

Judd Day, Ph.D.
Senior Scientist

Professional Profile

Dr. Judd Day is a Senior Scientist in Exponent's Biomechanics practice. He has expertise in micro-computed tomography, solid mechanics, motion analysis, mechanical testing, finite element modeling of orthopedic implants for both upper and lower extremities, and orthopedic biomechanics. His research interests include bone remodeling and quantification of the relation between bone density, quality and its mechanical properties. Specifically this has included modeling of peri-prosthetic bone remodeling, morphometric quantification of bone micro-architecture and analysis of matrix properties. Prior to joining Exponent, Dr. Day was a research assistant at the Orthopedic Research Laboratory at Erasmus Medical Center in Rotterdam, The Netherlands. He was also involved in collaborative projects with the Department of Anatomy and Cell Biology at Rush University and with the Orthopedic Research Laboratory at Aarhus University, Denmark.

Academic Credentials and Professional Honors

Ph.D., Medical Science at Erasmus University, Rotterdam, The Netherlands, 2005
M.S. Mechanical Engineering, Queen's University, Kingston, Canada, 1997
B.Sc. Mining Engineering, Queen's University, Kingston, Canada, 1992

W.W. King Graduate Fellowship (1993), CIMM Student Essay Contest (1992), F.K. MCKean, Science '40 Prize in Mining Engineering (1992), Dean's Scholar (1991), Robert E. Smith Memorial Scholarship in Mining Engineering (1991), Canadian Mineral Industry Scholarship (1990, 1991), N.A. Timmins Scholarship (1989), Longstaffe Scholarship (1988), Delia Baetes Memorial Scholarship (1988)

Publications

Gregory JS, Waarsing JH, Day J, Pols HA, Reijman M, Weinans H, Aspden RM. Early identification of radiographic osteoarthritis of the hip using an active shape model to quantify changes in bone morphometric features: Can hip shape tell us anything about the progression of osteoarthritis? *Arthritis Rheum* 2007; 56(11):3634–3643.

Hakulinen MA, Day JS, Toyras J, Weinans H, Jurvelin JS. Ultrasonic characterization of human trabecular bone microstructure. *Phys Med Biol* 2006; 51(6):1633–1648.

Sierpowska J, Hakulinen MA, Toyras J, Day JS, Weinans H, Kiviranta I, Jurvelin JS, Lappalainen R. Interrelationships between electrical properties and microstructure of human trabecular bone. *Phys Med Biol* 2006; 51(20):5289–5303.

Waarsing JH, Day JS, Verhaar JA, Ederveen AG, Weinans H. Bone loss dynamics result in trabecular alignment in aging and ovariectomized rats. *J Orthop Res* 2006; 24(5):926–935.

Botter SM, van Osch GJ, Waarsing JH, Day JS, Verhaar JA, Pols HA, van Leeuwen JP, Weinans H. Quantification of subchondral bone changes in a murine osteoarthritis model using micro-CT. *Biorheology* 2006; 43(3–4):379–388.

Waarsing JH, Day JS, Weinans H. Longitudinal micro-CT scans to evaluate bone architecture. *J Musculoskelet Neuronal Interact* 2005; 5(4):310–312.

Beumer A, Campo MM, Niesing R, Day J, Kleinrensink GJ, Swierstra BA. Screw fixation of the syndesmosis: a cadaver model comparing stainless steel and titanium screws and three and four cortical fixation. *Injury* 2005; 36(1):60–64.

Zandbergen RA, de Boer SF, Swierstra BA, Day J, Kleinrensink GJ, Beumer A. Surgical treatment of achilles tendon rupture: examination of strength of 3 types of suture techniques in a cadaver model. *Acta Orthopaedica* 2005; 76(3):408–411.

Hakulinen MA, Day JS, Toyras J, Timonen M, Kroger H, Weinans H, Kiviranta I, Jurvelin JS. Prediction of density and mechanical properties of human trabecular bone in vitro by using ultrasound transmission and backscattering measurements at 0.2-6.7 MHz frequency range. *Phys Med Biol* 2005; 50(8):1629–1642.

Sierpowska J, Hakulinen MA, Toyras J, Day JS, Weinans H, Jurvelin JS, Lappalainen R. Prediction of mechanical properties of human trabecular bone by electrical measurements. *Physiol Meas* 2005; 26(2):S119–131.

Waarsing JH, Day JS, Weinans H. An improved segmentation method for in vivo microCT imaging. *J Bone Miner Res* 2004; 19(10):1640–1650.

Day JS, Van Der Linden JC, Bank RA, Ding M, Hvid I, Sumner DR, Weinans H. Adaptation of subchondral bone in osteoarthritis. *Biorheology* 2004; 41(3–4):359–368.

van der Linden JC, Day JS, Verhaar JAN, Weinans H. Altered tissue properties induce changes in cancellous bone architecture in aging and disease. *J Biomech* 2004; 37(3):367–374.

Waarsing JH, Day JS, van der Linden JC, Ederveen AG, Spanjers C, De Clerck N, Sasov A, Verhaar JAN, Weinans H. Detecting and tracking local changes in the tibiae of individual rats: A novel method to analyse longitudinal in vivo micro-CT data. *Bone* 2004; 34(1):163–169.

Day JS, Ding M, Bednarz P, van der Linden JC, Mashiba T, Hirano T, Johnston CC, Burr DB, Hvid I, Sumner DR, Weinans H. Bisphosphonate treatment affects trabecular bone apparent properties through micro-architecture rather than matrix properties. *J Orthop Res* 2004; 22(3):465–471.

Ding M, Day JS, Burr DB, Mashiba T, Hirano T, Weinans H, Sumner DR, Hvid I. Canine cancellous bone microarchitecture after one year of high-dose bisphosphonates. *Calcif Tissue Int* 2003; 72(6):737–744.

van der Linden JC, Day JS, Verhaar JAN, Weinans H. Combinatie van computersimulaties en experimenten in botonderzoek. *Netherlands Journal for Calcium and Bone Metabolism* 2003; 1(2):31–38.

Hu JH, Ding M, Soballe K, Bechtold JE, Danielsen CC, Day JS, Hvid I. Effects of short-term alendronate treatment on the three-dimensional microstructural, physical, and mechanical properties of dog trabecular bone. *Bone* 2002; 31(5):591–597.

Zhao J, Day J, Yuan ZF, Gregersen H. Regional arterial stress-strain distributions referenced to the zero-stress state in the rat. *Am J Physiol Heart Circ Physiol* 2002; 282(2):H622–629.

Day JS, Ding M, van der Linden, JC, Hvid I, Sumner DR, Weinans H. A decreased subchondral trabecular bone tissue elastic modulus is associated with pre-arthritis cartilage damage. *J Orthop Res* 2001; 19(5):914–918.

Day JS, Ding M, Odgaard A, Sumner DR, Hvid I, Weinans H. Parallel plate model for trabecular bone exhibits a volume fraction-dependant bias. *Bone* 2000; 27(5):715–720.

Day JS, Murdoch DJ, Dumas GA. Calibration of position and angular data from a magnetic tracking device. *J Biomech* 2000; 33(8):1039–1045.

Day JS, Dumas GA, Murdoch DJ. Evaluation of a long-range transmitter for use with a magnetic tracking device in motion analysis. *J Biomech* 1998; 31(10):957–961.

Presentations

Ong KL, Day JS, Manley MT, Kurtz SM. Effects of surgical variations in hip resurfacing arthroplasty. Presented at Engineers and Surgeons: Joined at the Hip, London, UK, 2007.

Marke D, Day J, Siskey R, Kurtz S, Ong K, Liepins I. Deformation of metal-backed acetabular components and the impact of liner thickness in a cadaveric model. International Society for Technology in Arthroplasty, Paris, France, 2007.

Ong KL, Day JS, Kurtz SM, Field RE, Manley MT. Role of surgical variations on initial bone remodeling around hip resurfacing arthroplasty. Proceedings, 8th European Federation of National Associations of Orthopaedics and Traumatology Congress, Florence, Italy, 2007.

Day JS, Ong KL, Kurtz SM, Manley MT. A finite element comparison of bone remodeling around bone conserving femoral stems. Proceedings, 8th European Federation of National Associations of Orthopaedics and Traumatology Congress, Florence, Italy, 2007.

Day JS, Ong KL, Bowden A, Manley MT, Kurtz SM. A finite element comparison of bone conserving femoral stems. Proceedings, 53rd Annual Meeting of the Orthopaedic Research Society, San Diego, CA, 2007.

Day JS, Steinbeck M, Baxter R, Grochowsky J, Sakona A, Abboud J, Ramsey M, Kurtz SM. Wear analyses of retrieved components from total elbow arthroplasty. Proceedings, 53rd Annual Meeting of the Orthopaedic Research Society, San Diego, CA, 2007.

Ong KL, Day JS, Kurtz SM, Field RE, Manley MT. Adaptive bone remodeling around the Birmingham hip resurfacing arthroplasty. Proceedings, 53rd Annual Meeting of the Orthopaedic Research Society, San Diego, CA, 2007.

Ong KL, Day JS, Kurtz SM, Field RE, Manley MT. Role of surgical variations on initial bone remodeling around the Birmingham resurfacing arthroplasty. Proceedings, 53rd Annual Meeting of the Orthopaedic Research Society, San Diego, CA, 2007.

Turner JL, Sucato DJ, McCarthy RE, Zhang H, Wicker MA, Day JS. Novel method for quantifying articulating facet joint surfaces using microCT. Proceedings, 53rd Annual Meeting of the Orthopaedic Research Society, Chicago, IL, 2007.

Sucato DJ, McCarthy RE, Zhang H, Day JS, Turner JL. Effect of pedicle screws on facet joint morphometry in a growing rod immature animal model. Proceedings, 13th Annual International Meeting on Advanced Spine Technologies, Athens, Greece, 2006.

Day JS, Villarraga ML, Teti SD, Graber M, Schwardt JD. Does microCT provide clinically relevant information on vertebral compression fractures? Proceedings, 21st Annual Meeting of the North American Spine Society, Seattle, WA, 2006.

Day JS, Waarsing JH, Sumner DR, Stauber M, van Lenthe GH, Weinans H. Microarchitecture and the orthotropic mechanical properties of trabecular bone. Proceedings, 52nd Annual Meeting of the Orthopaedic Research Society, Chicago, IL, 2006.

Ong K, Kurtz S, Day J, Manley MT, Rushton N, Field RE. Biomechanics of the Birmingham hip resurfacing arthroplasty. Proceedings, British Hip Society 2006 Annual Meeting, Edinburgh, UK, 2006.

Ong K, Day J, Manley MT, Kurtz SM. Biomechanics of the Birmingham hip resurfacing arthroplasty. Proceedings, 73rd Annual Meeting of the American Academy of Orthopaedic Surgeons, Chicago, IL, 2006.

Ong K, Day J, Manley MT, Kurtz SM. Biomechanics of the Birmingham hip resurfacing arthroplasty: effects of fixation and interface conditions. Proceedings, 52nd Annual Meeting of the Orthopaedic Research Society, Chicago, IL, 2006.

Day JS, Villarraga ML, Teti SD, Graber MA, Schwardt JD. Does the resolution of microCT provide any clinically relevant information on vertebral compression fractures? Philadelphia Spine Research Symposium, Philadelphia, PA, 2005.

Diderich K, Waarsing JH, Buurman CJ, Day JS, Brandt RMC, De Jong FH, Amling M, Hoeijmakers JHJ, Weinans H, van der Horst GTJ, van Leeuwen JPT. Accelerated bone aging and altered estradiol levels in DNA repair deficient trichothiodystrophy mice. Proceedings, 2nd Joint Meeting of the European Calcified Tissue Society and the International Bone and Mineral Society, Geneva, Switzerland 2005.

Botter SM, van Osch GJV, Day JS, Waarsing JH, Kops N, Verhaar JAN, Pols HAP, Weinans H, van Leeuwen JPT. Bone changes depend on bone density in murine osteoarthritis. Proceedings, 2nd Joint Meeting of the European Calcified Tissue Society and the International Bone and Mineral Society, Geneva, Switzerland 2005.

Waarsing JH, Day JS, van der Linden JC, Ederveen AG, Weinans H. Trabecular realignment in aging and ovariectomized rats. Proceedings, 51st Annual Meeting of the Orthopaedic Research Society, Washington, DC, 2005.

Day JS, Waarsing JH, van Rietbergen B, Sumner DR, Weinans H. Prediction of trabecular bone mechanical properties using volume fraction and MIL; inter-individual and site dependant effects. Proceedings, 51st Annual Meeting of the Orthopaedic Research Society, Washington, DC, 2005.

Botter SM, Day JS, Waarsing JH, Kops N, van Osch G, van Leeuwen J, Weinans H. Bone changes in high and low bone mass mice using a murine osteoarthritis model. Proceedings, 51st Annual Meeting of the Orthopaedic Research Society, Washington, DC, 2005.

Waarsing JH, Day JS, Ederveen AGH, Weinans H. Spatial and temporal changes in bone architecture due to aging and OVX in rat tibiae. Proceedings, 31st Annual Meeting of the European Calcified Tissue Society, Nice, France, 2004.

Waarsing JH, Day JS, Ederveen AGH, Weinans H. Spatial and temporal differences in bone loss due to aging and OVX in the tibiae of rats. Proceedings, 14th Conference of the European Society of Biomechanics, s'-Hertogenbosch, The Netherlands 2004.

Day JS, Sumner DR, Waarsing JH, Weinans H. Inter-individual and gender differences in bone adaptation strategy. Proceedings, 14th Conference of the European Society of Biomechanics, s'-Hertogenbosch, The Netherlands 2004.

Waarsing JH, Day JS, Weinans H. An automated segmentation technique for micro-ct imaging. Proceedings, 14th Conference of the European Society of Biomechanics, s'-Hertogenbosch, The Netherlands 2004.

Weinans, H, Waarsing JH, Day JS, van der Linden JC, Verhaar JAN. Bone adaptation models and longitudinal in-vivo micro-ct. Proceedings, 14th Conference of the European Society of Biomechanics, s'-Hertogenbosch, The Netherlands 2004.

Waarsing JH, Day JS, Ederveen AGH, Weinans H. Spatial and temporal differences in bone loss due to aging and OVX in the tibiae of rats. Proceedings, 26th Annual Meeting of the American Society for Bone and Mineral Research, Seattle, WA, 2004.

Sierpowska J, Hakulinen MA, Day JS, Weinans H, Töyräs J, Jurvelin JS, Lappalainen R. Relationships of dielectric properties with mechanical properties and microstructure of human trabecular bone in vitro. Proceedings, 5th Combined Meeting of the Orthopaedic Research Society, Banff, Alberta, Canada, 2004.

Waarsing JH, Day JS, Ederveen AG, Weinans H. Trabecular thickness increases due to bone loss in aging, OVX, and Tibolone-treated rats. Proceedings, 50th Annual Meeting of the Orthopaedic Research Society, San Francisco, CA, 2004.

Day JS, Sumner DR, Waarsing JH, Weinans HH. Inter-individual and gender differences in bone adaptation strategy. Proceedings, 50th Annual Meeting of the Orthopaedic Research Society, San Francisco, CA, 2004.

Waarsing JH, Leemans A, Day JS, Ederveen AGH, Van Dyck D, Beulens E, De Clerck N, Sasov A, Weinans H. Effects of growth and ovariectomy in the tibia of individual rats: an in-vivo micro-CT study. Proceedings, 30th Annual Meeting of the European Calcified Tissue Society, Rome, Italy, 2003.

van der Linden JC, Day JS, van Immerzeel T, Verhaar JAN, Weinans H. Three dimensional reconstruction of bone remodeling. Proceedings, 30th Annual Meeting of the European Calcified Tissue Society, Rome, Italy, 2003.

Jahr H, Uitterlinden E, Day JS, Koevoet W, Verhaar JAN, van Osch G, Weinans H. Altered gene expression in osteoarthritic subchondral bone. Proceedings, Nederlandse Vereniging voor Calcium en Botstofwisseling, Papendal, Netherlands, 2003.

Swierstra B, de Boer S, Zandbergen R, Day JS, Kleinrensink GJ, Beumer A. Surgical treatment of Achilles tendon rupture: strength of 3 types of suture technique in a cadaver model. Proceedings, 6th Congress of the European Federation of National Associations of Orthopaedics and Traumatology, Helsinki, Finland, 2003.

Day JS, Manintveld O, Bank R, Ding M, Sumner DR, Hvid I, Weinans H. Denatured collagen in osteoarthritic bone. Proceedings, 49th Annual Meeting of the Orthopaedic Research Society, New Orleans, LA, 2003.

Waarsing JH, Leemans A, Day JS, Ederveem AGH, van Dyck D, Beulens E, DeClerck N, Sasov A, Weinans H. Effects of Growth and OVX in the tibia of individual rats: an in-vivo micro-ct study. Proceedings, 49th Annual Meeting of the Orthopaedic Research Society, New Orleans, LA, 2003.

Day JS, Ding M, Bednarz P, van der Linden JC, Mashiba T, Hirano T, Johnston CC, Burr DB, Hvid I, Sumner DR, Weinans H. Bisphosphonates affect the apparent modulus of trabecular bone through architecture and not mineralization. Proceedings, 48th Annual Meeting of the Orthopaedic Research Society, Dallas, TX, 2002.

Day JS, Ding M, Bednarz P, van der Linden JC, Mashiba T, Hirano T, Johnston CC, Burr DB, Hvid I, Sumner DR, Weinans H. Does secondary mineralization affect the Young's modulus of trabecular bone matrix after bisphosphonate treatment? A case for the negative. Proceedings, IXth Congress of the International Society of Bone Morphometry, Edinburgh, UK, 2002.

Waarsing JH, Day JS, Weinans H. An automatic algorithm to segment 3D microCT scans of bone. Proceedings, IXth Congress of the International Society of Bone Morphometry, Edinburgh, UK, 2002.

Day JS, van der Linden JC, Sumner DR, Weinans H. A mechanism for bone stiffening in osteoarthritis. Proceedings, 4th Combined Meeting of the Orthopaedic Research Societies, Rhodes, Greece, 2001.

Day JS, Bank RA, Ding M, Sumner DR, Hvid I, Weinans H. Increased bone collagen degradation in early stage osteoarthritis. Proceedings, 4th Combined Meeting of the Orthopaedic Research Societies, Rhodes, Greece, 2001.

Day JS, Ding M, Weinans H, Sumner DR, Berzins A, Hvid I. Effects of aging on canine trabecular bone structure. Proceedings, 46th Annual Meeting of the Orthopaedic Research Society, Orlando, FL, 2000.

Day JS, Ding M, van der Linden JC, Weinans H, Hvid I, Sumner DR. Trabecular bone tissue modulus is reduced in early osteoarthrosis. Proceedings, 12th Conference of the European Society of Biomechanics, Dublin, Ireland, 2000.

Day JS, Ding M, Odgaard A, Sumner DR, Hvid I, Weinans H. The parallel plate model for trabecular bone exhibits volume fraction dependant bias. Proceedings, 12th Conference of the European Society of Biomechanics, Dublin, Ireland, 2000.

Day JS, Murdoch DJ, Dumas GA. Calibration of a magnetic tracking device and long-range transmitter using locally linear fits. Proceedings, 1998 North American Congress on Biomechanics, Waterloo, Ontario, Canada, 1998.

Day JS, Dumas GA. Use of a magnetic tracking device to determine lumbosacral moments during asymmetric lifting. Proceedings, 11th Conference of the European Society of Biomechanics, Toulouse, France, 1998.

Day JS, Dumas GA, Murdoch DJ. Evaluation of the Polhemus Fastrak for the collection of biomechanical kinematic data. Proceedings, 9th Biennial Conference and Symposia of the Canadian Society for Biomechanics, Burnaby, British Columbia, Canada, 1996.

Day JS, Reid JG. Measurement of power and friction as applied to curling. Proceedings, International Symposium on Biomechanics, Paris, France, 1993.

Invited Presentations

Day JS. Medical Device Engineering: Retrieval analysis for improved device performance. Columbia University, Department of Biomedical Engineering, October 22, 2007.

Day JS. Segment title: A MicroCT Primer. European Society of Calcified Tissues training course on bone histomorphometry, Aarhus, Denmark, October 27–30, 2002.

Current Academic Appointments

- Research Assistant Professor, Drexel University, School of Biomedical Engineering (2007)

Professional Affiliations

- Orthopaedic Research Society (member)