

**Dr. Dawn M. E. Bowdish**

Department of Pathology & Molecular Medicine  
MG DeGrootte Institute for Infectious Disease Research  
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**Educational Background:**

2005 – 2008



**Canadian Institute of Health Research Post-doctoral Fellow**

University of Oxford, Department of Pathology, Oxford U.K  
Laboratory of Prof. Siamon Gordon

“Genetic and Functional Analysis of the scavenger receptor, MARCO”

2000 – 2005



**PhD. (Microbiology & Immunology)**

University of British Columbia, Dept. of Microbiology & Immunology  
Vancouver, Canada

Laboratory of Prof. R.E.W. Hancock

“Interactions of the human host defence peptide, LL-37 and the innate immune response”

1995 – 1999



**BSc. Honours (Microbiology)**

University of Guelph, Dept. of Microbiology, Guelph, Canada

Undergraduate project and summer studentship in the lab of Prof. J.S. Lam and supervised by Dr. Lori Burrows

“Genetics of the O-antigen of the O5 serogroup of *Pseudomonas aeruginosa*”

**Current Status at McMaster :**

February 2<sup>nd</sup> 2009  
– June 30<sup>th</sup>, 2012

**Assistant Professor, contract, tenure-track**

Department of Pathology & Molecular Medicine

MG DeGrootte Institute for Infectious Disease Research

McMaster University

“The role of macrophage receptors in innate immunity and host defence”



**Professional Organizations:**

1. Canadian Society of Microbiology
2. Canadian Thoracic Society
3. Society for Leukocyte Biology
4. Canadian Society for Immunology

**Employment History:**

- i) Academic  
February 2<sup>nd</sup>, 2009- present: Assistant Professor, Department of Pathology & Molecular Medicine, McMaster University, Hamilton, ON.

**Scholarly & Professional Activities:**

- i) Editorial Boards  
-none at present
- ii) Grant & Personnel Committees  
- none at present
- iii) Executive positions  
- none at present
- iv) Journal Referee  
-Journal of Immunology  
-FASEB  
-European Journal of Immunology  
-EMBO Journal  
-Futures Microbiology  
-Anti-Infective Agents in Medicinal Chemistry  
-PLoS One  
-PLoS Pathogens  
-Journal of Innate Immunity  
-Journal of the Royal Society Interface  
-PLoS One
- v) External Grant Reviews  
-NSERC (Discovery Grant Competition, Jan 2011)  
-Multiple Sclerosis Society of Canada (Operating Grant competition, Jan 2011)

**Areas of Interest (research):** macrophage biology, macrophage receptor expression, scavenger receptor and phagocytic receptor function and signalling, aging and immunity, innate immunity & host defence, bacterial colonization and infections (e.g. *Streptococcus pneumoniae*), animal models of pneumonia and post-influenza pneumoniae, microbiome of the upper respiratory tract, pathogens & commensals of the upper respiratory tract

**Areas of Interest (teaching):** immunology, innate immunity, host defence

**Honours:**

- 2011 ASPIRE, Pfizer Young Investigator Award for study of post-influenza pneumonia in the elderly
- 2006 – 2008 JMH Junior Research Fellowship awarded by Linacre College at the University of Oxford
- 2006 Cangene Gold Award, Awarded by the Canadian Society of Microbiologists for the highest ranked PhD thesis in Microbiology
- 2005 – 2008 Post-doctoral Fellowship awarded by the Canadian Institutes of Health Research
- 2003 – 2005 Canada Graduate Scholarship awarded by the Canadian Institute of Health Research
- February, 2005 Honorarium for having abstract chosen to present at the Innate Immunity in Human Disease Research Day: BC Research Institute for Children's & Women's Health
- November, 2004 Travel Allowance awarded by the International Endotoxin Society 8th Biennial Conference of the International Endotoxin Society, Kyoto, Japan

**Courses Taught:***i) Undergraduate*

- Biochemistry, Biochem 3A03- Independent Study, May- Jun 2010
- Biochemistry, Biochem 4B03 – Independent Study, Sept 2010-Apr 2011
- Biochemistry, Biochem 4B06 – Independent Study, Sept 2009-Apr 2010
- Health Sciences, HTH SCI 3H03- Independent Study, Sept 2009-Apr 2010
- Health Sciences, HTH SCI 4A09– Independent Study, Sept 2010-Apr 2011
- Science, Science 4C09– Independent Study, Sept 2009-Apr 2010

*ii) Graduate*

- Winter 2009 Medical Sciences MS715 “Advanced Immunobiology”
- Summer 2010 Medical Sciences MS799 “Independent Study in Medical Sciences”

**Supervisorships:**

- i. Masters of Science (MSc)
- a. In progress
- Mike Dorrington 2010- ongoing
- Fiona Whelan 2010-ongoing
- Zhongyuan Tu 2010-ongoing
- b. Completed
- Mariliis Kroos, July 2007- September 2008. Co-supervised with Prof. Siamon Gordon, University of Oxford

- ii. PhD, in progress  
Alicja Puchta 2010- ongoing
- iii. Post-doctoral (in progress)  
Dr. Peter Pelka (Jan 2011-Jan 2013)  
Dr. Preethi Jayanth (Jan 2011 – Jan 2012)  
Dr. Chris Verschoor (Aug 2010-Aug 2012)
- iv. Supervisory Committees (in progress)  
Pamela Shen (MSc, PI: Dr. Martin Stampfli)  
Tamara Krnetas (MSc, PI: Dr. Ali Ashkar)  
Lauren Waller (MSc, PI: Dr. Brian Coombes)  
Josip Marcinko (MSc, PI: Dr. Manel Jordana)  
Andrew Bysice (MSc, PI: Dr. Mark Larche)  
Elspeth Smith (MSc, PI: Dr. Brian Lichty)  
Devanghi Mehta (MSc: Dr. Karen Mossman)
- v. Others (completed)  
Julia Lee, High School Student, member of Youth Engaged in Science (YES)  
Mentorship program (Oct 2009-Mar 2010)

**Research Funding:**

**Currently Held:**

09/01/2010- 31/08/2015	Canadian Institutes for Health Research (CIHR) Emerging Team Grant “Respiratory tract microbiome dynamics and the interplay of commensal bacteria with resident pathogens” -co-applicant with Dr. Mike Surette	\$116,000/yr (of \$500,000/yr total) x 5 yr
01/01/2011 – 31/12/2011	ASPIRE-Pfizer New Investigator Award “Intranasal administration of Linezolid to prevent seasonal & post-influenza pneumococcal pneumonia in the elderly.”	\$100,000/1yr
06/01/2010- 05/31/2011	Canadian Institutes for Health Research (CIHR) Catalyst Grant “Molecular mechanisms of monocyte/macrophage immunosenescence and susceptibility to <i>Streptococcus pneumoniae</i> infection in the nursing home elderly” -Principal Applicant	\$50,000/1yr
07/01/2010- 06/01/2015	National Institutes of Health (NIH) RO1- subcontract “Control of <i>Streptococcus pneumoniae</i> carriage” -co-applicant with Dr. Jeffrey Weiser	\$50,000/yr x 5yr
01/05/2010-	NSERC (National Science & Engineering Research Council of	\$33,000/yr x

31/04/2015	Canada) "Novel signaling motifs in macrophage pattern recognition receptors" -Principal Applicant	5yr
01/09/2010- 31/08/2015	Canadian Foundation for Innovation (CFI) "Drug Discovery in a post-antibiotic world: Infrastructure for development of novel immunomodulators" -Principal Applicant	\$352,693 total
01/09/2010- 31/08/2015	Ontario Research Fund Application for Research Infrastructure Funding -Principal Applicant	\$130,471 total
01/2010- 01/2012	McMaster University-University of Waterloo McMaster-Waterloo Collaborative Seed grant -co-Principal Applicant with Dr. Brendan McConkey	\$22,500/yr x 2 yr

### Held in the past 5 yrs:

12/01/2010- 12/01/2011	Ontario Lung Association Grant-in-Aid "Macrophage scavenger receptors – novel recognition receptors for <i>Mycobacterium tuberculosis</i> " -Principal Applicant	\$50,000/1yr
03/01/2010- 31/03/2011	CIHR (Canadian Institutes of Health Research) "The role of macrophage function in prevention of <i>Streptococcus pneumoniae</i> infection in the nursing home elderly" -Principal Applicant	\$100,000/yr x 1 yr
01/5/2010- 31/04/2011	Institute for Infectious Disease Research (IIDR) "Clinical markers of monocyte immunosenescence" -Co-Principal applicant with Dr. Jonathan Bramson & Dr. Jack Gauldie	\$10,000/yr x 1 yr
05/2009- 06/2010	Institute for Infectious Disease Research, McMaster University, "Colonization vs Infection: Why aren't macrophage responses to <i>Streptococcus pneumoniae</i> immunizing?" -Principal Applicant	\$20,000/yr x 1 yr

### Lifetime Publications:

1. Peer reviewed
  - a. **Contributions to books (Book chapters)**

1. **Verschoor, C.P., Puchta, A., Bowdish, D.M.E.** The Macrophage. In: Methods in Molecular Biology. Springer Protocols. *In progress.*

2. **Bowdish, D.M.E.** & Gordon, S. Macrophage Function Disorders: a genetic perspective. Encyclopaedia of Life Sciences DOI:10.1002/9780470015902.a0002174.pub2
3. **Bowdish, D.M.E.**, Gordon, S. Introduction to macrophage biology. In: Protozoans in Macrophages. Landes Biosciences. Edited by E.Y. Denkers and R. Gazzinelli. (2007)1-15.
4. **Bowdish, D.M.E.**, Davidson, D.J., Hancock, R.E.W. Immunomodulatory properties of defensins and cathelicidins. In: Current Topics in Microbiology and Immunology. Edited by W. Shafer (2006)306:27-66.

#### **b. Journal articles**

##### **In preparation:**

1. Contact D. Bowdish for details.

##### **In submission/press:**

1. Geiger-Maor, A., Levi, I., Even-Ram, S., Smith, Y., **Bowdish D.M.**, Nussbaum, G., Rachmilewitz, J. Cells exposed to sub-lethal oxidative-stress selectively attract monocytes via scavenger receptors and MyD88-mediated signalling but do not provoke the release of pro-inflammatory cytokines. 2011. In submission.

##### **Published:**

1. CD200 induction by TLRs and NLRs limits macrophage activation to protect the host from meningococcal septicaemia. Mukhopadhyay., Plüddemann, A., Hoe, J.C., Williams, K., Varin, A., Makepeace K., **Bowdish, D.**, Smale, S, Moxon, E.R., Barclay, A.N., Gordon, S. Cell Host Microbe. 2010 Sep 16;8(3):236-47.
2. An accessory to the 'Trinity': SR-As are essential pathogen sensors of extracellular dsRNA, mediating entry and leading to subsequent type I IFN responses. DeWitte-Orr SJ, Collins SE, Bauer CM, **Bowdish DM**, Mossman KL. PLoS Pathog. 2010 Mar 26;6(3):e1000829.
3. G-protein-coupled receptor independent, immunomodulatory properties of chemokine CXCL9. Gong JH, Nicholls EF, Elliott MR, Brown KL, Hokamp K, Roche FM, Cheung CY, Falsafi R, Brinkman FS, **Bowdish DM**, Hancock RE. Cell Immunol. 2010;261(2):105-13.
4. **Bowdish, D.M.E.**, Sakamoto, K., Kim, M., Kroos, M., Mukhopadhyay, S., Leifer, C.A., Gordon, S., Russell, D.G. Mycobacterial trehalose 6,6' dimycolate uses MARCO and TLR2 as co-receptors for macrophage activation. PLoS Pathogens. 2009 Jun;5(6):e1000474.
5. Pistollic, J., Cosseau, C., Li, Y., Yu, J., Filewod, N.C.J., Gellatly, S., Rehaume, L.M. **Bowdish, D.M. E.**, Hancock, R.E.W. Host defense peptide LL-37 induces IL-6 expression in human bronchial epithelial cells by activation of the NF- $\kappa$ B signaling pathway. J. Innate Immun. 2008 Nov 6.
6. Yu, J., Mookherjee, N., **Bowdish, D.M.E.**, Pistollic, J., Li, Y., Rehaume, L., Hancock, R.E.W. Host defence peptide LL-37, in synergy with inflammatory mediator IL-1 $\beta$ , augments immune responses by multiple pathways. J. Immunol. 2007 Dec 1;179(11):7684-91.
7. Chang, G.W., Davies, J.Q., Stacey, M., Yona, S., **Bowdish, D.M.E.**, Hamann, J., Chen, T.C., Lin, C.Y., Gordon, S., Lin, H.H. CD312, the human adhesion-GPCR EMR2, is differentially expressed during differentiation, maturation, and activation of myeloid cells. Biochem Biophys Res Commun. 2007 Feb 2;353(1):133-8
8. Davidson, D.J., Currie, A.J., **Bowdish, D.M.E.**, Brown, K.L., Rosenberger, C.M., Ma, R.C., Bylund, J., Campsall, P.A., Puel, A., Picard, C., Casanova, J.L., Turvey, S.E., Hancock,

- R.E.W., Devon, R.S., Speert, D.P. IRAK-4 mutation (Q293X): rapid detection and characterization of defective post-transcriptional TLR/IL-1R responses in human myeloid and non-myeloid cells. *J. Immunol.* 2006 Dec;177(11):8202-11.
9. Barlow, P.G., Li, Y, Wilkinson, T.S., **Bowdish, D.M.E.**, Lau, Y.E., Cosseau, C., Haslett, C., Simpson, A.J., Hancock, R.E.W., Davidson, D.J. The human cationic host defense peptide LL-37 mediates contrasting effects on apoptotic pathways in different primary cells of the innate immune system. *J. Leukoc Biol.* 2006 Sep;80(3):509-20.
  10. Mookherjee, N, Brown, K.L, **Bowdish, D.M.E.**, Doria, S., Falsafi, R., Hokamp, K., Roche, F.M., Mu, R., Doho, G.H., Pistolic, J., Powers, J.P., Bryan, J., Brinkman, F.S.L., Hancock, R.E.W. 2006. Modulation of the Toll-like receptor-mediated inflammatory response by the endogenous human host defence peptide LL-37. *J. Immunol.* 2006 Feb 15;176(4):2455-64.
  11. Lau, Y.E., **Bowdish, D.M.E.**, Cosseau, C., Hancock, R.E.W., Davidson, D.J. Apoptosis of airway epithelial cells: human serum sensitive induction by the cathelicidin LL-37. *Am J Respir Cell Mol Biol.* 2006 Apr;34(4):399-409.
  12. **Bowdish, D.M.E.**, Davidson, D.J., Scott, M.G., Hancock R.E.W. 2005. Immunomodulatory activities of small host defence peptides. *Antimicrob Agents Chemother.* 2005.May;49:1727-32.
  13. **Bowdish, D.M.E.**, Davidson D.J., Lau Y.E., Lee K, Scott, MG, Hancock, R.E.W. Impact of LL-37 on anti-infective immunity. *J Leukoc Biol.* 2005. 77:451-9.
  14. **Bowdish, D. M. E.**, Davidson, D.J., Speert, D.P., Hancock, R.E.W. The Human Cationic Peptide LL-37 Induces Activation of the Extracellular Signal-Regulated Kinase and p38 Kinase Pathways in primary human monocytes. *J. Immunol.* 2004.172:3758-65.
  15. Davidson, D. J., Currie, A. J., Reid, G. S., **Bowdish, D.M.E.**, MacDonald, K. L., Ma, R., Hancock, R.E.W., and Speert, D. P. The cationic antimicrobial peptide LL-37 modulates dendritic cell differentiation and dendritic cell-induced T cell polarization. *J Immunol.* 2004.172:1146-56.
  16. Scott, M. G., Davidson, D. J., Gold, M. R., **Bowdish, D.**, Hancock, R.E.W. The human antimicrobial peptide LL-37 is a multifunctional modulator of innate immune responses. *J Immunol.* 2002. 169:3883-91.
  17. Low, A.M., **Bowdish, D.M.**, Prashad, T.R., Gaspar, V. Interactions of chloroethylclonidine with rauwolscine- and prazosin-sensitive adrenoceptors in dog saphenous vein. *Br J Pharmacol.* 1994. 113(4):1263-8.

#### a. Other – Review articles

1. **Bowdish, D.M.E.** Gordon, S. Conserved domains of the class A scavenger receptors: evolution and function. *Immunol Rev.* 2009 Jan;227(1):19-31.
2. **Bowdish, D.M.E.**, Loffredo, M., Mukhopadhyay, S., Gordon, S. MARCO, an example of the "adaptive" component of innate immunity. *Microbes Infect.* 2007 Nov-Dec;9(14-15):1680-7.
3. Gibbons, MA., **Bowdish, D.M.E.**, Davidson, D.J., Salleneuve, JM., Simpson, A.J. Endogenous pulmonary antibiotics. *Scott Med J.* 2006 May;51(2):37-42.
4. **Bowdish, D.M.E.**, Hancock, R.E.W. 2005. Anti-endotoxin properties of cationic host defence peptides and proteins. 2005. *J. Endotoxin Res.* 11(4):230-6.
5. **Bowdish, D.M.E.**, Davidson, D.J., Hancock, R.E.W. 2004. A Re-evaluation of the role of host defence peptides in mammalian immunity. *Curr Protein Pept Sci.* 2005 Feb;6(1):35-51

### **b. Other – Patents**

1. Monocyte biomarkers of dementia in the elderly. D.M.E. Bowdish & C. P. Verschoor. Provisional patent application in progress.
2. Effectors of innate immunity. R.E.W. Hancock, B. Finlay, M. Scott, D. Bowdish, C. Rosenberger and J.P. Powers. U.S. provisional patent No 60/336,632, filed Dec. 3, 2001 Full US application 10/308,905 filed Dec. 2, 2002; published Sept 16, 2004. US patent 7,507,787, granted March 24, 2009.
3. Effectors of innate immunity. R.E.W. Hancock, B. Finlay, M. Scott, D. Bowdish, C. Rosenberger, J.P. Powers, N. Mookherjee, J. Yu. CIP of US application 10/308,905; Application no. US11/400,411, filed April 7, 2006.
4. Effectors of innate immunity. R.E.W. Hancock, B. Finlay, M. Scott, D. Bowdish, C. Rosenberger and J.P. Powers. South African Patent No. 2004/4919, granted May 31, 2006.
5. Effectors of innate immunity. R.E.W. Hancock, B. Finlay, M. Scott, D. Bowdish, C. Rosenberger and J.P. Powers. Australian Patent No. 200223365675, granted April 5, 2007.
6. Effectors of innate immunity. R.E.W. Hancock, B. Finlay, M. Scott, D. Bowdish, C. Rosenberger and J.P. Powers. Chinese Patent No. 02827327.3, granted Dec 2, 2007.
7. Effectors of innate immunity. R.E.W. Hancock, B. Finlay, M. Scott, D. Bowdish, C. Rosenberger and J.P. Powers. Hong Kong Patent HK1075677, granted August 22, 2008.

### **c. Other – Figures**

1. S. Gordon. 2007. “Leukocyte migration” and “Phagocytosis & Autophagy” for: Macrophages and Phagocytosis. In: Fundamental Immunology 6th Ed. W. Paul Lippincott Raven. Publ. Philadelphia. Chapt 17.

### **d. Other – Supervised thesis**

2. Mariliis Kroos The role of the cytoplasmic domain of the macrophage scavenger receptor in MARCO in adhesion & uptake. University of Oxford. 2008. (co-supervised with Prof. Siamon Gordon) MSc)

### **Presentations at Meeting**

#### **i) Invited**

1. Department of Microbiology & Immunology. Queen’s University, Kingston. Jan 19,2011. “Save the Grandparents! How an aging immune system predisposes the elderly to pneumonia.”
2. Department of Pathobiology. University of Guelph. Jan 14, 2001. “Mechanisms of Immune Control of Streptococcus pneumoniae in the Upper Respiratory Tract”.
3. Society for Leukocyte Biology/International Endotoxin Society Meeting. Vancouver. Oct 7, 2010. “Immunosenescent macrophages cannot control Streptococcus pneumoniae colonization, resulting in invasive pneumococcal disease”

4. Institute of Molecular Biology and Biochemistry (IBMB) Invited Speaker Series. University of Waterloo. January, 26, 2010.
5. Department of Chemical Engineering. Invited Speaker Series. McMaster University. Nov. 11, 2009 “Macrophage scavenger receptors: roles in adhesion, uptake & motility.”
6. IIDR Opening Symposium. McMaster University. Oct. 24, 2009. New insights into an ancient disease: A novel macrophage receptor essential for host defence towards tuberculosis.
7. Bench-to-Bedside. McMaster University. Sept. 21, 2009. “Recurrent Pneumococcal Infections: A breach in Innate Immunity”.
8. Bowdish, D. (2009), "Cationic peptides in innate immunity", in Gordon, S. (ed.), Innate Immunity: Host recognition and response in health and disease, The Biomedical & Life Sciences Collection, Henry Stewart Talks Ltd, London (online at <http://www.hstalks.com/?t=BL0612078-Bowdish>)
9. Invited speaker. The University of British Columbia. May 15, 2009. “The Class A Scavenger receptors are associated with host defence to tuberculosis. ”
10. Tuberculosis and International Child Health meeting. Imperial College London, U.K., March 7, 2008. “Macrophage Receptors in Innate Immunity: The class A scavenger receptors in mycobacterial and neisserial disease.”
11. The Karolinska Institute. Stockholm, Sweden. January 20, 2008. “Genetic analysis of the scavenger receptor, MARCO”.
12. The Whitechapel Society Invited Speaker Series. London, U.K. June 14, 2007. “MARCO – a macrophage receptor associated with mycobacterial infection”.
13. Invited Speaker Series. Trinity College, Dublin, Ireland. April 27, 2007. “MARCO – a macrophage receptor associated with mycobacterial infection”
14. 5th PhD Students Workshop. January 25, 2007. Riva del Gara, Italy. “Fundamental Concepts in Immunology”
15. 6th Annual Meeting of the Canadian Society of Microbiology. June, 21, 2006. “LL-37, a host defence peptide with immunomodulatory properties”.
16. Invited Speaker Series. University of Gothenburg, Sweden. March 3, 2006. “LL-37, a human host defence peptide with immunomodulatory properties”
17. Innate Immunity in Human Disease: BC Research Institute for Children’s & Women’s Health, February, 1, 2005. “LL-37 is a host defence peptide which interacts directly with monocytes & epithelial cells and modulates the innate immune response”
18. 8th Biennial Conference of the International Endotoxin Society, Kyoto, Japan, November 15-18, 2004. “The host defence peptide LL-37 is a multi-functional immunomodulator”
19. International Symposium SFB 617 – Molecular Mechanisms of Epithelial Defense, Kiel, Germany, June 11-13, 2004 “The Involvement of Peptides in Host Defense against Infections.”

**Administrative Responsibilities:**

1. Committee Membership
  - i. Department

1. Institute for Infectious Disease Research Opening Symposium Organizing Committee – Aug-Oct 2010
  2. Organizer of Trainee Poster Presentations and Awards: Michael G. DeGroot Institute for Infectious Disease Research Opening Symposium (October 24<sup>th</sup>, 2009)
  - 3.
- ii. Faculty
1. FHS Research Plenary Award Selection Committee: Selected graduate winners of awards presented at the Inaugural Faculty of Health Sciences Research Plenary (May 14<sup>th</sup>, 2010)
  2. Judge – Poster session: 1<sup>st</sup> Annual FHS Postdoctoral Research Day (June, 3<sup>rd</sup>, 2010)
  3. Judge – Student Award Symposium: Canadian Society of Microbiology 2010 Annual Conference (June 2010)
- iii. University
1. Graduate Council Scholarships Member: Rank scholarships for OGS, NSERC, CIHR (Oct 2010 – ongoing)