Michael Dean Chamberlain

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EDUCATION

2013-Current.	Research Associate. University of Toronto. Supervisors: Drs. Aaron Wheeler and Michael Sefton
2007-2013.	Post-Doctoral Fellow. University of Toronto. Supervisor: Dr. Michael Sefton
2001-2007.	PhD, Biochemistry. University of Saskatchewan. Supervisor: Dr. Deborah Anderson
	Thesis: The interaction of the p85 subunit of PI3K with Rab proteins.
1996-2001.	BSc (Honours), Biology. University of Regina. Supervisor: Dr. Howard
	Honours Thesis: ExeD Multimerization and Localization in *Aeromonas hydrophila*.

HONOURS/AWARDS

Canadian Institutes of Health Research Post-Doctoral Fellowship 2010-2012

Canadian Institutes of Health Research-Regional Partnership Program (CIHR-RPP) Doctoral Scholarship 2003-2007

University of Saskatchewan, Department of Biochemistry Research Scholarship 2001-2004

Keystone Symposia Travel Scholarship for Regenerative Tissue Engineering and Transplantation 2012

PUBLICATIONS

Au S, **Chamberlain MD**, Mahesh S, Sefton MV and Wheeler AR. (2014). Hepatic Organoids for Microfluidic Drug Screening. *Lab on a Chip*. 14: 3290-3299.

Shih SCC, Mufti N, **Chamberlain MD**, Kim J and Wheeler AR. (2014). A Droplet-Based Screen for Wavelength-Dependent Lipid Production in Algae. *Energy & Environmental Science*. 7: 2366–2375.

Portalska KJ, **Chamberlain MD**, Lo C, van Blitterswijk C, Sefton MV and de Boer J. (2013). Collagen modules for in situ delivery of mesenchymal stromal cell-derived endothelial cells for improved angiogenesis. *Journal of Tissue Engineering and Regenerative Medicine*. doi: 10.1002/term.1738.

Bogojevic D, **Chamberlain MD**, Barbulovic-Nad I and Wheeler AR. (2012). A Digital Microfluidic Method for Multiplexed Cell-Based Apoptosis Assays. *Lab on a Chip*. 12(3): 627-34.

Khan OF, **Chamberlain MD** and Sefton MV. (2012). Towards an *in vitro* vasculature: differentiation of mesenchymal stromal cells within an endothelial cell-seeded modular construct in a microfluidic flow chamber. *Tissue Engineering Part A*. 18(7-8): 744-56.

Chamberlain MD, Gupta R and Sefton MV. (2012). Bone marrow-derived mesenchymal stromal cells enhance chimeric vessel development driven by endothelialized modules. *Tissue Engineering Part A*. 18(3-4): 285-94.

Chamberlain MD[†], Gupta R[†] and Sefton MV. (2011). Chimeric vessel tissue engineering driven by endothelialized modules in immunosuppressed Sprague-Dawley rats. *Tissue Engineering Part A*. 17(1-2): 151-60. [†]contributed equally.

Chamberlain MD[†], Oberg JC[†], Furber LA, Poland SF, Hawrysh AD, Knafelc SM, McBride HM, Anderson DH. (2010). Deregulation of Rab5 and Rab4 proteins in p85R274A-expressing cells alters PDGFR trafficking. *Cell Signalling*. 22(10), 1562-1575. [†]contributed equally.

Chagpar RB, Links PH, Pastor MC, Furber LA, Hawrysh AD, **Chamberlain MD**, Anderson DH. (2010). Direct positive regulation of PTEN by the p85 subunit of phosphatidylinositol3-kinase. *Proc. Natl. Acad. Sci. USA* 107(12):5471-6.

Chamberlain MD, Chan T, Oberg JC, Hawrysh AD, James KM, Saxena A, Xiang J and Anderson DH. (2008). Disrupted RabGAP function of the p85 subunit of phosphatidylinositol 3-kinase results in cell transformation. *J Biol Chem.* 283(23): 15861-8.

Ignatiuk A, Quickfall JP, **Chamberlain MD** and Anderson DH. (2006). The smaller Isoforms of Ankyrin 3 Binds to the p85 subunit of Phosphatidylinositol 3-Kinase and Enhances PDGF Receptor Down-Regulation. *J Biol Chem*. 281(9): 5956-64.

Johnson LM, James KM, **Chamberlain MD** and Anderson DH. (2005). Identification of key residues in the A-Raf kinase important for phosphoinositide lipid binding specificity. *Biochemistry*. 44, 3432-40.

Chamberlain MD, Berry TR, Pastor MC and Anderson DH. (2004). The p85alpha subunit of phosphatidylinositol 3'-kinase binds to and stimulates the GTPase activity of Rab proteins. *J Biol Chem*. 279, 48607-14.

Ast VA, Schoenhofen IC, Stratilo CW, Langen GR, **Chamberlain MD** and Howard SP. (2002). The ExeAB complex of *Aeromonas hydrophila* functions in the assembly of the ExeD secretion port multimer. *Molecular Microbiology.* 44(1): 217-231.

INVITED PUBLICATIONS

Ng AHC, Li BB, **Chamberlain MD** and Wheeler AR. (2015) Digital microfluidic cell culture. *Annual Review of Biomedical Engineering*. (Accepted)

Chamberlain MD, West M, Lam G and Sefton MV. (2014) Remodeling of Vascularizing Engineered Tissues *In Vivo*. *Annals of Biomedical Engineering*. DOI: 10.1007/s10439-014-1146-x (In press)

Ciucurel EC, **Chamberlain MD** and Sefton MV. (2013). Chapter 7: The Modular Approach. In G. Forgacs and W. Sun (Eds), *Biofabrication: Micro- and Nano-fabrication, Printing, Patterning and Assemblies*. Elsevier Publishing.

Chamberlain MD, Butler MJ, Ciucurel EC, Fitzpatrick LE, Khan OF, Leung BM, Lo C, Patel R, Velchinskaya A, Voice DN and Sefton MV. (2010). Fabrication of Micro-tissues using Modules of Collagen Gel Containing Cells. *Journal of Visualized Experiments.* Dec 13(46), 2177.

Anderson DH and **Chamberlain MD**. (2005). Assay and Stimulation of Rab5 GTPase by p85alpha subunit of Phosphatidylinositol 3-kinase. *Methods in Enzymology.* 403: 552-560.

Chamberlain MD and Anderson DH. (2005). Measurement of the Interaction of the p85alpha subunit of Phosphatidylinositol 3-kinase with Rab5. *Methods in Enzymology.* 403: 540-551.

MANUSCRIPTS SUBMITTED

Zhang B, Montgomery M, **Chamberlain MD**, Wells LA, Pahnke A, Massé S, Marjan K, La Pi, Kim J, Reis L, Abdulah M, Vasconcelos S, Nanthakumar K, Sefton M and Radisic M. AngioChip: a biodegradable scaffold with built-in vasculature for organ-on-a-chip model and direct surgical anastomoses. *Nature Materials*. (Under revision)

Ng AHC†, **Chamberlain MD**† and Wheeler AR. Digital Microfluidic Immunocytochemistry in Single Cells. *Nature Methods*. (Sent for review) † These authors contributed equally.

MANUSCRIPTS IN PREPERATION

Chamberlain MD and Sefton MV. Modular Liver Microtissues for Toxicology Assays and Transplant Therapy. (Planned submission to Biomaterials)

Chamberlain MD[†], Wells LA[†], Lisovsky A and Sefton MV. The Phosphoproteomics Landscape of the Interaction between Biomaterials and Cells. (Planned submission to Nature Materials) † These authors contributed equally.

GRANTS WRITTEN (Whole or Part of)

Title: A modular microfluidic platform for drug metabolism and toxicity screening in vascularized 3D liver tissue models. PI: SIMMONS, Craig; SEFTON, Micheal V; Grant, Denis; **CHAMBERLAIN, Michael Dean**. Funding agency: CIHR-POP Phase 1. Years funded: Submitted.

Title: A modular microfluidic platform for high-throughput drug metabolism and toxicity screening in vascularized 3D liver tissue models. PI: SIMMONS, Craig; SEFTON, Micheal V; Grant, Denis; **CHAMBERLAIN, Michael Dean**. Funding agency: CQDM Explore Program. Years funded: Submitted.

Title: Development of a digital microfludic platform for personalized chemotherapy evaluation in refractory disease. PI: WHEELER, Aaron R. Funding agency: McLean Award. Amount: $100,000

Title: Use of liver modules for drug toxicity testing
PI: SEFTON, Michael V. Funding agency: Centre for Commercialization of Regenerative Medicine (CCRM) Years funded: 2012-2013. Amount: $100,000

Title: Modular Tissue Engineering for Islet Transplantation
PI: SEFTON, Michael V and ROCHELEAU, Jonathan V. Funding agency: CIHR Years funded: 2011-2014. Amount: $346,262

Title: Vascularized Tissue Engineered Constructs
PI: SEFTON, Michael V; CYBULSKY, Myron I; MARSDEN, Philip A; SIMMONS, Craig A and MCGUIGAN, Alison P. Funding agency: CIHR Years funded: 2010-2015. Amount: $2,335,000

Title: Regulation of PDGFR trafficking
PI: ANDERSON, Deborah. Funding agency: Canadian Cancer Society Years funded: 2008-2011. Amount: $348,906

Title: The role of p85 in PDGF receptor down-regulation
PI: ANDERSON, Deborah. Funding agency: Canadian Cancer Society Years funded: 2005-2008. Amount: $397,800

Title: Regulation of PTEN
PI: ANDERSON, Deborah. Funding agency: CIHR/SHRF-RPP Years funded: 2005-2007.
Amount: $165,480

CONFERENCE PRESENTATIONS

Chamberlain MD and Sefton MV. (2011). Vessel formation and hepatocyte survival with the addition of MSC to microtissue implants. TERMIS-NA 2011. Houston. Dec.

Chamberlain MD and Sefton MV. (2010). Blood vessel formation by microtissue implantation is enhanced by the addition of MSC. TERMIS-EU 2010. Galway. June.

Chamberlain MD, Gupta R, Lo C and Sefton MV. (2008). Formation of Functional Tissue: Endothelialized Modules containing MSC or Islets. TERMIS-NA 2008. San Diego. Dec.

CONFERENCE ABSTRACTS

Chamberlain MD and Sefton MV. (2013). A modular approach to the development of liver microtissues. TERMIS-AM 2013. Atlanta. Nov. Poster.

Chamberlain MD and Sefton MV. (2013). A modular approach to the development of liver microtissues. Biomaterials and Tissue Engineering Gordon Conference. Holderness. July. Poster.

Chamberlain MD and Sefton MV. (2012). A modular approach to the development of liver microtissues. Signal Transduction by Engineered Extracellular Matrices Gordon Conference. Biddeford. July. Poster.

Chamberlain MD and Sefton MV. (2012). Modular tissue development of liver microtissues. Regenerative Tissue Engineering and Transplantation Keystone Meeting. Breckenridge. Apr. Poster.

Anderson DH, Nyarko JNK and **Chamberlain MD**. (2012). Both class 1A PI3K Subunits, p85 and p110, Regulate Rab-mediated PDGFR Signaling and Trafficking. Membranes in Motion: From Molecules to Disease Keystone Meeting. Tahoe. Jan. Poster.

Anderson DH, Nyarko JNK and **Chamberlain MD**. (2011). Both class 1A PI3K Subunits, p85 and p110, Regulate Rab-mediated PDGFR Signaling and Trafficking. 51st American Society for Cell Biology Annual Meeting. Denver, CO. Dec. Poster.

Krishnamoorthy V, **Chamberlain MD** and Anderson DH. (2011). Blocking Receptor Tyrosine Kinase Trafficking in Breast Cancer Cells. AACR International Conference on New Horizons in Cancer Research: Biology to Prevention to Therapy. Delhi, India. Dec. Poster.

Anderson DH, Nyarko JNK and **Chamberlain MD**. (2011). Both class 1A PI3K Subunits, p85 and p110, Regulate Rab-mediated PDGFR Signaling and Trafficking. Canadian Cancer Research Conference. Toronto. Oct. Poster.

Krishnamoorthy V, **Chamberlain MD** and Anderson DH. (2011). Blocking Receptor Tyrosine Kinase Trafficking to Promote Receptor Degradation and Reduced Breast Cancer Cell Division. Ninth Conference on Signalling in Normal and Cancer Cells. Banff. March. Poster.

Khan OF, **Chamberlain MD** and Sefton MV. (2010). Modular Tissue Containing EC and MSC formed in a Microfluidic Perfusion Chamber. TERMIS-EU 2010. Galway. June. Short Talk.

Chamberlain MD[†], Oberg JC[†], Furber LA, Poland SF, Hawrysh AD, Knafelc SM, Links PH, McBride HM and Anderson DH. (2010). Altered PDGFR trafficking in cells expressing a RabGAP defective p85 mutant (R274A). Molecular Basis for Biological Membrane Organization and Dynamics Keystone Meeting, Snowbird. Jan. Poster. [†]contributed equally.

Nyarko JNK, **Chamberlain MD**, Poland SF, Oberg JC and Anderson DH. (2009). PDGF receptor ubiquitination in 3T3 cells expressing p85R274A. PI 3-Kinase Signaling in Disease Keystone Meeting, Olympic Valley. April. Poster.

Links PH, Chagpar RB, Pastor MC, Hawrysh AD, **Chamberlain MD** and Anderson DH. (2009). PTEN is regulated by the p85 subunit of PI3K. PI 3-Kinase Signaling in Disease Keystone Meeting, Olympic Valley. April. Poster.

Gupta R, **Chamberlain MD**, Lo C and Sefton MV. (2008). Endothelialized modules drive vascularization in an allogeneic rat model. TERMIS-NA 2008. San Diego. Dec. Short Talk.

Anderson DH, **Chamberlain MD**, Hawrysh AD, Poland SF and Oberg JC. (2008). Defects in PDGFR Trafficking and Degradation Result in Enhanced Signaling and Oncogenesis. Eighth Conference on Signalling in Normal and Cancer Cells, Banff. March. Short Talk.

Links PH, **Chamberlain MD**, James KM, Hawrysh AD, Chan T, Saxena A, Xiang J and Anderson DH. (2007). Altered PDGF receptor phosphorylation, trafficking and degradation result in oncogenesis with the expression of a p85 (PI3K) RabGAP mutant. 47th American Society for Cell Biology Annual Meeting in Washington, DC December. Poster.

Chamberlain MD and Anderson DH. (2006). Role of the p85 subunit of PI3-kinase in the regulation of Rab proteins during Endocytosis of the PDGFR. Signalling in Normal and Cancer Cells, Banff. Mar. Poster.

Chamberlain MD and Anderson DH. (2005). Role of the p85 subunit of PI3-kinase in the regulation of Rab proteins during Endocytosis of the PDGFR. The 45th Annual Meeting of the American Society for Cell Biology, San Francisco. Dec. Poster.

Chamberlain MD and Anderson DH. (2004). Role of the p85 subunit of PI3-kinase in the regulation of Rab proteins during Endocytosis of the PDGFR. Signalling in Normal and Cancer Cells, Banff. Mar. Poster.

Chamberlain MD and Anderson DH. (2004). Role of the p85 subunit of PI3-kinase in the regulation of Rab proteins during Endocytosis of the PDGFR. Traffic Control: Rab GTPases in Vesicular Transport, Breckenridge. Jan. Poster.

Chamberlain MD and Anderson DH. (2002). The Regulation of Rab5 Activity by the p85 Subunit of Phosphatidylinositol 3'-Kinase. The 42nd Annual Meeting of the American Society for Cell Biology, San Francisco. Dec. Poster.

INVITED PRESENTATIONS

Modular Tissue Engineering: A platform for Studying Tissue Niches. (2012). Regenerative Medicine Program. University of Manitoba.

Formation of liver microtissues for toxicology and drug discovery. (2012). microTALKS. University of Toronto.

A Molecular Understanding of Cancer. (2004). The University of Regina Seniors' Education Centre.

CONFERENCE CHAIR

Chair for the Inflammation and Immune Response symposia at TERMIS-EU 2010.

PROFESSIONAL EXPERIENCE

Research Associate	University of Toronto Sept. 2013 to Current
Teaching Assistant	University of Saskatchewan Sept. 2004 to Dec. 2005
Summer Student	Memorial University June 2000 to Aug. 2000
Teaching Assistant	University of Regina Jan. 2000 to Apr. 2001
Laboratory Technician	Saskatchewan Provincial Laboratory May 1997 to Sept. 2000

PROFESSIONAL ACTIVITIES

- *Ad hoc* reviewer for Tissue Engineering Part A
- *Ad hoc* reviewer for Journal of Tissue Engineering and Regenerative Medicine
- *Ad hoc* reviewer for Stem Cells and Development
- Member of the Toronto Postdoctoral Association (2008)
- Member of the U of S College of Medicine Budget, Planning and Priorities Committee (2006-2007)
- Chairman of the College of Medicine Graduate Student Society (2007)
- Vice-Chairman of the College of Medicine Graduate Student Society (2006)
- Founding member of the College of Medicine Graduate Student Society (2005)

REFERENCES

Dr. Michael Sefton (Post-doctoral supervisor)
University Professor/Michael E. Charles Professor of Chemical Engineering
University of Toronto
Phone: (416) 978-3088
Email: michael.sefton@utoronto.ca

Dr. Deborah Anderson (Ph.D. supervisor)
Director of Research
Saskatchewan Cancer Agency
Phone: (306) 966-7038
Email: deborah.anderson@saskcancer.ca

Dr. Aaron Wheeler (Research Associate Supervisor)
Professor
University of Toronto
Phone: (416) 946-3864
Email: aaron.wheeler@utoronto.ca