of bone architecture. With Joanna Price.

PROJECT AND OTHER GRANTS 1990-

UNITED KINGDOM- Research Councils and UK Charities

The Wellcome Trust

1997-2000, £79,645. Role of ion channels in bone cells.

1995-1998. £167,168. Mechanical loadbearing as a controlling influence on bone strength. Veterinary Postdoctoral Research Fellowship to John Mosley.

1994-1997. £57,065 Study of loading history as a controlling influence on the architecture and fracture resistance of limb bones. Veterinary Training Scholarship

1994-1996. £110,985. Study of cytokines, oestrogens and bone cell biology.

Medical Research Council

1996-1999. £163,548. Estrogen's role in bone's adaptive response to load-bearing.

1992-1995. £114,656. The cellular mechanism of mechanically-adaptive bone remodelling and their significance in osteoporosis.

1990-1992. £89,697. Significance of strain-related functionally adaptive bone remodelling.

1988-1991. £88,090. The mechanisms and clinical significance of strain-related functionally adaptive bone remodelling.

BBSRC

1997-2000 £143,912. Early strain-related control mechanisms in bone's functionally adaptive response to load-bearing.

1993-1996 £257,720. Mechanism controlling fracture resistance in avian and mammalian bone during growth and production.

Wolfson Foundation

1989-1992 £58,500 Wolfson Research Award for senior staff with major administrative commitments..

Horse Race Betting Levy Board

1996-1997 £43,931. Validation of biochemical markers of bone metabolism as indicators of skeletal adaptation to exercise in 2-year old Thoroughbreds.

Home of Rest for Horses

1993-1996 £70,000. Study of biochemical markers of bone and connective tissue turnover, potential application to the diagnosis and prevention of skeletal disease.

INDUSTRY

Eli Lilly

2000-2002, US\$ 265,000 The use of Selective Estrogen Receptor Modulators to modulate strain related effects on bone cells.

PUBLICATIONS

ORIGINAL RESEARCH ARTICLES IN PEER REVIEWED JOURNALS.

Lanyon LE. & Smith RN (1969). Measurement of bone strain in the walking animal. Research in Veterinary Science 10, 93-94.

Lanyon LE & Smith RN (1970) Bone strain in the tibia during normal quadrupedal locomotion. Acta Orthopaedica Scandinavia 41, 238-248.

Lanyon LE (1971) Strain in sheep lumbar vertebrae recorded during life. Acta Orthopaedica Scandinavia 42, 102-112.

Lanyon LE (1971) Use of an accelerometer in determining support and swing phases of a limb during locomotion. American J. of Veterinary Research 32, 1099-1101.

Lanyon LE (1972) In vivo bone strain recorded from thoracic vertebrae in sheep. J of Biomechanics 5, 277-281.

Lanyon LE (1973) Analysis of surface bone strain in the calcaneus of sheep during normal locomotion. J. Biomechanics 6, 41-49.

Lanyon LE (1974) Experimental support for the trajectorial theory of bone structure. J. Bone & Joint Surgery 56B, 160-166.

Clark EA Goodship AE & Lanyon LE (1974) Locomotor bone strain as the stimulus for bone's mechanical adaptability. J Physiology 245, 57p.

Lanyon LE Hampson WGJ Goodship AE & Shah JS (1975) Bone deformation recorded in vivo from strain gauges attached to the human tibial shaft. Acta Orthop Scand 46, 256-268.

Lanyon LE & Baggott DG (1976) Mechanical function as an influence on the structure and form of bone. J. Bone & Joint Surgery 58B, 436-443.

Lanyon LE (1976) The measurement of bone strain in vivo. Acta Orthop Belg 42, Suppl 1 98-108.

Lanyon LE & Hartman W (1977) Strain related electrical potentials recorded in vitro and in vivo. Calcified Tissue Research 22, 315-327.

Baggott DG & Lanyon LE (1977) An independent 'post mortem' calibration of electrical resistance strain gauges bonded to bone surfaces 'in vivo'. J. Biomechanics 10, 615-622.

Lanyon LE Magee PT & Baggott DG (1979) The relationship of functional stress and strain to the processes of bone remodelling. An experimental study on the sheep radius. J. Biomechanics 12, 593-600.

Goodship AE Lanyon LE & McFie H (1979). Functional adaptation of bone to increased stress. J. Bone and Joint Surgery 61-A, 539-546.

Lanyon LE & Bourn S (1979). The influence of mechanical function on the development and remodelling of the tibia. An experimental study in sheep. J. Bone and Joint Surgery 61-A, 263-273.

Lauder GV Jr & Lanyon LE (1980) Functional anatomy of feeding in the Bluegill Sunfish Lepomis Macrochirus: In vivo measurements of bone strain. J. Experimental Biology 84, 33-35.

Lanyon LE (1980) The influence of function on the development of bone curvature. An experimental study on the rat tibia. J. Zoology 192, 457-466.

Lanyon LE Paul IL Rubin CT Thrasher EL Delaura R Rose RM & Radin EL (1981). In vivo strain measurements from bone and prosthesis following total hip replacement. An experimental study in sheep. J. Bone and Joint Surgery 63A 989-1002.

Baggott DG Goodship AE & Lanyon LE (1981) A quantitative assessment of compression plate fixation in vivo. An experimental study using the sheep radius. J. Biomechanics 14 701-711.

Lanyon LE Goodship AE Pye CJ & MacFie H (1982) Mechanically adaptive bone remodelling. A quantitative study on functional adaptation in the radius following ulna osteotomy in sheep. J. Biomechanics 15 141-154.

Radin EL Rubin CT Thrasher EL Lanyon LE Crugnola AM Schiller AS Paul IL & Rore RM (1982) Changes in the Bone-Cement Interface after Total Hip Replacement. An in vivo animal study. *J. Bone and Joint Surgery* 64-A, 1188-1200.

O'Connor JA Lanyon LE & MacFie H (1982) The influence of strain rate on adaptive bone remodelling. *J. Biomechanics* 15 767-781.

Rubin CT & Lanyon LE (1982). Limb mechanics as a function of speed and gait: A study of functional strain in the radius and tibia of horse and dog. *J. Experimental Biology* 101 187-211.

Silver IA Brown PN Goodship AE Lanyon LE McCullagh KG Perry, GC and Williams IF (1983). A clinical and experimental study of tendon injury, healing and treatment of the horse. *Equine Veterinary J. Suppl* 1.

Biewener AA Thomason J & Lanyon LE (1983). Bone stress in the horse forelimb during locomotion at different gaits: a comparison of two experimental methods. *J. Biomechanics* 16 565-576.

Biewener AA Thomason J & Lanyon LE (1983). Mechanics of locomotion and jumping in the forelimb of the horse (*Equus*): in vivo stress developed in the radius and metacarpus. *J. Zoology (London)* 201 67-82.

Goodship AE Brown PN MacFie HJH Lanyon LE & Silver IA (1983). A quantitative force plate assessment of equine locomotor performance. *Equine Exercise Physiology*, p.263-270.

Lanyon LE & Rubin CT (1984). Static versus dynamic loads as an influence on bone remodelling. *J. Biomechanics* 17 892-905.

Rubin CT & Lanyon LE (1984) Regulation of bone formation by applied dynamic loads. *J. Bone and Joint Surgery* 66A, 397-402.

Rubin CT & Lanyon LE (1984) Dynamic strain similarity in vertebrates: an alternative to allometric limb bone scaling. *J. Theoretical Biology* 107 321-327.

Lanyon LE (1984) Functional strain as a determinant for bone remodeling. *Calcified Tissue Int.* 36 S56-S61.

Rubin CT & Lanyon LE (1985) Regulation of bone mass by mechanical strain magnitude. *Calcified Tissue Int.* 37 411-417.

Lanyon LE Rubin CT & Baust G (1986) Modulation of bone loss during calcium insufficiency by controlled dynamic loading. *Calcified Tissue Int.* 38 209-216.

Rubin CT Pratt GW Porter AM Lanyon LE & Poss R (1987) The use of ultrasound in

vivo to determine acute change in the mechanical properties of bone following intense physical activity. J. Biomechanics 20 723-727.

Biewener AA Thomason JJ & Lanyon LE (1988) Mechanics of locomotion and jumping in the horse (Equus): in vivo strains in the tibia and metatarsus. J of Zoology London 214: 547-565.

Rubin CT Pratt GW Jr Porter AL Lanyon LE & Poss R (1988) Ultrasonic measurement of Immobilization-Induced Osteopenia: An Experimental Study in Sheep. Calcified Tissue Int. 42 309-312.

Skerry TM Bitensky L Chayen J & Lanyon L E (1988) Loading-related reorientation of bone proteoglycans. A strain memory in bone tissue? J Orthopaedic Research 6: 542-551.

Pead MJ Suswillo R Skerry TM Vedi S & Lanyon LE (1988) Increased ³H uridine levels in osteocytes following a single short period of dynamic bone loading in vivo. Calcified Tissue Int. 43 92-96.

Pead MJ Skerry TM & Lanyon LE (1988) Direct transformation from quiescence to bone formation in the adult periosteum following a single brief period of bone loading. J Bone & Mineral Research 3 647-656.

Skerry TM Bitensky L Chayen J and Lanyon LE (1989) Early strain-related changes in enzyme activity in osteocytes following bone loading in vivo. J Bone & Mineral Research 4 783-788.

Pead MJ & Lanyon LE Indomethacin modulation of load-related stimulation of new bone formation in vivo. Calcified Tissue Int. 45 34-40.

Rubin CT McLeod KJ Lanyon LE (1989) Prevention of osteoporosis by pulsed electromagnetic fields. J Bone & Joint Surgery 71-A 411-418.

El Haj AJ Minter SL Rawlinson SCF Suswillo R & Lanyon LE (1990) Cellular responses to mechanical loading in vitro. J Bone & Mineral Research 5 923-932.

Skerry TM Suswillo AJ El Haj AJ Ali NN Dodds RA & Lanyon LE (1990) Load-induced proteoglycan orientation in bone tissue in vivo and in vitro. Calcified Tissue Int. 46: 318-326.

Skerry TM Pead MJ & Lanyon LE (1991) Modulation of bone loss during disuse by pulsed electromagnetic fields. J. Orthopaedic Research 9 600-608.

Rawlinson SCF El-Haj AJ Minter SL Tavares IA Bennett A & Lanyon LE (1991) Loading-related increases in prostaglandin production in cores of adult canine cancellous bone in vitro: A role for prostacyclin in adaptive bone remodeling?

J Bone & Mineral Research 6 1345-1351.

Zaman G, Dallas SL & Lanyon LE (1992) Cultured embryonic bone shafts show osteogenic responses to mechanical loading. *Calcified Tissue Int.* 51: 132-136.

Riggs CM, Lanyon LE & Boyde A (1993) Functional associations between collagen fibre orientation and locomotor strain direction in cortical bone of the equine radius. *Anat Embryol* 187 231-238.

Skerry TM & Lanyon LE (1993) Immobilisation induced bone loss in the sheep is **not** modulated by calcitonin treatment. *Bone* 14 511-516.

Riggs CM Vaughan LC Evans GP Lanyon LE & Boyde A (1993) Mechanical implications of collagen fibre orientation in cortical bone of the equine radius. *Anat Embryol* 187 239-248

Riggs CM Vaughan LC Evans GP Lanyon LE & Boyde A (1993) Mechanical implications of collagen fibre orientation in cortical bone of the equine radius. *Anat Embryol* 187 239-248

Rawlinson SCF Mohan Subbaraman Baylink DJ & Lanyon LE (1993) Exogenous prostacyclin, but not prostaglandin E2, produces similar responses in both G6PD activity and RNA production as mechanical loading, and increases IGF-II release, in adult cancellous bone in culture. *Calcified Tissue Int.* 53: 324-329.

Dallas SL Zaman G Pead MJ & Lanyon LE (1993) Early strain-related changes in cultured embryonic chick tibiotarsi parallel those associated with adaptive modeling in vivo. *J Bone & Mineral Research* 8: 251-259.

Dodds RA Ali N Pead MJ & Lanyon LE (1993) Early loading-related changes in the activity of glucose 6 phosphate dehydrogenase and alkaline phosphatase in osteocytes and periosteal osteoblasts in rat fibulae in vivo. *J Bone & Mineral Research* 8: 261-267.

Cheng MZ Zaman G & Lanyon LE (1994) Estrogen enhances the stimulation of bone collagen synthesis by loading and exogenous prostacyclin, but not prostaglandin E2, in organ cultures of rat ulnae. *J Bone & Mineral Research* 9: 805-816.

Torrance AG Mosley JR Suswillo RFL & Lanyon LE (1994) Noninvasive loading of the rat ulna in vivo induces a strain-related modeling response uncomplicated by trauma or periosteal pressure. *Calcified Tissue Int.* 54 241-247.

Skerry TM & Lanyon LE (1995) Interruption of disuse by short duration walking exercise does not prevent bone loss in the sheep calcaneus. *Bone* 16: 269-274.

Rawlinson SCF Mosley JR Suswillo RFL Pitsillides AA & Lanyon LE. (1995) Calvarial and limb bone cells in organ and monolayer culture do not show the same early responses

to dynamic mechanical strain. *J Bone & Mineral Research* 10: 1225-1232.

Price JS Jackson B Eastell R Goodship AE Blumsohn A Wright Stoneham S Lanyon LE & Russell RGG (1995) Age related changes in biochemical markers of bone metabolism in horses. *Equine Vet J* 27: 201-207.

Thomas T Skerry TM Vico L Caulin F Lanyon L E Alexandre C (1995) Ineffectiveness of Calcitonin on a Local-Disuse Osteoporosis in the Sheep: A Histomorphometric Study. *Calcified Tissue Int.* 57: 224-228.

Pitsillides AA Rawlinson SCF Suswillo RFL Bourrin S Zaman G & Lanyon LE (1995) Mechanical strain-induced NO production by bone cells: a possible role in adaptive bone (re)modeling? *FASEB* 9:1614-1622

Price JS Jackson B Eastell R Wilson AM Russell RGG Lanyon LE and Goodship AE (1995) The response of the skeleton to physical training: A biochemical study in horses. *Bone* 17: 221-229.

Cheng MZ Zaman G Rawlinson SCF Suswillo RFL & Lanyon LE. (1996) Mechanical Loading and Sex Hormone Interactions in Organ Cultures of Rat Ulna. *J Bone & Mineral Research* 11: 502-511.

Jackson B Eastell R Lanyon LE Russell RGG and Price JS (1996) The measurement of bone specific alkaline phosphatase in the horse: A comparison of two techniques. *Research in Veterinary Science* 61: 160-164.

Webb CMB Zaman G Mosley JR Tucker RP Lanyon LE & Mackie EJ (1997) Expression of Tenascin-C in bones responding to mechanical load. *J. Bone & Mineral Research* 12:52-58.

Rawlinson SCF Pitsillides AA & Lanyon LE. (1996) Involvement of different ion channels in osteoblasts' and osteocytes' early responses to mechanical strain. *Bone* 19:609-614.

Mosley JR March BM Lynch J Lanyon LE (1997) Strain magnitude-related changes in whole bone architecture in growing rats. *Bone* 20: 191-198.

Zaman G Suswillo RFL Cheng MZ Tavares IA Lanyon LE (1997) Early responses to dynamic strain change and prostaglandins in bone-derived cells in culture. *J Bone & Mineral Research* 12, 769-777.

Cheng MZ Zaman G Rawlinson SCF Pitsillides AA Suswillo RFL & Lanyon L. (1997) Enhancement by sex hormones of the osteoregulatory effects of mechanical loading and prostaglandins in explants of rat ulnae. *J Bone & Mineral Research* 12: 1424-1430.

Noel LS Champion BR Holley CL Simmons CJ Morris DC Payne JA Lean JM Chambers TJ Zaman G Lanyon LE Suva LJ & Miller LR. 1998. RoBo-1, a Novel

Member of the Urokinase Plasminogen Activator Receptor/CD59/Ly-6/Snake Toxin Family Selectively Expressed in Rat Bone and Growth Plate Cartilage. *J Biological Chemistry* 273: no 7 3878-3883.

Damien E, Price JS, Lanyon LE (1998) The estrogen receptor's involvement in osteoblasts' adaptive response to mechanical strain. *J Bone & Mineral Research* 13: 1275-1282.

Mosley JR & Lanyon LE (1998) Strain rate as a controlling influence on adaptive modeling in response to dynamic loading of the ulna in growing male rats. *Bone* 23:313-318.

Rawlinson SCF Zaman G Mosley JR Pitsillides AA & Lanyon LE. (1998) Heme oxygenase isozymes in bone: induction of HO-1 mRNA following physiological levels of mechanical loading in vivo. *Bone* 23: 433-436.

Zaman G Pitsillides AA Rawlinson SCF Suswillo RFL Mosley JR Cheng MZ Platts LAM Hukkanen M Polak JM & Lanyon LE. (1999) Mechanical Strain stimulates nitric oxide production by rapid activation of endothelial nitric oxide synthase in osteocytes. *J Bone & Mineral Research* 14:1123-1131.

Cheng MZ Zaman G Rawlinson SCF Mohan S Baylink DJ & Lanyon L (1999) Mechanical strain stimulates ROS cell proliferation through IGF-11 and estrogen through IGF-1. *J Bone & Mineral Research* 14:1742-1750.

Pitsillides AA, Rawlinson SCF, Mosley JR & Lanyon LE (1999) Bone's early responses to mechanical loading differ in distinct genetic strains of chick: selection for enhanced growth reduces skeletal adaptability *J Bone & Mineral Research* 14:980-987

Damien E, Price JS, & Lanyon LE 2000 Mechanical strain stimulates proliferation through the estrogen receptor in males as well as females. *Journal of Bone and Mineral Research* 15:2169-2178

Zaman G, Cheng MZ, Jessop HL, White R, & Lanyon LE 2000 Mechanical strain activates estrogen response elements in bone cells. *Bone* 27:233-239.

Rawlinson SCF, Wheeler-Jones CPD & Lanyon LE 2000 Arachidonic acid for loading induced prostacyclin and prostaglandin E₂ release from osteoblasts and osteocytes is derived from the activities of different forms of phospholipase A₂ *Bone* 27:241-247.

Jessop HL, Sjoberg M, Cheng MZ, Zaman G, Wheeler-Jones CPD & Lanyon LE, 2001, Mechanical strain and estrogen activate estrogen receptor α in bone cells. *Journal of Bone and Mineral Research* 16:1045-1056.

Mosley JR & Lanyon LE, 2002, Growth rate rather than gender determines the size of the adaptive response of the growing skeleton to mechanical strain. *Bone* 30:314-320.

Jessop HL, Rawlinson SCF, Pitsillides AA, & Lanyon LE, 2002, Mechanical strain and fluid movement both activate ERK in osteoblast-like cells but via different signalling pathways. *Bone* 31:186-194

Ehrlich PJ, Noble BS, Jessop HL, Stevens HY, Mosley JR, & Lanyon LE, 2002, The effect of in vivo mechanical loading on estrogen receptor α expression in rat ulnar osteocytes. *Journal of Bone and Mineral Research* 17:1646-1655

Cheng MZ, Rawlinson SCF, Pitsillides AA, Zaman G, Mohan S, Baylink DJ & Lanyon LE, 2002, Human osteoblasts' proliferative response to strain and estrogen are mediated by the estrogen receptor and the receptor for IGF-I. *Journal of Bone and Mineral Research* 17:593-603.

Lee KCL, Maxwell A, and Lanyon LE, 2002 Validation of a technique for studying functional adaptation of the mouse ulna in response to mechanical loading. *Bone* 31:407-412.

Noble BS, Peet N, Stevens HY, Brabbs A, Mosley JR, Reilly GC, Reeve R, Skerry TM, Lanyon LE, 2003 Mechanical loading: biphasic osteocyte survival and targeting of osteoclasts for bone destruction in rat cortical bone. *American Journal of Cell Physiology* 284:

Lee K, Jessop H, Suswillo R, Zaman G, Lanyon L 2003, Bone adaptation requires oestrogen receptor- α . *Nature* 424:389.

Jessop HL; Suswillo RFL; Rawlinson SCF; Zaman G; Lee K; Das-Gupta V; Pitsillides AA; Lanyon LE, 2004, Osteoblast-like cells from mice lacking Estrogen Receptor α have deficient responses to mechanical strain. *Journal of Bone & Mineral Research* 19:938-946.

Lee KCL, Jessop H, Suswillo R, Zaman G and Lanyon LE, (2004) The adaptive response of bone to mechanical loading in female transgenic mice is deficient in the absence of oestrogen receptor- α and - β . *Journal of Endocrinology* 182:193-201.

De Souza, RL, Pitsillides AA, Lanyon LE, Skerry TM Chenu C (2005) Sympathetic nervous system does not mediate the load-induced cortical new bone formation. *Journal of Bone and Mineral Research* 20: 2159-2168

De Souza RL, Matsuura M, Eckstein F, Rawlinson SC, Lanyon LE, Pitsillides AA (2005) Non-invasive axial loading of mouse tibiae increases cortical bone formation and modifies trabecular organization: A new model to study cortical and cancellous compartments in a single loaded element. *Bone* 37:810-818.

Zaman G, Jessop HL, Muzylak M, DeSouza R, Pitsillides A, Price JS, Lanyon LE (2006) Osteocytes use estrogen receptor α to respond to strain but their ER α content is regulated by estrogen. *Journal of Bone & Mineral Research* 21:1297-1306.

Verheyen K, Price J, Lanyon L, Wood J (2006) Exercise distance and speed affect the risk of fracture in racehorses. *Bone* 39:1322-1330.

Armstrong VJ, Muzylak M, Sunters A, Zaman G, Saxon LK, Price JS, Lanyon LE, (2007) Wnt/ β -catenin signaling is a component of osteoblastic bone cells' early responses to load-bearing and requires Estrogen Receptor α . *Journal of Biological Chemistry* 282:20715-20727.

Sugiyama T, Saxon LK, Zaman G, Moustafa A, Sunters A, Price JS, Lanyon LE. Mechanical loading enhances the anabolic effects of intermittent parathyroid hormone (1-34) on trabecular and cortical bone in mice. *Bone* 43: 238-248, 2008

Moustafa A, Sugiyama T, Saxon LK, Zaman G, Sunters A, Armstrong VJ, Javaheri B, Lanyon LE, Price JS. The mouse fibula as a suitable bone for the study of functional adaptation to mechanical loading. *Bone* 44: 930-935, 2009

Skerry TM, Lanyon LE. Systemic and contralateral responses to loading of bones. *J. Bone Miner. Res.* 2009Apr.;24(4):753; authorreply754.

Sugiyama T, Price JS, Lanyon LE. Functional adaptation to mechanical loading in both cortical and cancellous bone is controlled locally and is confined to the loaded bones. *Bone* 2010Feb.;46(2):314–21

Zaman G, Saxon L, Sunters A, Hilton H, Underhill P, Williams D, Price J Lanyon L, Loading-related regulation of gene expression in bone in the contexts of estrogen deficiency, lack of estrogen receptor α and disuse (2009) *Bone*. 2010Mar.;46(3):628–42

Andrew Sunters, Victoria J. Armstrong, Gul Zaman, Robert M. Kypta, Yoshiaki Kawano, Lance E. Lanyon and Joanna S. Price. Mechano-transduction in osteoblastic cells involves strain-regulated, Estrogen Receptor α -mediated, control of IGF-IR sensitivity to ambient IGF, leading to PI3-K/ AKT dependent, Wnt/LRP5 receptor-independent activation of β -catenin signaling. *J Biological Chemistry* 2010 Mar.19;285(12):8743–58.

Sugiyama T, Galea GL, Lanyon LE, Price JS. Mechanical loading-related bone gain is enhanced by tamoxifen but unaffected by fulvestrant in female mice. *Endocrinology*. 2010Dec.;151(12):5582–90

Moustafa A, Sugiyama T, Prasad J, Zaman G, Gross TS, Lanyon LE, et al. Mechanical loading-related changes in osteocyte sclerostin expression in mice are more closely associated with the subsequent osteogenic response than the peak strains engendered. *Osteoporos Int*. 2011May15

Price JS, Sugiyama T, Galea GL, Meakin LB, Sunters A, Lanyon LE. Role of endocrine and paracrine factors in the adaptation of bone to mechanical loading. *Curr Osteoporos Rep*. 2011Jun.;9(2):76–82.

Sugiyama T, Meakin LB, Galea GL, Jackson BF, Lanyon LE, Ebetino FH, et al. Risedronate does not reduce mechanical loading-related increases in cortical and trabecular bone mass in

mice. *Bone*. 2011Jul.;49(1):133–9.

Saxon LK, Jackson BF, Sugiyama T, Lanyon LE, Price JS. Analysis of multiple bone responses to graded strains above functional levels, and to disuse, in mice in vivo show that the human Lrp5 G171V High Bone Mass mutation increases the osteogenic response to loading but that lack of Lrp5 activity reduces it. *Bone*. 2011Aug.;49(2):184–93

Galea GL, Sunters A, Meakin LB, Zaman G, Sugiyama T, Lanyon LE, et al. Sost down-regulation by mechanical strain in human osteoblastic cells involves PGE2 signaling via EP4. *FEBS Lett*. 2011Aug.4;585(15):2450–4.

Zaman G, Sunters A, Galea GL, Javaheri B, Saxon LK, Moustafa A, et al. Loading-related regulation of transcription factor EGR2/Krox-20 in bone cells is ERK1/2 protein-mediated and prostaglandin, Wnt signaling pathway-, and insulin-like growth factor-I axis-dependent. *J. Biol. Chem*. 2012Feb.3;287(6):3946–62.

Sugiyama T, Meakin LB, Galea GL, Lanyon LE, Price JS. The cyclooxygenase-2 selective inhibitor NS-398 does not influence trabecular or cortical bone gain resulting from repeated mechanical loading in female mice. *Osteoporos Int*. 2012Feb.14.

Saxon LK, Galea G, Meakin L, Price J, Lanyon LE. Estrogen receptors α and β have different gender-dependent effects on the adaptive responses to load bearing in cancellous and cortical bone. *Endocrinology*. 2012May;153(5):2254–66.

Javaheri B, Sunters A, Zaman G, Suswillo RFL, Saxon LK, Lanyon LE, et al. Lrp5 Is Not Required for the Proliferative Response of Osteoblasts to Strain but Regulates Proliferation and Apoptosis in a Cell Autonomous Manner. Marie PJ, editor. *PLoS ONE*. 2012May2;7(5):e35726.

Sugiyama T, Meakin LB, Browne WJ, Galea GL, Price JS, Lanyon LE. Bones' adaptive response to mechanical loading is essentially linear between the low strains associated with disuse and the high strains associated with the lamellar/woven bone transition. *J. Bone Miner. Res*. 2012 Aug.;27(8):1784–93.

Galea GL, Meakin LB, Sugiyama T, Zebda N, Sunters A, Taipaleenmaki H, Stein GS, van Wijnen AJ, Lanyon LE, **Price JS**. (2013) Estrogen receptor α mediates proliferation of osteoblastic cells stimulated by estrogen and mechanical strain, but their acute down-regulation of the Wnt Antagonist Sost is mediated by Estrogen Receptor β . *Journal of Biological Chemistry* 288(13), 9035-48.

Meakin LB, Sugiyama T, Galea GL, Browne WJ, Lanyon LE, **Price JS**. (2013) Male mice housed in groups engage in frequent fighting and show a lower response to additional bone loading than females or individually housed males that do not fight. *Bone* 54(1):113-7.

Windahl S, Saxon L, Börjesson A, Lagerquist M, Frenkel B, Henning P, et al. Estrogen receptor- α is required for the osteogenic response to mechanical loading in a ligand-

independent manner involving its activation function 1 but not 2. J. Bone Miner. Res. 2012 Sep.12.

CHAPTERS IN BOOKS AND INVITED REVIEWS

Lanyon LE (1972) The prospect of encouraging osteogenesis. Veterinary Annual, p 126-129.

Lanyon LE Goodship AE & Baggott D.G. (1976). The significance of bone strain in vivo. Acta orthop belg 42, Suppl 1 109-123.

Lanyon L E O'Connor JA & Goodship AE (1977) The importance of physiological relevance in biomechanical experiments. Letter to the Editor, Journal of Biomechanics 10 611-612.

Lanyon LE (1982). Mechanical function and bone remodelling. In "Bone in Clinical Orthopaedics". Editor, G.Sumner-Smith, WB Saunders, Philadelphia.

Lanyon LE (1981) Locomotor loading and functional adaptation in limb bones. In "Vertebrate Locomotion". Editor, MH Day. Academic Press, London. Symposia of the Zoological Society of Lond 48 305-329.

Lanyon LE (1981) The influence of mechanical stress on bone remodelling. In "Mechanical Factors and the Skeleton" Ed. IAF Stokes, John Libbey & Co London.

O'Connor JA Rubin CT & Lanyon LE (1981). The effect of artificial load regimes on bone remodelling. In "Mechanical Factors and the Skeleton". Ed IAF Stokes, John Libbey & Co London.

Lanyon LE (1980) Bone remodelling, mechanical stress and osteoporosis. In "Osteoporosis: Recent Advances in Pathogenesis and Treatment". Eds. HF DeLuca HM Frost WS Jee CC Johnston and AM Parfitt. University Park Press, Maryland.

Lanyon LE (1981). The measurement and biological significance of bone strain in vivo p93-105. In 'Mechanical Properties of Bone' Ed SC Cowin ASME. Applied Mechanics Symposia Series, AMD Vol 45.

Lanyon LE (1982) Osteoporosis and mechanically related bone remodelling. In Osteoporosis and Related Bone Diseases, Editors J.Menczel GC Rubin and M Makin Wiley Medical Publications, John Wiley and Sons, Westchester, NY.

Lanyon LE Rubin CT Goodship AE & O'Connor JA (1982). The stimulus for mechanically adaptive bone remodelling. In Osteoporosis and Related Bone Diseases, Editors J Menczel GC Rubin & M Makin, Wiley Medical Publications, John Wiley and

Sons Westchester NY

Radin EL & Lanyon LE (1982) The effects of ageing on the skeleton. In Lectures on Gerontology Vol IB p379-405 Editor A Viidik Academic Press London.

Lanyon LE & Rubin CT (1982) Regulation of bone mass in response to physical activity p51-61. In: Osteoporosis A Multi Disciplinary Problem Ed ASJ Dixon Royal Society of Medicine International Congress & Symposium Series No 55 Academic Press Inc (London) Ltd and the Royal Society of Medicine.

Lanyon LE (1983) Functionally induced strain as an influence on remodelling in bones with and without prostheses. Proceedings NIH/AAOA Workshop on the Implant Interface.

Lanyon LE & Rubin CT (1983) Regulation of Bone Remodelling in Response to Functional Load Bearing p.183-185. In Clinical Disorders of Bone and Mineral Metabolism. Boy Frame & John T Potts Jr. International Congress Series 617.

Lanyon LE (1984) Functional Strain as a Determinant for Bone Remodelling. Calcified Tissue International 36: S56-S61.

Lanyon LE & Rubin CT (1985). Functional adaptation and structural properties of body tissues. In Functional Vertebrate Morphology. Ed M Hildebrande Harvard University Press.

Lanyon LE (1985) Functional Adaptation to Load Bearing in Bone Tissue. In Bone Fragility in Orthopaedics and Medicine. Eds HK Uhthoff and ZFG Jaworski. Springer Verlag Berlin.

Lanyon LE (1986) The Interaction of Nutrition and Load-Bearing in Maintaining the Structural Integrity of the Skeleton. In Nutritional Diseases: Research Directions in Comparative Pathobiology. Alan R Liss, New York.

Rubin CT & Lanyon LE (1987). Osteoregulatory nature of mechanical stimuli: Function as a determinant for adaptive remodelling in bone. Kappa Delta Award Paper. Journal of Orthopaedic Research 5: 300-313.

Lanyon LE (1987) Functional strain in bone tissue as an objective and controlling stimulus for adaptive bone remodellings. Journal of Biomechanics. 20: 1083-1093.

Lanyon LE in Bone Matrix and Bone Specific Products. Editor, B.K. Hall, Telford Press, New Jersey.

Lanyon LE (1989) The Equine Skeleton, in Equine Sports Medicine. 53-58. Lea & Febiger 1989.

Lanyon LE (1990) Functional load-bearing as a controlling influence on bone

modelling/remodelling, and thus a determinant for bone mass and architecture. In *The Interface Between Cell and Tissue Biology*, Ed H. Takahashi, Niigata, Japan.

Lanyon LE (1990) The relationship between functional loading and bone architecture, in *Primate Life History and Evolution*. 269-284. Wiley-Liss Inc.

Lanyon LE (1990) Bone loading-the functional determinant of bone architecture and a physiological contributor to the prevention of osteoporosis In *Osteoporosis* 63-78. Royal College of Physicians Ed Roger Smith.

Lanyon LE (1991) The influence of functional loadbearing on bone architecture in *Biological Mechanisms of Tooth Movement and Craniofacial Adaptation* 195-199. Ohio State University, College of Dentistry Ed Zeev Davidovitch.

Lanyon LE (1989) Bone: The Architecture of Bone and How it is Influenced by External Loading in *Implant Bone Interface*. 101-113 Springer-Verlag London Ed John Older

Zaman G Dallas SL and Lanyon LE (1992) Cultured embryonic bone shafts show osteogenic responses to mechanical loading. *Cal Tiss Int* 51 132-136.

Lanyon LE (1992) The success and failure of the Adaptive response to functional load-bearing in averting bone fracture. *Bone* 13: S17-21.

Lanyon LE (1992) Control of bone architecture by functional load-bearing. *J Bone Mineral Res* 7 Suppl2 S369-S375.

Lanyon LE (1993) Skeletal Responses to Physical Loading in *Handbook of Experimental Pharmacology*, Vol 107 Physiology and Pharmacology of Bone 485-505. Springer-Verlag Berlin Heidelberg Ed GR Mundy/T J Martin.

Lanyon LE (1993) Osteocytes, Strain Detection, Bone Modeling and Remodeling. *Calcified Tissue Int* 53: S102-107.

Pead MJ & Lanyon LE (1993) Considerations in achieving peak bone mass. In: *Progress in Endocrinology*. Eds Mornex R Jaffiol C & Leclere J. Parthenon, Carnforth, England pp 418-422.

Lanyon LE & Pead MJ Mechanical function and bone remodelling. In: *Bone in Clinical Orthopaedics*. Ed Sumner-Smith G WB Saunders.

Lanyon LE (1993) Functional loadbearing as a controlling influence for fracture resistance in the skeleton. In *Bone Biology and Skeletal Disorders in Poultry* (Ed CC Whitehead), Carfax Publishing Co, Oxford.

Lanyon LE (1993) A new National Veterinary Curriculum by Evolution In *The Advancement of Veterinary Science (The Bicentenary Symposium Series)*, 2 13-17 (Ed A R Michell), CAB International, Wallingford, Oxon.

Lanyon LE (1993) Skeletal Responses to Physical Loading, In Handbook of Experimental Pharmacology. Physiology and Pharmacology of Bone (Eds G R Mundy and T J Martin), 107 Springer-Verlag.

Lanyon LE (1993) Architecture et resistance mecanique osseuses. In Acquisitions Rhumatologiques (Eds C Marcelli and J-L Sebert). Masson, France.

Lanyon LE (1994) Mechanically sensitive cells in bone In Biomechanics and Cells. p 178-186. Ed F Lyall & A J El Haj. Cambridge University Press.

Cheng MZ Zaman G Rawlinson SCF Suswillo RFL and Lanyon LE (1995) Interaction between mechanical loading and sex hormones in organ culture of rat ulna in: Advances in Osteoporosis Ed. Z Liu and Y Xue. Int. Academic Publishers. pp 183-185.

Cheng MZ Zaman G Rawlinson SCF Suswillo RFL and Lanyon LE (1995) Interaction between mechanical loading and sex hormones in organ culture of rat ulna. Advances in Osteoporosis 2, 183-186.

Mosley JR Lynch J and Lanyon LE (1996) Cortical bone adapts to controlled mechanical loading in vivo by architectural modification. Proc. Int. Symposium on Physical Loading, Exercise & Bone, Tampere, Finland. Bone 18 (1 supplement) 103S-104S.

Lanyon LE (1996) Using functional loading to influence bone mass and architecture: objectives, mechanisms and relationship with estrogen of the mechanically adaptive process in bone. Bone 18, no 1 37S-43S.

Lanyon LE (1996) New perspectives on causes, prevention and treatment in Osteoporosis p 135-150. Royal College of Physicians ed. Juliet C Compston.

Lanyon LE (1998) Amplification of the osteogenic stimulus of load-bearing as a logical therapy for the treatment and prevention of osteoporosis, in: Novel approaches to treatment of osteoporosis. Ed RGG Russell, TM Skerry, U Kollenkirchen. Springer.

Lanyon LE & Skerry TM (2001) Postmenopausal osteoporosis as a failure of bone's adaptation to functional loading: a hypothesis. Journal of Bone and Mineral Research 11:1937-1948.

Ehrlich PJ and Lanyon LE (2002) Mechanical strain and bone cell function: a review. Osteoporosis International 13:688-700.

Lee KCL and Lanyon LE (2004) Mechanical loading influences bone mass through estrogen receptor α . Exercise and Sport Science Reviews 32:64-68.

Lance Lanyon, Victoria Armstrong, Delia Ong, Gul Zaman and Joanna Price. (2004) Is estrogen receptor a key to controlling bones' resistance to fracture? *Journal of Endocrinology*, Volume 182:183-191.

Lanyon, L.E., Armstrong, V.J., Saxon, L.K., Sunter, A., Sugiyama, T., Zaman, G., and Price, J.S. (2007) Estrogen receptor α critically regulates bones' adaptive responses to loading. Clin Rev Bone & Miner Metab, 5(4):234-238.

Lanyon, L.E. Strain-related control of bone (re)modelling: objectives, mechanisms and failures. (2008) J Musculoskelet. Neuronal Interactions 208:8(4):298-300

Lanyon, L.E., Sugiyama T., and Price J.S., Regulation of Bone Mass: Local control or systemic influence or both? IBMS – Bone Key 2009, June 6; (6): 218-24.

Lanyon LE. Who needs more veterinary schools? Vet Rec. 2012 Dec 1;171(22):566. doi: 10.1136/vr.e8064.

Lanyon LE A veterinary based profession? Veterinary Record August 4th 2012

Galea GL, Price JS Lanyon LE Estrogen Receptors' roles in the control of mechanically adaptive bone remodelling. BoneKey Reports 2 2013.

PUBLISHED PROCEEDINGS AND ABSTRACTS

Lanyon LE Hampson WGJ Goodship AE & Shah JS (1974) Bone deformation recorded in vivo from strain gauges attached to the human tibial shaft. Proc. of Spring meeting British Orthopaedic Association. J. Bone & Joint Surgery 56B, 565.

Clark EA Goodship AE & Lanyon LE (1975). Locomotor bone strain as the stimulus for bone's mechanical adaptability. Proc. November 1974 Meeting Physiological Society. J. of Physiology 245 57P.

Lanyon LE & Hartman W (1976). The measurement and significance of strain-related electrical potentials in the radius of sheep during locomotion. Proc. British Orthopaedic Research Society, October 1975. J. of Bone & Joint Surgery 58B 256.

Lanyon LE Goodship AE & Baggott DG (1977). The functional adaptation of bone. Proceedings British Orthopaedic Research Society, November 1976. J. of Bone & Joint Surgery 59B, 250-251.

Brown PN Goodship AE Lanyon LE & Pye C (1978). The use of force platform gait analysis in the assessment of treatment for tendon injury in the racehorse. Proc Physiological Society Jan 1978. J. of Physiology 277, 38P.

Goodship AE Lanyon LE Nicopoulos A & O'Connor JA (1978). A technique for investigating the response of bone to changes in its mechanical environment. Proc Physiological Society, Jan 1978. J. of Physiology 277, 39P.

Lanyon LE Baggott DG & Goodship AE (1979) Strain protection and bone remodelling induced by dynamic compression plates -an experimental study in vivo. Transactions of the Orthopaedic Research Society. Feb 1979. Orthopaedic Transactions 3, 232.

Lanyon LE Paul IL Thrasher EL Rubin CT Liebmann VL Simon SR Rose RM & Radin EL (1979). In vivo strain measurements of bone and prosthesis following total hip replacement. Transactions of the Orthopaedic Research Society, February 1979. Orthopaedic Transactions 3 150.

Rubin CT & Lanyon LE (1979) Bone strain as a function of speed. Proc American Physiological Society. The Physiologist 22:4 109.

Lanyon LE Goodship AE O'Connor JA & Pye CJ (1980). A quantitative study on the functional adaptation of bone. Transactions of the Orthopaedic Research Society, February 1980.

Radin EL Rubin CT Thrasher EL Lanyon LE Crugnola AM Schiller AS Paul IL & Rose RM (1980). Femoral component loosening after total hip replacement. Transactions of Orthopaedic Research Society. Orthopaedic Transactions 4, 267.

Lanyon LE & O'Connor JA (1980). Adaptation of bone artificially loaded at high and low physiological strain rates. Proc Physiological Society February 1980. J.Physiology 303, 72p.

Lanyon LE & Rubin CT (1980). Loading of mammalian long bones during locomotion. Proc Physiological Society 1980. Journal of Physiology 303 36p

Lanyon LE (1980) Bone strain in vivo; its measurement and significance. Proc of the Fourth International Congress on Experimental Mechanics.

Biewener AA Thomason J Goodship AE & Lanyon LE (1981). The mechanics of horse locomotion: strains developed in the limb bones at different gaits. IV Annual Conference of the American Society of Biomechanics 14 487.

Lanyon LE Rubin C Thrasher EL Paul IL Schiller AL & Radin EL (1981). Pathogenesis of mechanical loosening in total hip replacement. Proc British Orthopaedic Research Society 1980.
Journal of Bone and Joint Surgery.

Rubin CT & Lanyon LE (1981). Bone remodelling in response to applied dynamic loads. Transactions of Orthopaedic Research Society 1981 p64. Orthopaedic Transactions S2 237.

Biewener AA Thomason J & Lanyon LE (1980) Mechanics of the horse forelimb during locomotion at different gaits. American Zoologist 20 (4) 894.

O'Connor JA & Lanyon LE (1982). The effect of strain rate on mechanically adaptive bone remodelling. Transactions of Orthopaedic Research Society 1982. Orthopaedic Transactions 6 240.

Rubin CT & Lanyon LE (1982) Peak functional strain and fatigue life in bone. Transactions of Orthopaedic Research Society. Orthopaedic Transactions 6 231.

Lanyon LE Rubin CT DeLaura RA & Stableforth PG (1982). Load distributions in the proximal femur following total hip replacement. Transactions of Orthopaedic Research Society. Orthopaedic Transactions 6 256.

Rubin CT & Lanyon LE (1983). Regulation of bone mass by peak strain magnitude. Transactions of Orthopaedic Research Society p 70. Orthopaedic Transactions.

Rubin CT Harris J McA Jones BH Ernst HB & Lanyon LE (1984) Stress Fractures: the remodelling response to excessive repetitive loading. Transactions of Orthopaedic Research Society p 303. Orthopaedic Transactions.

Rubin CT Pratt GW Porter AL Whiteneck DM Middleton HF Jones BH Lanyon LE & Poss R (1984). Acute change in bone properties caused by long distance running: Ultrasound measurements of tibia and patella before and after the Boston Marathon. Transactions of Orthopaedic Research Society p 350 Orthopaedic Transactions.

Rubin CT & Lanyon LE (1985) Prevention of disuse osteoporosis by pulsed electromagnetic fields. Transactions of Orthopaedic Research Society p 70 Orthopaedic Transactions.

Lanyon LE & Rubin CT (1986) Modulation of bone loss during calcium insufficiency by controlled dynamic loading. Transactions of Orthopaedic Research Society p460.

Rubin CT Pratt GW Porter AL Lanyon LE & Poss (1986) Osteoporosis and ultrasound: non-invasive evaluation of the physical properties of bone. Transactions of Orthopaedic Research Society p465.

Skerry TM Dodds RA Bitensky L Chayen J & Lanyon LE (1986) The acute effect of loading on bone tissue in vivo: a possible signal for mechanical control of bone remodelling. Transactions of British Orthopaedic Research Society Journal of Bone & Joint Surgery.

Skerry TM Bitensky L Chayen J & Lanyon LE (1987). Strain memory in bone tissue? Transactions of Orthopaedic Research Society. p.75.

McLeod AJ Rubin CT & Lanyon LE (1987). Optimisation of induced electric field frequency in the prevention of osteoporosis. Transactions of Orthopaedic Research Society, p 231.

Rubin CT McLeod KJ Brand RA & Lanyon LE (1987). Reversal of disuse osteoporosis by controlled dynamic loading. Transactions of Orthopaedic Research Society p 351.

El Haj AJ Pead MJ Skerry TM Suswillo R Minter SC Rawlinson SCF Ali NN & Lanyon LE (1987). Early cellular responses in load-related adaptive bone remodelling. Proc September Meeting Bone & Tooth Society.

El Haj A Pead MJ Skerry TM Suswillo R Minter SL Rawlinson SCF & Lanyon LE (1987) Early cellular responses in load related adaptive bone remodelling. Proc. Bone & Tooth Society.

Pead MJ Skerry TM Lanyon LE (1987). Modulation of disuse osteoporosis by pulsed electro-magnetic fields. Proc September Meeting, Bristol Orthopaedic Research Society.

Skerry TM Pead MJ Rubin CT & Lanyon LE (1988). Modulation of disuse osteoporosis by pulsed electro-magnetic fields. Proc Orthopaedic Research Society

El Haj AJ Skerry TM Caterson B & Lanyon LE (1988). Proteoglycans in bone tissue: Identification and possible function in strain-related remodelling. Proc of Orthopaedic Research Society.

Skerry TM Pead MJ Suswillo R Vedi S & Lanyon LE (1988). Strain related remodeling in bone tissue: Early stages of the cellular response to bone loading in vivo. Proc Orthopaedic Research Society.

Lanyon LE El Haj AJ Minter S Pead MJ & Skerry TM (1988) Early changes in loading related functional adaptation in bone tissue. *J. Bone & Mineral Research* 3:S194

Pead MJ Suswillo R Skerry TM Vedi S & Lanyon LE (1988) Strain related remodelling in bone tissue: Early stages of the cellular response to bone loading in vivo. *Orthopaedic Transactions* (34th ORS) 12: 343.

Skerry TM Pead MJ Rubin CT & Lanyon LE (1988) Modulation of disuse osteoporosis by pulsed electromagnetic fields. *Orthopaedic Transactions* (34th ORS) 12: 397.

El Haj AJ Minter S Rawlinson S and Lanyon LE (1988) Cellular responses to mechanical loading in explants of adult cancellous bone. *J Bone & Mineral Research* 3:S200.

El Haj AJ Minter S & Lanyon LE Pathways of activation in adult adaptive bone remodelling. *Calcified Tissue International Suppl* 42: A30.

Lanyon LE (1989) *Bone: The Architecture of Bone and how it is Influenced by External Loading in Implant Bone interface*. 101-113. Springer-Verlag London, Ed John Older.

Lanyon LE & Pead MJ (1989) Control of resorption and formation during disuse osteopaenia by pulsed electromagnetic fields. "Electrobiology Today" International Symposium in honour of Luigi Galvani.

Pead MJ and Lanyon LE (1989) Pulsed electromagnetic fields- Experimental evidence for a novel treatment method. (British Small Animal Veterinary Association Congress).

Pead MJ & Lanyon LE (1989) Control of resorption and formation during disuse osteopaenia by pulsed electromagnetic fields. (21st European Calcified Tissue Symposium) *Calcified Tissue International* 44: s68

Ali NN Dodds RA Pead MJ & Lanyon LE (1989) The effects of direct loading versus hydrostatic pressure on proteoglycan orientation in bone. *Calcified Tissue International* 44: s96.

Pead MJ & Lanyon LE (1989) Loading related adaptive remodelling in bone: Torsion versus Compression. *European Society of Biomechanics*.

Lanyon LE El Haj A Minter SL Pead MJ & Skerry TM (1988) Early changes in loading-related functional adaptation in bone tissue. *J Bone & Mineral Research* 3: s194.

Lanyon L E (1989) The Equine Skeleton, in *Equine Sports Medicine*. 53-58. Lea & Febiger, 1989.

Lanyon LE (1990) The relationship between functional loading and bone architecture, In *Primate Life History and Evolution*. p 269-284. Wiley-Liss Inc.

Lanyon L E (1990) Bone loading - the functional determinant of bone architecture and a

physiological contributor to the prevention of osteoporosis, in Osteoporosis. 63-78. Royal College of Physicians, Ed Roger Smith.

Zaman G Minter SL Pead MJ Morgan MJ & Lanyon LE (1990) A sequence of adaptive change following mechanical loading in bone organ cultures. Abstract 23rd Bone & Tooth Society Meeting, September 1990.

Dodds RA Ali NN Pead MJ & Lanyon LE (1990) Early strain related changes in the activities of enzymes in osteocytes and periosteal osteoblasts following bone loading in vivo. J Bone & Mineral Research 5: s83

Pead MJ & Lanyon LE (1990) Adaptive remodelling in bone: Torsion versus compression. Orthopaedic Transactions (36th ORS) 14: 340.

Pead MJ Skerry TM Rubin CT & Lanyon LE (1990) Treatment of disuse osteopaenia with pulsed electromagnetic fields. Orthopaedic Transactions (36th ORS) 14: 43

Dodds R Skerry TM Pead MJ & Lanyon LE (1990) Proteoglycan orientation in bone: Its relationship to loading, disuse and clinical osteoporosis. Orthopaedic Transactions 14: 511

Torrance AG Suswillo R Lanyon LE & Boyde A (1991) Effects of two dynamic loading regimes upon bone in the rat ulna. Proc Bone & Tooth Soc. 13 276.

Torrance AG Suswillo R Lanyon LE & Boyde A (1991) Fluorochrome analysis by confocal microscopy in the rat ulna. Imaging of Cartilage and Bone Meeting. Inst Orthopaedics, Stanmore. Bone 13 100-101.

Torrance AG Boyde A Suswillo R and Lanyon LE (1992) Non-invasive loading of the rat ulna induces periosteal response predicted by surface strains. J Bone & Min Research Suppl 7 S271.

Lanyon L E (1991) The influence of functional loadbearing on bone architecture, in Biological Mechanisms of Tooth Movement and Craniofacial Adaptation. 195-199. Ohio State University, College of Dentistry, Ed Zeev Davidovitch.

Lanyon LE (1992) Control of bone architecture by functional load-bearing. J Bone Min Res. 7 Suppl 2 S369-S375.

Rawlinson SCF Mohan S Baylink DJ & Lanyon LE (1992) Load-related osteogenesis, prostacyclin and IGF-11. J Bone & Min. Research Suppl. 17 S141.

Rawlinson SCF El Haj AJ Minter SL Tavares IA Bennett A & Lanyon LE (1993) Prostacyclin production in osteocytes and lining cells may be an early strain-related step in mechanically adaptive bone remodelling. J Anat 179 218.

Lanyon LE (1993) Mechanically-related control of bone architecture. Belgian J of Zoology 123 42.

Lanyon LE (1993) Osteocytes, Strain Detection, Bone Modeling and Remodeling.

Calcified Tissue Int 53 S102-107.

Lanyon LE (1993) Osteocytes and the Control of Bone (Re)Modelling. Calcified Tissue Int. 52 S2.

Lanyon LE (1993) Prostaglandins & Adaptive Bone (Re)Modelling. Calcified Tissue Int. 52 S389.

Lanyon LE (1993) Prostaglandins & Adaptive Bone (re)modelling. Calcified Tissue Int. Suppl 1 Vol 52. 389.

Lanyon LE (1993) Mechanically-related control of bone architecture. Belgian Journal of Zoology, 123: Suppl 1 p42.

Lanyon LE (1994) Using functional loading to influence bone mass and architecture: Objectives, Mechanisms and Relationship with Estrogen of the Mechanically Adaptive Process in Bone. Proc.Int.Symposium on Physical Loading, Exercise and Bone. Tampere, Finland. Bone, 18: Suppl 1 p37S.

Mosley JR and Lanyon LE (1994) Adaptive modeling in response to controlled non-invasive mechanical loading in the rat ulna in vivo. Transactions of the 40th Annual Meeting of the Orthopaedic Research Society 19 33.

Mosley JR and Lanyon LE (1994) Adaptive modelling in response to controlled non-invasive mechanical loading of the rat ulna in vivo. Proc European Orthopaedic Research Soc. 4 82.

Rawlinson SCF Mosley JR Suswillo RFL Cheng MZ and Lanyon LE (1994) Calvarial cells are not responsive to physiological strains in situ or cell culture. J Bone & Mineral Res. 9 S303.

Zaman G Suswillo RFL Cheng MZ and Lanyon LE (1994) Effect of mechanical strain and exogenous prostaglandins on osteogenic responses in bone derived cells in culture. J Bone & Mineral Research 8 S373.

Zaman G Suswillo RFL Cheng MZ and Lanyon LE (1994) Effect of strain and strain-related prostanoids on mRNA expression of c-fos, IGF-I & IGF-II and TGF- β . J Bone & Mineral Research 9 S303.

Zaman G Suswillo RFL Cheng MZ and Lanyon LE (1994) Osteogenic responses in primary bone-derived cells in culture. Bone 15 129.

Cheng MZ Zaman G Rawlinson SCF Suswillo RFL and Lanyon LE (1995) Oestrogen amplifies bone's osteogenic responses to load-bearing in female rat ulna in vitro. Calcif Tissue Int. 56: 428.

Cheng MZ Zaman G Rawlinson SCF Suswillo RFL and Lanyon LE (1995) Mechanical loading, prostaglandin and sex hormone interactions in male and female rat ulna in culture

(1995) J Bone Min Res 10: S342 (M358).

Jackson BJ Eastell R Wilson AM Russell RG Lanyon LE Goodship AE and Price JS (1995) The effects of exercise on biochemical markers of bone metabolism in the horse. Trans Orthop Res Soc 20: 201.

Jackson BJ Eastell R Russell RG Lanyon LE and Price JS (1995) The measurement of pyridinium crosslinks in serum as a biochemical marker of bone turnover in horses. J Bone Min Res 10: S339.

Pitsillides AA Rawlinson SCF Suswillo RFL Zaman G Nijweide PJ and Lanyon LE (1995) Mechanical strain-induced nitric oxide production by osteoblasts and osteocytes J Bone Min Res 10: S217.

Pitsillides AA Rawlinson SCF Suswillo RFL and Lanyon LE (1995) Nitric oxide production is stimulated by mechanical loading. Bone 16: 682.

Price JS Ayad S Oyajobi BO Lanyon LE and Russell RGG (1995) Type VI collagen expression in deer antler: a model of accelerated chondrogenesis. Trans Orthop Res Soc 20: 466.

Price JS Suswillo RFL Houston B Zaman G Nijweide PJ and Lanyon LE (1995) The expression of bone morphogenetic proteins 6 and in osteocytes: the effects of mechanical strain. J Bone Min Res 10: S307.

Rawlinson SCF Pitsillides AA and Lanyon LE (1995) Strain measurement by bone cells during mechanical loading. Bone 17: 319.

Pitsillides AA Rawlinson SCF Suswillo RFL and Lanyon LE (1995) Nitric oxide production is stimulated by mechanical loading. Bone 16: 682.

Pitsillides AA Rawlinson S Suswillo R Zaman G Nijwiede PJ and Lanyon LE (1995) Mechanical strain-induced NO production by osteoblasts and osteocytes. J Bone Min Res 10: S217.

Rawlinson SCF Pitsillides AA and Lanyon LE (1995) Mechanodependent signalling pathways in osteocytes and osteoblasts. J Bone Min Res. 10: M357.

Rawlinson SCF Pitsillides AA and Lanyon LE (1996) The prostacyclin synthetase inhibitor, 15-HPETE, blocks load-related increases in osteocytic G6PD activity and reduces NO release. Bone 17: 571.

Zaman G Rawlinson SCF Pitsillides AA Price JS Suswillo RFL Cheng MZ and Lanyon LE (1996) Mechanical strain enhances NO production and upregulates nNOS mRNA levels. Bone 17: 576.