

Andrea Clark

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POSITIONS

Assistant Professor, Faculties of Kinesiology and Medicine, University of Calgary, AB 2008-present

RESEARCH INTERESTS

- The biomechanics of articular cartilage and cartilage cells (chondrocytes)
- The detection and transduction of loading (mechanical/chemical) into biological responses by chondrocytes
- Osteoarthritis – the etiology, progression and treatment of this disease

EDUCATION

Postdoctoral Researcher, Orthopaedic Research Laboratory, Duke University, NC 2005-2007

Advisor: Dr. Farshid Guilak

Area of Specialisation: Chondrocyte Deformation and Ca²⁺ Signaling In Situ

PhD, Medical Science, University of Calgary, AB 1998-2004

Advisor: Dr. Walter Herzog

Area of Specialisation: Patellofemoral Articular Cartilage and Osteoarthritis

BSc, Physical Education, Sports Science and Physics, Loughborough University, UK 1993-1997

Advisors: Dr. Dave Kerwin, Dr. Fred Yeadon

Area of Specialisation: Biomechanics, Sports Psychology and Mechanics

RESEARCH EXPERIENCE

Postdoctoral Research

- Develop methods and measure chondrocyte Ca²⁺ response to osmotic loading in fully intact wild type and TRPV4 knock out murine femora.
- Develop methods and measure simultaneous chondrocyte Ca²⁺ and volume response to static compression in porcine explants.
- Characterize in situ chondrocyte Ca²⁺ response to osmotic loading in porcine explants.

Doctoral Research

- Developed methods to apply static compression to fully intact patellofemoral cartilages and measured the resulting cartilage and chondrocyte deformations. Experiments carried out in healthy, short- and long-term anterior cruciate ligament transected feline knees.
- Developed methods and measured the chondrocyte biological response to muscle induced cyclical load applied to intact lapine patellofemoral joints.
- Measured the contact area and pressure distribution in the feline patellofemoral joint.

Undergraduate Research

- Measured the effects of foot placement on the speed of the field hockey short corner push.

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FUNDING

Source	Value	Dates Held	Institution
Faculty of Kinesiology, Start Up Grant	CN 50,000/year	2008-2009	University of Calgary
Arthritis Foundation Postdoctoral Fellowship (2yr)	US \$50,000/year	2006-2007	Duke University
AHFMR Studentship (1yr)	CN \$20,000/year	2003-2004	University of Calgary
CIHR Studentship (5yr)	CN \$19,030/year	1998-2002	University of Calgary
Olympic Oval Endowment Fund	CN \$5,000	2003	University of Calgary
William H Davies Medical Research Scholarship	CN \$4,000	2001	University of Calgary
Faculty of Medicine Trust Award	CN \$1,500	2000	University of Calgary
Faculty of Graduate Studies Fee Scholarships	CN \$6,500	1999-2001	University of Calgary

PEER-REVIEWED PUBLICATIONS

- Clark AL:** (2008) Osteoarthritis: What we have been missing in the patellofemoral joint. *Exerc Sport Sci Rev.* 36:1:30-37.
- Clark AL, Barclay LD, Leonard TR, Matyas JR and Herzog W:** (2006) Heterogeneity in patellofemoral cartilage adaptation to anterior cruciate ligament transection; chondrocyte shape and deformation with compression. *Osteoarthritis and Cartilage* 14:2:120-130.
- Clark AL, Barclay LD, Leonard TR, Matyas JR and Herzog W:** (2005) Opposing cartilages in the patellofemoral joint adapt differently to long-term cruciate deficiency: chondrocyte deformation and reorientation with compression. *Osteoarthritis and Cartilage* 13:12:1100-1114.
- Clark AL, Mills L, Hart DA and Herzog W:** (2004) Muscle-induced patellofemoral joint loading rapidly affects cartilage mRNA levels in a site specific manner. *J Musculoskeletal Res* 8:1:1-12.
- Herzog W, Longino D, Clark A:** (2003) The role of muscles in joint adaptation and degeneration. *Langenbeck's Archives of Surgery* 288:5:305-315.
- Herzog W, Clark AL, Wu J:** (2003) Resultant and local loading in models of joint disease. *Arthritis and Rheumatism* 49:2:239-247.
- Clark AL, Barclay LD, Matyas JR and Herzog W:** (2003) In-situ chondrocyte deformation with physiological compression of the feline patellofemoral joint. *J Biomechanics* 36:553-568.
- Clark AL, Herzog W, Leonard TR.:** (2002) Contact area and pressure distribution in the feline patellofemoral joint under physiologically meaningful loading conditions. *J Biomechanics* 35:53-60.

BOOK CHAPTERS

- Clark AL:** (in press) Measurement techniques (pressure). In *Encyclopedic Reference of Neuroscience*. Windhorst U, Binder M and Hirokawa N Eds. Springer-Verlag, Berlin, Heidelberg.
- Herzog W, Clark A and Longino D:** (2004) Joint mechanics in Osteoarthritis. In *Osteoarthritic Joint Pain*. Chadwick D and Goode J Eds. Wiley, Chichester pp. 79-99.

PRESENTATIONS AT INTERNATIONAL AND NATIONAL SCIENTIFIC CONFERENCES

- Clark AL, Votta BJ, Kumar S, Liedtke W, Guilak F:** (accepted) Osteoarthritic changes and increased bone density in *trpv4*^{-/-} mice are sex-dependent. *55th Annual Meeting of the Orthopedic Research Society*.
- Clark AL, Votta BJ, Kumar S, Liedtke W and Guilak F:** (2008) In situ chondrocyte calcium signaling in response to osmotic stress: The role of TRPV4 ion channel. *54th Annual Meeting of the Orthopedic Research Society*, 480.
- Clark AL, Liedtke W and Guilak F:** (2007) Osmotically-induced calcium signaling in murine articular chondrocytes: The role of TRPV4. *2007 Arthritis Research Conference*.
- Clark AL, Herzog W, Matyas J, Barclay L and Leonard T:** (2004) Heterogeneous adaptation of the patellofemoral joint to short- and long-term anterior cruciate ligament deficiency. [CD-ROM] *28th Annual Meeting of the American Society of Biomechanics*.
- Clark AL, Herzog W, Hart D, Mills L, Leonard T:** (2004) Muscle-induced patellofemoral joint loading affects cartilage mRNA levels. *50th Annual Meeting of the Orthopedic Research Society*, 619.

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- Clark AL**, Herzog W, Hart DA and Craig S: (2003) Changes in cartilage mRNA levels with dynamic patellofemoral joint loading in-vivo. *49th Annual Meeting of the Orthopedic Research Society*, 638.
- Clark AL**, Herzog W, Matyas JR, Barclay LD and Leonard TR: (2003) Compression induced changes in chondrocyte shape and volume during the progression of osteoarthritis. *49th Annual Meeting of the Orthopedic Research Society*, 637.
- Clark AL**, Herzog W, Matyas JR, Barclay LD and Leonard TR: (2002) In-situ chondrocyte deformation in early stage Osteoarthritic (OA) articular cartilage. [CD-ROM] *IVth World Congress of Biomechanics*.
- Clark AL**, Herzog W, Matyas JR and Leonard TR: (2002) Osteoarthritic morphological pathology >57 months post anterior cruciate ligament transection in the feline knee joint. *48th Annual Meeting of the Orthopedic Research Society*, 682.
- Clark AL**, Herzog W, Matyas JR, Barclay LD and Leonard TR: (2001) In-situ chondrocyte deformation in endstage osteoarthritic (OA) articular cartilage. *XVIIIth Congress of the International Society of Biomechanics*, 162.
- Clark AL**, Herzog W, Leonard TR: (2000 **Finalist, Young Investigator Award**) Contact area and pressure distribution in the feline patellofemoral joint under physiological loading conditions. *XIth Congress of the Canadian Society of Biomechanics*, 173.
- Clark AL**, Herzog W and Leonard T.: (2000) Gross morphology, contact area and pressure distribution in a long-term feline model of Osteoarthritis. *34th Annual Meeting of the Canadian Orthopedic Research Society*, 59.
- Clark AL**, Herzog W, Matyas JR and Barclay LD: (2000) In-situ chondrocyte deformation resulting from static compression of articular cartilage. *46th Annual Meeting of the Orthopedic Research Society*, 104.
- Clark AL**, Herzog W, Matyas JR and Barclay LD: (1999 **Finalist, Young Investigator Award**) Chondrocyte deformation resulting from in-situ static compression of articular cartilage. *XVIIth Congress of the International Society of Biomechanics*, 173.

SUPERVISORY EXPERIENCE

2007 - 2008	Gregory Meyers, Undergraduate Student
2006	Eric Mansfield, Undergraduate Student
2001	Sean Craig, Undergraduate Student
1999	Laurent Favre, Undergraduate Student

TEACHING EXPERIENCE

Fall 2008 – Present	KNES201 Activity: Essence and Experience (Lecture). Fall and Winter semesters. Enrolment 100 undergraduate students per semester.
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CURRENT COMMITTEE MEMBERSHIP

2008 – Present	Life and Environmental Sciences Animal Care Committee, University of Calgary
2008 – Present	Research Policy Committee, Faculty of Kinesiology, University of Calgary
2008 – Present	Graduate Scholarship Committee, Faculty of Kinesiology, University of Calgary
2008 – Present	Faculty of Fine Arts Council, Kinesiology Representative, University of Calgary
2008 – Present	Doctoral Examination Committee, Faculty of Kinesiology, University of Calgary
	Candidate: Aliaa Youssef, Thesis Title: The effects of muscle weakness on joint degeneration

SOCIETY/INSTITUTE MEMBERSHIP

2008 – Present	Member, Bone and Joint Institute, Faculty of Medicine, University of Calgary
2008 – Present	Member, Orthopaedic Research Society

INTERVIEWS/BROADCASTS

Article Title: Uncovering the secrets of osteoarthritis, Author: Alex Venter,
Publication: Research in Action, University of Calgary, 2008