CURRICULUM VITAE

GREGORY PHILIP TOCHTROP

Work Address: Case Western Reserve University, Department of Chemistry
10900 Euclid Ave.
Cleveland, OH 44106
Phone: 216.368.2351(office); 216.368.3006(fax)
E-mail: tochtrop@case.edu
Born: July 4, 1974 in St. Louis, MO

EDUCATION

5/02–6/06 Harvard University, Cambridge, MA, Fellow, Chemistry

8/96–5/02: Washington University Medical School, St. Louis, MO, Ph.D. Bioorganic Chemistry

8/92–5/96: University of Missouri, Columbia, MO, B.S. Biochemistry (Honors)

RESEARCH STATEMENT

My research program uses an interdisciplinary approach to study fundamental physiologic processes using chemical tools. Our lab is primarily interested in understanding lipid targeting and signaling in the context of two pathways relevant to cancer and vision.

TEACHING INTERESTS

Chemical biology, integration of modern day research and applied theory into the classroom

PROFESSIONAL APPOINTMENTS

7/16–Present **Professor and Associate Chair** *Case Western Reserve University, Department of Chemistry*

7/16–Present **Professor** *Case Western Reserve University*

7/12 –6/16 **Associate Professor**: *Case Western Reserve University*

7/06 –6/12 **Assistant Professor**: *Case Western Reserve University*

12/04–5/06 **Instructor:** *Harvard University*

PROFESSIONAL TRAINING

6/02 – 6/06 **Postdoctoral Research**: *Harvard University & The Broad Institute, Department of Chemistry and Chemical Biology.* In the laboratories of Dr. Stuart Schreiber and Dr. Randall King I used diversity oriented synthesis (DOS) to synthesize natural product-like small molecule libraries to be used in chemical genetic studies.

8/96 – 5/02 **Ph.D. Graduate Research**: *Washington University. Departments of Biochemistry & Molecular Biophysics & Department of Molecular Biology and Pharmacology.* I successfully executed a joint project in the laboratories of Dr. David Cistola and Dr. Douglas Covey in which I used synthetically isotopically enriched bile acids to elucidate the the structural, dynamic, and thermodynamic aspects of bile acid binding to a member of the fatty acid binding proteins using a combination of organic synthesis and NMR.

DISTINCTIONS

2009	NSF CAREER Award
2009	Landon Foundation INNOVATOR Award for Cancer Prevention Research (Managed by American Association of Cancer Researchers-one given nationwide)
2007–2012	Reuter Foundation Award
2009	American Heart Association New Investigator Award (Funding declined due to overlap)
2008	Glennan Fellow (CWRU Pedigogical Award)
2007–2010	Nominated for the Carl F. Wittke Award for Undergradaute Teaching
2010	Nominated for J. Bruce Jackson Award for Undergradaute Mentoring
2003–2006	Ruth L. Kirschstein National Research Service Award (NIH-NIGMS) Postdoctoral Fellow
2002	Ceil Degutis Award for Outstanding Achievement in Bioorganic Chemistry
1999–2001	Gerti T. Cori Sigma Chemical Company Predoctoral Fellow
1996	Biochemistry Department Honors Scholar (University of Missouri, Columbia)
1995	USDA Plant Genetics Fellow (One of five nationwide)

PEER REVIEWED PUBLICATIONS

(1) **Tochtrop GP,** DeKoster GT, Cistola DP, Covey DF. A Simple Efficient Synthesis of [23,24]-$^{13}C_2$-Labeled Bile Salts as NMR Probes of Protein-Ligand Interactions. *Bioorg. Med. Chem. Lett.* **2002**, *12*, 433-435.

(2) **Tochtrop GP,** Richter K, Tang C, Toner JJ, Covey DF, Cistola DP. Energetics by NMR: site-specific binding in a positively cooperative system. *Proc. Natl. Acad. Sci. U. S. A.* **2002**, *99*, 1847-1852.

(3) **Tochtrop GP,** DeKoster GT, Cistola DP, Covey DF. Synthesis of [3,4-$^{13}C_2$]-Enriched Bile Salts as NMR Probes of Protein-Ligand Interactions," *J. Org. Chem.* **2002**, *67*, 6764-6771.

(4) **Tochtrop GP**, Bruns JL, Tang C, Covey DF, Cistola DP. Steroid Ring Hydroxylation Patterns Govern Cooperativity in Human Bile Acid Binding Protein. *Biochemistry* **2003**, *42*, 11561-11567.

(5) **Tochtrop GP,** DeKoster GT, Covey DF, Cistola DP. A Single Hydroxyl Group Governs Ligand Site Selectivity in Human Ileal Bile Acid Binding Protein. *J. Am. Chem. Soc.* **2004**, *126*, 11024-11029.

(6) Verma R, Peters NR, D'Onofrio M, **Tochtrop GP,** Sakamoto KM, Varadan R, Zhang M, Coffino P, Fushman D, Deshaies RJ, King RW. Ubistatins Inhibit Proteasome-Dependent Degradation by Binding the Ubiquitin Chain. *Science* **2004**, *306*, 117-120.

Featured in David S. Bellows and Mike Tyers "Chemical Genetics Hits Reality", Science 306, 67-68 (2004) & Chemical and Engineering News Concentrates 82, 31 (October 4th 2004)

(7) Cegelski L, Rice CV, O'Connor RD, Caruano AL, **Tochtrop GP,** Cai ZY, Covey DF, Schaefer, J. Mapping the locations of estradiol and potent neuroprotective analogues in phospholipid bilayers by REDOR. *Drug Dev. Res.* **2005**, *66*, 93-102.

(8) Toke O, Monsey JD, DeKoster GT, **Tochtrop GP,** Tang C, Cistola DP. Determinants of Cooperativity and Site Selectivity in Human Ileal Bile Acid Binding Protein. *Biochemistry* **2006**, *45*, 727-737.

(9) Han Y, AlexanderTE, **Tochtrop GP*.** Design, Synthesis, and Evaluation of an Isotopic Labeling Strategy for Studying Fatty Acid–Protien Binding by NMR. *Mol. Biosys.,* **2008**, *4*, 551-557.

(10) Ghosh S, **Tochtrop GP***. A new strategy for the synthesis of β-benzylmercaptoethylamine derivatives. *Tetrahedron Lett*. 2009; 50(15), 1723-1726

(11) Zhang G, Kombu RS, Kasumov T, Han Y, Sadhukhan S, Zhang J, Sayre L, Ray D, Gibson KM, Anderson VA, **Tochtrop GP**, Brunengraber H. Catabolism of 4-Hydroxyacids and 4-Hydroxynonenal via 4-Hydroxy-4-phosphoacyl-CoAs. *J. Biol. Chem*. 2009; 284, 33521
Highlighted as paper of the week for Nov 27th 2009

(12) Zhu X, Tang X, Zhang J, **Tochtrop GP**, Anderson VE, Sayre LM. Mass Spectrometric Evidence for the Existence of Distinct Modifications of Different Proteins by 2(E), 4(E)-Decadienal. *Chem. Res. Toxicol.* 2010, 23, 467-473

(13) Sadhukhan S, Han Y, Zhang G, Brunengraber H, **Tochtrop GP***. Using Isotopic Tools to Dissect and Quantitate Parallel Metabolic Pathways. *J. Am. Chem. Soc.* 2010, 132, 6309-6311

(14) Barker EC, Gatbonton-Schwager TN, Han Y, Clay, JE, Letterio JJ, **Tochtrop GP***. Bryonolic Acid: A Large-Scale Isolation and Evaluation of Heme Oxygenase 1 Expression in Activated Macrophages. *J. Nat. Prod.* 2010, 73, 1064-1068
Highlighted Paper for July 2010

(15) Chakrararti E, Ghosh S, Sadhukhan S, Sayre LM, **Tochtrop GP***, Smith JD*. Synthesis and Biological Evaluation of Analogues of a Novel Inhibitor of β-Amyloid Secretion, *J. Med. Chem.* 2010, 53, 5302-5319

(16) Tomcika K, Ibarra RA, Sadhukhan S, **Tochtrop GP,** Zhang G. Isotopomer enrichment assay for very short chain fatty acids and its metabolic applications. *Anal. Biochem. 2011, 410, 110-7*

(17) Harris SR, Zhang GF, Sadhukhan S, Murphy AM, Tomcik KA, Vazquez EP, Anderson VE, **Tochtrop GP**, Brunengraber H. Metabolism of levulinate in perfused rat livers and live rats: conversion to the drug of abuse 4-hydroxypentanoate. *J. Biol Chem.* 2011*, 286, 5895-5904*

(18) Tang X, Sayre LM, **Tochtrop GP*.** Mass spectroscopic studies on the modification of cytochrome c by 4-HNE. *J. Mass. Spectrom.* 2011, 46, 290-297

(19) Li Q, **Tochtrop GP*.** A stereoselective synthesis of the allo-bile acids from the 5β-isomers. *Tet. Lett.* 2011, 52, 4137-4139

(20) Gatbonton-Schwager TN, Letterio JJ,**Tochtrop GP***. Bryonolic Acid Transcriptional Control of Anti-inflammatory and Antioxidant Genes in Macrophages in Vitro and in Vivo. *J Nat Prod*. 2012, 75,591-598

(21) Zhang G, Sadhukhan S, Ibarra RA, Lauden S, Chuang CY, Sushailo S, Chatterjee P, Anderson VE, **Tochtrop GP**, Brunengraber H. Metabolism of gamma-Hydroxybutyrate in Perfused Rat Livers. *Biochem J*. 2012, 444, 333-341

(22) Petty A, Myshkin E, Qin H, Guo H, Miao H, **Tochtrop GP**, Hsieh JT, Page P, Liu L, Lindner DJ, Acharya C, MacKerell AD Jr, Ficker E, Song J, Wang B. A small molecule agonist of EphA2 receptor tyrosine kinase inhibits tumor cell migration in vitro and prostate cancer metastasis in vivo. *PLoS One* 2012, 7, e42120

(23) Harris SR, Zhang GF, Sadhukhan S, Wang H, Shi C, Puchowicz MA, Anderson VE, Salomon RG, **Tochtrop GP**, Brunengraber H. Metabolomics and mass isotopomer analysis as a strategy for pathway discovery: pyrrolyl and cyclopentenyl derivatives of the pro-drug of abuse, levulinate. *Chem Res Toxicol*. 2013, 26, 213-220

(24) Ignatenko VA, Han Y, **Tochtrop GP*.** Molecular library synthesis using complex substrates: expanding the framework of triterpenoids. *J. Org. Chem*. 2013, 78, 410-418

(25) Li Q, Sadhukhan S, Berthiaume JM, Ibarra RA, Tang H, Deng S, Hamilton E, Nagy LE, **Tochtrop GP***, Zhang GF*. 4-Hydroxy-2(E)-nonenal (HNE) catabolism and formation of HNE adducts are modulated by β oxidation of fatty acids in the isolated rat heart. *Free Radic Biol. Med*. 2013, 58, 35-44

(26) Li Q, Sadhukhan S, Berthiaume JM, Ibarra RA, Tang H, Deng S, Hamilton E, Nagy LE, **Tochtrop GP*** Zhang GF.* 4-Hydroxy-2(E)-nonenal (HNE) catabolism and formation of HNE adducts are modulated by beta oxidation of fatty acids in the isolated rat heart, *Free Radic Biol Med*. 2013, 58, 35.

(27) Levi L, Lobo G, Doud MK, von Lintig J, Seachrist D, **Tochtrop GP,** Noy N. Genetic ablation of the fatty acid-binding protein FABP5 suppresses HER2-induced mammary tumorigenesis, *Cancer Res*. 2013, 73, 4770.

(28) Ignatenko, V. A.; **Tochtrop, G. P.*** Approach for expanding triterpenoid complexity via divergent Norrish-Yang photocyclization, *J Org Chem*. 2013, 78, 3821.

(29) Ignatenko, V. A.; Han, Y.; **Tochtrop, G. P.*** Direct access to 6/5/7/5- and 6/7/5/5-fused tetracyclic triterpenoids via divergent transannular aldol reaction of lanosterol-derived diketone, *J Org Chem*. 2013, 78, 12229.

(30) Jin Z, Berthiaume JM, Li Q, Henry F, Huang Z, Sadhukhan S, Gao P, **Tochtrop GP**, Puchowicz MA, Zhang GF*. Catabolism of (2E)-4-Hydroxy-2-nonenal via omega- and omega-1-Oxidation Stimulated by Ketogenic Diet. *J Biol Chem*. 2014;**289**:32327-38.

(31) Gatbonton-Schwager TN, Sadhukhan S, Zhang GF, Letterio JJ, **Tochtrop GP***. Identification of a negative feedback loop in biological oxidant formation fegulated by 4-hydroxy-2-(E)-nonenal. *Redox Biol*. 2014;**2**:755-63.

(32) Sadhukhan S, Zhang GF, **Tochtrop GP***. Modular isotopomer synthesis of gamma-hydroxybutyric acid for a quantitative analysis of metabolic fates. *ACS Chem Biol*. 2014;**9**:1706-11.

(33) Sadhukhan S, Han Y, Jin Z, **Tochtrop GP***, Zhang GF*. Glutathionylated 4-hydroxy-2-(E)-alkenal enantiomers in rat organs and their contributions toward the disposal of 4-hydroxy-2-(E)-nonenal in rat liver. *Free Radic Biol Med*. 2014;**70**:78-85.

(34) Li Q, **Tochtrop GP***. New methodology toward alpha,beta-unsaturated carboxylic acids from saturated acids. *Org Lett*. 2014;**16**:1382-5.

(35) Kiser PD, Zhang J, Badiee M, Li Q, Shi W, Sui X, Golczak M, **Tochtrop GP**, Palczewski K. Catalytic mechanism of a retinoid isomerase essential for vertebrate vision. *Nat Chem Biol*. 2015;**11**:409-15.

(36) Zhang J, Kiser PD, Badiee M, Palczewska G, Dong Z, Golczak M, **Tochtrop GP**, Palczewski K. Molecular pharmacodynamics of emixustat in protection against retinal degeneration. *J Clin Invest*. 2015;**125**:2781-94.

(37) Horváth G, Bencsura Á, Simon Á, **Tochtrop GP**, DeKoster GT, Covey DF, Cistola DP, Toke O. Structural determinants of ligand binding in the ternary complex of human ileal bile acid binding protein with glycocholate and glycochenodeoxycholate obtained from solution NMR. FEBS J. 2016 **283**(3):541-55.

(38) Gulati S, Jastrzebska B, Banerjee S, Placeres ÁL, Miszta P, Gao S, Gunderson K, **Tochtrop GP**, Filipek S, Katayama K, Kiser PD, Mogi M, Stewart PL, Palczewski K. Photocyclic behavior of rhodopsin induced by an atypical isomerization mechanism. Proc Natl Acad Sci U S A. 2017 **114**:E2608-E2615

(39) Kiser PD, Zhang J, Badiee M, Kinoshita J, Peachey NS, **Tochtrop GP**, Palczewski K. Rational Tuning of Visual Cycle Modulator Pharmacodynamics. J Pharmacol Exp Ther. 2017 **362**:131-145

(40) Sui X, Weitz AC, Farquhar ER, Badiee M, Banerjee S, von Lintig J, **Tochtrop GP**, Palczewski K. Structure and Spectroscopy of Alkene-Cleaving Dioxygenases Containing an Atypically Coordinated Non-Heme Iron Center. Biochemistry. 2017 **362**: 2836-2852

(41) Wilson KA, Han Y, Zhang M, Hess JP, Chapman KA, Cline GW, **Tochtrop GP**, Brunengraber H, Zhang GF. Inter-relations between 3-hydroxypropionate and propionate metabolism in rat liver: relevance to disorders of propionyl-CoA metabolism. Am J Physiol Endocrinol Metab. 2017 **313**:E413-E428

(42) Badiee M, **Tochtrop GP***. Bile Acid Recognition by Mouse Ileal Bile Acid Binding Protein. ACS Chem Biol. 2017 **56**:3049-3056.

(43) Barker EC, Kim BG, Yoon JH, **Tochtrop GP***, Letterio JJ*, Choi SH*. Potent suppression of both spontaneous and carcinogen-induced colitis-associated colorectal cancer in mice by dietary celastrol supplementation. Carcinogenesis. 2018 **39**:36-46.

(44) Kiser PD, Zhang J, Sharma A, Angueyra JM, Kolesnikov AV, Badiee M, **Tochtrop GP**, Kinoshita J, Peachey NS, Li W, Kefalov VJ, Palczewski K. Retinoid isomerase inhibitors impair but do not block mammalian cone photoreceptor function. J Gen Physiol. 2018 **150**:571-590.

(45) Chen Y, Chen Y, Jastrzebska B, Golczak M, Gulati S, Tang H, Seibel W, Li X, Jin H, Han Y, Gao S, Zhang J, Liu X, Heidari-Torkabadi H, Stewart PL, Harte WE, **Tochtrop GP**, Palczewski K. A novel small molecule chaperone of rod opsin and its potential therapy for retinal degeneration. Nat Commun. 2018; **9**:1976.

(46) Mesiano SA, Peters GA, Amini P, Wilson RA, **Tochtrop** GP, van Den Akker F. Progestin therapy to prevent preterm birth: History and effectiveness of current strategies and development of novel approaches. Placenta. 2019 **79**:46-52.

(47) Kahremany S, Sander CL, **Tochtrop** GP, Kubas A, Palczewski K. Z-isomerization of retinoids through combination of monochromatic photoisomerization and metal catalysis. Org Biomol Chem. 2019 **17**: 8125-8139.

(48) Kahremany S, Kubas A, **Tochtrop** GP, Palczewski K. Catalytic synthesis of 9-cis-retinoids: mechanistic insights. Dalton Trans. 2019 **48**:10581-10595.

REVIEWS AND INVITED BOOK CHAPTERS

(49) Roberts CA, Karr AL, Beuselinck PR, **Tochtrop GP,** Marek SM. In *Chitin Enzymology*; Muzzarelli, R. A. A., Ed.: Sengallia, Italy, 1996.

(50) Gokel GW, Abel E, Dewall SL, Evans JP, Jin T, Maguire GEM, Meadows ES, Murillo O, Nakano A, Shah MR, Suzuki I, **Tochtrop GP,** Watanabe S. In *Molecular Recognition and Inclusion*; Kluwer Academic Publishers: Amsterdam, 1998, pp 19-29.

(51) **Tochtrop GP,** King RW. Target identification strategies in chemical genetics. *Comb. Chem. High Throughput Screen.* 2004, *7*, 677-688.

(52) **Tochtrop GP***, Sadhukhan, S, Koner, RR, Ghosh, S. The syntheses and applications of β-benzylmercaptoethylamine derivatives. *Tetrahedron* 2009, 65, 10515-10534

(53) Zhang G, Sadhukhan S, **Tochtrop GP,** Brunengraber H* Metabolomics, pathway regulation and pathway discovery. J. Biol. Chem. 2011, 286, 23631-23635

(54) **Tochtrop GP*,** Looper RE. Target-oriented synthesis/ Strategies for building focused libraries and their uses. In *Chemical Genomics,* Cambridge University Press, *2012*

(55) **Tochtrop, GP***, Sadhukhan, S; Zhang G., "The fate of 4-hydroxy-2-(*E*)-nonenal. *In preparation for Chem. Res. Toxicol.*

PATENTS AND INTELLECTUAL PROPERTY

(56) Smith J, Chakrabart E, Ghosh S, Sayre M, Tochtrop G, inventors; Compositions and methods for inhibiting beta amyloid secretion. U.S. Publ. No US20130158112 Filed Jun 20, 2012

INVITED TALKS

(1) "Molecular Recognition of the Cholanic Acids by Human Ileal Bile Acid Binding Protein", The 222nd National Meeting of the American Chemical Society, August 26, 2001, Chicago, IL.

(2) "Cooperativity in Ligand-Protein Recognition: Human Ileal Bile Acid Binding Protein", The 15th Annual Gibbs Conference on Biothermodynamics, September 29, 2001, Carbondale, IL.

(3) "Chemical Genetic Studies of Cyclin Degradation", The 43rd Annual Meeting of the American Society for Cell Biology December 13, 2003 San Francisco, CA

(4) "The Chemistry and Biology of Bile Acids" Department of Chemistry, Pennsylvania State University Behrend College December 5, 2008

(5) "Small Molecule Modulation of Expression in the Inflammatory Response" Central Regional Meeting of the American Chemical Society May 22nd 2009, Cleveland, OH

(6) "Small Molecule Modulation of Expression in the Inflammatory Response" American Association for Cancer Research National Meeting, Landon Foundation INNOVATOR Award Keynote Address, September 28th 2009, Denver, CO

(7) "Small Molecule Modulation of Expression in the Inflammatory Response" Rammelkamp Center for Education & Research, November 17th 2009

(8) "Small Molecule Modulation of Expression in the Inflammatory Response" Annual Landon-AACR Prize Lectures, University of Miami Miller School of Medicine, February 26th 2010

(9) “Small Molecule Modulation of Expression in the Inflammatory Response” Department of Chemistry, University of Maryland, April 6th 2010

(10) “Metabolism and Signaling of Lipid Peroxidation Products” Bioorganic Gordon Conference, Andover NH, June 17th 2010

(11) “The Origin and Fates of Reactive Species During Inflammation”, University at Buffalo (SUNY Buffalo), October 5th 2010

(12) “The Origin and Fates of Reactive Species During Inflammation”, The University of Utah, October 28th 2010

(13) “The Origin and Fates of Reactive Species During Inflammation”, The Biological Chemistry of Inflammation as a Cause of Cancer (Joint meeting between ACS and AACR), San Diego, CA, January 31st 2011

(14) “The Origin and Fates of Reactive Species During Inflammation”, Institute of Chemical Biology, Vanderbilt University, Feb 9th 2011

(15) “The Origin and Fates of Reactive Species During Inflammation”, Hillsdale College invited speaker January 1st 2012

(16) “The Origin and Fates of Reactive Species During Inflammation”, John Carroll University invited speaker October 19th 2012

(17) "Nrf2 Signaling in Inflammation and Cancer" Taussig Cancer Institute Translational Hematology and Oncology Research (THOR) lecture series. December 4th 2012

(18) "The Origin and Fates of Reactive Species During Inflammation" Metrohealth Medical Center February 4th 2013

(19) “Epoxyketooctadecenoicacid (EKODE)s synthesis via bifunctional conjunctive ylide and their comparative kinetic studies towards model nucleophile” National Meeting of the American Chemical Society March 16th 2013

(20) "The Metabolism of Lipid Peroxidation Products" Molecular & Cellular Biology of Lipids Gordon Conference July 24th 2013

(21) "The Metabolism of Lipid Peroxidation Products" Cellular & Molecular Mechanisms of Toxicity Gordon Conference August 12th 2013

(22) "The Metabolism and Signaling of Oxidized Lipids" Brock University, St. Catherines Canada, February 6th 2014

(23) “Epoxyketooctadecenoicacid (EKODE)s synthesis via bifunctional conjunctive ylide and their comparative kinetic studies towards model nucleophiles” National Meeting of the American Chemical Society, Dallas Texas, March 16th 2014

(24) "The Metabolism and Signaling of Oxidized Lipids" Kenyon College, November 18th 2014

(25) “Triterpenoid chemopreventive molecules from traditional Chinese herbs” Joint Great Lakes and Central Regional ACS Meeting, May 28th 2015

(26) “Furanyl Fatty Acid Inhibition of FABP5 as a Mechanism for Treatment and Prevention of Breast Cancer” Natural Product Gordon Conference August 2nd 2016

(27) "The Origin and Fates of Reactive Lipids During Inflammation and Vision", Cleveland State University October 14th 2018

(28) "The Origin and Fates of Reactive Lipids During Inflammation and Vision", Youngstown State University November 2nd 2018

(29) "The Origin and Fates of Reactive Lipids During Inflammation and Vision", University of Toledo February 4th 2019

(30) "The Origin and Fates of Reactive Lipids During Inflammation and Vision", Origin and Evolution in Enzyme Catalysis and Metabolic Networks Gordon Conference July 23rd 2019

(31) "Restive Species in the Retinoid Cycle" Distinguished Lecture, Gavin Herbert Eye Institute, University of California Irvine January 17th 2020

PROFESSIONAL SERVICE AND SOCIETIES

Membership:

1996–Present Member, American Chemical Society

2002–Present Member, American Society for Cell Biology

2008–Present Member, American Association for Cancer Research

Journal Reviewing and Editing:

2013-Present Academic Editor PLoS ONE

2009–Present Journal of the American Chemical Society

2008–Present Molecular Biosystems

2008–Present Tetrahedron Letters

2007–Present Steroids

2007–Present Organic Letters

2007–Present Journal of Organic Chemistry

2007–Present Journal of Chemical Education

Grant Reviewing:

2009, 2010	National Science Foundation Chemistry of Life Processes panel member
2010, 2012, 2014	National Science Foundation MRI instrumentation panel member
2010	Ad hoc reviewer, American Cancer Society
2011–2013	Ad hoc reviewer, National Science Foundation
2011	Ad hoc reviewer, Alzheimer's Association
2012, 2014	National Institutes of Health NCI Cancer Target Discovery and Development (CTDD) Network (U01) Reviewer

Departmental, Regional and National Service:

2011–Present Chair, Undergraduate Affairs Committee

2011–Present Chemistry Olympiad National Laboratory Committee

2006–Present Laboratory Safety Committee, CWRU

2006–2012 Graduate Recruiting Committee, CWRU Chemistry

2008–2012 Graduate Committee, CWRU Chemistry

2008–2012 Organizer, CWRU Chemistry Department Retreat

2008–2010 Meet the Faculty Presenter, CWRU Orientation

2008–2010 Summer Undergraduate Orientation Advisor, CWRU

2009 Organizer, Chemical Biology Symposium, CERMACS

EXTERNAL FUNDING

–Current–

Title: The Metabolism and Signaling of Oxidized Lipids
Source: NSF **Amount**: $510,000 **Direct**: $363,757
Period: 8/2019–7/2022 **Role:** PI

Title: Furanyl Fatty Acid Inhibition of FABP5 as a Mechanism for Treatment and Prevention of Cancer
Source: Department of Defense CDMRP **Amount**: $1,500,000 **Direct**: $952,380
Period: 9/2016–9/2021 **Role:** PI

–Completed–

Title: MRI: Acquisition of a High Sensitivity X-Detect NMR Instrument
Source: NSF MRI **Amount**: $663,344 **Direct**: $663,344
Period: 8/2013–8/2016 **Role:** PI

Title: Triterpenoid Modulators of Inflammatory Driven Carcinogenesis
Source: National Institutes of Health R01 **Amount**: $1,557,003 **Direct**: $1,037,500
Period: 1/2011–12/2015 **Role:** PI

Title: Development of gene-specific progesterone receptor modulators
Source: The Gates Foundation **Amount**: $109,320 **Direct**: $109,320
Period: 10/2012–9/2016 **Role:** co-Investigator (Mesiano PI)

Title: Endogenous Signaling Through the Farnesoid X Receptor
Source: NSF CAREER **Amount**: $893,105 **Direct**: $568,857
Period: 6/2009–9/2015 **Role:** PI

Title: Discovery Novel Triterpenoid Chemopreventives from the Natural Product Bryonolic Acid
Source: American Association of Cancer Researchers **Amount**: $100,000 **Direct:** $100,000
Period: 7/2009–6/2012 **Role:** PI
(Only one award given nationwide)

Title Novel Triterpenoid Chemopreventives
Source: Reuter Foundation **Amount**: $150,000 **Direct:** $150,000
Period: 7/2007–6/2012 **Role:** Co-PI-50% (with J. Letterio)

Title: Molecular Basis of Oxidative Modification of LDL
Source: National Institutes of Health R01 **Amount**: $570,116 **Direct:** $398,942
Period: 7/2008–6/2011 **Role:** Co-Investigator (with RG Salomon, PI)

Title: LCMS Equipment Grant
Source: Shimadzu Corporation **Amount**: $46,500 **Direct:** $46,500
Period: 7/2009–6/2011 **Role:** PI

Title: Discovery and Evaluation of Novel Triterpenoid Chemopreventives in a New Colon Cancer Model
Source: National Institutes of Health R03 **Amount**: $157,000 **Direct:** $100,000
Period: 7/2008–6/2011 **Role:** PI

Title: MRI: Acquisition of a Cyber-Enabled Mass Spectrometer Facility
Source: NSF MRI **Amount**: $565,442 **Direct**: $565,442
Period: 8/2008–7/2011 **Role:** Co-PI

Title The Chemistry and Biology of Triterpenoids as Novel Triterpenoids
Source: American Cancer Society Pilot Grant **Amount**: $30,000 **Direct:** $27,273
Period: 9/2007–8/2008 **Role:** PI

Title Drug discovery to prevent and treat staphylococcal infections including MRSA
Source: Steris Foundation/CWRU **Amount**: $50,000 **Direct:** $50,000
Period: 7/2008–6/2009 **Role:** Co-Investigator with M. Shoham

Title Chemical Approaches to the Study of Cell Division
Source: NIH NRSA **Amount**: $127,824 **Direct:** $127,824
Period: 4/2004–3/2006 **Role:** PI