

# CURRICULUM VITAE CHRISTOPHER McCULLOCH

University of Toronto  
CIHR Group in Matrix Dynamics  
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## CURRENT POSITIONS:

2009 – present	Matrix Dynamics Group, Faculty of Dentistry, University of Toronto
2006 – present	Canada Research Chair (Tier 1) in Matrix Dynamics
1994 – present	Professor, University of Toronto, Faculty of Dentistry
1986 – present	Full Member, School of Graduate Studies

## CURRENT RESEARCH INTEREST:

Regulation of Connective Tissue Cells in Periodontium; Cell Signaling; Periodontal Regeneration

## DEGREES AND DIPLOMAS OBTAINED

1982	F.R.C.D.(C) (in Periodontics), Royal College of Dentists in Canada
1978 – 1982	Ph.D. University of Toronto
1976 – 1978	Certificate in Periodontics, Columbia University, New York
1972 – 1976	D.D.S. University of Toronto
1969 – 1972	B.Sc. University of Toronto

## PROFESSIONAL TRAINING AND POST-GRADUATE EDUCATION

1982-1984	Post-doctoral Fellowship in the Department of Anatomy, Faculty of Medicine, University of Toronto; Supervisor: Dr. H. Cheng; Funding: M.R.C. Fellowships
1978-1982	Ph.D. Program in the M.R.C. Group in Periodontal Physiology, Faculty of Dentistry, University of Toronto; Supervisor: Dr. A.H. Melcher; Funding: M.R.C. Fellowships
1978 – present	Part-time Private Practice in Periodontics, Hamilton, Ontario
1977 Summer	Department of Indian Affairs - Clinical Dentistry, Northern Manitoba Reserves
1976 – 1978	Postgraduate Periodontics Program, Columbia University, New York City, New York; Supervisor: Dr. R. Gottsegen
1972 – 1976	Dental Student, University of Toronto

## APPOINTMENTS

2001 – 2009 Director, CIHR Group in Matrix Dynamics, University of Toronto  
1995 – present Full Professor, University of Toronto, Canada  
1990 – 1995 Associate Professor, University of Toronto, Canada  
1986 – present Graduate, Full Member, University of Toronto, Canada  
1984 – 1990 Assistant Professor, University of Toronto, Canada

## CERTIFICATION AND LICENSURE

09/1976 – 09/1978 Certificate in Periodontics Credential,  
Columbia University, New York, United States  
09/1972 – 06/1976 D.D.S. License Credential, R.C.D.S., Ontario, Canada

## HONOURS, DISTINCTIONS AND AWARDS

04/2009 International Association of Dental Research (IADR) Distinguished Scientist Award for Research in Oral Biology, United States (supported by Church & Dwight Company)  
06/2009 International Association of Dental Research (IADR) Hatton Award Supervisor (Graduate Student, Hugh Kim)  
09/2007 – present Fellow, Canadian Academy of Health Sciences  
10/2006 – 09/2013 Canada Research Chair, Tier 1 Research Award, CRC Program, Canada  
08/1998 – 09/1998 Honorary Award for Excellence in Research, Columbia University, United States  
04/1998 International Association of Dental Research (IADR) Hatton Award Supervisor (Graduate Student, Michael Glogauer)  
07/1989 – 06/1994 Renewal of Career Scientist Award, Ontario Ministry of Health, Canada  
07/1984 – 06/1989 Career Scientist Award, Ontario Ministry of Health, Canada  
1982 – 1984 MRC Fellowship; Supervisor- H. Cheng  
1980 – 1982 MRC Fellowship; Supervisor- A.H. Melcher  
01/1978 – 12/1982 First Prize, Research in Cell Migration Research Award, Canadian Dental Association, Canada

## TEACHING ACTIVITIES

### A. Classroom

Date	Course Title	Level	Hours/yr	Role
2009	JTC1331 Biomaterials and Tissue Engineering	Graduate	2	Lecturer
1996 – present	DEN1080 Biology of Connective Tissues	Graduate	14	Course Director
1999 – present	DEN 121Y; Biological Basis of Oral Health and Disease	Undergrad	1	Lecturer
2007-present	LMP 404; Bone and skeletal disorders	Undergrad	6	Lecturer

Date	Course Title	Level	Hours/yr	Role
Sept – June 1996 – 2002	Oral Health Seminars DEN 1001Y, 1100Y, weekly Faculty Research seminars		35	Course Director
1986 – 1995	Clinical epidemiology	Undergrad 3 <sup>rd</sup> year	4	Lecturer
1984 – 1994 1996 – 1997	Literature Review in the Diploma Program in Periodontics	Post-grad 2 <sup>nd</sup> year	40	Course Director
1984 – 1999	Periodontics Course	Undergrad 1 <sup>st</sup> year	4	Lecturer
Alternate years 1984 – 1999	Periodontal Pathology, DEN101H		8	Lecturer
1984 – 1998	Experimental methods in periodontology	Post-grad	9	Course Director
1984 – 1994	Microbiology, Periodontics	Post-grad 2 <sup>nd</sup> year	2	Lecturer
1984 – 1994	Immunology, Periodontics	Post-grad 2 <sup>nd</sup> year	4	Lecturer

## B. Clinical Teaching

Date	Course Title	Level	Hours/yr	Role
1984 – 1986	Tutor in clinical clerkship program	Year III	6	Seminar leader
1984 – 1990	Clinical instructor in periodontology	Year III	110	Instructor

## TECHNOLOGISTS AND RESEARCH ASSOCIATES CURRENT SUPERVISION

04/2009 – present	Ilana Talior, Research Associate
02/2008 – present	Dhaarmini Rajshankar, Post-doctoral fellow
07/2002 – present	Qin Wang, Research Associate
01/2007 – present	Yulia Shifrin, Research Associate
04/1987 – present	Wilson Lee, Tech III; Flow cytometry; immunolabeling
04/1991 – present	Pam Arora, Tech IV; Confocal microscopy; cell culture; Northern & Western blotting; immunolocalization
04/1991-present	Cheung Lo, Tech II; Cell Culture facility manager
04/1998-present	Carol Laschinger, Research Associate

## STUDENT SUPERVISION

### Current Masters of Science Students

06/2008 – present	Reza Termei, Mast Cell Proteases and Myofibroblast differentiation
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06/2008 – present Ibrahim Mohammad, Focal Adhesions and Endoplasmic Reticulum Junctions  
07/2006 – present Amy Yuen, Control of cell differentiation by collagen glycation

### **Current Ph.D. Candidates**

09/2009 – present Maliheh Aghasi, Mechanotransduction through the focal adhesion kinase  
07/2006 – present Hugh Kim, Filamin A in mechanoprotection  
06/2006 – present Matthew Chan, Regulation of Myofibroblast Differentiation by Mechanical Loading

### **Summer Students**

1985 – present 43 summer students supervised

### **Post-Doctoral Fellows**

04/2009 – present James Greenaway, Role of osteopontin in ovarian cancer  
09/2005 – 12/2008 Yulia Shifrin, Force-induced ER stress kinases  
*Current position:* Research Associate in McCulloch lab  
05/2006 – 06/2007 Qin Wang, IL-1 Signaling through Focal Adhesions  
*Current position:* Research Associate in McCulloch lab  
10/2000 – 11/2001 T. Kainulainen, Role of APB-binding in mechanoprotection  
*Current position:* Assistant professor, Karolinska Institute  
05/1997 – 06/2001 B. Au, Lymphocyte migration  
*Current position:* Private Practice  
19/1995 – 08/1997 A. Lew, Role of mechanical force  
*Current position:* Senior Research Scientist, Cytochroma, Toronto  
09/1994 – 06/1997 P. Lekic, Periodontal cell differentiation  
*Current position:* Chair, Ped. Dent., University of Manitoba  
1987 – 1988 F. Hughes, Prostaglandins and osteogenesis  
*Current position:* Professor, University of London  
1986 – 1988 T. Tsuji, Bone cell culture  
*Current position:* Professor, Nihon Medical School, Tokyo  
1988 – 1989 K. Karjalainen, Diabetes and periodontitis  
*Current position:* Professor, University of Turkey  
1989 – 1990 B. Ogiso, PL homeostasis,  
*Current position:* Professor, Tokyo Medical School

### **Graduated Students**

06/2005 – 07/2008 Mindy Pho, M.Sc., University of Toronto; Regulation of smooth muscle actin in cardiac valve fibroblasts  
08/2004 – 06/2006 Sabrina Zhao, M.Sc., University of Toronto; Role of Rho kinase in mediating alpha smooth muscle actin expression by mechanical force  
06/2003 – 06/2006 Sandra Cheong, M.Sc., University of Toronto; Role of glycation end-products in regulation of collagen phagocytosis  
07/2002 – 07/2007 Tarek El-Sayegh, Ph.D., University of Toronto; Intracellular adhesions of fibroblasts  
07/2002 – 06/2005 V. Bhide, M.Sc., University of Toronto; Role of decorin in collagen phagocytosis

- 09/2001 – 02/2005 Jiaxu Wang, Ph.D. University of Toronto; Regulation of SMA by mechanical force
- 09/2003 – 06/2005 Mario D'Addario, M.Sc., University of Toronto; Signalling and mechanotransduction through filamin A
- 09/1998 – 08/2002 K. Ko, Ph.D., University of Toronto; Cell-to-cell communication and mechanotransduction
- 09/1998 – 09/2001 L. Chano, M.Sc., University of Toronto; Control of wound healing in the periodontium
- 09/1997 – 07/2000 J. Lai, M.Sc., University of Toronto; Collagenase activation by MT-MMP
- 09/1997 – 07/2000 L. Silvestri, M.Sc., University of Toronto; Regulation of phagocytosis
- 09/1997 – 06/1999 D. Lin, M.Sc., University of Toronto; Repopulation response after injury to periodontal cells
- 09/1996 – 06/1998 R. Romanelli, M.Sc., University of Toronto; Activation of neutrophil collagenase
- 09/1996 – 06/1998 M. Glogauer, Ph.D. University of Toronto; Cell responses to localized membrane deformation
- 09/1995 – 06/1998 S. Mancini, M.Sc., University of Toronto; Neutrophil collagenase
- 09/1995 – 06/1997 N. Narani, M.Sc., University of Toronto; TGF- $\beta$ -induced expression of alpha muscle actin
- 09/1994 – 06/1998 R. Zohar, Ph.D. University of Toronto; Intracellular osteopontin
- 09/1993 – 06/1995 D. Chou, M.Sc., University of Toronto; TNF-alpha regulation of collagen phagocytosis
- 09/1992 – 06/1996 K. Kulkarni, Ph.D.; University of Toronto; Regulation of fibroblast apoptosis
- 07/1991 – 06/1993 A. Bosy, M.Sc., University of Toronto; Relationship of Oral Malodour to Periodontics
- 07/1991 – 06/1993 A. de Fillipo, M.Sc., University of Toronto; Cytopathic effects of Treponema Denticola on KB epithelial cells
- 08/1991 – 07/1993 E. Nemeth, M.Sc., University of Toronto; Responses to Gingival Fibroblast and Endothelial Cell Populations to experimentally-induced inflammation in monkey
- 09/1990 – 06/1992 J.F. Tessier, M.Sc., University of Toronto; Relationship between Periodontal Probing Velocity and Gingival Inflammation in Human Subjects
- 06/1990 – 08/1993 K.J. Bibby, M.Sc., University of Toronto; The Relationship of Calcium Ion Flux and Cell Volume: Studies in Two Fibroblast Phenotypes in Vitro
- 09/1989 – 06/1991 Y.T. Teng, Dipl. Periodont., University of Toronto; Gelatinase activity in periodontal diagnosis
- 07/1987 – 08/1990 R.P. Carmichael, M.Sc., University of Toronto; Quantitative immunohistochemical analysis of keratins and desmoplakins in human gingiva and peri-implant mucosa

## GRADUATE ADVISORY COMMITTEE MEMBER: M.Sc., Ph.D.

**M.Sc. students:** J. Chateauvert, F. Main, R. Midroni, D. Cathrigamu, P. Yang, T. Batthiki, T. Massa, V.J. Ciolfi, D. Matthews, A. Hui, D. Rajshankar, S. Abital, M. Ramahi, J. Zhu, A. Paes da Silva

**Ph.D. students:** H. Yu, M.Z. Hui, M. Rossi, W.D. Pei

### Examination Committee Member

G. Pakota (M.Sc.); J.K. Chen (Ph.D.); B.J. Crowe (Ph.D.); W.N. Andrade (Ph.D.); N. Jones (M.Sc. to Ph.D.); R. Todescan (Ph.D.); P. Dufort (Ph.D.); R. Bryant (Ph.D.); V. Ciolfi (M.Sc.); M. Hamilton (diploma student in Public Health); T. Harle (Prosthodontics), A. Paes da Silva (August 2003, M.Sc.)

### Examination Committee Member for postgraduate diploma theses in periodontics

D. Awde (1983), D. Hanmer (1984), J. Larivee (1985), M. Couture (1987), D. Gainey (1987), L. Drouin (1988), S. Gangbar (1989), M. Karim (1989), A. Teng (1991).

## PUBLICATIONS

222. Kim H, Nakamura F, Lee W, Shifrin Y, Arora PD, **McCulloch CA**. Filamin A is required for vimentin-mediated cell adhesion and spreading. *Am J Physiol Cell Physiol*. 2009 Oct 28. Epub ahead of print.
221. Chan MW, Arora PD, Bozavikov P, **McCulloch CA**. FAK, PIP5KI $\{\gamma\}$  and gelsolin cooperatively mediate force-induced expression of  $\{\alpha\}$ -smooth muscle actin. *J Cell Sci*. 2009 Aug 1;122(Pt 15):2769-81.
220. Wang Q, Rajshankar D, Branch DR, Siminovitch KA, Herrera Abreu MT, Downey GP, **McCulloch CA**. Protein tyrosine phosphatase- $\alpha$  and Src functionally link focal adhesions to the endoplasmic reticulum to mediate IL-1 induced Ca<sup>2+</sup> signaling. *J Biol Chem*. 2009 Jul 31;284(31):20763-72.
219. Hwang Q, Cheifetz S, Overall CM, **McCulloch CA**, Sodek J. Bone sialoprotein does not interact with pro-gelatinase A (MMP-2) or mediate MMP-2 activation. *BMC Cancer*. 2009 Apr 22;9(1):121.
218. Huang Y, Arora PD, **McCulloch CA**, Vogel WF. The collagen receptor DDR1 regulates cell spreading and motility by associating with myosin IIA. *J Cell Sci*. 2009 May 15;122(Pt 10):1637-46.
217. Li GH, Shi Y, Chen Y, Sun M, Sader S, Maekawa Y, Arab S, Dawood F, Chen M, De Couto G, Liu Y, Fukuoka M, Yang S, Da Shi M, Kirshenbaum LA, **McCulloch CA**, Liu P. Gelsolin Regulates Cardiac Remodeling After Myocardial Infarction Through DNase I-Mediated Apoptosis. *Circ Res*. 2009 Apr 10;104(7):896-904.

216. Y. Shifrin, P.D. Arora, Y. Ohta, D.A. Calderwood, **C. A. McCulloch**. The Role of FilGAP-Filamin A Interactions in Mechanoprotection. *Mol Biol Cell*. 2009 Mar;20(5):1269-79.
215. Arora PD, Conti MA, Ravid S, Sacks DB, Kapus A, Adelstein RS, Bresnick AR, **McCulloch CA**. Rap1 activation in collagen phagocytosis is dependent on nonmuscle myosin II-A. *Mol Biol Cell*. 2008 Dec;19(12):5032-46.
214. Mak BC, Wang Q, Laschinger C, Lee W, Ron D, Harding HP, Kaufman RJ, Scheuner D, Austin RC, **McCulloch CA**. Novel Function of PERK as a Mediator of Force-induced Apoptosis. *J Biol Chem*. 2008 Aug 22;283(34):23462-72.
213. Arora PD, Marignani PA, **McCulloch CA**. Collagen phagocytosis is regulated by the guanine nucleotide exchange factor Vav2. *Am J Physiol Cell Physiol*. 2008 Jul;295(1):C130-7.
212. Nayak BN, Wiltshire WA, Ganss B, Tenenbaum H, **McCulloch CA**, Lekic C. Healing of periodontal tissues following transplantation of cells in a rat orthodontic tooth movement model. *Angle Orthod*. 2008 Sep;78(5):826-31.
211. Pho M, Lee W, Watt DR, Laschinger C, Simmons CA, **McCulloch CA**. Cofilin is a Marker of Myofibroblast Differentiation in Cells from Porcine Aortic Cardiac Valves. *Am J Physiol Heart Circ Physiol*. 2008 Apr;294(4):H1767-78.
210. Papp S, Szabo E, Kim H, **McCulloch CA**, Opas M. Kinase-dependent adhesion to fibronectin: Regulation by calreticulin. *Exp Cell Res*. 2008 Apr 1;314(6):1313-26.
209. Herrera Abreu MT, Castellanos Penton P, Kwok V, Vachon E, Shalloway D, Vidali L, Lee W, **McCulloch CA**, Downey GP. Tyrosine Phosphatase PTP{alpha} Regulates Focal Adhesion Remodeling Through Rac1 Activation. *Am J Physiol Cell Physiol*. 2008 Apr;294(4):C931-44.
208. Kim H, Sengupta A, Glogauer M, and **McCulloch CA**. Filamin A regulates cell spreading and survival via beta1 integrins. *Exp Cell Res*. 2008 Feb 15;314(4):834-46.
207. Lenga Y, Koh A, Perera AS, **McCulloch CA**, Sodek J, Zohar R. Osteopontin expression is required for myofibroblast differentiation. *Circ Res*. 2008 Feb 15;102(3):319-27.
206. Matthew W. C. Chan, Pamela D. Arora and **Christopher A. McCulloch**. Cyclosporin inhibition of collagen remodeling is mediated by gelsolin. *Am J Physiol Cell Physiol* 293: C1049–C1058, 2007.
205. T. Y. El Sayegh, P. D. Arora, K. Ling, C. Laschinger, P. A. Janmey, R. A. Anderson, and **C. A. McCulloch**. Phosphatidylinositol-4,5 Bisphosphate Produced by PIP5KIY Regulates Gelsolin, Actin Assembly, and Adhesion Strength of N-Cadherin Junctions. *Mol Biol Cell*. 2007 Aug;18(8):3026-38.

204. Paul A. Janmey and **Christopher A. McCulloch**. Cell Mechanics: Integrating Cell Responses to Mechanical Stimuli. *Annu Rev Biomed Eng.* 2007;9:1-34.
203. Xiao-Han Zhao, Carol Laschinger, Pam Arora, Katalin Szászi, Andras Kapus, **Christopher A. McCulloch**. Force activates smooth muscle alpha-actin promoter activity through the Rho signaling pathway. *J Cell Sci.* 2007 May 15;120(Pt 10):1801-9.
202. Sylvia Papp, Marc P. Fadel, Hugh Kim, **Christopher A. McCulloch**, and Michal Opas. Calreticulin Affects Fibronectin-based Cell-Substratum Adhesion via the Regulation of c- Src Activity. *J Biol Chem.* 2007 Jun 1;282(22):16585-98.
201. Tenenbaum, H, Matthews D, Sandor G, **McCulloch C**. Oral health - Systemic health: What is the true connection? *Journal of the Canadian Dental Association.* Apr 2007;73(3):211-216.
200. Marie-Claude Jobin, Inderpreet Virdee, **Christopher A. McCulloch**, Richard P. Ellen. Activation of MAPK in fibroblasts by *Treponema denticola* major outer sheath protein. *Biochem Biophys Res Commun.* 2007 Apr 27;356(1):213-8.
199. Sandra A. C. Chong, Wilson Lee, Pam D. Arora, Carol Laschinger, Edmond W. K. Young, Craig A. Simmons, Morris Manolson, Jaro Sodek, and **Christopher A. McCulloch**. Methylglyoxal Inhibits the Binding Step of Collagen Phagocytosis. *J Biol Chem.* 2007 Mar 16;282(11):8510-20.
198. T.Y. El Sayegh, A. Kapus, **C.A. McCulloch**. Beyond the epithelium: Cadherin function in fibrous connective tissues. *FEBS Letters* 581 (2007) 167–174.
197. Lingzhi Fan, Attila Sebe, Zalan Peterfi, Andras Masszi, Ana C.P. Thirone, Ori D. Rotstein, Hiroyasu Nakano, **Christopher A. McCulloch**, Katalin Szaszi, Istvan Mucsi, and Andras Kapus. Cell Contact–dependent Regulation of Epithelial–Myofibroblast Transition via the Rho-Rho Kinase-Phospho-Myosin Pathway. *Mol Biol Cell.* 2007 Mar;18(3):1083-97.
196. **Christopher. A. McCulloch**, Gregory P. Downey and Hani El-Gabalawy. Signalling platforms that modulate the inflammatory response: new targets for drug development. *Nat Rev Drug Discov.* 2006 Oct;5(10):864-76.
195. Hyejin Lee, Christopher M. Overall, **Christopher A. McCulloch**, and Jaro Sodek. A Critical Role for the Membrane-type 1 Matrix Metalloproteinase in Collagen Phagocytosis. *Biol Cell.* 2006 Nov;17(11):4812-26.
194. Qin Wang, Maria Teresa Herrera Abreu, Katherine Siminovitch, Gregory P. Downey, and **Christopher A. McCulloch**. Phosphorylation of SHP-2 Regulates interactions between the Endoplasmic Reticulum and Focal Adhesions to Restrict Interleukin-1-induced Ca<sup>2+</sup> Signaling. *J Biol Chem.* 2006 Oct 13;281(41):31093-105.
193. Mario D’Addario, Pamela D. Arora, **C.A. McCulloch**. Role of p38 in stress activation of Sp1. *Gene* 379 (2006) 51–61.

192. **Christopher A. McCulloch**. Proteomics for the periodontium: current strategies and future promise. *Periodontol 2000*. 2006;40:173-83.
191. Wang J, Zohar R, **McCulloch CA**. Multiple roles of alpha-smooth muscle actin in mechanotransduction. *Exp Cell Res*. 2006 Feb 1;312(3):205-14.
190. Maria Teresa Herrera Abreu, Qin Wang, Eric Vachon, Tomoko Suzuki, Chung-Wai Chow, Yingchun Wang, Ouyang Hong, Jesu S Villar, **Christopher A.G. McCulloch**, and Gregory P. Downey. Tyrosine Phosphatase SHP-2 Regulates IL-1 Signaling in Fibroblasts Through Focal Adhesions. *J Cell Physiol*. 2006 Apr;207(1):132-43.
189. Tarek Y. El Sayegh, Pamela D. Arora, Lingzhi Fan, Carol A. Laschinger, Peter A. Greer, **Christopher A. McCulloch**, and Andras Kapus. Phosphorylation of N-Cadherin-associated Cortactin by Fer Kinase Regulates N-Cadherin Mobility and Intercellular Adhesion Strength. *Mol Biol Cell*. 2005 Dec;16(12):5514-27.
188. P. D. Arora, M.W.C. Chan, R. A. Anderson, P. A. Janmey, and **C. A. McCulloch**. Separate Functions of Gelsolin Mediate Sequential Steps of Collagen Phagocytosis. *Mol Biol Cell* 2005 Nov;16(11):5175-90.
187. Tomoko Suzuki, Theo J. Moraes, Eric Vachon, Hedy H. Ginzberg, Tsun-Tsao Huang, Michael A. Matthay, Morley D. Hollenberg, John Marshall, **Christopher A. G. McCulloch**, Maria Teresa Herrera Abreu, Chung-Wai Chow, and Gregory P. Downey. Proteinase-Activated Receptor-1 Mediates Elastase- Induced Apoptosis of Human Lung Epithelial Cells. *Am J Respir Cell Mol Biol*. 2005 Sep;33(3):231-47.
186. Vinay M. Bhide, Carol A. Laschinger, Pamela D. Arora, Wilson Lee, Lari Hakkinen, Hannu Larjava, Jaro Sodek, and **Christopher A. McCulloch**. Collagen Phagocytosis by Fibroblasts Is Regulated by Decorin. *J Biol Chem*. 2005 Jun 17;280(24):23103-13.
185. J. Wang, Carol Laschinger, Xiao Han Zhao, Baldwin Mak, A. Seth, **C.A. McCulloch**. Mechanical force activates eIF-2alpha phospho-kinases in fibroblast. *Biochem Biophys Res Commun*. 2005 Apr 29;330(1):123-30.
184. Wen-Kuan Xin, Xiao-Han Zhao, Jindong Xu, Gang Lei, Chun L. Kwan, Kang-Min Zhu, Jae-Sung Cho, Missy Duff, Richard P. Ellen, **Christopher A. G. McCulloch** and Xian-Min Yu. The removal of extracellular calcium: a novel mechanism underlying the recruitment of N-methyl-d-aspartate (NMDA) receptors in neurotoxicity. *Eur J Neurosci*. 2005 Feb;21(3):622-36.
183. Qin Wang, Gregory P. Downey, Maite Abreu, Elena Bajenova, András Kapus, and **Christopher A. McCulloch**. Mitochondrial function is a critical determinant of IL-1-induced ERK activation. *FASEB J*. 2005 May;19(7):837-9.
182. Wen-Kuan Xin, Chun L. Kwan, Xiao-Han Zhao, Jindong Xu, Richard P. Ellen, **Christopher A. G. McCulloch**, and Xian-Min Yu. A Functional Interaction of Sodium and Calcium in the Regulation of NMDA Receptor Activity by Remote NMDA Receptors. *J Neurosci*. 2005 Jan 5;25(1):139-48.

181. Jiayu Wang, Jennie Fan, Carol Laschinger, Pamela D. Arora, Andras Kapus, Arun Seth, and **Christopher A. McCulloch**. Smooth Muscle Actin Determines Mechanical Force-induced p38 Activation. *J Biol Chem*. 2005 Feb 25;280(8):7273-84.
180. Lekic PC, Nayak BN, Al-Sanea R, Tenenbaum H, Ganss B, **McCulloch C**. Cell transplantation in wounded mixed connective tissues. *The Anatomical Record Part A* 287a:1256–1263 (2005).
179. Masszi A, Fan L, Rosivall L, **McCulloch CA**, Rotstein OD, Mucsi I, Kapus A. Integrity of cell-cell contacts is a critical regulator of TGF-beta 1-induced epithelial-to-myofibroblast transition: role for beta-catenin. *Am J Pathol*. 2004 Dec;165(6):1955-67.
178. Wang Q, Downey GP, Herrera-Abreu MT, Kapus A, **McCulloch CA**. SHP-2 modulates interleukin-1-induced Ca<sup>2+</sup> flux and ERK activation via phosphorylation of phospholipase Cgamma1. *J Biol Chem*. 2005 Mar 4;280(9):8397-406
177. **McCulloch CA**. Drug-induced fibrosis: interference with the intracellular collagen degradation pathway. *Curr Opin Drug Discov Devel*. 2004 Sep;7(5):720-4. Review.
176. El Sayegh TY, Arora PD, Laschinger CA, Lee W, Morrison C, Overall CM, Kapus A, **McCulloch CA**. Cortactin associates with N-cadherin adhesions and mediates intercellular adhesion strengthening in fibroblasts. *J Cell Sci*. 2004 Oct 1;117(Pt 21):5117-31.
175. Chan MW, El Sayegh TY, Arora PD, Laschinger CA, Overall CM, Morrison C, **McCulloch CA**. Regulation of intercellular adhesion strength in fibroblasts. *J Biol Chem*. 2004 Sep 24;279(39):41047-57.
174. Zohar R, Zhu B, Liu P, Sodek J, **McCulloch CA**. Increased cell death in osteopontin-deficient cardiac fibroblasts occurs by a caspase-3-independent pathway. *Am J Physiol Heart Circ Physiol*. 2004 Oct;287(4):H1730-9.
173. Batista da Silva AP, Lee W, Bajenova E, **McCulloch CA**, Ellen RP. The major outer sheath protein of *Treponema denticola* inhibits the binding step of collagen phagocytosis in fibroblasts. *Cell Microbiol*. 2004 May;6(5):485-98.
172. Koivisto L, Hakkinen L, Matsumoto K, **McCulloch CA**, Yamada KM, Larjava H. Glycogen synthase kinase-3 regulates cytoskeleton and translocation of Rac1 in long cellular extensions of human keratinocytes. *Exp Cell Res*. 2004 Feb 1;293(1):68-80.
171. Arora PD, Glogauer M, Kapus A, Kwiatkowski DJ, **McCulloch CA**. Gelsolin mediates collagen phagocytosis through a rac-dependent step. *Mol Biol Cell*. 2004 Feb;15(2):588-99.
170. Zhu B, Suzuki K, Goldberg HA, Rittling SR, Denhardt DT, **McCulloch CA**, Sodek J. Osteopontin modulates CD44-dependent chemotaxis of peritoneal macrophages through G-protein-coupled receptors: evidence of a role for an intracellular form of osteopontin. *J Cell Physiol*. 2004 Jan;198(1):155-67.

169. D'Addario M, Arora PD, Ellen RP, **McCulloch CA**. Regulation of tension-induced mechano- transcriptional signals by the microtubule network in fibroblasts. *J Biol Chem*. 2003 Dec 26;278(52):53090-7.
168. Wang Q, Downey GP, Choi C, Kapus A, **McCulloch CA**. IL-1 induced release of Ca<sup>2+</sup> from internal stores is dependent on cell-matrix interactions and regulates ERK activation. *FASEB J*. 2003 Oct;17(13):1898-900.
167. Koivisto L, Alavian K, Hakkinen L, Pelech S, **McCulloch CA**, Larjava H. Glycogen synthase kinase-3 regulates formation of long lamellipodia in human keratinocytes. *J Cell Sci*. 2003 Sep 15;116(Pt 18):3749-60.
166. Wang J, Chen H, Seth A, **McCulloch CA**. Mechanical force regulation of myofibroblast differentiation in cardiac fibroblasts. *Am J Physiol Heart Circ Physiol*. 2003 Nov;285(5):H1871-81.
165. Arora PD, Fan L, Sodek J, Kapus A, **McCulloch CA**. Differential binding to dorsal and ventral cell surfaces of fibroblasts: effect on collagen phagocytosis. *Exp Cell Res*. 2003 Jun 10;286(2):366-80.
164. MacGillivray M, Herrera-Abreu MT, Chow CW, Shek C, Wang Q, Vachon E, Feng GS, Siminovitch KA, **McCulloch CA**, Downey GP. The protein tyrosine phosphatase SHP-2 regulates interleukin-1-induced ERK activation in fibroblasts. *J Biol Chem*. 2003 Jul 18;278(29):27190-8.
163. Chano L, Tenenbaum HC, Lekic PC, Sodek J, **McCulloch CA**. Emdogain regulation of cellular differentiation in wounded rat periodontium. *J Periodontal Res*. 2003 Apr;38(2):164-74.
162. Masszi A, Di Ciano C, Sirokmany G, Arthur WT, Rotstein OD, Wang J, **McCulloch CA**, Rosivall L, Mucsi I, Kapus A. Central role for Rho in TGF-beta1-induced alpha-smooth muscle actin expression during epithelial-mesenchymal transition. *Am J Physiol Renal Physiol*. 2003 May;284(5):F911-24.
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2. **McCulloch, CAG** and Melcher, AH. Migration of mouse molar periodontal ligament cells. *J. Dent. Res.* 61: 198, 1982.
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## INVITED TALKS, SEMINARS, WORKSHOPS

114. Invited speaker: "*Impact of collagen glycation on cardiac function*", University of Bergen, Bergen, Norway, November 26, 2009.
113. Invited speaker: "*Interactive signalling through focal adhesions and the endoplasmic reticulum*", University of Texas, Southwestern Medical School, Dallas, November 17, 2009.
112. Invited Speaker: "*Filamin A-vimentin interactions mediate cell spreading*", Cytoskeleton Group, Toronto, September 24, 2009.
111. Invited Speaker: "*Diabetes and periodontal diseases*", Brantford Dental Society, January 14, 2009.
110. Invited Speaker: "*Wound repair in the periodontium*", Ottawa Dental Society, November 10, 2008.
109. Invited Speaker: "*Discoïdin domain receptors and collagen remodelling*", Wolfgang Vogel Symposium, University of Toronto, October 22, 2008.
108. Invited Speaker: "*Collagen glycation and intercellular adhesions*", North Eastern University of Ohio Medical School, October 16, 2008.
107. Invited Speaker: "*Myofibroblasts and diabetic cardiomyopathy*", Medical University of South Carolina. October 8, 2008.
106. Invited Speaker: "*Diabetic cardiomyopathy and intercellular adhesions*", St. Joseph's Hospital Research Institute, McMaster University, September 25, 2008.

105. Invited Speaker: *“Role of myosin IIA in phagocytosis”*, University of Pennsylvania, April 8, 2008.
104. Invited Speaker: *“Inflammatory cell signaling through the endoplasmic reticulum”*, University of Ottawa, Jan 29, 2008.
103. Invited Speaker: *“Signaling through the endoplasmic reticulum”*, University of Tel Aviv, Oct 25, 2007.
102. Invited Speaker: *“IL-1 signaling requires ER-focal adhesion connections”*, University of North Carolina, Oct 03, 2007.
101. Invited Speaker: *“Cell Signaling in Soft Tissues”*, North Annual Retreat (Network for Oral Research Training and Health), Friday, June 16, 2006.
100. Invited Speaker: *“Role of gelsolin in strengthening of intercellular adhesions”*, Division of Molecular and Developmental Genetics, Department of Zoology, University of Toronto, Toronto, Ontario, Feb 03, 2006.
99. Invited Speaker: *“Current Concepts in Periodontics – 2006 Update”*, Brant County Dental Society, Brantford, ON, Tuesday, January 10, 2006.
98. Invited Speaker: *“Role of the Endoplasmic Reticulum in IL-1 Signal Transduction”*, McMaster University, Dept. of Pathology, November 15, 2005.
97. Invited Speaker: *“Signaling platforms that mediate the inflammatory response”*, 7th World Congress on Inflammation, Melbourne, Australia; August 21, 2005.
96. Invited Speaker: *“Canadian Academy of Periodontology”*, Ottawa, Ontario, May 21, 2005, Full-Day Program- Impact of Periodontal Infections on Systemic Health.
95. Invited Speaker: *“Searching for the Myofibroblast”*, Liberty Grand, Exhibition Place, Toronto, Ontario, Friday, May 6, 2005.
94. Invited Speaker: *“Restriction of IL-1 signaling through focal adhesions”*, Sunnybrook and Women’s College Health Sciences Centre, Tuesday, April 5, 2005.
93. Invited Speaker: *“Adreno-Cortical Stress Response and Periodontal Destruction”*, The Ontario Dental Symposium, Mississauga, Ontario, Friday, March 4, 2005.
92. Invited Speaker: *“Do microbial infections increase risk of cardiovascular diseases”?* Royal College of Dental Surgeons of Ontario, Toronto, Ontario, February 4, 2005.
91. Invited Speaker: *“How mechanical forces impact connective tissues of the periodontium”*, Brantford Dental Society, Brantford, Ontario, January 11, 2005.
90. Invited Speaker: *“Role of periodontal diseases in systemic health”*, Tel Aviv University, Tel Aviv, Israel, Wednesday, November 23, 2004.

89. Invited Speaker: "*Signalling platforms that mediate the inflammatory response.*" Canadian Arthritis Conference, Vancouver, B.C. Friday Nov. 12, 2004.
88. Invited Speaker: "*Role of Filamin A in Mechanoprotection*", Henderson Hospital Research Centre, McMaster University, Dept. of Medicine, Hamilton, Ontario, May 6, 2004.
87. Invited Speaker: "*Filamin A protects cells against tensile force-induced cell death*", University of British Columbia, Dept. of Biochemistry, Vancouver, B.C., May 3, 2004.
86. Invited Speaker: "*Role of myofibroblast differentiation in congestive heart failure*", Heart and Stroke Foundation of Orillia, Ontario, February 3, 2004.
85. Invited Speaker, "*Collagen phagocytosis: Alternative Pathway for Matrix Turnover*", Gordon Conference on Matrix Metalloproteinases, August 18, 2003, Big Sky, Montana, USA.
84. Invited lecture; "*Effect of Periodontitis on Systemic Diseases*", Ontario Dental Nurses and Assistants Association; Wednesday, May 14, 2003, Burlington, Ontario.
83. Invited Full-Day Program Speaker; "*Role of Periodontal Diseases in Systemic Health*", Ontario Dental Association Convention, May 10, 2003; Crowne Plaza Hotel, Toronto, Ontario.
82. Organizer and Speaker, "*Role of Gelsolin in Collagen Phagocytosis*", CIHR Group in Matrix Dynamics, University of Toronto, May 5, 2003.
81. Invited Speaker, "*Il-1 Signaling Restrictions by cytoskeletal proteins*", Toronto General Hospital Dept. of Surgery, October 22, 2002.
80. Organizer and Speaker, "*Filamin A in Mechanoprotection*", CIHR Group in Matrix Dynamics, University of Toronto, September 30, 2002.
79. Invited Speaker, "*Development of Membership in CAN*", Canadian Arthritis Network, Calgary, Alberta, September 26, 2002.
78. Invited Speaker, "*Mechanotranscriptional coupling of the cytoprotective protein filaminA*", Institute for Medicine and Engineering, University of Pennsylvania, May 7, 2002.
77. Invited Speaker and Symposium Organizer, "*Tissue Engineering for the Periodontium*" IADR, Vancouver, March 9, 2002.
76. Invited Speaker, "*Mechanotransduction and role of cytoskeleton*", Department of Mechanical Engineering, University of Toronto, February 26, 2002.
75. Invited Speaker, "*Protecting the Periodontium: Cytoskeletal adaptations for coping with biomechanical forces*", University of Western Ontario, September 16, 2001.

74. Invited Speaker, "*Role of the fibroblast in cardiac hypertrophy*", Heart and Stroke Foundation Regional Conference, Peterborough, Ontario, April 19, 2001.
73. Invited Speaker, "*ABP-280 in mechanical protection of cells*", C.H.U.L., University of Laval, Quebec City, Quebec, March 21, 2001.
72. Invited Speaker, "*Role of matrix metalloproteinases in progressive periodontitis*", G.R.E.B., University of Laval, Quebec City, Quebec, March 21, 2001.
71. Invited Speaker, "*Role of fibroblasts in wound repair*", Faculty of Dentistry, University of Laval, Quebec City, Quebec, March 20, 2001.
70. Invited Speaker, "*Mechanical signaling through the cytoskeleton to gene expression*". Department of Pathobiology and Laboratory Medicine, University of Toronto, November 6, 2000.
69. Invited Speaker, "*Role of actin binding protein 280 in mechanical protection of cells in the periodontium*", Gordon Conference on Periodontal Diseases, Queen's College, Oxford, UK, July 16-21, 2000.
68. Invited Speaker, "*IL-1 signaling through focal adhesions*", Canadian Arthritis Network, Toronto, May 24, 2000.
67. Invited Speaker, "*Molecular factors that regulate selection and differentiation*", III Reunión Internacional Sobre Biología Periodontal, Ciudad Universitaria, Mexico, November 26, 27, 1999.
66. Invited Speaker, "*The role of actin binding proteins in cellular protection against physical forces*", Tokushima University, Japan, July 27, 1999.
65. Invited Speaker, "*Tooth replantation: How can we best preserve the periodontal ligament after injury*", Academy for Sports Dentistry Symposium, Toronto, June 18, 1999.
64. Invited Speaker, "*Transfer of bacteria in the pathogenesis of periodontitis*", Omicron Kappa Upsilon Dental Society, Toronto Chapter, Toronto, June 17, 1999.
63. Invited Speaker and Ph.D. Opponent Examination, "*Hyper-reactive neutrophils in periodontitis*", Karolinska Institute, Stockholm, Sweden, May 28, 1999.
62. Organizer and speaker at IADR Symposium, Vancouver, B.C. "*Life at the Edge*", March 11, 1999.
61. Invited Speaker, Connective Tissue Research Group, Mount Sinai Hospital, "*Cellular Mechanoprotection*", Toronto, Ontario, October 26, 1998.
60. Invited Speaker, Cardiovascular Research Group, Hospital for Sick Children, "*Role of actin in mechanical signalling*", Toronto, Ontario, October 1, 1998.

59. Invited Speaker, *"Planning for stability of clinical outcomes"*, Stockholm, Sweden, May 9, 1998.
58. Moderator, Annual meeting of the Scandinavian Society of Periodontology, *"Potential of regenerative procedures"*, Stockholm, Sweden, May 8, 1998.
57. Invited Speaker, Annual meeting of the Scandinavian Society of Periodontology, Karolinska Institute, *"Role of focal adhesions in restricting Interleukin-1 signalling"*, Stockholm, Sweden, May 7, 1998.
56. Invited Speaker, *"Role of actin binding proteins in mechanoprotection"*, University of Buffalo, Department of Cell Biology Buffalo, New York, April 7, 1998.
55. Invited Speaker on *"TGF- $\beta$ -induced myofibroblast formation is dependent on the compliance of the matrix"*. Conference on Mechanisms involved in tissue repair and fibrosis: roles of the myofibroblast. Centre Jacques Cartier, Lyons, France, December 8, 1997.
54. Invited Lecturer on *"The role of ABP-280 in integrin-dependent mechanoprotein actin"*, Harvard University, Brigham and Women's Hospital Boston Massachusetts, November 14, 1997.
53. Invited Speaker, Conference on Biological Mechanisms of Tooth Eruption, Resorption, Replacement by Implants. *"The actin binding protein gelsolin regulates motility and cell contraction in periodontal fibroblasts"*, Toledo, Spain, October 23, 1997.
52. Invited Speaker, Flow Cytometry Users Group, Hospital for Sick Children, *"Use of flow cytometry for studies of phagocytosis"*, Toronto, May 29, 1997.
51. Invited Speaker, Bone and Mineral Research Club, Women's College Hospital, *"Mechanotransduction in stromal cells"*, Toronto, November 21, 1996.
50. Invited Speaker, *"Role of actin in mechanotransduction"*, Department of Zoology, University of Toronto, Toronto, September 27, 1996.
49. Invited Speaker, *"Methods to optimize periodontal wound healing"*, ESPE Corporation, Munich, Germany, April 20-23, 1996.
48. Invited Speaker, *"New Diagnostic methods in periodontal diseases"* and *"Advances in Periodontal Wound Healing"*, Norwegian Society of Periodontists, Geilo, Norway, March 20-25, 1996.
47. Bernard S. Moskow International Lectureship in Periodontology, *"Cells and processes critical for periodontal regenerations"*, Columbia University, New York, November 17, 1995.
46. Invited Lecture on *"Role of fibroblast cytoskeleton in periodontal homeostasis"*, University of British Columbia, Vancouver, B.C., October 3, 1995.

45. Invited Lecture on "*Periodontal regeneration from a developmental perspective*", Nihon University, Tokyo, Japan, September 21-28, 1995.
44. Invited Lecture on "*Cells essential for periodontal repair and their origin*", University College, Cork, Ireland, September 11-12, 1995.
43. Invited Lecture on "*Cell Signalling and the Cytoskeleton: the importance of fibroblasts in wound healing*", University of Manitoba, Winnipeg, February 27, 1995.
42. Invited Lecture on "*Tricks and Traps of Periodontal Therapy*", Hamilton Academy of Dentistry, Hamilton, Ontario, January 12, 1995.
41. Invited Lecture on "*Biological approach to recognition and treatment of periodontal diseases*", City of Toronto, Dept. of Public Health, Toronto, October 26, 1994.
40. Invited Lecture on "*Critical Analysis of the Literature*", 38th Canadian Teaching Conference on Dental Clinical Epidemiology and Decision-Making, Toronto, October 13-15, 1994.
39. Invited Lecture on "*Fibroblast Regulation by IL-1*", University of Western Ontario, June 8, 1994.
38. H.K. Box Memorial Lecture on "*Cell Biology of Periodontal Regeneration*", University of Toronto, April 7, 1994.
37. Invited lecturer and Organizer of Workshop on "*Confocal Microscopy in Dental Sciences*", IADR, Seattle, Washington, March 11, 1994.
36. Invited lecture on "*Diagnostic accuracy of collagenase periodontitis*", New York Academy of Sciences, Inhibition of Matrix Metalloproteinases: Therapeutic Potential, Tampa, Florida, January 21, 1994.
35. Invited lecture on "*Fibroblast Subpopulations*", University of Buffalo, S.U.N.Y., December, 1993.
34. Invited lecture sponsored by the R.C.D.S., Workshop on Quality Assurance in Dentistry. "*Evidence based health care in periodontal diseases*", November, 1993.
33. Invited lecture sponsored by Harvard University, Biological mechanisms of tooth eruption, resorption and replacement by implants. "*Role of fibroblastic actin in remodelling of periodontium*", Danvers, MA., October 23, 1993.
32. Keynote speaker at Israeli Division of IADR, Tel Aviv, Israel, April 30, 1993.
31. Lecture on "*New diagnostic methods for periodontitis*", Tel Aviv School of Dental Medicine, Tel Aviv, Israel, April 29, 1993.

30. Invited Speaker on "*Quantitative associations between periodontal disease-related parameters and oral malodour*", First International Workshop on Oral Malodour. Herzliya, Israel, April 28, 1993.
29. Invited speaker "*Regeneration of Periodontal Tissues*", Eastman Dental Center, Rochester, New York, April 5, 1993.
28. Symposium Speaker at IADR Symposium on "*Diagnosis of Periodontal Diseases*", Glasgow, Scotland, July, 1992.
27. Invited speaker "*Diagnosis and Treatment of Periodontal Diseases*", University of London, England, May, 1992.
26. Invited Speaker at IV International Symposium on Periodontics and Restorative Dentistry, Boston, April, 1992.
25. Invited speaker "*a) Fibroblast origins and lineages; b) Antibiotics in Periodontal Therapy; c) Regulation of osteogenesis; d) New diagnostic methods in periodontology; e) Automated periodontal probe*", November 23-November 30, 1991, University of Sao Paulo, Bauru, Sao Paulo, Brazil.
24. Lecture on "*Regulation of osteogenesis by fibroblasts*", December 14, 1990, University of Texas Dental Branch, Houston, Texas.
23. Lecture on "*Regeneration of Periodontium*", N.I.D.R. Mini Symposium. January 31, 1990, N.I.H., Bethesda, Maryland.
22. Lecture on "*Diagnosis and treatment of periodontal diseases: Approaches to the Young and Elderly*", June 7, 1990, Eastern Ontario Regional Dental Staff Conference, Belleville, Ontario.
21. Lecture on "*Periodontitis in Young Human Populations*", December 5, 1989, North York Board of Health, North York, Ontario.
20. Invited speaker "*Clinical Trial of Doxycycline in Treatment of Recurrent Periodontitis*", November 18, 1989, Ontario Society of Periodontists, Scarborough, Ontario.
19. Invited speaker "*Regenerating the Soft Tissue Attachment*", October 27, 1989, General Session, American Academy of Periodontology Annual Meeting, Washington, D.C.
18. Invited speaker "*Origin and Function of Cells of the Periodontium*", July 3, 1989, University of Liverpool, School of Dentistry, Liverpool, England.
17. Invited speaker "*Efficacy of Doxycycline in treatment of refractory periodontitis*", April 18, 1989, Toronto. Toronto Bone and Mineral Club, Mount Sinai Hospital.
16. Invited speaker "*Wound healing in the periodontium*", April 10, 1989, Eastman Dental Center, Rochester, New York.

15. Innovation Foundation Lectures, "*Application of Automated Periodontal Probe to Diagnosis of Periodontal Diseases*", September, 1988. Faculty of Library Science, University of Toronto.
14. Invited speaker "*Bone and cementum synthesizing cells originate from endosteal spaces and maintain separate domains in periodontal tissues*", Gordon Research Conference on Periodontal Diseases, June 27, 1988, Plymouth, New Hampshire, U.S.A.
13. Invited Speaker "*Origin and fate of periodontal ligament cell populations*", Dows Dental Institute, University of Iowa, April 19, 1988, Iowa City, U.S.A.
12. Lecture on "*Periodontal examination*", Faculty of Dentistry, University of Toronto, Continuing Education Lectures, March 21, 1988, Toronto, Ontario.
11. Invited Speaker "*Automated measurements of periodontal disease*", Faculty of Dentistry, University of Manitoba, July 7, 1987, Winnipeg, Manitoba.
10. Lecture on "*Periodontal examination methods*", Faculty of Dentistry, University of Toronto, Postgraduate Lectures, March 24, 1987, Toronto, Ontario.
9. Lecture on "*Clinical periodontics*", Academy of General Dentistry, October 17, 1986, Welland, Ontario.
8. Lecture on "*Periodontics in the 1990's*", Canadian Dental Association Convention, October 1, 1985, Ottawa, Ontario.
7. Lecture on "*How do we diagnose periodontitis?*" Burlington Academy of Dentistry, April 19, 1985, Burlington, Ontario.
6. Lecture on "*Clinical periodontology*", Faculty of Dentistry, University of Toronto, Postgraduate Lectures, April 17, 1985, Toronto, Ontario.
5. Lecture on "*Cell attachment in periodontal tissues*", Faculty of Dentistry, University of Toronto, Postgraduate Lectures, April 25, 1984, Toronto, Ontario.
4. Lecture on "*Treatment of isolated periodontal lesions*", Hamilton Academy of Dentistry, October 13, 1983, Hamilton, Ontario.
3. Lecture on "*Cell populations in periodontal tissues*", Faculty of Dentistry, University of Toronto, Postgraduate Lectures, April 27, 1983, Toronto, Ontario.
2. Lecture on "*Pathogenesis of periodontitis*", Walter Gordon Centre at Queen's University, Kingston District Dental Society, April 15, 1983, Kingston, Ontario.
1. Invited Speaker, "*Wound healing in the periodontium*", Brookdale Medical Center, New York University Dental School, November 27, 1982, Brooklyn, New York.

## **MOST SIGNIFICANT RESEARCH CONTRIBUTIONS**

- A. Demonstrated a critical role for the fibroblast in collagen degradation by phagocytosis. Over a +14 year time period showed that collagen phagocytosis is a crucial mechanism for remodelling of the extracellular matrix and demonstrated for the first time that perturbations in collagen recognition and calcium signaling to actin were responsible for the formation of fibrotic lesions in human periodontium. The published work (1993-2006) and a large series of international and national presentations has provided the biological basis by which inflammatory cytokines and aging processes cause dysfunctional collagen homeostasis, leading to the formation of collagen overgrowth and fibrosis (Knowles et al. *J. Cell Science* 1991; Arora et al. *J. Biol. Chem.* 2000; Arora et al. *J. Biol. Chem.* 2001; Arora et al. *Mol. Biol. Cell* 2004; *Mol Biol. Cell* 2005; Lee et al. *Mol Biol. Cell* 2006; Arora et al. *Mol Biol. Cell* 2008).
- B. Showed that mechanical forces signal actin assembly in fibroblasts. Developed a model to apply tensile forces to fibroblasts via integrins and the actin cytoskeleton and then demonstrated that tensile forces cause rapid disassembly of actin filaments followed by a persistent pattern of actin assembly under the control of stretch-induced calcium entry. The published papers showed for the first time the direct, interactive relationships between physical forces and the mechanisms that regulate actin assembly. (Pender and McCulloch *J. Cell Science* 1991; Glogauer et al. *J. Cell Science* 1997; *ibid. J. Biol. Chem.* 1998)
- C. Demonstrated that the actin cross linking protein filamin A protects cells against force-induced death. Cells in mechanically challenged environments elaborate protective systems to prevent cell death. Identified an actin binding protein (filamin A) that protects cells against mechanical loading by virtue of its ability to cross-link actin filaments and increase the rigidity of the cell membrane. Introduced the idea of mechanoprotection and demonstrated a role for filamin A in protecting cells against stretch-induced apoptosis. (Glogauer et al. *J. Biol. Chem.* 1998; Kainulainen et al. *J. Biol. Chem.* 2001). Showed that mechanoprotective signals regulate the promoter of the filamin A gene through the activation of Sp1 binding, a process mediated by the MAP kinase p38 (D'Addario et al. *J. Biol. Chem.* 2001; D'Addario et al. *J. Biol. Chem.* 2002) and is modified by microtubules (D'Addario et al. *J. Biol. Chem.* 2003; *Mol Biol. Cell* 2005). Showed that mechanical signalling through filamin A requires Fil Gap (Schifrin et al. 2008) and involves the protein unfolding pathway (Mak et al. *J. Biol Chem.* 2008).
- D. Showed that actin filaments regulate inflammatory cytokine signaling. Dr. McCulloch and his collaborators found that actin filaments in focal adhesions are required for IL-1 signaling in fibroblasts. This discovery led to the discovery of new targets to reduce chronic inflammation and the filing of a patent application. The experimental work links the actin cytoskeleton to the calcium signaling system in fibroblasts, which may impact on a wider variety of inflammatory signals than previously thought (Arora et al. *J. Biol. Chem.* 1995; MacGillivray et al. *J. Biol. Chem.* 2000; MacGillivray et al. *J. Biol. Chem.* 2003; Wang et al. *FASEB. Journal* 2003; Wang et al. *J. Biol. Chem* 2005; Wang et al. *J. Biol. Chem.* 2006; McCulloch et al. *Nature Reviews Drug Discovery* 2007; Wang et al. 2008).
- E. Demonstrated that mechanical forces regulate the differentiation of myofibroblasts. The differentiation of fibroblasts into myofibroblasts is critical for fibrosis which is characterized

by enhanced production of collagen and by a large increase of contractile activity. The increased tensile forces generated by myofibroblasts is attributable to the expression of alpha smooth muscle actin, the defining phenotypic marker of myofibroblast. Dr. McCulloch and his students developed substrates and culture systems that enabled definition of how fibroblasts differentiate into myofibroblasts. These are particularly important cells in the formation of fibrotic lesions of connective tissues (Arora et al. Am. J. Path. 1999; Arora and McCulloch Am. J. Path. 1999; Wang et al. J. Biol. Chem. 2002; Wang et al. Am. J. Physiol. 2003; J. Biol. Chem. 2005; Zhang et al. J. Cell Science 2007; Lenga et al. Circ Res. 2008).

## CURRENT COLLABORATIONS

<i>Andras Kapas</i>	St. Michael's Hospital Research Institute; smooth muscle actin
<i>Anne Bresnick</i>	Albert Einstein, Faculty of Medicine, Bronx, New York; Non-muscle myosin II
<i>Arun Seth</i>	Sunnybrook Hospital Research Institute; CIHR Group in Matrix Dynamics
<i>Christopher Overall</i>	University of British Columbia, Vancouver; collagenase
<i>David Calderwood</i>	Yale University; filamin A
<i>David Kwiatkowski</i>	Harvard University; gelsolin and filamin
<i>David Ron</i>	New York University; ER stress
<i>Gregory Downey</i>	National Jewish Hospital, Denver Colorado; IL-1 and focal adhesion signalling
<i>Kathy Siminovitch</i>	Mt. Sinai Hospital Samuel Lunenfeld Institute; IL-1 signaling
<i>Mel Rosenberg</i>	Tel Aviv University; microbial biofilms
<i>Patricio Smith</i>	University of Santiago, Santiago, Chile; myofibroblast, galectin 8 and collagen remodeling
<i>Paul Janmey</i>	University of Pennsylvania; PIP2 signaling
<i>Richard Anderston</i>	University of Wisconsin; PIP2 signaling
<i>Richard Austin</i>	McMaster University; ER stress
<i>Robert Adelstein</i>	NIH, Cardiology, Bethesda, MD; Non-muscle myosin II
<i>Tom Stossel</i>	Harvard University; filamin A

## VISITING SCIENTISTS

1990	Dr. N. Pender, Liverpool, England
1996	Dr. Ida Rubino, Italy
2002 – 2006	Anita Sengupta, University of Bristol, England

## GRANTS AWARDED

04/2009 – 03/2015	<b>Canadian Institutes of Health Research (CIHR)</b> CIHR Strategic Training Initiative in Health Research (STIHR) Health Applications of Cell Signaling in Mucosal Inflammation and Pain <i>Co-applicant</i> ; Duration 6 years; Total award: \$1,195,000
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- 09/2009 – 08/2014      **Canadian Institutes of Health Research (CIHR)**  
 Operating Grant  
 Role of the cytoskeleton in collagen phagocytosis  
*Principal applicant*; Duration 5 years; Total award: \$777,194
- 07/2009 – 06/2012      **Heart and Stroke Foundation of Ontario**  
 Operating Grant  
 Role of intercellular adhesions in diabetic cardiomyopathy  
*Principal applicant*; Duration 3 years; Total award: \$305,000
- 07/2008 – 06/2009      **Canadian Institutes of Health Research**  
 Operating Grant  
 Osteopontin in matrix remodelling  
*Principal applicant*; Duration 1 year; Total award: \$82,342
- 07/2008 – 06/2010      **Canadian Institutes of Health Research**  
 Operating Grant  
 Bone sialoprotein in skeletal metastasis  
*Principal applicant*; Duration 3 years; Total award: \$382,400
- 04/2008 – 03/2009      **University of Toronto,**  
 Dean's Academic Enrichment Endowment Fund,  
 Bioquant Imaging System  
*Co-applicant*; Duration: 1 year; Total Award: \$30,000
- 04/2008 – 05/2008      **Connaught Foundation (Ontario),**  
 Operating Grant,  
 Jaro Sodek – Celebration of a Life in Science  
*Principal applicant*; Duration: 1 month; Total Award: \$5,000
- 10/2007 – 09/2012      **Canadian Institutes of Health Research (CIHR),**  
 Operating Grant,  
 Focal Adhesion Restriction of IL-1 Induced Signals  
*Principal applicant*; Duration: 5 years; Total Award: \$850,000
- 10/2007 – 09/2010      **Heart and Stroke Foundation,**  
 Operating Grant,  
 Regulation of Myofibroblast Differentiation by Mechanical Loading  
*Principal applicant*; Duration: 3 years; Total Award: \$345,000
- 07/2007 – 06/2009      **Networks of Centres of Excellence (NCE),**  
 Canadian Arthritis Network Grant,  
 Diagnostic Tools for Inflammatory Arthritis  
*Co-applicant*; Duration: 2 years; Total Award: \$50,000

- 10/2007 – 09/2008      **Canada Foundation for Innovation (CFI),**  
 Operating Grant,  
 Equipment for Imagine Matrix Signaling Molecules  
*Principal applicant; Duration: 1 year; Total Award: \$320,000*
- 07/2006 – 06/2013      **Canada Research Chairs (CRC),**  
 CRC Tier 1 Chair,  
 Canada Research Chair in Matrix Dynamics  
*Principal applicant; Duration: 7 years; Total Award: \$1,400,000*
- 04/2006 – 03/2011      **Canadian Institutes of Health Research (CIHR),**  
 Combined Equipment and Maintenance Grant,  
 Multi-user equipment for the molecular and cell biological analyses  
 of signalling and extracellular matrix dynamics  
*Principal applicant; Duration: 5 years; Total Award: \$287,268*
- 10/2005 – 09/2010      **Canadian Institutes of Health Research (CIHR),**  
 Operating Grant,  
 Role of the endoplasmic reticulum and filamin A in mechanoprotection  
*Principal applicant; Duration: 5 years; Total Award: \$687,160*
- 10/2004 – 09/2009      **Canadian Institutes of Health Research (CIHR),**  
 Operating Grant,  
 Fibroblast Differentiation: role of actin in matrix remodelling  
*Principal applicant; Duration: 5 years; Total Award: \$690,000*
- 10/2004 – 09/2009      **Canadian Institutes of Health Research (CIHR),**  
 Group Operating Grant,  
 CIHR Group in Matrix Dynamics  
*Principal applicant; Duration: 5 years; Total Award: \$1,616,190*
- 07/2004 – 06/2007      **Heart and Stroke Foundation,**  
 Grant-in-Aid,  
 Regulation of acting gene expression by mechanical loading  
*Principal applicant; Duration: 3 years; Total Award: \$281,000*
- 03/2002 – 02/2007      **Canadian Institutes of Health Research (CIHR),**  
 CIHR Strategic Training Program for Student Support,  
 Cell signalling in mucosal inflammation and pain  
*Co-applicant; Duration: 5 years; Total Award: \$1,512,850*
- 04/2001 – 03/2006      **Canadian Institutes of Health Research (CIHR),**  
 Operating Grant,  
 IL-signaling through focal adhesions  
*Principal applicant; Duration: 5 years; Total Award: \$585,305*

- 10/2001 – 09/2004      **Canadian Institutes of Health Research (CIHR),**  
Group Grant,  
CIHR Group in Matrix Dynamics  
*Principal applicant; Duration: 3 years; Total Award: \$802,569*
- 07/2001 – 06/2004      **Heart and Stroke Foundation,**  
Operating Grant,  
Regulation of actin gene expression by mechanical loading  
*Principal applicant; Duration: 3 years; Total Award: \$259,062*
- 04/2001 – 03/2003      **Canadian Arthritis Network 01-INF-01R,**  
Regulation of signaling by perturbation of adhesion complexes,  
*Principal applicant; Duration: 2 years; Total Award: \$97,000*
- 04/2001                      **Canadian Institutes of Health Research (CIHR) MME-63123,**  
Purchase of a Flow Cytometer  
*Principal applicant; Duration: Total Award: \$157,199*
- 10/2000 – 09/2005      **Canadian Institutes of Health Research (CIHR),**  
Operating Grant,  
The Role of ABP-280 in mechanoprotection  
*Principal applicant; Duration: 5 years; Total Award: \$615,750*
- 04/2000 – 03/2003      **CIHR Grant Group MOP37937,**  
Neutrophil collagenase (MMP-8) in extracellular matrix degradation  
*Principal applicant; Duration: 3 years; Total Award: \$109,175*  
(+\$55,468 equipment)
- 10/1999 – 09/2004      **Canadian Institutes of Health Research (CIHR),**  
Operating Grant,  
Fibroblast differentiation: role of actin in matrix remodelling  
*Principal applicant; Duration: 5 years; Total Award: \$650,000*
- 10/1999 – 09/2004      **Canadian Institutes of Health Research (CIHR),**  
Operating Grant,  
Osteopontin signalling and cell migration  
*Co-applicant; Duration: 5 years; Total Award: \$489,695*
- 2003                              **University of Toronto, Faculty of Dentistry,**  
Dean's Academic Enrichment Fund;  
Flow Cytometer Top-Up Grant  
*Principal applicant; Duration: Total Award: \$10,000*
- 04/2003                      **Canadian Arthritis Network,**  
Regulation of inflammatory signaling by perturbation of adhesion  
complexes.  
*Principal applicant; Duration: 2 years; Total Award: \$41,000*

- 12/2003                    **Alpha Omega Foundation of Canada,**  
Role of Diabetes-Associated Glycation of Collagen,  
*Principal applicant*; Duration: 1 year; Total Award: \$4,000
- 04/2002                    **CIHR Equipment Grant,**  
Purchase of a Confocal Microscope  
*Principal applicant*; Duration: Total Award: \$260,074
- 05/2002                    **University of Toronto, Faculty of Dentistry,**  
Dean's Academic Enrichment Fund,  
Leica Confocal Microscope Top-Up Grant,  
*Principal applicant*; Duration: Total Award: \$30,000
- 1999 – 2002                **MRC Maintenance Grant #MT11114,**  
Flow Cytometer and Confocal Microscope  
*Principal applicant*; Duration: 3 years; Total Award: \$202,764
- 1998 – 2002                **Canadian Network Center for Excellence,**  
IL-1 Signalling in Arthritis  
*Principal applicant*; Duration: 4 years; Total Award: \$29,000
- 01/1999 – 12/2000        **Dairy Farmers of Canada,**  
Role of the milk protein osteopontin in prevention of dental disease  
*Principal applicant*; Duration: 1 year; Total Award: \$108,500
- 07/1998 – 06/2001        **MRC Grant #MT13187,**  
IL-1 Signalling through focal adhesions  
*Principal applicant*; Duration: 3 years; Total Award: \$72,402
- 04/1998 – 03/2000        **MRC Grant #MA14657,**  
Early diagnosis in periodontitis  
*Principal applicant*; Duration: 2 years; Total Award: \$188,170
- 07/1998 – 06/2000        **Heart and Stroke Foundation,**  
Regulation of actin gene expression by mechanical loading  
*Principal applicant*; Duration: 2 years; Total Award: \$166,112
- 03/1997                    **University of Toronto, Faculty of Dentistry,**  
Dean's Academic Enrichment Fund,  
Eppendorf Cell Microinjector  
*Principal applicant*; Duration: 1 year; Total Award: \$24,451.
- 03/1996                    **University of Toronto, Faculty of Dentistry Major Equipment Grant,**  
Upgrade of fluorescence imaging and CCD Camera  
*Principal applicant*; Duration: 1 year; Total Award: \$46,140

- 07/1996 – 06/1999      **MRC Maintenance Grant,**  
Flow Cytometer and Confocal Microscope  
*Principal applicant; Duration: 3 years; Total Award: \$149,361*
- 12/1994 – 05/1995      **Alpha Omega Foundation,**  
*Principal applicant; Duration: 6 months; Total Award: \$5,000*
- 1995 – 1998              **Arthritis Society of Canada,**  
Oxidant and cytokine induced apoptotic cell death of chondrocytes  
*Co-applicant; Duration: 3 years; Total Award: \$176,100*
- 10/1995 – 09/1998      **MRC Grant,**  
IL-1 signalling and focal adhesions  
*Co-applicant; Duration: 3 years; Total Award: \$121,302*
- 07/1994 – 06/2000      **MRC Group Grant in Periodontal Physiology,**  
*Co-applicant; Duration: 6 years; Total Award: \$5.4 million,*  
*\$150,000 (equipment) plus salaries*
- 1995                        **University of Toronto, Faculty of Dentistry,**  
Dean's Academic Enrichment Fund,  
Confocal Laser Scanning Microscope Equipment  
*Principal applicant; Duration: Total Award: \$12,790*
- 07/1993 – 06/1996      **MRC Maintenance Grant, MT-11114,**  
Flow Cytometry and Confocal Microscope  
*Principal applicant; Duration: 3 years; Total Award: \$146,853*
- 01/1992 – 12/1993      **Hospital for Sick Children Research Foundation,**  
Role of fibroblasts in regulation of bone formation  
*Principal applicant; Duration: 1 year; Total Award: \$69,000*
- 07/1992 – 06/1995      **MRC Operating Grant, MA-8903,**  
Cell Kinetics of fibroblasts for periodontium  
*Principal applicant; Duration: 3 years; Total Award: \$365,000*
- 07/1992 – 06/1994      **MRC Clinical Trial Grant, MA-11782,**  
Fluorogenic screening test for periodontitis in high risk young adult  
patients  
*Principal applicant; Duration: 2 years; Total Award: \$238,450*
- 07/1992 – 06/1997      **MRC Maintenance Grant, MT-9932,**  
Electron Microscopy for Dental Research  
*Co-applicant; Duration: 5 years; Total Award: \$72,490*
- 07/1992                    **MRC Equipment Grant, ME-11792,**  
Confocal Laser Scanning Microscope  
*Principal applicant; Duration: 1 year; Total Award: \$153,450*

- 04/1990 – 03/1991      **Ontario Ministry of Health Research Grant, #02628,**  
Study of Collagenase in Early Diagnosis of Periodontitis  
*Principal applicant*; Duration: 1 year; Total Award: \$99,169
- 04/1991                    **University of Toronto, Faculty of Dentistry,**  
Dean's Academic Enrichment Fund  
*Principal applicant*; Duration: 1 year; Total Award: \$24,000
- 05/1990                    **University of Toronto, Faculty of Dentistry,**  
Dean's Academic Enrichment Fund,  
*Principal applicant*; Duration: 1 year; Total Award: \$17,400
- 05/1990 – 06/1990      **Connaught Foundation Major Equipment Grant,**  
Becton Dickinson flow cytometer  
*Principal applicant*; Duration: 1 month; Total Award: \$305,898
- 07/1990 – 06/1993      **M.R.C. Maintenance Grant MT-11114,**  
Maintenance Grant Flow Cytometry  
*Principal applicant*; Duration: 3 years; Total Award: \$140,760
- 04/1989 – 03/1990      **Ontario Ministry of Health Research Grant, #02628,**  
Study of collagenase in early diagnosis of periodontitis  
*Principal applicant*; Duration: 1 year; Total Award: \$113,769
- 07/1989 – 06/1992      **M.R.C. Operating Grant MA-8903,**  
Cell kinetics of fibroblasts from gingival connective tissue  
*Principal applicant*; Duration: 3 years; Total Award: \$322,709
- 07/1989 – 06/1992      **M.R.C. Operating Grant MA-9870,**  
Regulation of bone cell differentiation  
*Co-applicant*; Duration: 3 years; Total Award: \$253,932
- 05/1989                    **University of Toronto, Faculty of Dentistry,**  
Dean's Academic Enrichment Fund,  
Decision making in dentistry: Feasibility Study for the incorporation of  
Clinical Epidemiology into Teaching Practice  
*Principal applicant*; Duration: 1 year; Total Award: \$53,400
- 04/1988 – 03/1989      **Ontario Ministry of Health Research Grant, #02019,**  
Efficacy of doxycycline  
*Principal applicant*; Duration: 1 year; Total Award: \$101,000
- 05/1988                    **Cummings Foundation,**  
Equipment for cinemicrography  
*Co-applicant*; Duration: 1 year; Total Award: \$13,000

- 03/1987                    **Ontario Ministry of Health Clinical Equipment,**  
For research in periodontal diseases  
*Principal applicant; Duration: 1 year; Total Award: \$50,000*
- 07/1987 – 03/1988        **Ontario Ministry of Health Research Grant, #02019,**  
Efficacy of doxycycline as treatment for periodontitis  
*Principal applicant; Duration: 1 year; Total Award: \$85,000*
- 07/1986 – 06/1989        **M.R.C. Operating Grant MA-8903,**  
Cell kinetics of fibroblasts from gingival  
*Principal applicant; Duration: 3 years; Total Award: \$165,780*
- 12/1986 – 06/1989        **M.R.C. Operating Grant MA-9870,**  
Factors that regulate bone cell differentiation  
*Co-applicant; Duration: 3 years; Total Award: \$94,949*
- 02/1985                    **Connaught Foundation Grant,**  
Major Equipment Grant,  
Leitz Orthoplan Microscope,  
*Principal applicant; Duration: 1 year; Total Award: \$23,198*
- 07/1985 – 06/1987        **M.R.C. Operating Grant MA-9288,**  
Automated clinical measurements of periodontal diseases  
*Co-applicant; Duration: 2 years; Total Award: \$65,226*
- 07/1985                    **Bickell Foundation Grant,**  
Major Equipment Grant,  
Leitz image analysis system  
*Principal applicant; Duration: 1 year; Total Award: \$20,000*
- 09/1985 – 04/1986        **Ontario Ministry of Health Grant #01646,**  
Adjunctive antibiotics in periodontal therapy  
*Principal applicant; Duration: 1 year; Total Award: \$12,556*
- 07/1984 – 06/1986        **M.R.C. Operating Grant MA-8903,**  
Cell kinetics of gingival fibroblasts  
*Principal applicant; Duration: 2 years; Total Award: \$92,368*

## **PATENTS AND INTELLECTUAL PROPERTY RIGHTS**

- Co-inventor and patent holder for automated periodontal probe (Canadian and U.S. patents #4,878,841)
- Co-inventor and patent applicant for collagenase diagnostic kit (with J. Sodek)
- Inventor and Patent Disclosure for focal adhesion dispersing peptides as anti-inflammatories

## PROFESSIONAL ACTIVITIES AND DEVELOPMENT

1985 – 1988 Editor, Periodontics section, "Oral Health", (Southam Publishers)

## ADMINISTRATIVE POSITIONS & COMMITTEES

2009-11-06 Member, Clinical Investigation B Grant Review Panel for CIHR  
2006, 2008 Scientific Officer, Dental Sciences Grant Review Panel for CIHR  
2005 – 2008 Member, Cell Physiology Grant Review Panel for CIHR  
2005 Member, Dental Sciences Grant Review Panel for CIHR  
2003 – present National and International Committee Memberships  
2003 – 2005 Inflammation Theme Leader, Canadian Arthritis Network  
2003 Member, Scientific Review Committee, The Arthritis Society  
2003 Co-Chair, Canadian Connective Tissue Conference Meeting, Montreal  
2002 – 2005 Member, Cell Physiology Grant Review Panel for CIHR  
2002 – 2005 Dental Sciences Committee for CIHR  
2001 – present Director, CIHR Group in Matrix Dynamics  
2005 – 2007 Chair, Membership Committee, Canadian Arthritis Network  
2004 – 2006 Member, Research and Development Committee, Canadian Arthritis Network  
1995 – 1998 Scientific Officer, Medical Research Council of Canada

## University Committee Memberships

2002 – 2003 Member, Harron, OGS, Life Sciences and University of Toronto Open Scholarship Committee  
25-26/04/2002 Organizer and Presentation of CIHR Group in Matrix Dynamics for Pls, Vancouver, B.C.  
1998 – 2002 Member, University of Toronto Health Sciences Research Committee  
1997 Search committee for Head of Department of Periodontics  
1996 – present Member, Graduate and Postgraduate Committee, Faculty of Dentistry, University of Toronto  
1996 – 1998 Member, Executive Committee, Faculty of Dentistry, University of Toronto  
1996 – 1997 Chair, Assessment of Teaching & Creative Activities Subcommittee of Promotion Committee for two staff members  
1995 – 2002 Graduate Coordinator, Faculty of Dentistry, University of Toronto  
1994 – 1998 Coordinator, Summer Student Research Program (Undergraduate), Faculty of Dentistry, University of Toronto  
1994 Member, Task Force for Academic Planning, Faculty of Dentistry, University of Toronto  
1993 – present Member, Ontario Graduate Student Scholarships Review Panel  
1993 – 1995 Member of Subcommittee, Curriculum Committee, Faculty of Dentistry, University of Toronto  
02/1993 Site Visit member, Medical Research Council Development Grant, Laval University  
1992 – 1999 Member of the Medical Research Council Dental Sciences Committee  
1992 – 1995 Faculty of Dentistry, University of Toronto, Research Committee

1990 – present	Assistant to Associate Dean for Research, Faculty of Dentistry, University of Toronto
1989 – 1991	Ad Hoc Committee for Clinical Epidemiology
1989 – 1992	Postgraduate & Graduate Committee
1986 – 2002	Member of Interview Committee; Post-Graduate Periodontics Students
1984 – present	Member, Faculty of Dentistry Animal Care Committee
1984 – 1996	Chairman, Biosafety Committee
2002-2004	Member, Faculty of Dentistry Ethics Committee
2001-present	Member and Mentor, CIHR Training Grant in Cell Signaling

## GRANTS & JOURNALS REVIEWED

### Granting Agencies:

- CIHR and formerly, Medical Research Council Operating Grants
- Ontario Ministry of Health Operating Grants
- Saskatchewan Health Research Board
- Israel Science Foundation
- National Institutes of Health, U.S.A
- Arthritis Society
- N.S.E.R.C.
- Wellcome Foundation
- Alberta Heritage Foundation for Medical Research, British Columbia Health Research Foundation

### Editorial Board Member

2002 – present	Archives of Oral Biology
1995 – 1999	Journal of Dental Research
1994 – present	Journal of Periodontal Research

### Journals (Editorial Board)

- Journal of Dental Research
- Journal of Periodontal Research

### Journals (Ad-Hoc Reviewer)

- Archives of Oral Biology, CDA, Journal of Biological Chemistry
- Infection & Immunity, Bone and Mineral, American Journal of Cell and Tissue Kinetics, Canadian Journal of Cardiology
- Journal of Cellular Physiology, The Histochemical Journal
- FEBS Letters, Biochemistry & Cell Biology, Oral Diseases
- Experimental Cell Res., Molecular & Cellular Biology, Molecular Biology of the Cell, Journal of Cell Biology

### Individual Reviews

- University of Manitoba and Laval University, Faculties of Dentistry