

Melissa Lai Tee TEOH-FITZGERALD

Free Radical and Radiation Biology Program

Radiation Oncology

University of Iowa

500 Newton Road

B180 Medical laboratories

Iowa City

IA52242

Work Tel: (319) 335-8019

Cell: (319) 594-2033

Fax: (319) 335-8039

Email: laitee-teoh@uiowa.edu**Current Position**

Adjunct Assistant Professor/ Assistant Research Scientist, Department of Radiation Oncology, University of Iowa, Iowa City

Education and Training**2010 – Present Assistant Research Scientist/Adjunct Assistant Professor**

Free Radical and Radiation Biology Program, Radiation Oncology, University of Iowa, Iowa

2005 – 2010 Postdoctoral Research Scholar [Mentor: Dr. Larry Oberley (2005-2008), then Dr. Frederick Domann and Dr. Douglas Spitz (since Dr. Oberley passed away in April 2008)]

Free Radical and Radiation Biology Program, Radiation Oncology, University of Iowa, Iowa

2003 – 2005 PhD (Advisor: Dr. David Evans)

(transferred with PhD advisor from the University of Guelph)

Thesis “Characterization and Functional Analysis of Leporipoxvirus Copper-Zinc Superoxide Dismutase Homologs”

Medical Microbiology and Immunology, University of Alberta, Alberta, Canada.

2000 – 2003 PhD Candidate (Advisor: Dr. David Evans)

Molecular Biology and Genetics, University of Guelph, Ontario, Canada

1995 – 1998 Bachelor of Science

Food Science and Microbiology, Acadia University, Nova Scotia, Canada

Research Experience**2010 – Present Assistant Research Scientist**, Free Radicals and Radiation Biology Program, Department of Radiation Oncology, The University of Iowa, IA**2005 – 2010 Postdoctoral Research Scholar**, Free Radicals and Radiation Biology Program, Department of Radiation Oncology, The University of Iowa, IA**1998 – 2000 Research Associate**, Medmira Laboratories Inc., Halifax, Nova Scotia, Canada (previously known as Octopus Diagnostic Research Center)**1997 – 1998 Research Project**, Department of Food Science, Acadia University, Canada
Performing a project in collaboration with Octopus Diagnostic Research Center entitled – “Rapid detection of methicillin resistant *Staphylococcus aureus* by RNA-probing method”.

- 1997 – 1998** **Lab Coordinator**, CHEM 2000 and CHEM 3000 Biochemistry I & II, Department of Biochemistry, Acadia University, Canada
- 1996 – 1998** **Research Technician**, Octopus Diagnostic Research Center, Nova Scotia, Canada

Honors, Awards, Recognitions

- 2010** **SFRBM Mini-Fellowship Research Program Award**
Fellowship training provided by Society for Free Radical Biology and Medicine at the University of Pittsburgh
- 2010** **Vere D. Wenger Travel Award**
Provided by Holden Comprehensive Cancer Center, University of Iowa to attend the 2010 San Antonio Breast Cancer Symposium
- 2009** **Travel Award**
16th Annual Meeting of the SFRBM, San Francisco, CA
- 2006** **Jeff Kirsch Memorial Travel Award**
Free Radical Radiation Biology Graduate Program, University of Iowa, IA
- 2004** **75th Anniversary Graduate Student Award**
Faculty of Medicine and Dentistry, University of Alberta, Alberta, Canada
- 2004** **AHFMR Studentship Award**
Alberta Heritage Foundation for Medical Research, Alberta, Canada
- 2004** **Travel Bursary**
XVth Biennial International Poxvirus and Iridovirus Conference, Oxford, UK
- 2004** **Best Oral Presentation Award**
8th Annual Immunet Retreat, University of Alberta and University of Calgary, Canada
- 2004** **Travel Award**
11th Annual Meeting of the SFRBM, St. Thomas, VI
- 2003** **Travel Award**
10th Annual Meeting of the SFRBM, Seattle, WA
- 2002** **Travel Award**
21st Annual Meeting of the American Society of Virology, Lexington, KY
- 2001** **Young Investigator's Award**
8th Annual Meeting of the SFRBM, Research Triangle Park, NC
- 2000 – 2003** **University Graduate Scholarships**
University of Guelph, Ontario, Canada
- 1997** **Jane Louise Robb Memorial Bursary**
Acadia University, Nova Scotia, Canada

Professional Affiliations

Society for Free Radical Biology and Medicine (SFRBM)
Holden Comprehensive Cancer Center, University of Iowa

Teaching Experience

- Winter 2004** **Teaching Assistant**
IMIN 2000 Immunology and Infection, Department of Science, University of Alberta, Canada

- Fall 2002** **Lab Instructor**
MBG 3500 Laboratory Methods I, Department of Molecular Biology and Genetics,
University of Guelph, Canada
- Winter 2002** **Lab Instructor**
MBG 3500 Laboratory Methods II, Department of Molecular Biology and Genetics,
University of Guelph, Canada
- Winter 2002** **Teaching Assistant**
MBG 1000 Introductory Genetics, Department of Molecular Biology and Genetics,
University of Guelph, Canada
- Fall 2000** **Lab Instructor**
MBG 3500 Laboratory Methods I, Department of Molecular Biology and Genetics,
University of Guelph, Canada
- Fall 2000** **Teaching Assistant**
TOX 2000 Introductory Toxicology, Department of Toxicology, University of Guelph,
Canada
- Summer 1997** **Teaching Assistant & Lab Coordinator**
CHEM 3000 Biochemistry II, Department of Biochemistry, Acadia University, Canada
- Spring 1997** **Teaching Assistant**
CHEM 2000 Introductory Biochemistry, Department of Biochemistry, Acadia
University, Canada
- Spring 1997** **Teaching Assistant & Lab Coordinator**
CHEM 3000 Biochemistry I, Department of Biochemistry, Acadia University, Canada

Mentoring Experience

- Summer 2010** Danielle Hudachek (high school student)
Summer high school student project, University of Iowa, Iowa
Tissue culture techniques and Molecular Biology and Genetic methods
- Summer 2009** Anna Johns (undergraduate student)
Undergraduate Research Program, University of Iowa, Iowa
Project: "Inhibitory effects of EcSOD on *in vitro* growth, clonogenic survival, and
invasion of lung cancer cells"
- Summer 2008** Ann Radant (PhD candidate),
Department of Biosciences research rotation project, University of Iowa, Iowa
Project: "Cloning and characterization of MnSOD and GPX-1 overexpressing breast
cancer cells"
- 2007 – 2008** Suwimol Jettawatana (PhD),
Graduate Student, University of Iowa, Iowa
Project: "Redox regulation of HIF1- α by MnSOD via ROS"
- Summer 2007** Clay Hazelett (PhD candidate)
Department of Biosciences research rotation project, University of Iowa, Iowa
Project: "Inhibition of CuZnSOD and MnSOD in breast cancer cells with siRNAs"

Invited Lectures and Oral Presentations

Seminars

- 2010** Breast Cancer Research Interest Group Meeting, University of Iowa
"The role of extracellular superoxide dismutase in breast cancer progression"
- 2009** Holden Comprehensive Cancer Center Forum, University of Iowa
"Targeting heparanase with extracellular superoxide dismutase in breast cancer",

- 2009** Midwest Breast Cancer Research Symposium, University of Iowa
“Extracellular superoxide dismutase as a novel anti-metastatic agent in breast cancer”
- 2008** Presentation to The Des Moines Affiliate of Susan G. Komen for the Cure foundation, Iowa
“Extracellular superoxide dismutase plus LMWH as a novel anti-metastatic therapy for breast cancer”

Conference presentations

- 2009** Midwest Breast Cancer Research Symposium, University of Iowa, IA
“Extracellular superoxide dismutase as a novel anti-metastatic agent in breast cancer”
- 2007** 14th Annual Meeting of the SFRBM, Washington, DC
“EcSOD enhances the anti-tumor efficacy of heparanase inhibitors in breast cancer cells”
- 2004** Fifteen International Poxvirus and Iridovirus Conference, Oxford, United Kingdom.
“Leporipoxvirus SOD1 homologs promote virus tumorigenesis and enhance pathogenicity”
- 2003** Tenth Annual Meeting of the SFRBM, Seattle, WA
“Leporipoxvirus SOD1 homologs promote virus tumorigenesis and enhance pathogenicity”
- 2002** 21st Annual Meeting of the American Society for Virology, Lexington, KY
“Leporipoxvirus Cu-Zn superoxide dismutase homologs inhibit cellular superoxide dismutase, but are not essential for virus replication or virulence”
- 2002** Fourteenth International Poxvirus and Iridovirus Conference, Lake Placid, NY
“Biochemical Properties of Shope fibroma virus Cu-Zn superoxide dismutase homolog”

Publications

peer-reviewed papers

- Teoh, M.L.**, Fitzgerald, M. P., Askeland, R., Zhong, W., and Domann, F. E. Loss of EcSOD expression as a biomarker for breast cancer development: epigenetic reprogramming of EcSOD during mammary morphogenesis. (in preparation) 2011.
- Teoh, M.L.**, Fitzgerald, M. P., Jensen, T.J., Futscher, B.W., and Domann, F. E. Epigenetic silencing of EcSOD contributes to malignant phenotype of lung cancer cells. *Cancer Research* (in submission), 2010.
- Du, J., Nelson, E., Smith, B.J., Du, C., **Teoh, M.L.**, Tsao, M., Oberley, L.W., and Cullen, J.J. K-ras oncogene increases reactive oxygen species (ROS): Mechanisms involved in regulating pancreatic cancer cell growth. *Molecular Cancer Therapeutics* (in submission), 2010.
- Fitzgerald M., Guorronc, F., **Teoh, M.L.**, Provenzano, M., Case, A., Martin, J., and Domann, D.E. Human chondrosarcoma cells display a mesenchymal to epithelial transition associated with an epigenetic switch. *Sarcoma* (in press), 2010.
- Place, T., Venkataraman, S., Fitzgerald, M.P., Case, A., **Teoh, M.L.**, Oberley, L.W., and Domann, F.E. PHD3 promoter methylation is a mechanism for loss of PHD3 expression in breast and prostate carcinoma cells. *PLoS ONE* (in press), 2010.
- Fitzgerald, M.P., Madsen, J.M., Coleman, M.C., **Teoh, M.L.**, Westphal, S.G., Spitz, D.R., Radi, R., and Domann, F.E. Transgenic biosynthesis of trypanothione protects *Escherichia coli* from radiation-induced toxicity. *Radiat Res*; 174: 290-62010.

- Teoh, M. L.**, Fitzgerald, M. P., Oberley, L. W., and Domann, F. E. Overexpression of extracellular superoxide dismutase attenuates heparanase expression and inhibits breast carcinoma cell growth and invasion. *Cancer Res*, 69: 6355-6363, 2009.
- Weydert, C. J., Zhang, Y., Sun, W., Waugh, T. A., **Teoh, M. L.**, Andringa, K. K., Aykin-Burns, N., Spitz, D. R., Smith, B. J., and Oberley, L. W. Increased oxidative stress created by adenoviral MnSOD or CuZnSOD plus BCNU (1,3-bis(2-chloroethyl)-1-nitrosourea) inhibits breast cancer cell growth. *Free Radic Biol Med*, 44: 856-867, 2008.
- Teoh, M. L.**, Sun, W., Smith, B. J., Oberley, L. W., and Cullen, J. J. Modulation of reactive oxygen species in pancreatic cancer. *Clin Cancer Res*, 13: 7441-7450, 2007.
- Teoh, M. L.**, Turner, P. V., and Evans, D. H. Tumorigenic poxviruses up-regulate intracellular superoxide to inhibit apoptosis and promote cell proliferation. *J Virol*, 79: 5799-5811, 2005.
- Teoh, M. L.**, Walasek, P. J., and Evans, D. H. Leporipoxvirus Cu,Zn-superoxide dismutase (SOD) homologs are catalytically inert decoy proteins that bind copper chaperone for SOD. *J Biol Chem*, 278: 33175-33184, 2003.
- Cao, J. X.**, **Teoh, M. L.**, Moon, M., McFadden, G., and Evans, D. H. Leporipoxvirus Cu-Zn superoxide dismutase homologs inhibit cellular superoxide dismutase, but are not essential for virus replication or virulence. *Virology*, 296: 125-135, 2002.
- (Cao and Teoh share first authorship)**

chapters

- Teoh, M. L.** and Domann, F.E. Superoxide Dismutase and Cancer Therapy. In: *Oxidative stress in clinical practice: Cancer*. Humana Press, 2011 (in press).

abstracts

- Teoh, M.L., Fitzgerald, M.P., Zhong, W., Domann, F.E. The loss of EcSOD expression in mammary epithelial cells is associated with aberrant DNA methylation when mammary tissue organization is disrupted. Poster presentation at the San Antonio Breast cancer Symposium, San Antonio, TX. 2010
- Teoh, M.L., Fitzgerald, M.P., Zhong, W., Domann, F.E. Acinar morphogenesis of human mammary epithelial cells in 3D culture induces EcSOD expression via epigenetic reprogramming. Poster presentation at the Seventeen Annual Meeting of the SFRBM, Orlando, FL. 2010
- Teoh, M.L., Fitzgerald, M.P., Domann, F.E. Overexpression of extracellular superoxide dismutase attenuates heparanase expression and inhibits breast carcinoma cell growth and invasion. Poster presentation at the Sixteen Annual Meeting of the SFRBM. San Francisco, CA. 2009
- Teoh, M.L., Fitzgerald, M.P., Oberley, L.W., Domann, F.E. Extracellular superoxide dismutase enhances the anti-tumor effect of LMWH in breast cancer by preventing heparan sulfate degradation. Poster presentation at the Fifteen Annual Meeting of the SFRBM. Indianapolis, IN. 2008
- Teoh, M.L., Oberley, L.W. EcSOD increases the anti-tumor efficacy of heparanase inhibitors in breast cancer cells. *Oral presentation* at the Fourteen Annual Meeting of the SFRBM. Washington, DC. 2007
- Teoh, M.L., Fitzgerald, M.P., Cullen, J.J., and Oberley, L.W. Suppression of MIA PaCa-2 malignant phenotype by SOD: Role of MnSOD, CuZnSOD, and EcSOD in cell proliferation, cell cycle distribution, and tumor invasion. Poster presentation at the Thirteen Annual Meeting of the SFRBM. Denver, CO. 2006
- Teoh, M.L., Oberley, L.W. CuZnSOD and EcSOD possess greater inhibition of pancreatic. cancer cell growth than MnSOD in Vitro. Poster presentation at the Twelve Annual Meeting of the SFRBM. Austin, TX. 2005

- Teoh, M.L., Turner, P., and Evans, D.H. Leporipoxvirus SOD1 homologs promote virus tumorigenesis and enhance pathogenicity. *Oral presentation* at the Fifteen International Poxvirus and Iridovirus Conference, Oxford, United Kingdom. 2004
- Teoh, M.L., Turner, P., and Evans, D.H. Tumorigenic Leporipovirus SOD1 homologs upregulate intracellular superoxide level to promote cellular proliferation and inhibit apoptosis. Poster presentation at the Eleventh Annual Meeting of the SFRBM. St. Thomas, US Virgin Islands. 2004
- Teoh, M.L., Walasek, P., Tuner, P., and Evans, D.H. Leporipoxvirus SOD1 homologs promote virus tumorigenesis and enhance pathogenicity. *Oral presentation* at the Tenth Annual Meeting of the SFRBM. Seattle, WA. 2003
- Teoh, M.L., Walasek, P., and Evans, D.H. Leporipoxvirus Cu-Zn superoxide dismutase homologs inhibit cellular superoxide dismutase, but are not essential for virus replication or virulence. *Oral presentation* at the 21st Annual Meeting of the American Society for Virology, Lexington, KY. 2002
- Teoh, M.L., Walasek, P., and Evans, D.H. Biochemical Properties of Shope fibroma virus Cu-Zn superoxide dismutase homolog. *Oral presentation* at the Fourteenth International Poxvirus and Iridovirus Conference, Lake Placid, NY. 2002
- Teoh, M.L., Cao, J.X., Moon, M., McFadden, G., and Evans, D.H. Characterization of myxoma virus gpM131R, a viral homolog of Cu-Zn superoxide dismutase. Poster presentation at the Eighth Annual Meeting of Oxygen Society (currently named Society for Free Radical in Biology and Medicine, SFRBM), Research Triangle Park, NC. 2001

Funding Support

Ongoing

Oberley Seed Grant

Holden Comprehensive Cancer Center, University of Iowa, Teoh (PI) 04/01/11-03/31/12

“Genetic and Epigenetic Silencing of EcSOD: Loss of EcSOD as a Predictive Marker for Breast Cancer Development”

The objectives of this study are to test our hypothesis that loss of EcSOD expression is a predictor for breast cancer development and to determine the molecular mechanisms involved in silencing the EcSOD gene expression in clinical breast cancer samples.

Susan G. Komen for the Cure

Postdoctoral Research Award (KG080437) Teoh (PI) 11/01/2008 - 10/31/2011

“Extracellular Superoxide Dismutase Plus LMWH as a Novel Anti-Metastatic Therapy for Breast Cancer”

Our objectives are to understand the roles played by EcSOD and heparanase in breast cancer progression and to determine if EcSOD/EcSOD Δ HBD will enhance the anti-angiogenic and anti-metastatic activities of LMWH.

Completed during the last three years

SFRBM Mini-Fellowship Research Program Award

07/01/2010 – 07/31/2010

Fellowship training provided by Society for Free Radical Biology and Medicine to learn new techniques at the University of Pittsburgh (Mentor: Dr. Tim Oury)

American Heart Association

Postdoctoral Fellowship Award 0820070Z Teoh (PI)

01/01/2008 - 10/31/2008

"A Role for Homocysteine in Regulating Extracellular Superoxide Dismutase Function in Cardiovascular Diseases"

The objective of this study is to investigate how homocysteine affects the expression of EcSOD and its affinity for endothelial cell surfaces using hyperhomocysteinemic animal model.

This AHA award was relinquished since the Postdoctoral Fellowship award given by the Susan G. Komen for the Cure Foundation was in conflict with the AHA award due to an overlapping funding period.

Recently submitted but not funded

Department of Defense

Breast Cancer Research Program, Idea Award, Teoh (PI) **Score = 1.3** 2010

“Epigenetic regulation of extracellular superoxide dismutase and its role in suppressing mammary cancer progression and metastasis”